# NATURAL SCIENCE

## GRADE 8 LESSON PLANS 2019



*Together, Moving Gauteng City Region Forward*

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# FOREWORD

Dear Natural Sciences teachers,

Welcome to the GDE Natural Sciences Lesson Plan Development Program. These lesson plans were designed as per the CAPS document, and covers all strands in Natural Sciences. Each lesson plan is based on a 30-minute time frame and where practical activities are necessary for concept development the lesson plan will extend over more periods. The lesson plans come with:

- Images and videos for easy access to content and support material.
- Informal activities for learners to engage with, based on the content covered for that lesson.

It is of importance to note that each lesson plan is developed at a basic level to serve as a generic structure that can be built upon according to context and resource availability. Reference has been made to the Sasol Inzalo learner books as these were made available to schools in either hard copy or as a soft copy that could be downloaded free of charge from the web. All lesson plans allow for supplementary resources to be used e.g. textbooks, developed content manuals etc.

It is off importance to remember that much of the work done in future grades has to be firmly developed in the senior phase, with a sound foundation in Natural Sciences, specialist subjects like Life Sciences and Physics will be able to flourish in the FET band.

Please take note that Natural Sciences is a subject that needs to be taught in an investigative and exploratory manner for various scientific phenomena to be understood. This will be the basis for future development in STEM (Science; Technology; Engineering and Maths) subjects. Where necessary the principle of “Science on a shoe string” must be applied. Resources must be used with care and respect, such that it can be optimized for each lesson and for years to follow.

We hope that the lesson plan resource being made available will be of benefit to you and that its implementation will benefit your learners extensively. We envisage that the lesson plans provided will be of great assistance to you, the teacher and that all efforts will made to enhance the quality of teaching and learning. It must also be mentioned that the developed lesson plans will greatly reduce the administrative workload that teachers are faced with on a daily basis. However, these lesson plans must be engaged with prior to the lesson being delivered for its true potential and impact to be determined.

GDE Natural Sciences Team

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# The Importance of Lesson Planning

Lesson planning is the most essential element of being an effective and resourceful teacher. The lesson planning process has to consider the learner; the school or classroom context and whether the essence of the content found within the curriculum can be addressed effectively. Integral to this process is the pedagogical knowledge the teacher possesses and how it will be used to elicit the content that needs to be taught. The time allocated to the subject must be effectively utilized and optimized such that a suitable learning environment can be created for the learner to engage with the learning process. It should be an experience that would articulate the content in a manner that the learner will be able to imbibe and reflect its worth and value in context of the real world. Each lesson provides an opportunity for the teacher to reflect and improve and scaffold the content for the next lesson. Lesson planning proposes and intention for the lesson, while preparation emphasizes the execution of the lesson plan.

## Why plan?

Lesson planning is a vital component of the teaching-learning process. Proper classroom planning will keep teachers organized and on track while teaching, thus allowing them to teach more, help students reach objectives more easily and manage less. The better prepared the teacher is, the more likely she/he will be able to handle whatever unexpectedly happens in the lesson.

Lesson planning:

- provides a coherent framework for smooth efficient teaching.
- helps the teacher to be more organized.
- gives a sense of direction in relation to the syllabus.
- helps the teacher to be more confident when delivering the lesson.
- provides a useful basis for future planning.
- helps the teacher to plan lessons which cater for different students.
- Is a proof that the teacher has taken a considerable amount of effort in his/her teaching.

Decisions involved in planning lessons:

Planning is imagining the lesson before it happens. This involves prediction, anticipation, sequencing, organizing and simplifying. When teachers plan a lesson, they have to make different types of decisions which are related to the following items:

- the aims to be achieved;
- the content to be taught;
- the group to be taught: their background, previous knowledge, age, interests, etc.
- the lessons in the book to be included or skipped;
- the tasks to be presented;
- the resources needed, etc.

The decisions and final results depend on the teaching situation, the learners level, needs, interests and the teacher's understanding of how learners learn best, the time and resources available.

Hints for effective lesson planning:

- When planning, think about your students and your teaching context first.
- Prepare more than you may need: It is advisable to have an easily presented, light "reserve" activity ready in case of extra time. Similarly, it is important to think in advance which component(s) of the lesson may be skipped. if you find yourself with too little time to do everything you have planned.
- Keep an eye on your time. Include timing in the plan itself. The smooth running of your lesson depends to some extent on proper timing.
- Think about transitions (from speaking to writing or from a slow task to a more active one).
- Include variety if things are not working the way you have planned.
- Pull the class together at the beginning and at the end.
- End your lessons on a positive note.

Planning enables you to think about your teaching in a systematic way before you enter the classroom. The outcome of your planning is a coherent framework which contains a logical sequence of tasks to prepare the field for more effective teaching and learning.

Plans only express your intentions. Plans are projects which need to be implemented in a real classroom with real students. Many things may happen which you had not anticipated. In the end you need to adapt your plans in order to respond to your pupils´ actual needs. It is important to bear in mind Jim Scrivener's words:

**"Prepare thoroughly. But in class, teach the learners not the plan."**

BIBLIOGRAPHY


- Moon, J. (2005) Children Learning English. Macmillan.
- Scrivener, J. (2011) Learning Teaching. Macmillan
- Ur, P. (1996) A Course in Language Teaching. Cambridge: CUP


**Use of the developed lesson plans**

The developed lesson plans were designed with the intention of providing teachers with an exemplar that could be used as is or customized to suite the context of each individual class situation. As is the case in most instances, when it comes to lesson plan development, it is very difficult to establish a plan that will satisfy everyone and every situation and context, thus the lesson plans provided here are merely a base document that can be contextualized as per each teachers own liking, as lesson plans are a personal document that also expresses the teachers own creativity and professionalism.

Lesson plans were developed for all strands, namely:

- Life & Living
- Matter & Material
- Energy & Change
- Planet Earth & Beyond

Each lesson plan was developed according to the notional times as prescribed within the CAPS document, that is 30 minute periods with six periods a week for a 5-day cycle. In some instances, to cater for practical activities the lesson plan will be indicated as components and not as one lesson plan.

The lesson plans are accompanied with informal class activities to assist in reinforcing the content and concepts expressed in the lesson. The developed lesson plans also make use of PowerPoint presentations, videos and other ICT related resources to help facilitate the learning process in the digital age, these are optional and can be used as is or the teacher can contextualize it according to resources and infrastructure available at school.

We envisage that the lesson plans provided will be of great assistance to you, the teacher and that all efforts will made to enhance the quality of teaching and learning. It must also be mentioned that the developed lesson plans will greatly reduce the administrative workload that teachers are faced with on a daily basis. However, these lesson plans must be engaged with prior to the lesson being delivered for its true potential and impact to be determined.

## Acknowledgement

The following colleagues from the various district offices within Gauteng played an integral role in the development of the lesson plans being presented. Their unwavering dedication and high degree of professionalism and discipline is greatly appreciated and acknowledged.

| No. | Title | Name | District | Phase | E-mail |
|---|---|---|---|---|---|
| 1 | Mr | Padayachee, Perumal | Head Office | Intersen | Perumal.Padayachee@gauteng.gov.za |
| 2 | Mr | Aroon Singh | Tshwane North | SP | Aroon.Singh@gauteng.gov.za |
| 3 | Mr | Molefe Ramaroka | Tshwane South | SP | Molefe.ramoroka@gauteng.gov.za |
| 4 | Ms | Raquel Jacobs | Tshwane South | SP | raquel.jacobs@gauteng.gov.za |
| 5 | Mr | Nakedi Matlala | Ekurhuleni North | SP | Nakedi.Matlala@gauteng.gov.za |
| 6 | Mr | Magezi David Khosa | Gauteng East | SP | Magezi.Khosa@gauteng.gov.za |
| 7 | Mrs | Lisebo More | Sedibeng East | SP | Lisebo.More@gauteng.gov.za |
| 8 | Mrs | Mary Qhalane | Sedibeng West | SP | Mary.Qhalane@gauteng.gov.za |
| 9 | Ms | Maswanganye, Zippora | Gauteng North | SP | Zippora.Maswanganye@gauteng.gov.za |
| 10 | Ms | Moleki, Beauty | Gauteng West | SP | Beauty.Moleki@gauteng.gov.za |
| 11 | Mr | Nkopane, Thabo George | Johannesburg South | SP | George.Nkopane@gauteng.gov.za |
| 12 | Mrs | Magdeline (Maxi) Mooke | Ekurhuleni South | SP | mmamooke@gmail.com |
| 13 | Mrs. | Jessica Sampson | Ekurhuleni South | SP | jessicas.oosrandss@gmail.com |
| 14 | Ms | Ramsamy, Kumintree | Johannesburg Central | SP | Kumitree.Ramsamy@gauteng.gov.za or clive.virasamy@gmail.com |
| 15 | Ms | Sihlangu, Boitumelo | Johannesburg East | SP | Boitumelo.Sihlangu@gauteng.gov.za |
| 16 | Mr | Albert Bareng | Johannesburg West | SP | Albert.Bareng@gauteng.gov.za |

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**NATURAL SCIENCES: LESSON PLAN**
**PERIOD: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

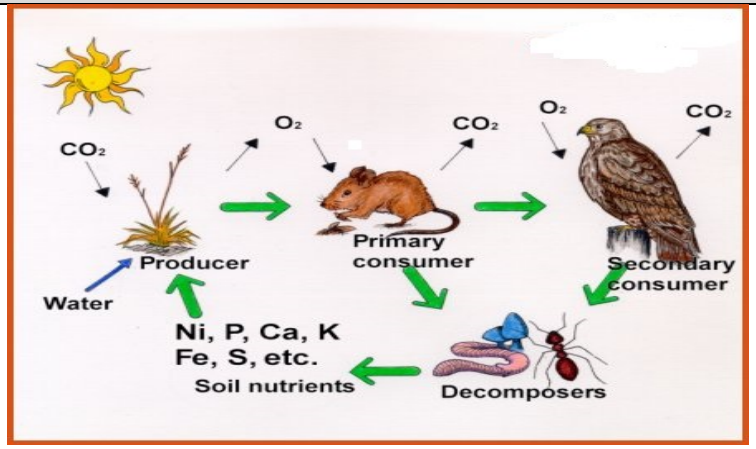
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
|---|---|
| **TOPIC: Photosynthesis and Respiration** | • Demonstrate an understanding of the seven life processes in living things |
| **SUB-TOPIC**: Interaction and interdependence and the need for energy to sustain life | • Understand the importance of energy for sustaining life. |

| | | |
|---|---|---|
| **KEY CONCEPTS** | Ecosystem, interdependence, interaction, Photosynthesis, Radiant energy, pigment, chlorophyll, chloroplast, | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| Interaction and interdependence and the need for energy to sustain life. | **Baseline Assessment**<br>The teacher will ask of the seven life processes carried out by living things, orally/through pictures.<br>Learners will identify and describe how they are all related to energy as a requirement for sustaining life.<br>The teacher shows the learners a diagram of interaction and interdependence/nutrient cycle for them to observe and discuss any interaction existing in the diagram(ecosystem) | • CAPS compliant textbooks and other resource materials.<br>• Sasol Inzalo workbooks. |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br>The teacher will consolidate by explaining how the living things in the studied ecosystem depend on each other for energy to sustain life.<br>Teacher to address misconceptions of the sun being part of the food chain. | |

**ASSESSMENT**

**Activity 1.**

1.Write 7 life processes and explain how each uses energy using the given table;

| LIFE PROCESSES | USE OF ENERGY |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |

**TEACHER REFLECTION**

Answers:
The seven life processes are: movement (moving), reproduction (reproducing), sense the environment (sensing), growth (growing), respiration, excretion (excreting), nutrition (feeding).

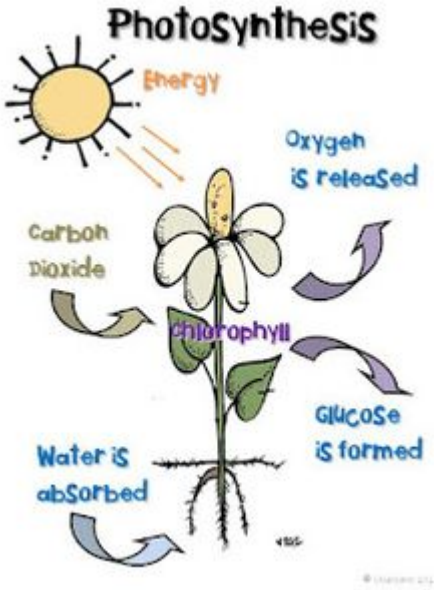
| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Photosynthesis and Respiration** | • **Define photosynthesis** |
| **SUB-TOPIC: Photosynthesis** | • **List and write the requirements for the process of photosynthesis and the products formed.** |

| | | |
|---|---|---|
| **KEY CONCEPTS** | **Photosynthesis, Radiant energy, glucose, carbon dioxide, oxygen, pigment chlorophyll, chloroplast,** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| **Accessing & recalling Information** | ✓ | **Identifying problems & issues** | | **Doing Investigations** | |
| **Observing** | ✓ | **Raising Questions** | | **Recording Information** | |
| **Comparing** | | **Predicting** | ✓ | **Interpreting Information** | |
| **Measuring** | | **Hypothesizing** | | **Communicating** | ✓ |
| **Sorting & Classifying** | | **Planning Investigations** | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| • **Radiant Energy.**<br>• **Requirements and the products of the process of photosynthesis.**<br>• **Equation for the process of photosynthesis.** | The teacher will use the concept map to find out the knowledge that the learners have on photosynthesis.<br><br>Any concept map that will seek the knowledge that the teacher wants from the learners on the process of photosynthesis would be welcome.<br><br>The teacher will use the diagram below to explain the process of photosynthesis and to show learners how to represent it in the form of an equation.<br><br>*Carbon dioxide + water* $\xrightarrow{\text{sunlight + chlorophyll}}$ *glucose + oxygen* | • CAPS compliant textbooks and other resource materials.<br>• Siyavula workbooks.<br>• https://youtu.be/D1Ymc311XS8. |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br>https://youtu.be/D1Ymc311XS8. Video clip on the process of photosynthesis.<br><br>**Questions to be answered after watching the video clip**<br>1. **How would you define photosynthesis?**<br>2. **What happens to the oxygen that is released during photosynthesis?**<br>3. **What would be the effect of removing chlorophyll and sunlight from the equation representing the process of photosynthesis?** | |

| | |
|---|---|
| **ASSESSMENT** | Activity on requirements and products of photosynthesis, e.g Siyavula LB pg. 7. - To be done as a class activity. |
| **TEACHER REFLECTION** | |

Answers :

1. Photosynthesis is the process in which chlorophyll molecules absorb the radiant energy from the sun and transfers it into chemical potential energy.
2. Release into the atmosphere and important for human, animal and certain organisms survival.
3. Photosynthesis process will not be possible without sunlight and chlorophyll

**NATURAL SCIENCES: LESSON PLAN 3**
**PERIOD: 2X30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
|---|---|
| **TOPIC: Photosynthesis and Respiration** | • Differentiate between glucose and starch |
| **SUB-TOPIC:** An investigation to determine if leaves produce starch. | • Conduct an investigation to test for the presence of starch in leaves.<br>• Write a scientific report on the investigation conducted. |

| | | |
|---|---|---|
| **KEY CONCEPTS** | Photosynthesis, Starch, Respiration, Glucose | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | ✓ |
| Observing | ✓ | Raising Questions | | Recording Information | ✓ |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | ✓ |
| Measuring | ✓ | Hypothesizing | ✓ | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| • Plants change glucose into starch, cellulose and other chemical compounds to enable processes like growth and reproduction.<br>• An investigation to show that green leaves | The teacher will conduct a demonstration to test the solubility of glucose and starch in water for learners to observe. The teacher will consolidate their observations by providing the differences between the two.<br><br>For Prior knowledge: Learners to watch a video clip from the previous lesson or to respond to questions based on it.<br><br>Explain all the steps for the scientific process to learners (these will be later used to write a report), as well as the safety measures in handling the apparatus when conducting an investigation. (Question and answer method could be used)<br><br>The teacher may play the video clip on testing for starch in leaves or provide a worksheet to discuss with the learners the steps for the scientific process. The worksheet will only | • A variety of leaves<br>• Heat source<br>• spirit or Bunsen<br>• burners<br>• Glass containers/<br>• test tubes<br>• Ethanol/<br>• methylated spirits<br>• Iodine solution.<br>• White surfaces/ tile<br>• https://www.youtube.com/watch?v=0s_xZqvwm_s |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| contain starch. | provide the information on the procedure they will use to carry out the investigation. The rest of the worksheet will be completed as an activity.<br>https://www.youtube.com/watch?v=0s_xZqvwm_s<br><br>Learners will conduct the investigation in groups of five under strict supervision of the teacher. | |
| **ASSESSMENT** | Apply the knowledge gained from the investigation conducted to complete the given worksheet. | |
| **TEACHER REFLECTION** | | |

**WORKSHEET: PRACTICAL INVESTIGATION TO TEST FOR THE PRESENCE OF STARCH.**

**AIM:**

**HYPOTHESIS:**

**VARIABLES: Independent:**

**Dependent:**

**Control:**

**APPARATUS:** Beakers, Bunsen burner or spirit light, test tube, white tile or any white surface, iodine solution, ethanol/methylated spirit, green leaf.

**METHOD:**

1. Boil the water in a beaker.
2. Use forceps to place a leaf in the boiling water for one hour.
3. Remove the leaf and place it in a test tube with ethanol/methylated spirit.
4. Place the test tube containing the leaf in a hot water bath.(do not let the water flow into the test tube
5. Remove the leaf from the test tube and rinse it in water.
6. Place the leaf on a white tile.
7. Use the dropper to drop the iodine solution on the surface of the leaf.
8. Observe changes.

**OBSERVATIONS:**

**CONCLUSION:**

1.2. Based on the experiment conducted in the above diagram, answer the following questions.

a). What organic substance does iodine solution indicate the presence of?

b). How do we know this is a positive test for this organic substance?

c). Why is the leaf boil in water first.

d). What have you observed about the leaf after it has been boiled?

e). Why is it necessary to boil the leaf in alcohol?

f). What is the appearance of the leaf after it has been boiled in alcohol?

g). Explain why the leaf needs to be rinsed with water.

h). Give an investigative question for this experiment?

i). What is your conclusion after doing this experiment?

Answers:

| | |
|---|---|
| 1.2.a | starch |
| 1.2b | The leaf turned blue/black colour |
| 1.2.c | Soften the tissue/ Break down the cuticle |
| 1.2.d | the leaf is soft/floppy |
| 1.2.e | to dissolve/extract the chlorophyll |
| 1.2.f | the leaf loses its colour/becomes white |
| 1.2.g | To remove any chemical residue/ to rehydrate / give water back to the leaf |
| 1.2.h | How does sunlight affect the production of starch during photosynthesis |
| 1.2.i | Sunlight is needed in order for the plant to photosynthesise thus allowing the plant to produce starch |

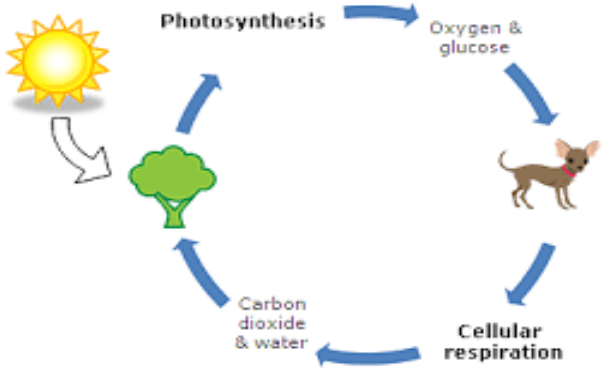
| DURATION: | OBJECTIVES: LEARNERS MUST BE ABLE TO |
|---|---|
| **TOPIC: Photosynthesis and Respiration** | • Define respiration<br>• Demonstrate an understanding on the requirements of respiration<br>• Understanding and writing the equation to represent respiration. |
| **SUB-TOPIC:** Respiration | |

| | | |
|---|---|---|
| **KEY CONCEPTS** | **Respiration** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| Photosynthesis and respiration | **Baseline Assessment**<br>Using the given diagram the teacher will explain the interaction existing in the environment which relates to photosynthesis and respiration. | • CAPS compliant textbooks and other resource materials.<br>• Sasol Inzalo workbooks. |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br>Learners will respond to the teacher's questions leading to the definition of respiration. The questions will be based on the diagram above.<br><br>1. **What form of energy is present in the tree?**<br>2. **Where does the tree get this energy from?**<br>3. **How is the energy in the plant transferred to the buck?**<br>4. **What type of energy is evident when the buck runs around the forest?**<br><br>The teacher will consolidate by effecting corrections where necessary. The definition for respiration and photosynthesis.<br>Misconceptions about photosynthesis taking place in plants and respiration in animals should be addressed.<br><br>A comparison should be made between the requirements and the products of both photosynthesis and respiration. | |

| | | |
|---|---|---|
| **ASSESSMENT** | **Activity 1.**<br>1. Tabulate differences between photosynthesis and respiration.<br>2. Use the information you have learnt to write the equation for respiration. | |
| **Teacher reflection.** | Progress. | Challenges |

Answers:

| **Characteristics** | **Photosynthesis** | **Respiration** |
|---|---|---|
| Starting ingredients/ requirements (reactants) | Carbon dioxide, sunlight energy and water | Glucose and oxygen |
| End products/what the process produces | Glucose and oxygen | Carbon dioxide and water |
| Organisms in which this process takes place | Green plants | All living organisms |
| When this process takes place | During the daytime/when there is sunlight | All the time as organisms continuously respire |



glucose + oxygen→carbon dioxide + water + energy

**NATURAL SCIENCES: LESSON PLAN 5** **GRADE 8**
**PERIOD: 2X30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| | | |
|---|---|---|
| **DURATION:** | | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Photosynthesis and Respiration** | | • Test for the presence of carbon dioxide. |
| **SUB-TOPIC:** Test for the presence of carbon dioxide in exhaled air | | |
| **KEY CONCEPTS** | Exhaled air, lime water, carbon dioxide | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | ✓ |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| Testing for the presence of carbon dioxide in exhaled air using clear lime water. | **Baseline Assessment**<br><br>Complete the given table<br><br>**Products/By products of respiration** \| **Organ or place where it is found**<br>\| \|<br>\| \|<br>\| \|<br><br>An equation for respiration can also be used to close the gab for learners with difficulties.<br><br>*Glucose + water* ⟶ *energy + carbon dioxide + water* | • CAPS compliant textbooks and other resource materials.<br>• Slaked lime (to<br>• make lime water)<br>• Drinking straws<br>• Test tubes |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | Learners must be engaged in a practical activity on:<br><br>The test for the presence of carbon dioxide in exhaled air.<br>The teacher should provide learners with an appropriate worksheet with clear instructions on how to do the practical. This could be obtained from any available resource material. | |
| **ASSESSMENT** | **Activity 1.**<br>1. Describe what you observed when you blow air from your lungs through the lime water. What does this mean?<br>2. Do you think the same results could be obtained using carbon dioxide collected from the atmosphere? What would be the reason for your answer? | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**WORKSHEET: PRACTICAL INVESTIGATION TO TEST FOR THE PRESENCE OF CARBON DIOXIDE IN EXHALED AIR.**

**AIM:**

**HYPOTHESIS:**

**VARIABLES:** **Independent:**

**Dependent:**

**Control:**



**APPARATUS:** Clear limewater, test tubes, straws

**METHOD:**

1. Pour some limewater into the test tube
2. Place the straw inside the test tube
3. Blow into the test tube
4. Observe changes.

**OBSERVATIONS:**

**CONCLUSION:**

1. Describe what you observed when you blew air from your lungs through the limewater. What does this mean?

   *The clear limewater turned cloudy white. This means our breath contains carbon dioxide from respiration.*

2. Describe what you observed when you used the syringe to bubble air from the atmosphere through clear limewater.

   *The clear limewater did not change and remained clear. Some might notice a very slight change, which indicates that there is a small amount of carbon dioxide present in atmospheric air.*

3. A very small percentage of atmospheric air is carbon dioxide gas (0.03). Why do you think you observed the result you did when you pushed air from the atmosphere through the limewater?

   As air contains such a small percentage of carbon dioxide, there is not enough to cause a noticeable difference in the limewater. Discuss with your learners why they think that the limewater turned cloudy with your breath but not with the air, even though air does contain carbon dioxide. Point out that air from your lungs contains a much higher percentage of carbon dioxide from respiration and so this is able to turn the limewater cloudy in a shorter time than atmospheric air will.

4. Think about respiration. a) What are the requirements for respiration? b) What are the products of respiration?

   *a) Glucose and oxygen. b) Energy, carbon dioxide and water.*

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN 1** **GRADE 8**
**PERIOD/DURATION: 30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: Interactions and interdependence within the environment.**<br>**SUB TOPIC:** Introduction to ecology | **Define ecology.**<br>**Identify the four levels of interaction within the ecology.**<br>**Demonstrate an understanding of the four levels of interaction within ecology.** |

| | | |
|---|---|---|
| **TERMINOLOGY** | Ecology, Organism, Population, Community, Ecosystem, Biosphere | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |



SCIENCE PROCESS SKILLS

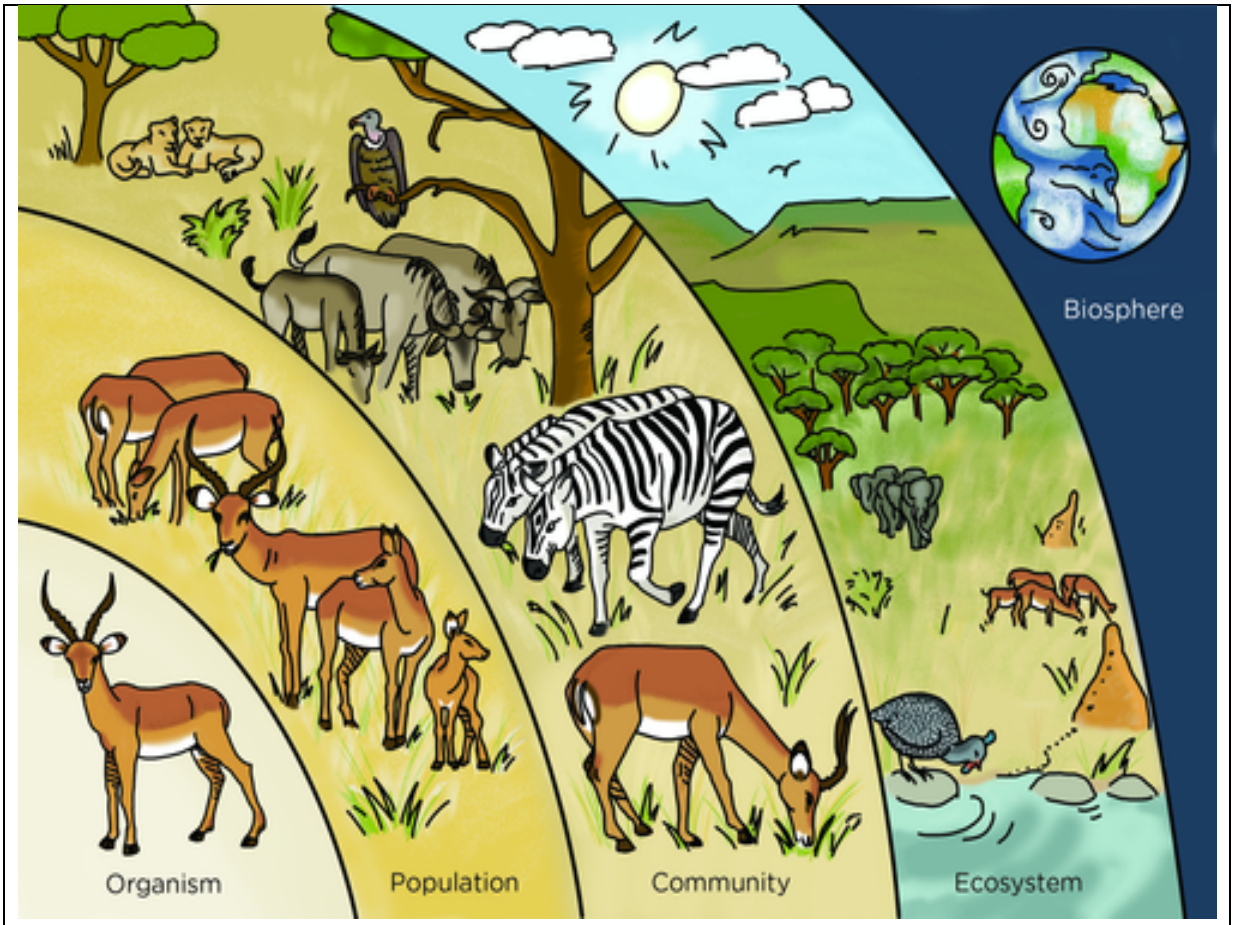
| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | ✓ |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN 1** **GRADE 8**
**PERIOD/DURATION: 30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| CONTENT | TEACHING AND LEARNING ACTIVITY | Resources |
|---|---|---|
| Introduction to ecology<br>Ecological interactions of organisms with one another | The teacher will define ecology and identify the four levels of interaction within ecology. The learners will be given an activity to demonstrate the understanding of ecology and the four levels of interaction. | • Slaked lime to make lime water<br>• Drinking straws<br>• Sasol Inzalo |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | | Challenges: |

**NATURAL SCIENCES GR 8: INTERDEPENDANCE**
**GRADE 8**
**PERIOD/DURATION: 30 MINUTES**
**STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE**
**TERM 1**

**Study the diagram below and answer questions that follow**:




**Activity 1.**

1. Explain the meaning of biosphere and ecosystem?

2. Define each of the following: ecology, population, community and habitat.

3. Arrange the following words about levels in ecological interactions in order from the largest to the smallest: Population, biosphere, community and ecosystem

4. Give 3 examples of an interaction between living things.

**Answers:**

1. The biosphere is the place where life exists on planet Earth.

2. The particular branch of Science that studies how organisms interact with other organisms and their environment is called ecology.
   A population is a group of organisms of the same species that live in the same area at a specific point in time and they can interbreed with each other.
   A community refers to all the populations of organisms that interact in a certain area in the ecology.
3. Biosphere, population, community and ecosystem
4. Examples: Competition, Symbiosis and Feeding,

**The following can be done as an informal assessment/ class activity/ homework**

## ACTIVITY: What is a population?

**INSTRUCTIONS:**

1. Look at the following examples of populations.
2. Answer the questions which follow.



*A population of hippos in the St Lucia estuary (river mouth) in Kwa-Zulu Natal.*



*A population of zebra in Kruger National Park.*



*A population of seals on Seal Island in False Bay.*



*A population of penguins at Boulders Beach.*

**QUESTIONS:**

1. What do you notice about all the animals that make up a population?

_____

_____

2. In each of the photos, the populations of animals are found in a specific area. Do you think the zebra in Kruger National Park and the zebra in Hluhluwe-Umfolozi game reserve in Zululand are from the same population? Why do you say so?

_____

3. How big is a population?

4. Do you think the seals that lived on Seal Island 100 years ago are part of the same population as the seals that live there now in the photo? Why do you say so?

5. What do you think would happen to the population of hippos in the estuary at St Lucia if the river dried up? Explain your answer.

6. A group of scientists is studying a population of zebra in the Kruger National Park. They notice that over the last 4 years, the population has grown quite rapidly. Why do you think this might be the case? What are some possible reasons for this? Discuss this with your class.

**Answers:**

**1. What do you notice about all the animals that make up a population?**

***All the animals are of the same species in a population. They are different ages, there are males and females.***

**2. In each of the photos, the populations of animals are found in a specific area. Do you think the zebra in Kruger National Park and the zebra in Hluhluwe-Umfolozi game reserve in Zululand are from the same population? Why do you say so?**

***No, they are not from the same population. Individuals in a population all live in a specific area and they can interact and breed with each other. They are not able to interbreed if they live in different areas.***

**3. How big is a population?** ***A population does not have a specific size. Rather, it is defined by the area that you are talking about and whether the individuals can interact.***

**4. Do you think the seals that lived on Seal Island 100 years ago are part of the same population as the seals that live there now in the photo? Why do you say so?**

***No, they are not from the same population. A population consists of organisms that live in the same space and at the same time. Individuals in a population interact with each other and are able to interbreed. Since the seals lived at different times, they cannot be part of the same population.***

**5. What do you think would happen to the population of hippos in the estuary at St Lucia if the river dried up? Explain your answer.**

***The number of hippos in the population would decrease. They might not necessarily all die, but the numbers would decline. The decline may be due to some individuals of the population migrating to other areas. The population would decrease because the environment cannot support the hippos anymore as there is not enough water in their habitat.***

**6. A group of scientists is studying a population of zebra in the Kruger National Park. They notice that over the last 4 years, the population has grown quite rapidly. Why do you think this might be the case? What are some possible reasons for this? Discuss this with your class.**

***Some possible reasons include*: *there are perhaps fewer predators and so less of the zebra are being eaten. There might perhaps be an increase in the number of females that are born and so more are reproducing. There might be an increase in the amount of food available, perhaps other populations of herbivores have decreased or there might have been particularly rainy seasons so there is lots of food (green grass). Disease may have decreased so fewer animals are dying, or the amount of hunting or poaching by humans may have decreased.***

**NATURAL SCIENCES**
**GR 8: INTERDEPENDANCE LESSON PLAN**
**PERIOD/DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: Interactions and interdependence within the environment.**<br>**Sub Topic:** Different types of ecosystems | • Define the ecosystem<br>• Demonstrate an understanding of the different types of ecosystems.<br>• Differentiate between biotic and abiotic factors with examples. |

| | | |
|---|---|---|
| **TERMINOLOGY** | Abiotic, Biotic, Terrestrial ecosystem, Aquatic ecosystem, Grassland ecosystem, Marine ecosystem | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | ✓ | Doing Investigations | |
| Observing | ✓ | Raising Questions | ✓ | Recording Information | |
| Comparing | ✓ | Predicting | | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | ✓ | Planning Investigations | | | |

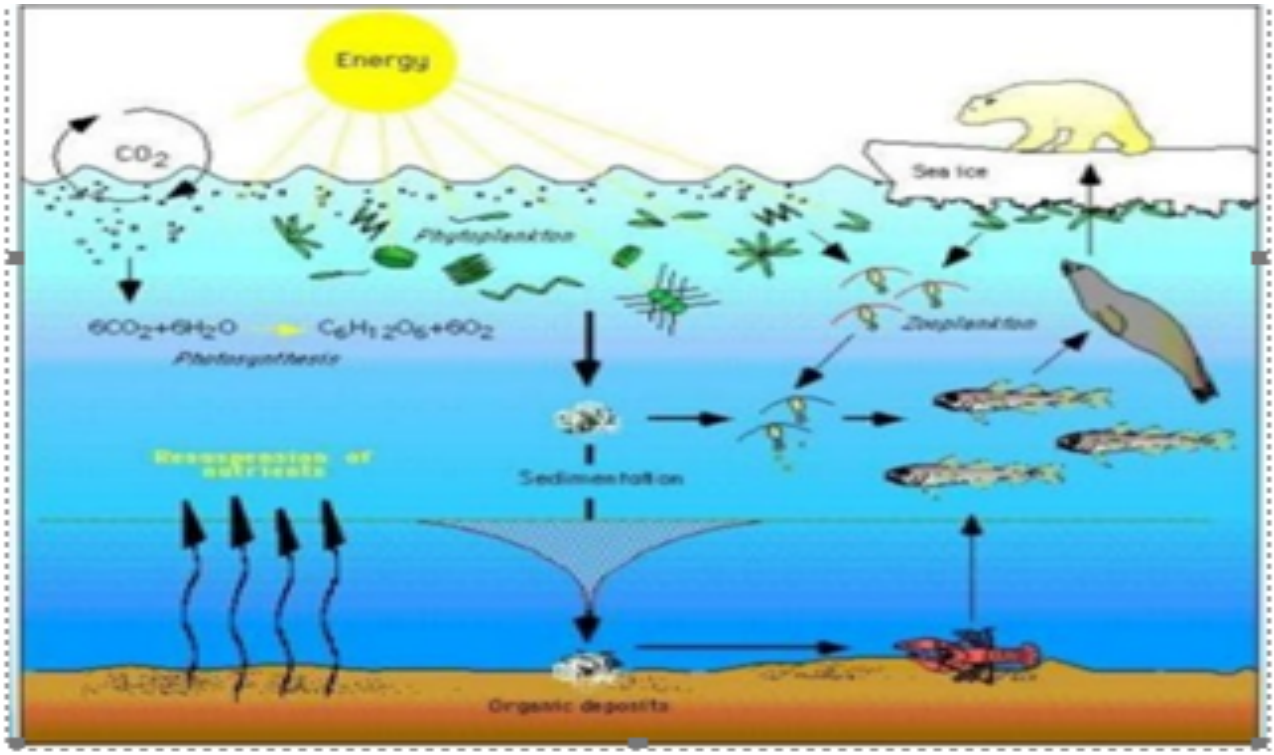
**NATURAL SCIENCES**
**GR 8: INTERDEPENDANCE LESSON PLAN** **GRADE 8**
**PERIOD/DURATION: 30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| CONTENT AND CONTEXT | TEACHING AND LEARNING ACTIVITY | Resources |
|---|---|---|
| An ecosystem consists of an ecological community that includes all living organisms (biotic) such as plants, and animals together with the non- living (abiotic) environment such as temperature, wind, water interacting as a system. The size of an ecosystem is not specifically defined and it usually encompass the entire planet. | The teacher will use the diagrams below to explain the two main types of the ecosystems in the biosphere.<br>From the diagrams biotic and abiotic factors will be identified and listed by the learners. | Sasol inzalo<br>Science dictionary<br>English dictionary |
| **ASSESSMENT** | **Activity 1.**<br>A variety of terrestrial and aquatic ecosystems will be given to learners in groups of four to study and respond to the following questions:<br>1. Define the word ecosystem.<br>2. List the biotic and the abiotic factors in your given ecosystem.<br>3. Classify the given ecosystem with reasons.<br>4. Give an example of a terrestrial/aquatic ecosystem given to you. | |
| **TEACHER REFLECTION** | Progress | Challenges |

**NATURAL SCIENCES**
**GR 8: INTERDEPENDANCE LESSON PLAN 2**
**GRADE 8**
**PERIOD/DURATION: 30 MINUTES**
**STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE**
**TERM 1**

CLASS ACTIVITY

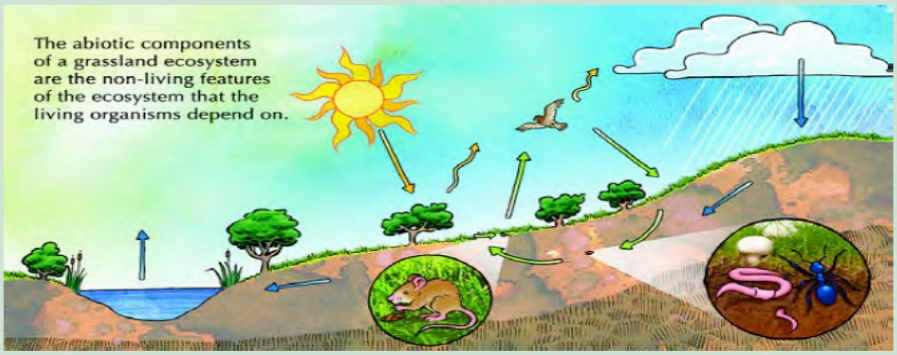




## ACTIVITY: Abiotic components in a grassland ecosystem

**INSTRUCTIONS:**

1. Look at the following image of a grassland ecosystem.
2. Answer the questions that follow.




**QUESTIONS:**

1. List some of the abiotic things in the grassland ecosystem shown in the image.

_____

_____

2. For each of the animals, discuss how you think the organisms below are interacting with the abiotic environment.
   a) The eagle

_____

   b) The trees and grass

_____

   c) The mouse

_____

   d) The worm and insect

_____

3. In the picture, the blue arrows show the movement of water through the ecosystem. What do we call this movement of water?

4. Temperature is an abiotic factor in an ecosystem. What can affect the temperature in the grassland ecosystem?

5. Another abiotic factor which affects ecosystems is the slope of the land. For example, is it flat or are there hills or mountains. How would you describe the land in the grassland ecosystem? How do you think this contour affects the ecosystem?

**Answers:**

**1. List some of the abiotic things in the grassland ecosystem shown in the image.**

*Soil, rocks, water, wind/air, sunlight/temperature, clouds.*

**2. For each of the animals, discuss how you think the organisms below are interacting with the abiotic environment. a) The eagle b) The trees and grass c) The mouse d) The worm and insect** *a) The eagle uses the wind and air to soar and glide while hunting. b) The trees and grass are rooted in the soil so that they do not blow over and they can get water and use sunlight and carbon dioxide to make food. c) The mouse creates its home in the ground/dead stick/grass, it can store seeds and food in the soil and hide from predators. d) The worm and insect live in the soil.*

**3. In the picture, the blue arrows show the movement of water through the ecosystem. What do we call this movement of water?** *The blue arrows describe the water cycle. You can revise the water cycle here, namely: The water in the pond/dam evaporates as it changes from a liquid to a gas. The water vapour then condenses to form clouds as fine droplets of water. When the water droplets become big enough, they precipitate as rain. The water runs down the slopes and collects in the lower regions such as the pond.*

**4. Temperature is an abiotic factor in an ecosystem. What can affect the temperature in the grassland ecosystem?** *The time of day will affect the temperature as this will affect how much heat energy the ecosystem receives from the Sun depending on the Earth's position. The time of year will also affect the temperature as the ecosystems distance from the sun changes. Weather conditions will also affect the temperature, for example if there are clouds, wind, or it is raining. The direction the area faces will also affect the temperature, for example if it is on a slope.*

**5. Another abiotic factor which affects ecosystems is the slope of the land. For example, is it flat or are there hills or mountains. How would you describe the land in the grassland ecosystem? How do you think this contour affects the ecosystem?**

*This grassland ecosystem has a sloped surface. There is a hill on the right hand side and the ground slopes downwards towards the pond. This shape and slope enables the water to run down when it rains and collect in the pond, thereby providing a collection of water for the ecosystem. ..*

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN** **GRADE 8**
**PERIOD/DURATION: 30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **Term 1**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: Interactions and interdependence within the environment.**<br>**Sub Topic:** Abiotic aspects of the ecosystem | • **Identify and describe the abiotic aspects of a marked off ecosystem.** |

| | | |
|---|---|---|
| **TERMINOLOGY** | Abiotic, Biotic, Terrestrial ecosystem, Aquatic ecosystem, Grassland ecosystem, Marine ecosystem | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | ✓ | Doing Investigations | ✓ |
| Observing | ✓<br>✓ | Raising Questions | ✓ | Recording Information | ✓ |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | ✓ |
| Measuring | ✓ | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | ✓ | Planning Investigations | ✓ | | |

| **CONTENT** | **TEACHING AND LEARNING ACTIVITY** | **Resources** |
|---|---|---|
| An ecosystem consists of an ecological community that includes all living organisms (biotic) such as plants, and animals together with the non-living (abiotic) environment such as temperature,wind, water | The teacher will select and mark off ecosystems on the school ground for learners to work in groups.<br>It might also be necessary that the teacher introduces some of the abiotic factors into some of the marked ecosystems for accessibility.<br>The teacher must be familiar with the ecosystems marked off.<br><br>A questionnaire will be developed by the teacher to guide the learners on describing the abiotic factors within the different marked ecosystems. | An identified Ecosystem, Sasol Inzalo , English dictionary, Science Dictionary, Apparatus, Thermometers |

<table>
<tr><th>CONTENT</th><th>TEACHING AND LEARNING ACTIVITY</th><th>Resources</th></tr>
<tr><td>interacting as a system. The size of an ecosystem is not specifically defined and it usually encompass the entire planet.</td><td>The questionnaire will be submitted after the investigation and one member of each group will present the group's findings to the whole class.<br>The teacher will consolidate all findings by all groups adding the relevant information, where there might be gaps.</td><td></td></tr>
<tr><td>ASSESSMENT</td><td colspan="2">A QUESTIONNAIRE TO STUDY THE ABIOTIC ASPECTS OF THE DEMARCATED ECOSYSTEMS<br><br>Name given to your ecosystem……..
<table>
<tr><th rowspan="2">No.</th><th rowspan="2">Abiotic aspect</th><th colspan="2">Availability of an abiotic aspect</th><th rowspan="2">Full description of the abiotic aspects accompanied by tests where possible, e.g. measuring the temperature of water.</th></tr>
<tr><th>Yes/Y</th><th>No/N</th></tr>
<tr><td>1.</td><td>(Amount of) sunlight</td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Water</td><td></td><td></td><td></td></tr>
<tr><td>3.</td><td>Wind</td><td></td><td></td><td></td></tr>
<tr><td>4.</td><td>Temperature</td><td></td><td></td><td></td></tr>
<tr><td>5.</td><td>Soil type</td><td></td><td></td><td></td></tr>
<tr><td>6.</td><td>Slope of the area</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>TEACHER REFLECTION</td><td></td><td>Challenges</td></tr>
</table>

Possible simple tests that the learners can do:

Measure the temperature of the water, soil and the temperature of the surroundings

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN 4**
**PERIOD/DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: Interactions and interdependence within the environment.**<br>**Sub Topic:** Interaction between abiotic and biotic factors in an ecosystem | • Demonstrate an understanding of the interactions between abiotic and biotic factors. |

| | | |
|---|---|---|
| **TERMINOLOGY** | Abiotic, Biotic, Terrestrial ecosystem, Aquatic ecosystem, Grassland ecosystem, Marine ecosystem | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | ✓ | Doing Investigations | ✓ |
| Observing | ✓ | Raising Questions | | Recording Information | ✓ |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

<table>
<tr><th>CONTENT</th><th>TEACHING AND LEARNING ACTIVITY</th><th>Resources</th></tr>
<tr><td>An ecosystem consists of an ecological community that includes all living organisms (biotic) such as plants, and animals together with the non-living (abiotic) environment such as temperature, wind, water interacting as a system. The size of an ecosystem is not specifically defined and it usually encompass the entire planet.</td><td>Learners will watch the video on the different abiotic factors and their effects on plants and animals in the ecosystem.<br>https://www.youtube.com/watch?v=cH0KX19V--Y<br>If the video cannot be accessed, revision of work done the previous lesson could be used.<br><br>Learners will work in their original groups as they revisit their marked ecosystems to observe the effects of the abiotic factors on plants and animals.<br><br>When they study the soil, they will use hand lenses to check for the remains of dead plants and animals in a sample of soil.<br><br>Learners will be given a worksheet to complete as well as hand lenses to study the interaction in a sample of soil.</td><td>• Hand lenses.<br>• Video clip<br>• Sasol Inzalo<br>• Science dictionary, English dictionary</td></tr>
<tr><td>ASSESSMENT</td><td colspan="2">Activity 1.<br>A QUESTIONNAIRE TO STUDY THE ABIOTIC ASPECTS OF THE DEMARCATED ECOSYSTEMS<br><br>Name given to your ecosystem…….<br><br>
<table>
<tr><th>No.</th><th>Abiotic aspect</th><th>Full description of the effects of the abiotic factor on plants and animals</th></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">(Amount of) sunlight</td><td>Plants:</td></tr>
<tr><td>Animals:</td></tr>
<tr><td rowspan="2">2.</td><td rowspan="2">Water</td><td>Plants:</td></tr>
<tr><td>Animals:</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Wind</td><td>Plants:</td></tr>
<tr><td>Animals:</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>CONTENT</th><th colspan="2">TEACHING AND LEARNING ACTIVITY</th><th>Resources</th></tr>
<tr><td></td><td colspan="3">
<table>
<tr><td rowspan="2">4.</td><td rowspan="2">Temperature</td><td>Plants:</td></tr>
<tr><td>Animals:</td></tr>
<tr><td rowspan="2">5.</td><td rowspan="2">Soil type</td><td>Plants:</td></tr>
<tr><td>Animals</td></tr>
<tr><td rowspan="2">6.</td><td rowspan="2">Slope of the area</td><td>Plants:</td></tr>
<tr><td>Animals:</td></tr>
</table>
<br>Learners will present their findings in the classroom and the teacher will consolidate all reports by providing all the relevant information.</td></tr>
<tr><td>TEACHER REFLECTION</td><td colspan="2">Progress</td><td>Challenges</td></tr>
</table>

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN**
**PERIOD/DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

| **DATE:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: Interactions and interdependence within the environment.**<br>**Sub Topic:** Abiotic components of marked ecosystems. | • **Identify, count and describe the biotic aspects of a marked off ecosystem.** |

| | | |
|---|---|---|
| **TERMINOLOGY** | Abiotic, Biotic, Terrestrial ecosystem, Aquatic ecosystem, Grassland ecosystem, Marine ecosystem | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | ✓ | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | | Predicting | ✓ | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | |
| Sorting & Classifying | | Planning Investigations | | | |

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN** **GRADE 8**
**PERIOD/DURATION: 30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| CONTENT AND CONTEXT | TEACHING AND LEARNING ACTIVITY | Resources |
|---|---|---|
| An ecosystem consists of an ecological community that includes all living organisms (biotic) such as plants, and animals together with the non-living (abiotic) environment such as temperature, wind, water interacting as a system. The size of an ecosystem is not specifically defined and it usually encompass the entire planet. | The Teacher will give learners demarcated ecosystems to work on: Learners (Groups) will work on their demarcated ecosystems to identify, count and describe the biotic factors.<br><br>The teacher will provide learners with a worksheet to write down their observations. The teacher will guide the learners on the completion of the worksheet.<br><br>The worksheet will be submitted after the investigation and one member of each group will present the group's findings to the whole class.<br><br>The teacher will consolidate all the findings and provide for all shortcomings. | • CAPS compliant textbooks (Sasol Inzalo workbook) and other resource materials.<br>• Any relevant resources and equipment for the demarcated ecosystem<br>• Science dictionary, English dictionary |
| **ASSESSMENT** | ACTIVITY: Studying an ecosystem<br><br>. This activity may be given to learners as a project. Learners will mark off parts of an ecosystem and must ideally be able to return to it regularly. You as the teacher must pre-visit the area and find a suitable area for marking off and studying, preferably near a stream or shore. Ensure that there is enough space for several classes to study the same area without damaging it. Identify organisms and find possible relationships between them. Show learners before the visit how to use equipment correctly and how to keep records. If you have microscopes, teach them how to use these to study soil samples and small organisms. During the visit, you will have to circulate and check on the groups of learners. . | |

<table>
<tr><th>CONTENT AND CONTEXT</th><th colspan="2">TEACHING AND LEARNING ACTIVITY</th><th>Resources</th></tr>
<tr><td></td><td colspan="3">MATERIALS::<br><br>• 60 m long string • pegs or stakes • measuring tape (10 m long) • old material for flags on pegs • thermometer • rulers • trowel • sieve • insect nets • large plastic ziploc bags • marking pens • forceps • gloves • hand lens • clipboard, paper and pens or pencils • camera (if possible)<br><br>INSTRUCTIONS:<br><br>1. Work in groups of five. Your teachers will help you to select a site to study.<br><br>2. Stake out a square measuring 10 m x 10 m. Use the 10 m measuring rope and knock the stakes or pegs into the ground to mark the corners of the square. Tie a flag to the stake to make it more visible. (You will use this square to study different things in the next few weeks so make sure that you choose an appropriate site that does not overlap with another group's site.)An example of a square with four quadrants.<br><br>3. Try to identify as many plants as possible. Use the following space to record your findings about the plants. You can even draw some illustrations.</td></tr>
<tr><td>TEACHER REFLECTION</td><td>Progress</td><td>Challenges</td><td></td></tr>
</table>

**Possible Answers**:

Learner-dependent answer. If you can find moss or lichen, point out this interaction to learners which shows how a plant grows on a rock (interaction between biotic and abiotic). Similarly, plants (biotic) interact with the soil (abiotic) when they draw mineral salts and water from the soil.

4. Use the net to capture a few small invertebrates. Try to identify them (ask for help if you need it), then release them unharmed. Use the following space to record your observations. You can use illustrations.

Learner-dependent answer. Perhaps there are ants building a nest - point out these interactions to learners.

5. Look for evidence of bigger animals. Are there any dropping, tracks, or birds in the trees? Record what you find.

Learner-dependent answer. Lookout for any interactions between animals and with their abiotic environment and point these out to learners.



6. Measure the temperature.

a) Measure the air temperature in your square. b) Measure the temperature of the soil about 5 cm below the surface.

If you are able to take the temperature several times over the course of a day, use this information to plot a graph to show how the temperature changes over the course of the day.

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN**
**PERIOD/DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO**<br>• **Identify interferences in the ecosystem.** |
| **TOPIC: Interactions and interdependence within the environment.**<br>**SUB-TOPIC:** Human interferences in the ecosystem | |
| **REFERENCES:** Sasol Inzalo workbook | |

| | | |
|---|---|---|
| **TERMINOLOGY:** | Interactions, Interdependence and Ecosystem | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | ✓ |
| Comparing | | Predicting | | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT AND CONCEPTS | TEACHING AND LEARNING ACTIVITIES | RESOURCES |
|---|---|---|
| Identify human interference in the ecosystem | Learners will revisit their ecosystems to check on human interferences including traces thereof.<br><br>Information gathered will used by the learners to write an assignment. | • CAPS compliant textbooks and other resource materials.<br>• Any relevant resources and equipment for the demarcated ecosystem |
| **ASSESSMENT** | Do activity 1 underneath. | |
| **TEACHER REFLECTION** | Progress | Challenges |

**ACTIVITY 1**:

1. In the area that you studied, was there any evidence of human interference? For example, rubbish or a pathway?

_____
_____
_____

2. Do you think that your presence while you made you observations had an influence on the animals or plants in the quadrant that you observed?

_____
_____
_____

3. Suggest ways in which such interferences could be prevented.

_____
_____
_____

1. In the area that you studied, was there any evidence of human interference? For example, rubbish or a pathway? How did this impact on the living organisms and also the abiotic factors in your square? What suggestions can you make to prevent this kind of interference. Learner-dependent answer.
   *Perhaps there is litter which is blocking a stream, or that animals can eat and choke on. Perhaps there is a path that humans walk on, resulting in them trampling the plants so that nothing grows there. Learners could suggest putting some rubbish bins nearby, or perhaps mark off the area so that people have to walk around, etc*.

2. Do you think that your presence while you made your observations had an influence on the animals or plants in the quadrant that you observed?
   *Learner-dependent answer. Learners may observe that insects or other small animals scurried away from them when they approached their quadrant. or perhaps insects were drawn to the stakes and rope that was used to demarcate their area.*

3. What suggestions can you make to prevent this kind of interference.
   *Learner-dependent answer.*

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Interactions and interdependence within the environment.** | • To classify some organisms into their feeding groups |
| **SUB-TOPIC:** Feeding relationships | • To define all the given types of feeding relationships. |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | | Predicting | | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | ✓ | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| Feeding relationship between organisms | Learners will be asked questions based on their previous investigation as baseline assessment on feeding relationships, e.g.<br><br>1. What is a producer?<br>2. What is a consumer?<br>3. What is a herbivore, carnivore and an omnivore? | • CAPS compliant textbooks and other resource materials.<br>• Siyavula workbook |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br><br>Learners will study the two given diagrams to identify organisms and sort them into their | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | feeding groups as a revision exercise from their previous investigation. | |
| **ASSESSMENT** | Activity<br><br>1. What is a herbivore? Write a definition below and then give four examples of animals which are herbivores.<br>2. What is a carnivore? Write a definition below and then give four examples of animals which are carnivores.<br>3. There are different types of carnivores. Some carnivores hunt other animals. They are called predators. The animals that they hunt are called prey. A lion is an example of a predator. Give three examples of animals which are prey of the lion.<br>4. Other types of carnivores are called scavengers as they eat dead meat. Name three examples of scavengers. | |
| | Answers:<br>1. A herbivore is an animal which feeds on plant material. Examples of herbivores are: elephant, duck, horse, buffalo, squirrel, grasshopper, rhino, zebra, cow, mouse, etc.<br>2. A carnivore is an animal which eats other animals (living or dead). Examples of carnivores are: lion, jackal, dolphin, crocodile, shark, leopard, mosquito, vulture, crab, seal, etc<br>3. Buck, zebra, buffalo.<br>4. Vulture, jackal, crab | |

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN**
**PERIOD: 2X30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
|---|---|
| **TOPIC: Interactions and interdependence within the environment.** | • To identify, write and draw food chains |
| **SUB-TOPIC:** Feeding Relationships: Food chains | • To understand the transfer of energy |

| | | |
|---|---|---|
| **TERMINOLOGY** | Food chain, trophic level, energy transfer | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

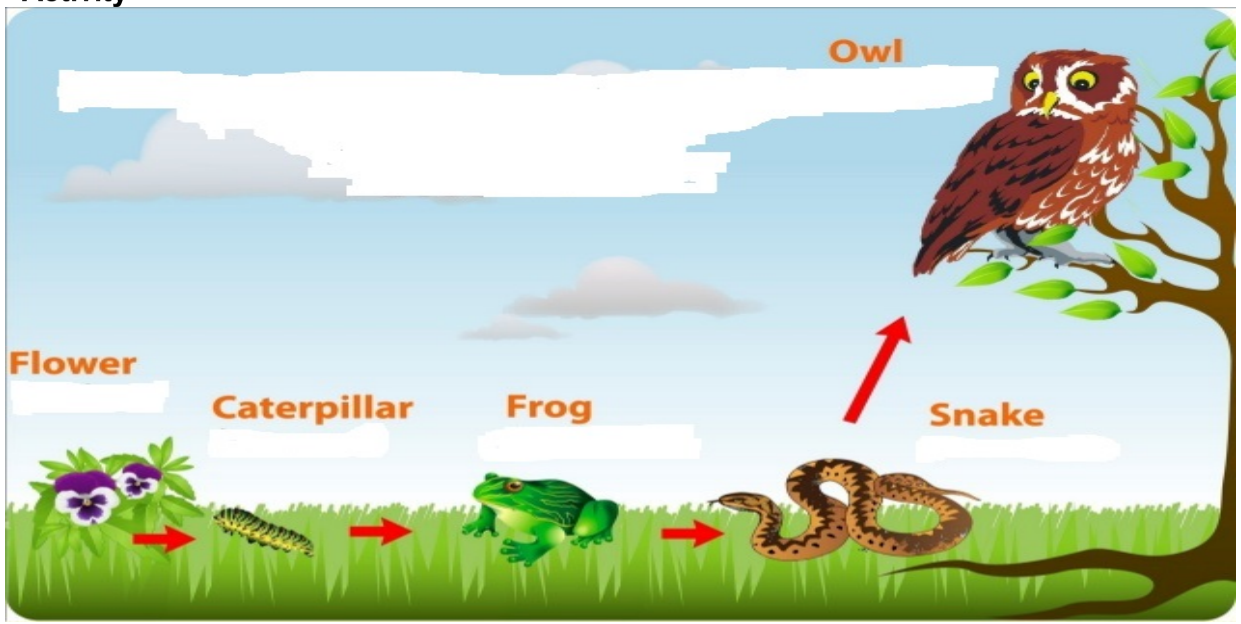
**PROCESS SKILLS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | ✓ | Predicting | | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | ✓ | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| **Transfer of energy in food from one organism to the other.** | The teacher will explain the concept of energy transfer, identify write and draw food chains in order for the learner to understand the concept of energy transfer.<br><br>Class Activity<br><br>The teacher will provide learners with the list or pictures of organisms to work with, e.g.<br>Frog, Bird, Owl, Grains, Lobster, Flower, Snake, Jackal, Locust, Caterpillar, Water lily, Seal, Cattle, Carrot, Green tree, Mouse, Grass, Zebra, Lion, Fish, Limpet, Human, Algae, Rabbit, Fox. | • CAPS compliant textbooks and other resource materials.<br>• Siyavula workbook<br>• Investigation results. |

<table>
<tr><th>CONTENT</th><th>ACTIVITIES</th><th>RESOURCES</th></tr>
<tr><td></td><td>
1. Categorize the given organisms into:
<table>
<tr><th>Producer</th><th>Herbivore</th><th>Carnivore</th><th>Omnivore</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
2. Arrange the organisms from your table to indicate at least four feeding relationships.<br>
3. Make food chains from what you developed in 2 above.<br><br>
The teacher will check on the learners' responses, correct them and explain the food chain with drawings from the given organisms. The importance of arrows (indicating the transfer of energy) and the trophic levels will also be discussed, e.g.<br><br>
Algae → limpet → lobster → seal.<br><br>
Energy transfer will be mentioned and further discussed in the following lesson.
</td><td></td></tr>
</table>

| ASSESSMENT | Activity |
|---|---|




1. Write down the relevant title for the diagram?
2. Which organism from the diagram is a producer?
3. Identify the herbivore and the carnivores from the diagram.
4. What do the arrows represent?

Class Activity:

Answers

| Producer | Herbivore | Carnivore | Omnivore |
|---|---|---|---|
| Grain | Locust | Frog | Human |
| Flower | Caterpillar | Bird | |
| Water lily | Cattle | Owl | |
| Carrot | Limpet | Lobster | |
| Green tree | Rabbit | Snake | |
| Grass | | Jackal | |
| Algae | | Mouse | |
| | | Zebra | |
| | | Lion | |
| | | Fish | |
| | | Seal | |
| | | Fox | |

Teacher will assist learners in class with all possibilities of food chains from the above table.

The teacher will discuss the importance of the arrows to indicate energy transfer as well as the trophic levels

**Activity**

**Answers**:

1. The Food Chain
2. Flower
3. Herbivore- caterpillar, Carnivore- frog, snake and the owl
4. It represents the energy transfer from one organism to another

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Interactions and interdependence within the environment.** | • **To classify the different levels of consumers**<br>• **To draw and analyse an energy pyramid.** |
| **SUB-TOPIC: Energy flow, Food Pyramid** | |
| **KEY CONCEPTS** | **Food web, Primary consumers, secondary consumers, tertiary consumers, trophic levels, energy pyramid** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

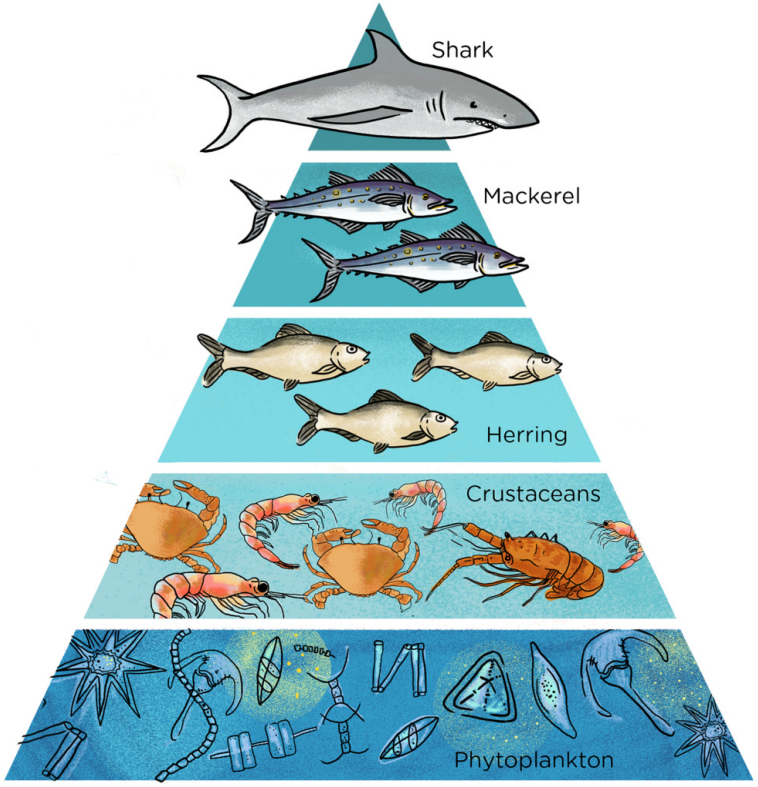
**PROCESS SKILLS**

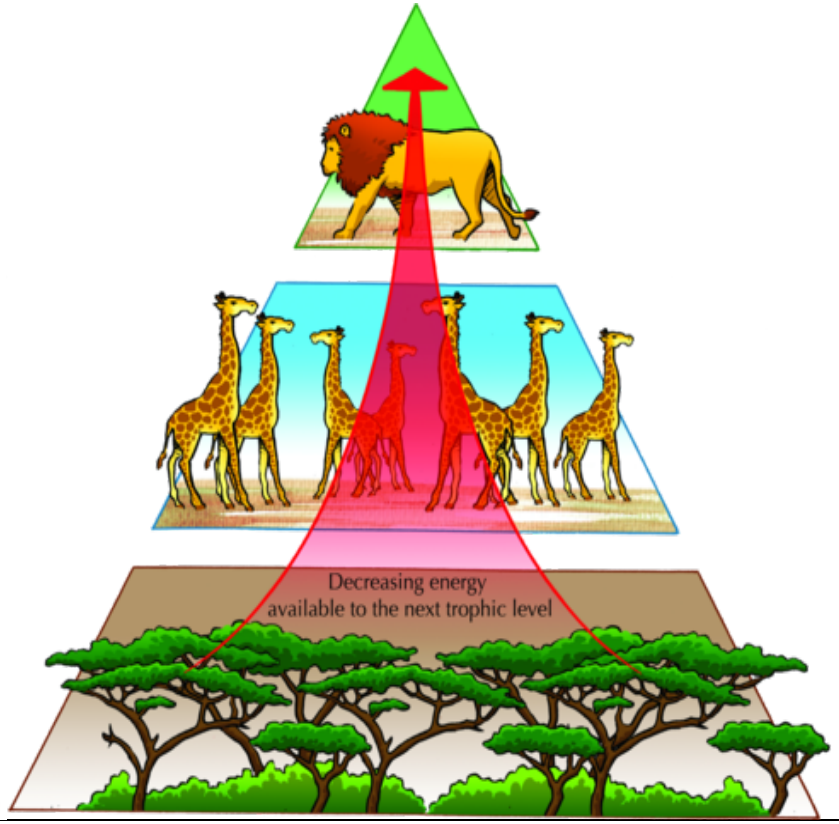
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | | Raising Questions | | Recording Information | |
| Comparing | ✓ | Predicting | | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | ✓ | Planning Investigations | ✓ | | |



| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| **Transfer of food energy by organisms from one trophic level to the other.** | Results collected from the investigations conducted in an allocated ecosystem.<br>Frog, Bird, Owl, Grains, Lobster, Flower, Snake, Jackal, Grasshopper, Caterpillar, Waterlily, Seal, Cattle, Carrot, Greentree, Mice, Grass, Zebra, Lion, Fish, Limpet, Human, Algae, Rabbit, Fox.<br>The teacher may use the food chain discussed in the previous lesson to further clarify the trophic levels and to introduce the energy pyramids to learners, e.g.<br>**Algae → limpet → lobster → seal.**<br>Learners will be asked to identify and name the different feeding levels to check for prior knowledge. | • CAPS compliant textbooks and other resource materials.<br>• Sasol Inzalo workbook<br>• Results from previous investigations |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | The feeding groups will then be classified into two major groups- **producers and consumers**.<br><br>The teacher will use the food chain from the study of an ecosystem to name and show the different trophic levels and to use them to discuss the energy pyramids. Clarification will be given of why the pyramid is broader at the base and tappers at the top. An exemplar of one should be formed with the learners using the food chain above. | |
| **ASSESSMENT** | **Activity 1.** | |



| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | **INSTRUCTIONS:**<br>**1. Have a look at the following energy pyramid for a marine and a savanna ecosystem.**<br>**2. Answer the questions that follow.**<br>**3. At the end, you can make your own energy pyramid.**<br><br>QUESTIONS:<br>1. Which organisms are the producers in the marine ecosystem and in the savanna ecosystem?<br><br>2. Which organisms are the primary consumers in the marine ecosystem and in the savanna ecosystem?<br><br>3. 90% of the energy is lost and only 10% is made available to the next trophic level. Why do you think this happens? Discuss this in your class and write your answer down below.<br><br>4. Give possible reasons why you think there needs to be so many producers in these ecosystems<br><br>5. How many trophic levels are there in each of the ecosystems?<br><br>6. Compare the amount of producers with the amount of secondary consumers. Why does there seem to be such a large difference in numbers? | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | Answers:<br>1. Which organisms are the producers in the marine ecosystem and in the savanna ecosystem?<br>*The phytoplankton in the marine ecosystem and the trees in the savanna ecosystem.*<br><br>2. Which organisms are the primary consumers in the marine ecosystem and in the savanna ecosystem?<br>*The crustaceans in the marine ecosystem and the giraffe in the savanna ecosystem.*<br><br>3. 90% of the energy is lost and only 10% is made available to the next trophic level. Why do you think this happens? Discuss this in your class and write your answer down below.<br>*The organisms in each level use most of the energy (90%) to sustain their own life processes (such as breathing, moving, reproducing etc). Therefore, only 10% is available to the next level which feeds on them.*<br>Learners might need help with this question, so ask them leading questions such as, what do the organisms in each level need energy for?<br><br>4. Give possible reasons why you think there needs to be so many producers in these ecosystems.<br>*Energy flow in an ecosystem is very inefficient and only 10% of the energy from a trophic level is passed to the next level. Therefore, to provide enough energy for the subsequent trophic levels, there needs to be many plants as primary producers.*<br><br>5. How many trophic levels are there in each of the ecosystems?<br>*There are 5 in the marine and 3 in the savanna ecosystem*.<br><br>6. Compare the amount of producers with the amount of secondary consumers. Why does there seem to be such a large difference in numbers?<br>*Since only 10% of the energy produced by the consumers is passed on to the next level, the primary consumers need to eat a large amount of producers to get enough energy to live. In the same way, each level needs to be supported by a larger population that it feeds on as only 10% of energy is passed on to each level.* | |

| TEACHER REFLECTION | |
|---|---|

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN** **GRADE 8**
**PERIOD: 2X30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| | |
|---|---|
| **DATE:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Interactions and interdependence within the environment.** | • **To identify food webs in ecosystems.** |
| **SUB-TOPIC:** Food webs | |
| **KEY CONCEPTS** | **Food web, food chain.** |

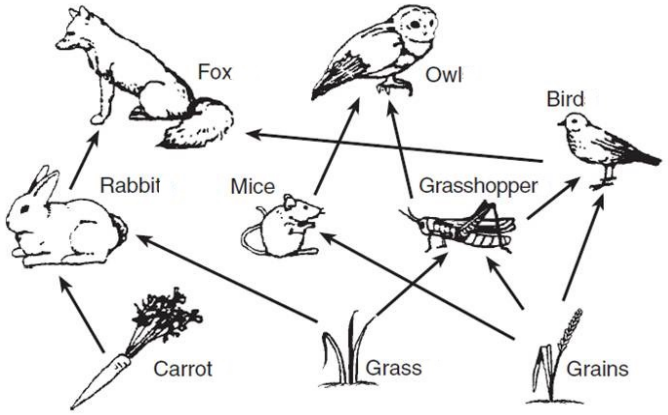
| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**PROCESS SKILLS**

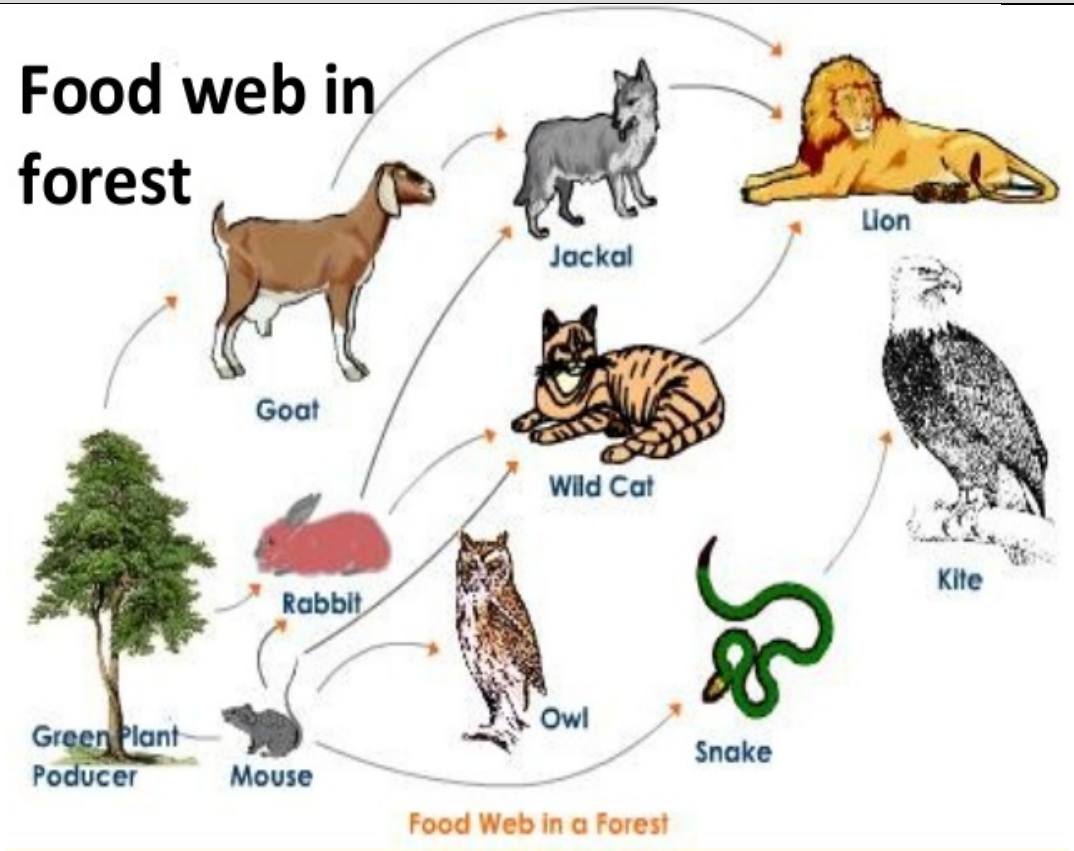
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | | Predicting | | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | ✓ | Planning Investigations | | | |



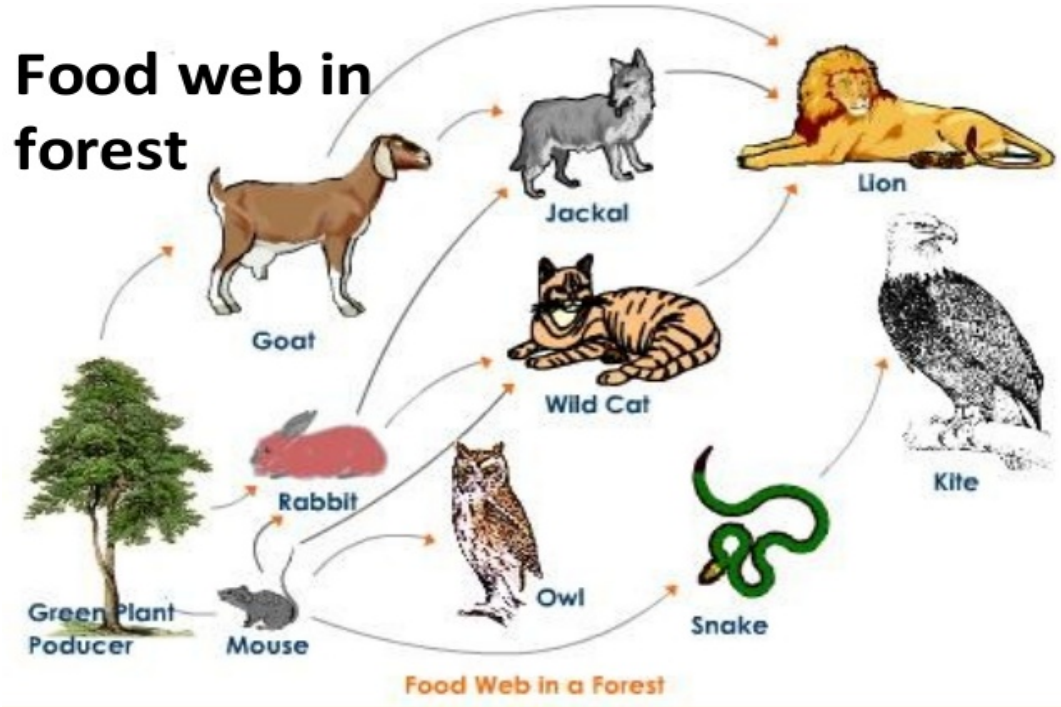
| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| **Transfer of energy in food from one organism to the other.** | Learners will work with the same food chains they developed the previous lesson.<br><br>They will have to identify animals that are feeding on the same kind of food. Such food chains will then be connected together to form a web.<br><br>The teacher may also draw food chains from the same organisms so as to discuss the food webs with the learners in the form of illustrations, e.g.<br><br>Frog, Bird, Owl, Grains, Lobster, Flower, Snake, Jackal, Grasshopper, Caterpillar, Waterlily, Seal, Cattle, Carrot, Greentree, Mice, Grass, Zebra, Lion, Fish, Limpet, Human, Algae, Rabbit, Fox. | • CAPS compliant textbooks and other resource materials.<br>• Siyavula workbook |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | Learners will be made to connect these food chains together to form a food web.<br><br>**A Food web**<br><br><br><br><br>Learners will then connect their own food chains in a similar manner to show that they have understood. | |
| **ASSESSMENT** | **Activity 1.**<br><br>1. Write down 3 food chains from the given food web. | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|




2. What does a food web show?
3. Name the producer in this food web?
4. List the herbivores in this food web.
5. Name two species in this food web that are top carnivores.

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | **Answers:**   | |

1. Possible answers:
   green plant, goat,jackal,lion / green plant,rabbit,jackal,lion / green plant,rabbit,wild cat,lion / green plant,mouse,owl,snake,kite

2. It shows how the different food chains are connected.
3. Green plant
4. Goat,rabbit,mouse
5. Lion and the kite

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | | |
| TEACHER REFLECTION | | |

| | |
|---|---|
| **DATE:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Interactions and interdependence within the environment.** | • To demonstrate an understanding on the knowledge of how some plants and animals are able to adapt to live in extreme environments |
| **SUB-TOPIC:** Adaptations | |

| | | |
|---|---|---|
| **KEY CONCEPTS** | **Adaptations, survival, extinct, camouflage, mimicry.** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | ✓ | Predicting | | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | |
| Sorting & Classifying | | Planning Investigations | | | |



| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| Adaptation of organisms for survival against the changing conditions within the environment.<br><br>Organisms becoming extinct. | Learners watch a video to get an exposure on the changes in behaviour, structure, functionally and physically for survival in their environment. https://www.youtube.com/watch?v=38dokLCg0sE<br><br>The teacher may also use pictures so that these changes are discussed with reference to them. For example the camel below and many others. | • CAPS compliant textbooks and other resource materials.<br>• Siyavula workbook<br>• https://www.youtube.com/watch?v=38dokLCg0sE<br>• https://www.youtube.com/watch?v=0X1NVIw1k6w |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br>Learners can brainstorm and discuss all they observe or a teacher can have a set of probing questions to help them discuss all changes associated with adaptation.<br><br>Learners will also be asked of the adaptations they experience in their daily lives, e.g. camouflage. | |
| **ASSESSMENT** | **Activity 1.**<br><br>1. Learners may select drawings or pictures of two different plants.<br>2. Describe the environment in which the plant grows.<br>3. How are these two plants adapted to live in their environment? | |
| | Answers:<br><br>Learner-centred answers. Teacher can use this activity as a research project or learners can present and discuss as a group in class. | |

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN**
**PERIOD: 2X30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE 8**
**STRAND: LIFE & LIVING**
**TERM 1**

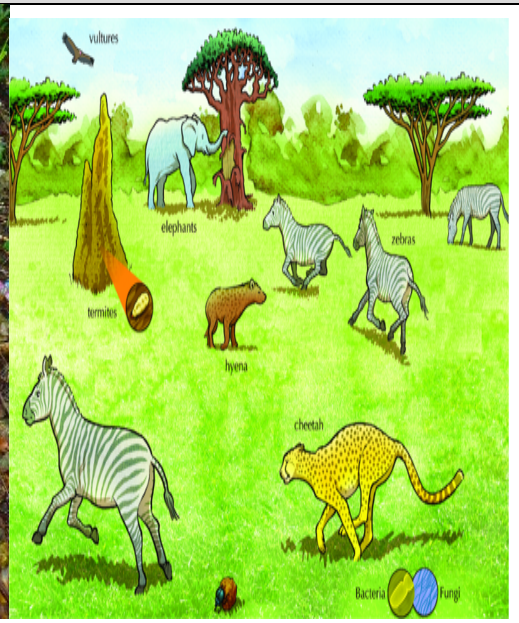
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
|---|---|
| | • Distinguished between natural and human factors causing an imbalance in the ecosystem.<br>• Evaluate the impact of various factors on the ecosystem<br>• Identify irresponsible human practices and to provide solutions |
| **TOPIC: Interactions and interdependence within the environment.** | |
| **SUB-TOPIC:** Balance in an ecosystem | |

| | | |
|---|---|---|
| **KEY CONCEPTS** | **Ecosystem** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | ✓ | Recording Information | ✓ |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| Natural and human factors and their contribution to an imbalance in an ecosystem | The teacher will provide the learners with the two sets of pictures showing the balanced and the imbalanced ecosystems. They will have to discuss these in their groups and present their findings to the whole class.    | • CAPS compliant textbooks and other resource materials.<br>• Siyavula workbook<br>• https://www.youtube.com/watch?v=EbL9t1wZ0AU<br>• https://www.youtube.com/watch?v=4xhCfvbe3jw |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| |    From their discussions they will derive the meaning and differences between balanced and imbalance. They will be exposed to natural and human factors. A number of factors will be discussed and explained by the teacher. | |
| **ASSESSMENT** | Write a paragraph to evaluate and explain what would happen to the ecosystem they had studied under the following situations:<br>1. A loss of habitat<br>2. A loss of species, e.g. if certain plants die out or if an animal species no longer lives in the ecosystem.<br>3. A change in weather or climate such as rainfall or temperature. | |

Possible Answers

There are many possible answers in this activity. Learners may be incredibly specific or they may prefer to answer generally. They can be creative with their suggestions. Below are some example answers, but learners may come up with many more: Environmental Issue Consequence Action

Inappropriate waste disposal: Air pollution

1) Harmful chemicals in the air cause a range of allergic and degenerative lung diseases as well as cardiovascular disease and many cancers.

2) Air pollution can also cause acid rain, which can destroy forests and poison lakes.



Support companies and products that use cleaner production methods. Do not use products known to cause pollution. Develop cleaner technologies.

Inappropriate waste disposal: Water pollution

Water pollution can be cause by factories or farms allowing their waste to run off into streams or water sources, or it can be caused by the accumulation of many people discarding their waste into rivers. This may cause the spread of disease or poison aquatic plants and animals.

Do not throw harmful chemicals down the drain or into rivers and streams. Support companies that dispose of their waste responsibly.

Inappropriate waste disposal: Landfills and littering

Litter builds up and can take many thousands of years to degrade. Due to inappropriate waste disposal, plastic is ending up in the oceans, and in many animals habitats. Animals who mistake litter for food often end up choking and dying.

Reduce, reuse and recycle wherever possible. Do not throw litter onto the ground. Look after your belongings so that they last longer. Purchase responsibly don't buy packaging that does not degrade (like polystyrene).

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO**<br>• **To understand the factors that lead to extinction** |
| **TOPIC: Interactions and interdependence within the environment.**<br>**SUB-TOPIC: Adaptations** | |
| **REFERENCES:** Sasol Inzalo workbook | |

| | | |
|---|---|---|
| **TERMINOLOGY:** | Adapt, Extinct | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | ✓ |
| Comparing | | Predicting | | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT AND CONCEPTS | TEACHING AND LEARNING ACTIVITIES | RESOURCES |
|---|---|---|
| **Organisms becoming extinct.** | 1. Teacher explains the following factors that can cause organisms to become extinct<br>• New diseases.<br>• New predators.<br>• New, more successful competitors.<br>• Changes to the environment over geological time - such as a change in climate.<br><br>2. Describe the environment in which the plant grows.<br>3. Label the different parts to describe the adaptations of the plant. | • CAPS compliant textbooks and other resource materials.<br>• Siyavula workbook |
| **ASSESSMENT** | Do activity 1 below. | |
| **TEACHER REFLECTION** | Progress | Challenges |



*The sun setting behind a baobab tree.*



*This baoba is over 3000 years old! Take note of its width and the reflective bark.*

1.Describe how the Baobab tree is adapted to its environment.

_____

_____

_____

_____

2.How does it protect the tree's fruit from the monkeys?

_____

_____

3.The flowers smell like rotting meat to attract bats, flies and moths at night. Why do you think the baobab tree needs to attract these animals to its flowers?

_____

_____

_____

Answers:

1.The Baobab tree survives in dry areas, since it stores water in the thick trunk and spongy wood. The smooth bark reflects heat, making it cooler

2.The slippery surface also helps prevent monkeys and other small animals from climbing up and eating its leaves and fruit!

3.The fruit bats come to feed on the flowers and the nectar and in turn they pollinate the baobab flowers

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN** **GRADE 8**
**PERIOD/DURATION: 30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: Interactions and interdependence within the environment.**<br>**Sub Topic: Conservation of the Ecosystem** | • **To demonstrate an understanding of the importance to maintain biodiversity.**<br>• **To sustain the use of natural resources**<br>• **To understand irresponsible human practices and to provide solutions** |

| | | |
|---|---|---|
| **TERMINOLOGY** | **Sustainable, conservation, aliens, environmentalist, indigenous, overgrazing, erosion** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | ✓ | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | ✓ |
| Comparing | | Predicting | ✓ | Interpreting Information | ✓ |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

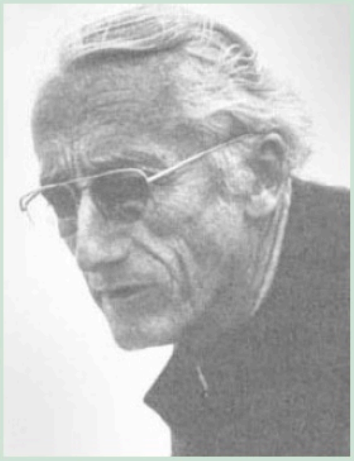
| CONTENT | TEACHING AND LEARNING ACTIVITY | Resources |
|---|---|---|
| Environmentalists and others work towards managing ecosystems, such as control of alien vegetation and preservation of wetlands. Individuals can contribute to conservation in various ways, such as appropriate waste disposal(including recycling, reusing) | The Teacher shows a video clip on undisturbed and disturbed natural resources:<br>https://www.youtube.com/watch?v=EbL9t1wZ0AU<br>https://www.youtube.com/watch?v=4xhCfvbe3jw<br><br>The videos will show the undisturbed natural resources, followed by a number of malpractices or uncontrolled disastrous happenings. Displaying ways in which everyone could own and protect the natural resources.<br><br>Learners could use their findings on the investigations done with the interaction between abiotic and biotic factors to get the meaning of renewable and non-renewable resources. A number of terms could be used to clarify from the previous investigations, e.g. aliens, indigenous, sustainable, conserving, etc.<br><br>The teacher may provide pictures of people or companies that have contributed to environmental conservation and awareness in some way for learners to research what they have done and reflect on how they could also make a difference. (Sasol Inzalo pg. 73) | • CAPS compliant textbooks and other resource materials.<br>• Sasol Inzalo workbook<br>• https://www.youtube.com/watch?v=EbL9t1wZ0AU<br>• https://www.youtube.com/watch?v=4xhCfvbe3jw<br>• English dictionary, Science dictionary |
| **ASSESSMENT** | Teacher gives learners a topic for a debate outlined on pg.73 of Sasol Inzalo workbook(LA) | |
| **TEACHER REFLECTION** | Progress: | Challenges: |



*Sir David Attenborough*



*Jane Goodall*



*Jacques Cousteau*



*Al Gore*

**Some other people to research include:**

- Wangari Mathai
- Lawrence Anthony
- Steve Irwin
- Diane Wilson
- Dian Fossey
- Ian Player

## ACTIVITY: Finding solutions to environmental problems

**INSTRUCTIONS:**

1. The following table is a list of environmental issues.
2. Do some research on air pollution, water pollution, landfills and climate change.

**INSTRUCTIONS:**

1. Write down the effect (consequence) of this issue on the ecosystem (or on humans). Write down a possible solution or a simple action that you can take to help.

| Environmental Issue | Consequence | Action |
|---|---|---|
| Inappropriate waste disposal: **Air pollution** | | |
| Inappropriate waste disposal: **Water pollution** | | |
| Inappropriate waste disposal: **Landfills and littering** | | |
| Carbon emissions and **climate change** | | |

## ACTIVITY: Why should we care?

**INSTRUCTIONS:**

1. Divide the class into two teams. One group supports environmental conservation and the other believes we should use all earth's resources as we like.
2. Both groups must research their topics beforehand and gather relevant points.
3. The teacher can lead the debate and ensure it proceeds in an orderly way.

**QUESTIONS:**

1. After the debate, write down 3 points about each viewpoint that you can remember.

Possible Answers:

There are many possible answers in this activity. Learners may be incredibly specific or they may prefer to answer generally. They can be creative with their suggestions. Below are some example answers, but learners may come up with many more.

Environmental Issue Consequence Action

Inappropriate waste disposal: Air pollution

1) Harmful chemicals in the air cause a range of allergic and degenerative lung diseases as well as cardiovascular disease and many cancers.

2) Air pollution can also cause acid rain, which can destroy forests and poison lakes.

Support companies and products that use cleaner production methods. Do not use products known to cause pollution. Develop cleaner technologies.

Inappropriate waste disposal: Water pollution



Water pollution can be cause by factories or farms allowing their waste to run off into streams or water sources, or it can be caused by the accumulation of many people discarding their waste into rivers. This may cause the spread of disease or poison aquatic plants and animals.

Do not throw harmful chemicals down the drain or into rivers and streams. Support companies that dispose of their waste responsibly.

Inappropriate waste disposal: Landfills and littering

Litter builds up and can take many thousands of years to degrade. Due to inappropriate waste disposal, plastic is ending up in the oceans, and in many animals habitats. Animals who mistake litter for food often end up choking and dying.

Reduce, reuse and recycle wherever possible. Do not throw litter onto the ground. Look after your belongings so that they last longer. Purchase responsibly don't buy packaging that does not degrade (like polystyrene). Carbon emissions and climate change

Excessive burning of fossil fuels is a type of air pollution that contributes to global warming and climate change. Climate change has an effect on habitats as animals and plants cannot adapt fast enough to the rapid changes in their habitats. This may result in many species going extinct.

Try to limit your use of electricity- switch off lights, put on more clothes instead of using a heater, turn off the geyser for some hours each day. Don't overfill the kettle. Use public transport. Share lifts and carpool. Don't drive excessively. Walk when you can. Use less plastic.

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN** **GRADE 8**
**PERIOD: 2X30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

| **DURATION:**<br>**TOPIC: Micro-organisms**<br>**SUB-TOPIC: Types of micro-organisms** | **OBJECTIVES: LEARNERS MUST BE ABLE TO**<br>• **Define micro-organisms**<br>• **Use a lens microscope to examine the small objects**<br>• **Examine and analyse micrographs**<br>• **Use the scale to calculate the size of the organisms** |
|---|---|

| | | |
|---|---|---|
| **KEY CONCEPTS** | **Micro-organisms, micrograph** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| **Accessing & recalling Information** | ✓ | **Identifying problems & issues** | | **Doing Investigations** | |
| **Observing** | ✓ | **Raising Questions** | | **Recording Information** | |
| **Comparing** | ✓ | **Predicting** | | **Interpreting Information** | |
| **Measuring** | | **Hypothesizing** | | **Communicating** | ✓ |
| **Sorting & Classifying** | | **Planning Investigations** | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| **Types of micro-organisms** | The teacher will provide the learners with the specimen of a bread mould she had prepared.<br><br>Learners will first use their naked eyes followed by the hand lenses to examine and record and draw their findings. The teacher will mount a specimen of the mould on the microscope if available. If not available they will use the micrographs or the bio viewers if they have.<br><br>Conclusions will be made from their findings leading to the part of the definition of the micro-organisms being that they are small to be seen by the naked eye.<br><br>The teacher should revise the classification of living organisms done in grade 7 where the first three groups (Bacteria, Protista and Fungi) were microscopic thus regarded as micro-organisms. Micro-organisms including the bread mould observed carry all processes involved in life. Therefore they are living organisms. | • Hand lenses<br>• Siyavula workbook<br>• Microscope<br>• Bio viewer<br>• Bread mould |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | These will be traced by the teacher together with the learners from the bread mould.<br><br>The teacher may use the activity on pg 91 of the Siyavula workbook or provide a worksheet on calculating the size of an organism using a scale bar. | |
| **ASSESSMENT** | **Activity 1.**<br><br>1. How would you define a micro-organism?<br>2. Give three groups of micro-organisms and one example for each.<br>3. Calculate the size of any given micro-organism. | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|
| | | |

Answers:

1. Microorganisms are extremely small living organisms.

   We say that we cannot see microorganisms with the 'naked eye' because they are too tiny to view without the aid of magnification

2. Bacteria - Tuberculosis

   Fungi - mushrooms

   Protists- Oxytricha trifallax

   Any other appropriate examples

3. How do you know the size of a microorganism? You will notice that many pictures of microorganisms have a scale bar. A scale bar is a very useful tool that allows us to calculate the actual size of objects

   INSTRUCTIONS:



1. Measure the length of Oxytricha trifallax using your ruler. (Express your answer in mm.) Learner-dependent answer. Note: The answer will depend on the format in which the image is viewed (printed, photocopied, online, etc.) and the exact point that learners choose for the start and end of the organism. A small amount of variability is expected.

2. Measure the length of the scale bar with your ruler. (Express your answer in mm.) Learner-dependent answer Note: This will depend on the format in which the image is viewed (printed, photocopied, online, etc.)

3. Divide the size of the object (in mm) by the size of the scale bar (in mm) and round off. Your answer will be a ratio and will not have units, since you divided mm by mm. The answer should be approximately 3. Note: The ratio should be constant no matter what size the image was printed! This is the power of using a scale bar. Encourage learners to round-off their answers to one decimal point in order to make their calculations easier. You can discuss with the class why learners may have slightly different answers.

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Micro-organisms** | • **Demonstrate an understanding of diseases caused by micro-organisms** |
| **SUB-TOPIC: Harmful micro-organisms** | • **Write about the effects, symptoms and treatment of the diseases caused by micro-organisms.**<br>• **Examine and analyse micrographs** |

| | | |
|---|---|---|
| **KEY CONCEPTS** | **Pathogens, microbes, diseases, transmission, infectious, contaminated** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | Identifying problems & issues | | Doing Investigations | |
| Observing | ✓ | Raising Questions | | Recording Information | |
| Comparing | ✓ | Predicting | ✓ | Interpreting Information | |
| Measuring | | Hypothesizing | | Communicating | ✓ |
| Sorting & Classifying | | Planning Investigations | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| **Disease-causing micro-organisms and the effective ways to prevent the spread of diseases** | The teacher will share pictures of different diseases to learners so that they are aware of the common ones and can trace them back to their main groups, e.g.<br> | • https://www.youtube.com/watch?v=OShyfL078KoSiyavula workbook<br>• Pictures of the fungus-casing disease<br>• Picture for the effect of eating food-laden with bacteria<br>• |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br><br>Learners could watch a video on disease-causing micro-organisms; how they enter the body of the living organism, what could be their cause and how they could be prevented.<br><br>https://www.youtube.com/watch?v=OShyfL078Ko<br><br>The video also discusses the symptoms and the treatment thereof.<br><br>Discussions and clarifications of all the concepts will be done as both the learners and the teacher engage each other as they watch the video and or observe the pictures. | |
| **ASSESSMENT** | **Activity 1.**<br><br>1. Learners will be divided in groups to research on a given disease caused by micro-organisms. They will be expected to interview nurses from different Health Care centres and to include pamphlets with causes, effects, symptoms and treatment of the given disease. The teacher will allocate different diseases to different groups. | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|
| | | |

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Micro-organisms** | • **Demonstrate an understanding of different cultural and historical beliefs about diseases caused by micro-organisms** |
| **SUB-TOPIC: Harmful micro-organisms** | |

| | | |
|---|---|---|
| **KEY CONCEPTS** | **Cultural differences** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| **Accessing & recalling Information** | ✓ | **Identifying problems & issues** | | **Doing Investigations** | |
| **Observing** | ✓ | **Raising Questions** | | **Recording Information** | |
| **Comparing** | ✓ | **Predicting** | ✓ | **Interpreting Information** | |
| **Measuring** | | **Hypothesizing** | | **Communicating** | ✓ |
| **Sorting & Classifying** | | **Planning Investigations** | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| **Cultural and historical beliefs about diseases caused by micro-organisms** | The teacher will send learners to interview elderly people of different cultures from their homes or community about cultural and historical beliefs on disease caused by micro-organisms.<br><br>Discussions will be held in class. The teacher will control and direct the discussions and ensure that learners respect one another and every learner's opinion is equally represented.<br><br>Different case studies can be used as references of local traditional healing. Other forms of alternative medicine could be discussed. | Information from interviews. |
| **ASSESSMENT** | **Activity** | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES GR 8: INTERDEPENDANCE LESSON PLAN** **GRADE 8**
**PERIOD: 2X30 MINUTES** **STRAND: LIFE & LIVING**
**CAPS SENIOR PHASE** **TERM 1**

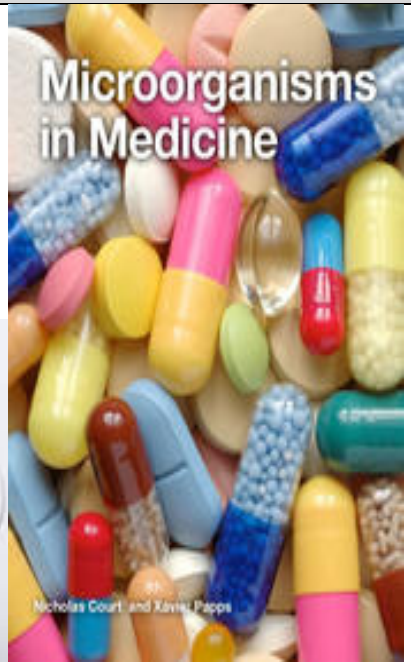
| | |
|---|---|
| **DATE:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO** |
| **TOPIC: Micro-organisms** | • **Demonstrate an understanding of the role played by useful micro-organisms in life, e.g. soil, food and medicine** |
| **SUB-TOPIC: Useful micro-organisms** | • **Demonstrate an understanding of the optimum growth of yeast** |

| | | |
|---|---|---|
| **KEY CONCEPTS** | | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | |
|---|---|---|---|---|---|
| **Accessing & recalling Information** | ✓ | **Identifying problems & issues** | | **Doing Investigations** | |
| **Observing** | ✓ | **Raising Questions** | | **Recording Information** | |
| **Comparing** | ✓ | **Predicting** | ✓ | **Interpreting Information** | |
| **Measuring** | | **Hypothesizing** | | **Communicating** | ✓ |
| **Sorting & Classifying** | | **Planning Investigations** | | | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| **Useful micro-organisms in the recycling of nutrients in the soil and the making of certain food and medicine** | Learners may be taken back to the study on feeding relationships where micro-organisms played a role in the recycling of nutrients in the soil.<br><br>The teacher may bring containers of yoghurt in class for learners to be aware of the confirming labels about “live cultures”- meaning bacteria are present in yoghurt.<br><br>Micro-organisms in antibiotics help to fight diseases. | • Siyavula workbook<br>• Worksheet on the investigation for the optimum growth conditions of yeast |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| |   | |
| **ASSESSMENT** | **Activity 1.**<br><br>1. Learners will work on the investigation on the growth of yeast as a micro-organism to find out the optimum growth conditions of yeast.<br>The teacher may also design a worksheet on the investigation for learners ensuring that learners are given the report to write on the investigation.<br><br>INVESTIGATION: Investigating the growth of yeast<br><br>You will conduct an investigations to determine the optimal conditions for yeast to grow.<br>• You will measure what sugar concentrations are necessary for yeast to grow best. You will receive some guidance and help with this part.<br>• You will be required to plan, conduct and collect data from the investigation on your own. | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | Yeast growth in different sugar concentrations<br>AIM:<br>INVESTIGATIVE QUESTION:<br>HYPOTHESIS:<br>MATERIALS AND APPARATUS:<br><br>TAKE NOTE There are different kinds of yeasts. The one we are using breaks down sugar in dough. Others breakdown wood and cornstalks and produce ethanol (alcohol) while another breaks down the sugar in fruits, nectar, molasses or sorghum.<br>• 6 balloons<br>• 14 grams (2 packets) of dry yeast<br>• white sugar • mass scale<br>• funnel • 6 x 50 cm string<br>• 2 - 50 ml graduated cylinders<br>• 600 ml beaker<br>• overflow pan<br>• permanent markers • ice packs<br><br>METHOD:<br>1. Work in groups of four.<br>2. Use the permanent marker to label each balloon A, B, C, D, E and F.<br>3. Each balloon will need to be filled with 2 g of yeast and a different quantity of sugar. Balloon A will need to get 2 g of sugar, B will get 3 g of sugar, C will get 4 g of sugar and so on. (See the table below.) Use a plastic spoon or spatula to place the yeast and sugar into the balloon.<br>4. Use a funnel and pour 50 ml lukewarm tap water into each balloon.<br>5. One person should hold the balloon and funnel while the other pours in the water.<br>6. As soon as the balloon has been filled, take a piece of string and tie off the balloon as close as possible to the level of the water without trapping any air.<br>7. Knot the balloon's rubber neck to ensure that no air can get in or water can get out.<br>8. Place each prepared balloon on ice to prevent the fermentation process from starting.<br>9. Before you allow the fermentation process to start, you need to determine the starting mass and volume of each balloon.<br>10. MASS: Determine the mass of the tied balloon to the nearest 2 decimal places. Return it to the ice.<br>11. VOLUME: Use the water displacement method to determine the volume of the balloon. a) Place water in a large jug level with the top of the jug. b) Completely submerge the balloon under the water in the jug: push the balloon and allow the water to flow over the sides into the overflow pan. You should stop when your fingers touch the water. | |

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|

c) The water in the overflow plan is therefore the volume of water that the balloon displaced. d) Carefully measure the water in the overflow pan. Record your measurements in the table below. e) Return the balloon to the ice as soon as possible.
12. PREPARE FOAM COOLER BOX: You are going to place the balloons inside a foam cooler box with warm water in (the box should keep the water warm). Pour 40 oC water into the cooler box (as it normally cools down quite quickly).
13. FERMENTATION INCUBATION: You are now ready to start the process of incubating the yeast. a) Place each balloon into the warm water. b) Record which balloons sink and which float. c) Leave the balloons in the warm water for 20 - 30 minutes during which time the yeast will ferment the sugar. d) Record the exact time that you used for incubation: minutes.

14. AFTER INCUBATION: Use a paper towel to dry the balloons. a) Determine the volume of each balloon. b) Determine the mass of each balloon.
Tip: It is really important that you work fast and accurately at this point. Your team should really consider letting one pair determine the mass and the other the volume of each balloon.
15. Calculate what changes (if any) occurred during incubation to the mass and volume of each balloon.
16. Hang your balloon on a clothesline or hanger in the class to dry.
17. Clean up your work area and wash, dry and pack away all equipment that you used.
18. THREE DAYS LATER: remove your balloons from the clothes line / hanger. Record all observations that you can make - remember to use ALL your senses.
19. Use the same methods to determine the mass and volume of each balloon and record this on the table.
20. AFTER measuring the mass and volume of each balloon, carefully cut it open. Make careful notes to describe your observations of the contents of each balloon.
21. Use your table of measurements to draw a graph.

RESULTS AND OBSERVATIONS:
Complete the table with the correct information obtained from your work.

| Balloon | Yeast (g) | Sugar (g) | Balloon mass before fermentation (g) | Balloon volume before fermentation (g) | Sink / Float | Balloon volume after fermentation (g) | Balloon mass after fermentation (g) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |

1. Describe the changes that you observed happening in your balloons from the start to the end of the incubation

| CONTENT | ACTIVITIES | RESOURCES |
|---|---|---|
| | period.<br><br>2. Were the changes the same in each balloon?<br><br>3. Explain why you think these changes occurred differently in the contents of each of your balloons.<br><br>4. How did you expect the balloons to react after 3 days?<br><br>5. Describe how each of the balloons actually looked after the 3 days.<br><br>6. Provide a possible explanation for your observations. Think for instance of what could possibly have been lost from the balloons.<br><br>7. At the start you added yeast, sugar granules and water. Describe how the contents of each of the balloons looked at the end of the investigation. | |

| | | |
|---|---|---|
| **TEACHER REFLECTION** | Progress | Challenges |

INVESTIGATION: Investigating the growth of yeast

You will conduct an investigations to determine the optimal conditions for yeast to grow.

• You will measure what sugar concentrations are necessary for yeast to grow best. You will receive some guidance and help with this part.

• You will be required to plan, conduct and collect data from the investigation on your own.

TEACHER'S NOTE

Learners will investigate the conditions necessary for optimal yeast growth or fermentation. As learners have been exposed to similar investigations in this strand it is less guided as previous investigations.

• This investigation should run over two periods. There should be at least 2 / 3 days between these periods. • The investigation will be done according to the scientific method • The activity works well with packets of dry yeast that are readily available from supermarkets. • The first part of the investigation will determine the sugar concentration needed for the yeast to grow and learners will receive more guidance. • The second part will require learners to plan and execute their own investigation to determine the optimal temperature at which the yeast will grow. • Teachers may therefore choose to use this for an informal practical assessment mark. • This lesson may be used for a cooperative learning task where the two pairs of learners within the team of 4 could be tasked to work independently to complete different tasks and complete the mass and volume measurements. Teachers should if possible encourage this as it also minimises the use of apparatus and scales. • If overflow pans are not available you can also use cake pans or foil pans that are readily available from supermarkets.



Part 1: Yeast growth in different sugar concentrations

AIM:

To determine the effect of different concentrations of sugar on the rate at which yeast grows.

INVESTIGATIVE QUESTION:

Which concentration of sugar is best for yeast growth?

HYPOTHESIS:

Learners should be able to explain that the yeast will use the sugar as a food source and produce carbon dioxide.

Answers:

1. Describe the changes that you observed happening in your balloons from the start to the end of the incubation period.

   *The answer would depend on the results from the investigation but learners should be able to say that the balloons filled up and became bigger (some more than others).*

2. Were the changes the same in each balloon?

   *The answer would depend on the results from the investigation but they should be able to observe that the balloons with the small amount of sugar only increased a little bit but the ones with more sugar in increased more in size.*

3. Explain why you think these changes occurred differently in the contents of each of your balloons.

   *The answer would depend on the results from the investigation but learners should be able to say that the balloons with a greater concentration sugar were able to ferment more quickly or for a longer time than the ones with a smaller concentration of sugar.*

4. How did you expect the balloons to react after 3 days?

   *Learner-dependent answer. Learners might indicate that they thought the balloons would just continue blowing up / increasing in size, or they may have hypothesise that once the sugar was used up the balloons would stay the same size (or even decrease).*

5. Describe how each of the balloons actually looked after the 3 days.

   *The answer would depend on the results from the investigation but in most cases the balloons should have decreased in size.*

6. Provide a possible explanation for your observations. Think for instance of what could possibly have been lost from the balloons.

   *The answer would depend on the results from the investigation but learners should be able to conclude that the sugar in the solution has all been used, so no new carbon dioxide was being made, and the carbon dioxide in the balloons slowly began to escape through the walls of the balloon.*

7. At the start you added yeast, sugar granules and water. Describe how the contents of each of the balloons looked at the end of the investigation.

   *The answer would depend on the results from the investigation but learners should be able to describe the light brown fizzy contents that has a distinct sour smell and flavour*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Atoms – building blocks of matter | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Learners will be able to define the term atom.<br>2. Learners will be able to define what an element is<br>3. Learners will be to display understanding that different elements are made of different atoms. |

| | | |
|---|---|---|
| **REFERENCES** | CAPS page 40<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Matter , atom, element, | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Atoms – building blocks of matter**<br>All matter is made up of tiny particles called atoms.<br>An element is made up of atoms of the same kind. For example all the atoms of an element, such as copper, are identical.<br>An element is a substance that cannot be broken down into two or more substances by chemical means (An element cannot be changed into another element by means of a chemical reaction)<br>Atoms of one element differ from the atoms of all other Elements.<br>All known elements are listed on the Periodic Table of the Elements | 1. Revise the concept of matter by asking the following questions.<br>a. What is matter?<br>b. Give three example of matter<br>c. How is matter classified?<br>2. Explain that matter is made up of tiny particles atoms called atoms<br>3. An element is made up of atoms of the same kind e.g. copper, iron, wood, zinc etc.<br>4. An element is a substance that cannot be broken down into two or more substances by chemical means.( an element cannot be changed into another element by means of a chemical reaction<br>5. All known elements are listed in the periodic table of elements<br>6. Use the periodic table of elements to show learners the first 20 elements The Periodic Table (Explained) - https://youtu.be/72vwtrJxUTY | Sasol Inzalo workbook<br>internet |

| | | |
|---|---|---|
| **ASSESSMENT** | a. Explain what an atom is.<br>b. Define an element.<br>c. Give three examples of elements | |
| **TEACHER REFLECTION** | Progress: | Challenges: |



Answers : a) An atom is the fundamental building block of matter. b) An element is a substance that cannot be broken down into simpler substances.

c) Any three elements from the Periodic Table of Elements

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

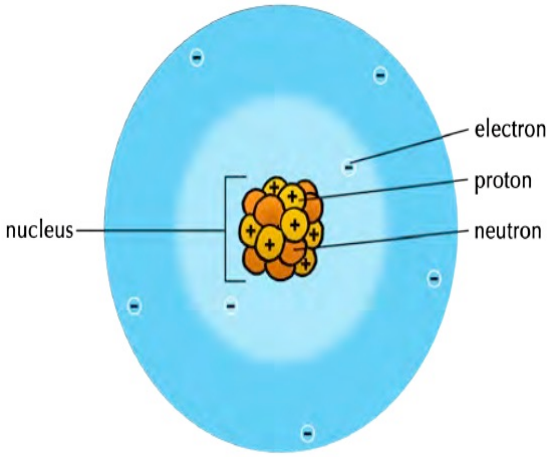
| | |
|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Sub atomic particles | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Explain concepts protons, neutrons, electrons and nucleus<br>2. To draw and label a model of an atom.<br>3. Explain why atom are neutral. |

| | | |
|---|---|---|
| **REFERENCES** | CAPS page 40<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Protons, electrons, nucleus, neutrons | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | √ |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | √ | | Raising Questions | | | Recording Information | | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | | |
|---|---|---|
| **Sub atomic particles**<br>Atoms are made up of smaller sub-atomic particles (protons, neutrons and electrons)<br>The central region of the atom is called the nucleus.<br>The nucleus is made up of positively charged particles called protons and neutral particles called neutrons.<br>Negatively charged particles called electrons move around the nucleus.<br>Atoms are neutral because the number of negatively charged particles (electrons) is equal to the number of positively charged particles (protons). | 1. Recap on the following terms Atom and Element<br>2. Scientists discovered that all atoms are made up of three different kinds of sub-atomic particles namely electrons, protons and neutrons<br>3. Use the following model of an atom to show how the three sub particles are arranged.<br><br><br>4. The central region of the atom is called the nucleus<br>5. The nucleus i.e. made up of two sub particles i.e. neutrons and the protons.<br>6. The neutron has a neutral charge, the protons are positively charged and the electrons are negatively charged<br>7. The electrons move around the nucleus.<br>8. The neutrons together with protons form the tightly packed nucleus at the centre of the atom<br>9. Atoms are neutrally charged because the number of negatively charged electrons is equal to the number of positively charged protons. | Sasol Inzalo workbook 8A |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | | |
|---|---|---|
| **ASSESSMENT** | 1. Define the following terms:<br>a. Protons<br>b. Electrons<br>c. Neutrons<br><br>2. Explain why atoms are neutral.<br>3. Draw and label a model of Boron. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**Answers:**

1a) Protons are particles that are positively charge
b) Electrons are particles that are negatively charge
c) Neutrons are particles that are neither positive or negatively charge/ zero charged particles

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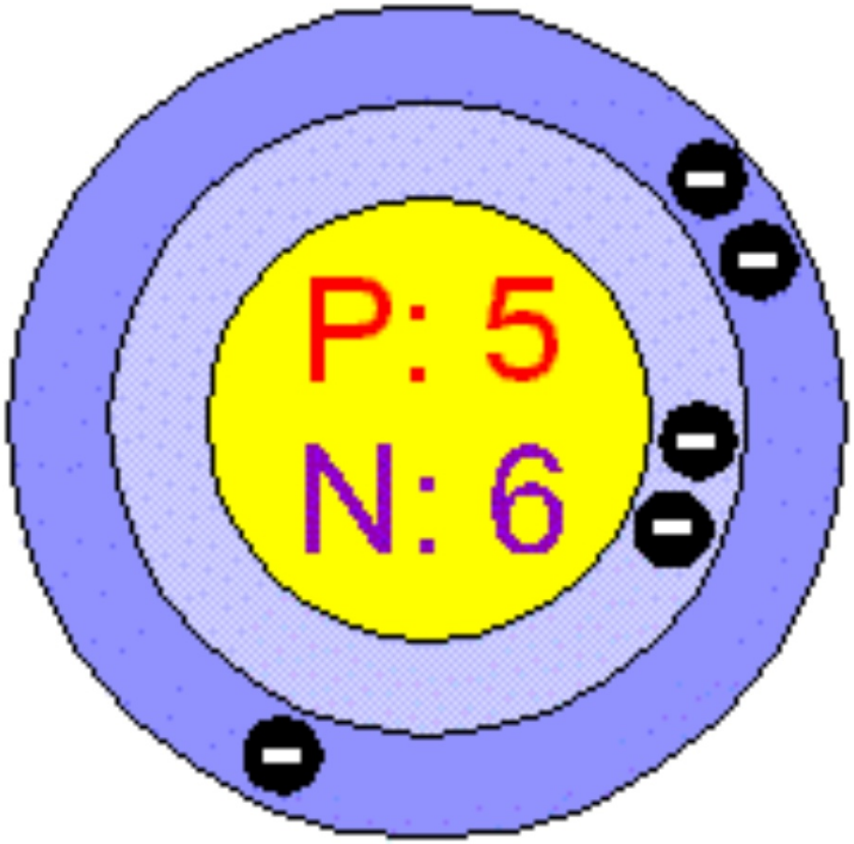


**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Sub atomic particles | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Make a model of an atom using resources listed.<br>2. Determine the number of protons of each element. |

| | | |
|---|---|---|
| **REFERENCES** | CAPS page 40<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Proton, electron, neutron, nucleus | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | √ | | Raising Questions | | | Recording Information | | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Sub atomic particles**<br>Atoms are made up of smaller sub-atomic particles (protons, neutrons and electrons)<br>The central region of the atom is called the nucleus.<br>The nucleus is made up of positively charged particles called protons and neutral particles called neutrons.<br>Negatively charged particles called electrons they move around the nucleus.<br>Atoms are neutral because the number of negatively charged particles (electrons) is equal to the number of positively charged particles (protons) | 1. Recap the previous lesson by asking learners to define following terms:<br>a) Protons<br>b) Electrons<br>c) Neutrons<br>d) Nucleus<br>2. Emphasize that each element consists of indivisible, minute particles called atoms.<br>3. All atoms of a given element are identical.<br>4. Atoms of different elements have different masses.<br>5. Each element of the periodic element has its own type of atom<br>6. The atomic number of each element is equal to the number of protons<br>7. Use the following (Beads/ dried lentils, or dried peas, Paper plates, glue) materials to show learners how to build the atom of the element that they have drawn in the previous lesson | Sasol Inzalo workbook<br>- Beads/dried lentils/peas<br>- Play dough<br>- Paper plates<br>- Glue |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **ASSESSMENT** | Use the following materials to build an atomic model of an element.<br><br>MATERIALS :<br>• glue<br>• paper plate<br>• play dough, beads, dried lentils or peas,<br><br>INSTRUCTIONS:<br>1. Choose any one from the list of the first 20 elements from the Periodic Table.<br>2. What is the atomic number of your element?<br>3. How many protons will you need to make for your atom?<br>4. Now decide what objects you will use to create the subatomic particles in your model.<br>5. Stick these onto the paper plate and provide labels.<br>6. After you have built your model, draw a model with labels of your atom below. | |

| | | |
|---|---|---|
| **TEACHER REFLECTION** | Progress: | Challenges: |

Answers:

1. After reading the information about atoms, your teacher will give you an element of which you have to build a model. What is the name of your element?
   ***Learner-dependent answer***

**2.** What is the atomic number of your element?
***Learner-dependent answer*.**

3. How many protons will you need to make for your atom?
   ***Learner-dependent answer. This must be the same as the atomic number*.**
4. Now decide what objects you will use to create the subatomic particles in your model.
5. Stick these onto the paper plate and provide labels.
   ***Learners must label the element they are doing, as well as the electrons, protons, neutrons and the nucleus.***
6. **After you have built your model, draw a model of your atom**
   ***Provide labels. These are both models of your atom***

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Pure substances | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Identify elements in a Periodic Table<br>2. Define element, molecules and diatomic molecules giving examples.<br>3. Describe pure substances : elements and compounds in terms of the atoms making them |

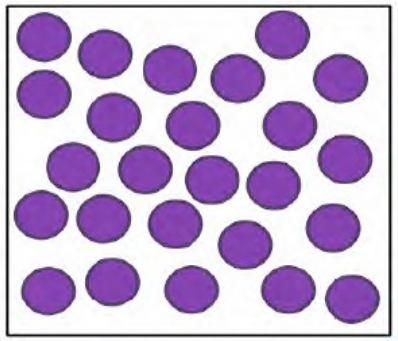
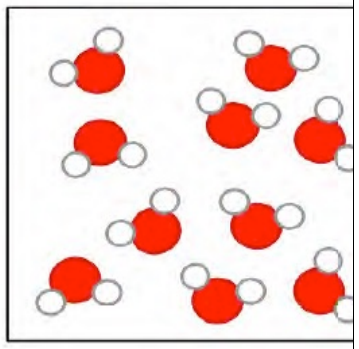
| | | |
|---|---|---|
| **REFERENCES** | CAPS page 41<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Elements, molecules, compounds, diatomic molecules | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | √ | | Raising Questions | | | Recording Information | | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

<table>
<tr>
<td>Pure substances<br>• Elements and compounds are pure substances<br>Elements<br>• An element is a material that consists of atoms of only one kind, such as hydrogen (H), oxygen (O), carbon (C), sodium (Na) and chlorine (Cl)<br>• All known elements are listed on the Periodic Table of Elements.<br>They are limited in number and are the building blocks of millions of compounds<br>• Some elements on the Periodic Table of Elements form diatomic molecules for example hydrogen (H2), nitrogen (N2), oxygen (O2), chlorine (Cl2).<br>• Sometimes atoms react together chemically to form molecules of compounds (such as $H_2O$, $CO_2$)</td>
<td>Recap the previous lesson by a game in the following link :<br>https://phet.colorado.edu/en/simulation/legacy/build-an-atom<br><br>1. Ask learners to look up for the meaning of the key concepts, elements, molecules, diatomic molecules and compounds<br>2. Use the periodic table of element to describe an element as a material that consist of only one kind of atoms eg Hydrogen ( H), Oxygen (O) and Chlorine ( Cl)<br>3. Elements are limited in number therefore they are used as building blocks of many other compounds.<br>4. The word ‘di’ means two therefore diatomic means two atoms chemically bonded. Thereby forming a diatomic molecule e.g. ( Nitrogen ($N_2$), Oxygen ($O_2$) chlorine ($Cl_2$) and Hydrogen ($H_2$)<br>5. Use the link to build the molecules https://phet.colorado.edu/en/simulation/legacy/build-a-molecule#<br>6.<br><br>An element consists of atoms that are all the same kind.<br><br>A compound consists of two or more of atoms in a fixed ratio.</td>
<td>• Play dough<br>• Paper plate<br>• Glue<br>• Beads, dried lentils/ peas<br>• Internet</td>
</tr>
<tr>
<td>ASSESSMENT</td>
<td colspan="2">1. Learners are then given available resources ( polystyrene balls/ play dough with different colours to make models of H2, N2, $CO_2$ to demonstrate their understanding</td>
</tr>
</table>

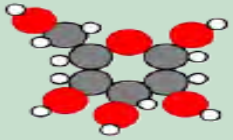
Let's make sure we understand the difference between atoms and molecules.

**QUESTIONS:**

1. Look at the following diagrams. Decide whether each represents an atom or a molecule. If it is a molecule, state how many atoms make up the molecule.

| Diagram | Atom or molecule? |
|---|---|
|  | |
|  | |
|  | |
|  | |
|  | |

2. Look at the following complex molecule.



a) How many atoms make up this molecule?

_____

b) How many different types of atoms make up this molecule?

_____

| **TEACHER REFLECTION** | Progress: | Challenges: |
|---|---|---|

**Answers:**



1. Decide whether each represents an atom or a molecule. If it is a molecule, state how many atoms make up the molecule.

| **Atom or a Molecule** |
|---|
| *An atom* |
| *A molecule of 2 atoms* |
| *A molecule of 4 atoms* |
| *An atom* |
| *A molecule of 9 atoms* |

2a) How many atoms make up this molecule?
*24 atoms.*

b) How many different types of atoms make up this molecule?
*3 different types of atoms make up this molecule.*

c) What holds the atoms together in this molecule?
*There are chemical bonds between the atoms.*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

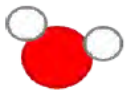
| | |
|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Compounds | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Explain the meaning of a compound.<br>2. Explain the chemical bond in a compound.<br>3. Mention that compounds are formed by a chemical reaction.<br>4. Write down the names and the chemical formula of the simple compounds. |

| | | |
|---|---|---|
| **REFERENCES** | CAPS page 41<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Compounds, , chemical bond , fixed ratio, decomposition | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | √ | | Raising Questions | | | Recording Information | √ | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

<table>
<tr>
<td>Compounds<br>• A compound is a material that consists of atoms of two or more different elements chemically bonded together, such as water ($H_2O$), carbon dioxide (CO2), salt (NaCl)<br>• The atoms in a given compound are always combined/bonded in a fixed ratio such as, in water, where the ratio is always two hydrogen atoms (H) to one oxygen atom (O)<br>• A chemical bond is the force that holds atoms together.<br>• Compounds [such as water ($H_2O$), carbon dioxide ($CO_2$), salt (NaCl)] are formed by chemical reactions</td>
<td>1. Recap the previous lesson by asking the learners to do the following<br>a) Define an element and a compound<br>b) Give one example of a compound and an element.<br>c) Draw a model of each of the examples that you have given<br>2. A chemical bond is force that holds atoms together.<br>3. Compounds are formed by chemical reactions and can be broken down.<br>4. Atoms in a given compound occur in a specific ratio .e.g. the ratio of hydrogen atoms to oxygen atom in water ($H_2O$) is 2:1 [ 2 hydrogen: 1 oxygen]<br>5. The teacher does the following to show learners.<br><br>
<table>
<tr><th>Name of substance</th><th>Chemical formula</th><th>What it is made of?</th><th>What would a molecule of this compound look like (if we could see it)?</th></tr>
<tr><td>Water</td><td>$H_2O$</td><td>Two H atoms and one O atom</td><td></td></tr>
</table>
</td>
<td>Sasol Inzalo workbook</td>
</tr>
<tr>
<td>ASSESSMENT</td>
<td></td>
<td></td>
</tr>
</table>

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| Name of substance | Chemical formula | What it is made of? | What would a molecule of this compound look like (if we could see it)? |
|---|---|---|---|
| Water | $H_2O$ | Two H atoms and one O atom |  |
| Carbon dioxide | $CO_2$ | | |
| Sulfur dioxide | | |  |
| Dihydrogen sulfide | $H_2S$ | | |
| Ammonia | | One N atom and three H atoms | |
| Oxygen gas | | Two O atoms | |
| Nitrogen gas | $N_2$ | | |
| Chlorine gas | | |  |
| Hydrogen gas | | Two H atoms | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|
| | | |

| Name of substance | Chemical formula | Chemical formula<br>What it is made of? | What would a molecule of this compound look like (if we could see it)? |
|---|---|---|---|
| Carbon dioxide | $CO_2$ | Two O atoms and one C atom | |
| Sulfur dioxide | $SO_2$ | Two O atoms and one S atom | |
| Dihydrogen sulfide | $H_2S$ | Two H atoms and one S atom | |
| Ammonia | $NH_3$ | One N atom and three H atoms | |
| Oxygen gas | $O_2$ | Two O atoms | |
| | | | |
| | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Compounds | **OBJECTIVES: LEARNERS MUST BE ABLE TO**:<br>1. Explain the that atoms of given compounds occur in fixed ratios<br>2. Explain the term decomposition |
| **REFERENCES** | CAPS page 41<br>Sasol Inzalo workbook Gr.8A |
| **TERMINOLOGY:** | Compounds, decomposition, heating, electrolysis |
| **SPECIFIC AIMS** | 1. DOING SCIENCE √<br>2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS √<br>3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | √ | | Raising Questions | | | Recording Information | √ | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Compounds**<br>• Compounds can be broken down in a decomposition reaction into other compounds or their original elements by heating or electrolysis. For example, electrolysis decomposes water ($H_2O$) to form hydrogen ($H_2$) and oxygen ($O_2$) | 1. Recap the previous lesson by asking the learners to do the following<br>d) Define an element and compound<br>e) Give one example of a compound and an element<br>f) Draw a model of each of the examples that you have given<br>2. A chemical bond is a force that holds atoms together<br>3. Compounds are formed by chemical reactions and can be broken down.<br>4. Atoms in a given compound occur in a specific ratio .e.g. the ratio of hydrogen atoms to oxygen atom in water ($H_2O$) is 2:1 [ 2 hydrogen: 1 oxygen]<br>5. The learners do the following activity from Sasol Inzalo workbooks page 137 -138<br>6. Show leaners a video for test of oxygen<br>7. https://youtu.be/UkADcJcPhuE | • Sasol Inzalo workbook<br>• Placticine/ Play dough in different colours |

**MATERIALS:**

- play dough or plasticine clay in two different colours

**INSTRUCTIONS:**

1. Build two water molecules from the clay or play dough. Look at the previous pictures to remind you what a water molecule looks like. You may use any colour clay to build yours.
2. Now break all the bonds holding the molecules together, separating them into individual atoms.
3. Answer the following questions:
   a) How many hydrogen (H) atoms do you have?

   b) How many oxygen (O) atoms do you have?

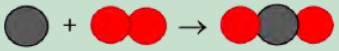
4. Combine the hydrogen and oxygen atoms into hydrogen molecules ($H_2$) and oxygen molecules ($O_2$).
5. Answer the following questions:
   a) How many hydrogen molecules could you build from the H atoms?

   b) How many oxygen molecules could you build from the O atoms?

6. Can you write a chemical equation for the reaction that you have just built with the clay models? Look at the diagram for inspiration:



7. Let us look at another example of a chemical reaction: the reaction when carbon (in coal) reacts with oxygen (in the air) to form carbon dioxide:



You can use the play dough balls to simulate this reaction.

**ASSESSMENT**

| | | |
|---|---|---|
| | a) Try to write a chemical equation for the reaction when carbon and oxygen combine to form carbon dioxide. (Hint: Use the diagram to guide you.)<br><br>b) How do the atoms in coal and oxygen rearrange to form carbon dioxide? Which bond breaks?<br><br>c) What new bonds form? | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

1. Build two water molecules from the clay or play dough. Look at the previous pictures to remind you what a water molecule looks like. You may use any colour clay to build yours.

2. Now break all the bonds holding the molecules together, separating them into individual atoms.

3. Answer the following questions:
a) How many hydrogen (H) atoms do you have? *Four H atoms.*
b) How many oxygen (O) atoms do you have? *Two O atoms.*

4. Combine the hydrogen and oxygen atoms into hydrogen molecules (H2) and oxygen molecules (O2).

5. Answer the following questions:
a) How many hydrogen molecules could you build from the H atoms? *Two hydrogen molecules (H2) could be made from four H atoms.*
b) How many oxygen molecules could you build from the O atoms? *One oxygen molecule (O2) could be made from two O atoms.*



6. Can you write a chemical equation for the reaction that you have just built with the clay models? Look at the diagram for inspiration:

   $2\ H_2O \rightarrow 2\ H_2 + O_2$

   a) Try to write a chemical equation for the reaction when carbon and oxygen combine to form carbon dioxide. (Hint: Use the diagram to guide you.)
   $C + O_2 \rightarrow CO_2$

   b) How do the atoms in coal and oxygen rearrange to form carbon dioxide? Which bond breaks?
   *The bond between the two oxygen atoms breaks.*

   c) What new bonds form?
   *Two new carbon-oxygen bonds form when carbon dioxide is made*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

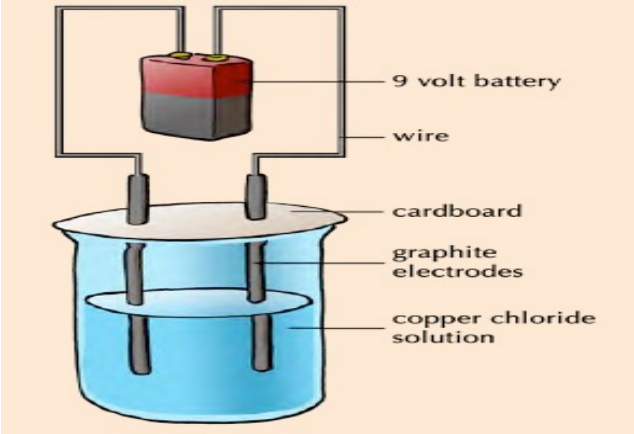
**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Compounds | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Define what electrolysis is.<br>2. Display an understanding that compounds can be broken down by electricity.<br>3. Write conclusion for the experiment. | |
| **REFERENCES** | CAPS page 41<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Electrolysis, decomposition, | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | √ | | Raising Questions | | | Recording Information | √ | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Compounds**<br>• Compounds can be broken down in a decomposition reaction into other compounds or their original elements by heating or electrolysis. For example, electrolysis decomposes water (CuCl2) to form copper (Cu) and chlorine ($Cl_2$) | 1. Divide learners into manageable groups.<br>2. Allocated each group apparatus and assist in setting up the experiment as the picture below<br><br><br>3. Answer the following questions<br>a). After the reaction had proceeded for a few minutes, what do you observe on the surface of the two electrodes?<br>b). At the end of the experiment, what colour was the copper chloride?<br>c) How did the appearance of the graphite electrodes change?<br><br>Answers:<br>a) The one electrode is covered in small bubbles, and the other is turning brown.<br><br>b) the solution is still blue<br><br>c)One electrode is still dark grey or black. The other electrode is covered in a reddish-brown layer. | • Sasol Inzalo workbook<br>• Beaker<br>• Cardboard disk to cover the top of the beaker<br>• Two graphite rods<br>• 2 conducting wires with crocodile clips<br>• Copper chloride solution<br>• 9 V battery |
| **ASSESSMENT** | | |

4. Summarise your experimental observations in the following table.

| | The copper chloride solution | Electrode 1 (called the anode) | Electrode 2 (called the cathode) |
|---|---|---|---|
| Before the experiment | | | |
| After the experiment | | | |

**ANALYSIS AND DISCUSSION:**

1. What gave the copper chloride solution its intense blue colour?

2. Do you think that some of the copper chloride may have changed into something else during the reaction? Explain why you think so.

3. How would you explain the bubbles on the surface of the first electrode? Do you have any idea what they might have been? Hint: what did the electrode smell like afterwards?

4. Do you know what the reddish-brown coating on the second electrode is? Hint: Which metal has that same characteristic reddish-brown colour?

5. How do we know that a chemical reaction has occurred?

**CONCLUSION:**

1. Write a conclusion for the investigation. In your conclusion you should rewrite the aim of the investigation into a statement about the findings of your investigation.



| **TEACHER REFLECTION** | Progress: | Challenges: |
|---|---|---|

**Answers:**

1. What gave the copper chloride solution its intense blue colour?
   *The copper chloride that was dissolved in it.*

2. Do you think that some of the copper chloride may have changed into something else during the reaction? Explain why you think so.

3 How would you explain the bubbles on the surface of the first electrode? Do you have any idea what they might have been? Hint: what did the electrode smell like afterwards?
   *Bubbles mean that a gas formed on the surface of the electrode. It smelled like bleach. Chlorine gas also smells like bleach, so it is possible that the gas we saw forming at the electrode may have been chlorine gas. Note: Chlorine is actually the active ingredient in bleach.*

4. Do you know what the reddish-brown coating on the second electrode is? Hint: Which metal has that same characteristic reddish-brown colour?
   *It is possible that the reddish-brown coating is copper.*

5. How do we know that a chemical reaction has occurred?
   *The atoms in copper chloride were rearranged to make different materials: copper (Cu) and chlorine (Cl2).*

Conclusion
*Learner's conclusion should contain at least two of the following: • It is possible to decompose copper chloride solution using electrical energy. • The compound copper chloride will decompose into copper metal (Cu) and chlorine gas (Cl2).*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

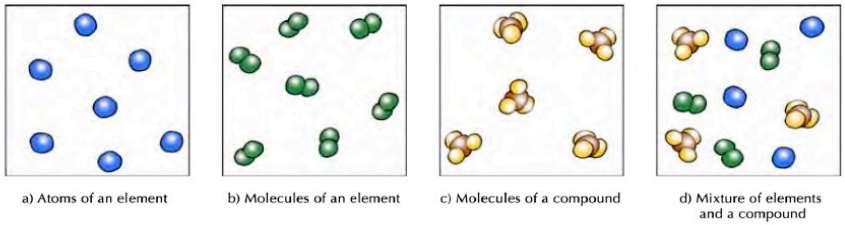
| | |
|---|---|
| **DURATION:**<br>**TOPIC: ATOMS**<br>**SUB TOPIC:** Mixtures of elements and compounds | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Demonstrate understanding of the concept mixture and various kinds of mixtures.<br>2. Describe different methods of separating mixtures.<br>3. Know the difference between physical process of separating mixtures and the chemical process of separating compounds. |

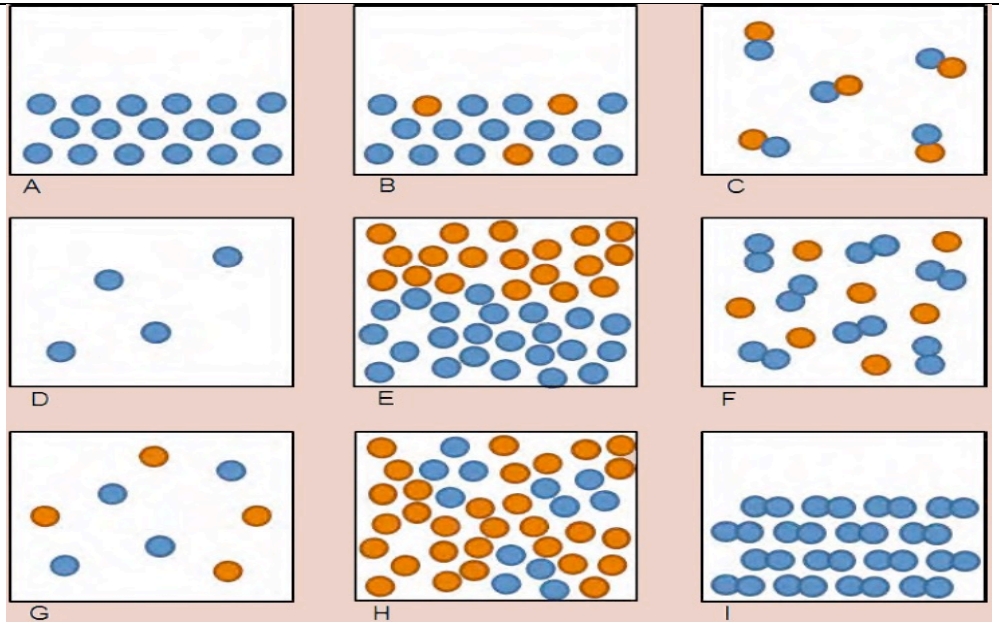
| | | |
|---|---|---|
| **REFERENCES** | CAPS page 41<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Mixtures | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | √ | | Raising Questions | | | Recording Information | √ | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Mixtures of elements and compounds**<br>• Elements and compounds are often found mixed together, such as in air, sea water, rocks, and in living things<br>• Mixtures are separated by physical means; compounds can be separated by chemical means | 1. The teacher briefly revises the methods of separating mixtures done in Gr 7 (CAPS: p P22-23) through oral questioning e.g. name and explain different methods of separating mixtures. What would you consider to choose a method of separating a mixture?<br>2. The teacher describes the concept: mixture and give examples such as air (mixture of gases), sea water (mixture of salt and water), and rock (mixture of minerals). Also name different elements and compounds that make up these mixtures.<br>3. The teacher makes use of various resources provided to make mixtures.<br>4. The teacher explains that mixtures are separated by physical process and that compounds are separated by chemical process.<br>5. The teacher makes use diagrams of an element, molecules of an element, molecules of a compound and mixtures of elements and compounds to show the difference between elements, compounds and mixtures.( e.g. Sasol Inzalo Gr 8A: p142)<br><br><br>*Diagrams to show the difference between elements, compounds and mixtures.* | • Sasol Inzalo workbook |
| **ASSESSMENT** | Each of the nine blocks below (Labelled A – I) contains some matter. Answer the following questions using the diagram in the blocks. | |




a) Which blocks represent the particles of an element?
b) Which block represents the particles of a compound?
c) Which block represents the particles of a mixture?
d) Which block represents the particles of a pure substance?
e) Which block represents the diatomic molecules of an element?
f) What is the difference between mixture and compounds in terms of how we can separate them?

| **TEACHER REFLECTION** | Progress: | Challenges: |
|---|---|---|

Answers:

a) A, D and I

b) C

c) B, E, F, G and H

d) A, C, D and I

e) I

f) Mixtures can be separated by physical means (such as sieving, filtering, distillation, etc), whereas compounds have to be separated by chemical means in a chemical reaction (such as electrolysis).

**NATURAL SCIENCES: LESSON PLAN** **GRADE: 8**
**DURATION:** 30 minutes **MATTER AND MATERIALS**
**CAPS SENIOR PHASE**
**Lesson 9** **TERM 2**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: PARTICLE MODEL OF MATTER** | 1. Explain the particle model of matter<br>2. List the postulates of the particles model of matter<br>3. Explain the behaviour of particles when they are heated and cooled. |
| **SUB TOPIC:** The concept of the particle model of matter | |

| | | |
|---|---|---|
| **REFERENCES** | CAPS page 42<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Particle model of matter, solid, liquid, gas | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | √ | | Raising Questions | | | Recording Information | | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • Atoms and molecules are referred to as particles in the particle model of matter<br>• The particle model is a scientific theory that all matter (solids, liquids and gases) is made up of particles.<br>• Scientists have evidence that particles in a solid, liquid or a gas are arranged differently. | 1. The teacher introduce the lesson by asking the following questions<br>a) List the three states of matter<br>b) Mention the property of each state of matter that you have listed<br>2. Learners watch a video from YouTube :<br>https://youtu.be/i0sOq7EbQWI<br>https://phet.colorado.edu/sims/ideal-gas/gas-properties_en.jnlp<br>3. Teacher explains the particle model of matter as a scientific theory used to explain that all matter( solid. liquid, gases) is made up of particles<br>4. The postulates of the particle model are given<br>○ Matter is made up of tiny particles not visible to with the naked eye<br>○ There are forces between the particles<br>○ Particles are in constant random motion – more energy they obtain the faster they move<br>○ The spaces between the particles is empty<br>○ These particles are arranged differently in solid, liquid and gases. | • Internet<br>• Sasol Inzalo workbook |
| **ASSESSMENT** | Activity<br>1. Explain the particle model of matter<br>2. List the four postulates of the particle model of matter<br>3. Explain what happens to particles of matter when they are heated and when they are cooled. | |

| **TEACHER REFLECTION** | Progress: | Challenges: |
|---|---|---|

Answers:

1. It explains the properties of the state of matter (solids, liquid, gas) and what happens in the changes of the state of matter
2. All matter consist of atoms. Atoms of the same elements are similar in shape and mass. Atoms of different elements can combine in a fix ratio to form a compound. Atoms from the same element can combine in more than one ratio to form two or more compounds

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

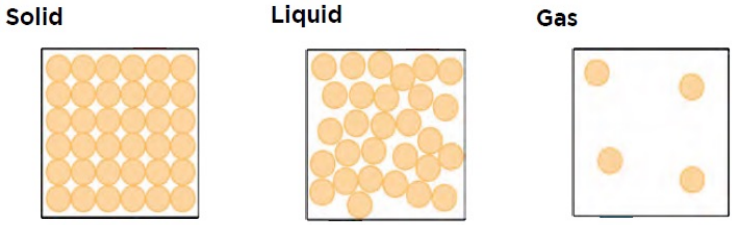
| | |
|---|---|
| **DURATION:**<br>**TOPIC: PARTICLE MODEL OF MATTER**<br>**SUB TOPIC:** The concept of the particle model of matter | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Apply the knowledge of particle model of matter theory to explain the three states of matter.<br>2. Use the particle model of matter to explain why solids have a fixed shape<br>3. Draw and identify diagrams showing different states of matter. |

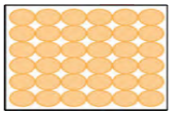
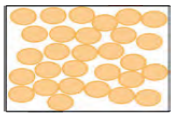
| | | |
|---|---|---|
| **REFERENCES** | CAPS page 41<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Particle model of matter, | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | √ | | Raising Questions | | | Recording Information | √ | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • Particles are arranged :<br>- In a solid the particles are closely packed in a regular arrangement. Vibrate against each other. Strong forces holding them together. Small spaces between the particles.<br>- In a liquid the particles are loosely arranged, but still closely together. Move fast and slide past each other. Have weaker forces between them. Have small spaces between them<br>- In gas the particles have no particular arrangement. Move very fast. Extreme weak forces. Have big spaces between them compared to solids and liquids. | 1. Divide learners into manageable groups and hand out apparatus<br>2. Learners slowly heat up the ice cubes<br>3. Continue heating until all the ice cubes has melted<br>4. Continue heating the water until boiling point<br>5. Ask the learners to identify all states of matter that they have identified in the demonstration<br><br>6. The teacher uses the above diagram to explain the behaviour of particles in each state of matter. | • Ice cubes<br>• Bunsen burner<br>• Tripod stand<br>• Gauze<br>• Lighter<br>• Beaker<br>https://phet.colorado.edu/sims/html/states-of-matter/latest/states-of-matter_en.html |
| **ASSESSMENT** | 1. Referring to the insert below, complete the following table using the particle model of matter. | |

| | Solid  | Liquid  | Gas  |
|---|---|---|---|
| **Arrangement of particles** | | | |
| **Movement of particles** | | | |
| **Forces between particles** | | | |
| **Spaces between particles** | | | |

| | | |
|---|---|---|
| | 2. Use the particle model of matter to explain why solids have a fixed shape but gases fill the shape of the container they are in.<br>3. Use the particle model of matter to explain why you can compress a gas easily, but you cannot compress a liquid very easily<br>4. Think of a bag of cake flour. You can pour out of the bag and into a mixing bowl. Does this mean the flour is a liquid? Explain whether you think the cake flour (and all powders) are solids or liquids | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

| | SOLID | LIQUID | GAS |
|---|---|---|---|
| Arrangement of particles | Closely packed in a regular arrangement | Loosely arranged, but still close together | No particular arrangement |
| Movement of particles | Do not move; only vibrate | Can move quite fast and slide past each other | Move very fast |
| Forces between particles | Very strong forces between them | Strong forces, but weaker than in the solid state | Very, very weak forces between the forces |
| Spaces between particles | Very small spaces | Small spaces | Very big spaces |

1. Solids have a fixed shape as their particles are arranged in a regular, fixed arrangement and they have strong forces holding them together, so the shape of the solid remains fixed. The particles in a gas do not have any particular arrangement and there are very, very weak forces between them. So, the particles in a gas can easily move around and fill the shape of the container they are in, meaning they have no fixed shape.

2. The particles in a gas have very large spaces between them, so the particles can be 'squashed' closer together, meaning the gas can easily be compressed to take up a smaller volume. Liquids have very small spaces between the particles and so it is much harder to 'squash' them together, so they are not easily compressed

3. The cake flour is not a liquid, but a solid. Flour, and all powders, are solids made of very fine grains which are able to flow freely when they container is tilted or shaken. But these grains are solid

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

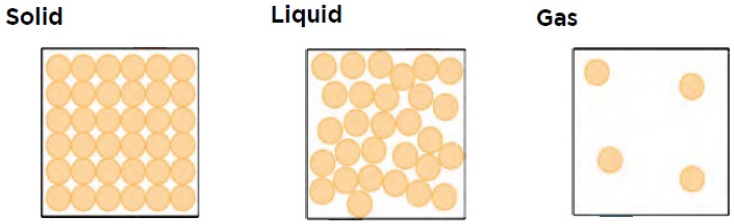
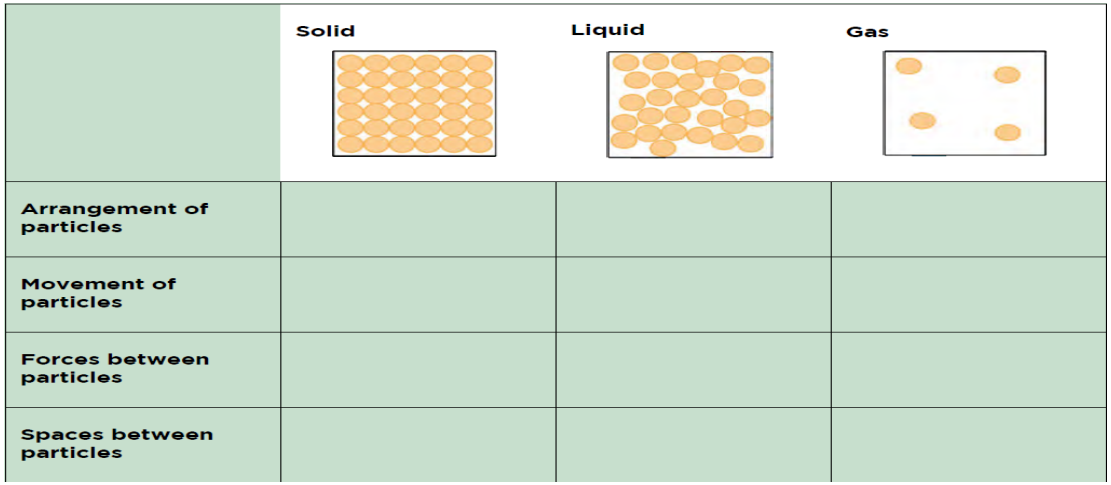
**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:**<br>**TOPIC: PARTICLE MODEL OF MATTER**<br>**SUB TOPIC:** The concept of the particle model of matter | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Apply the knowledge of particle model of matter theory to explain the three states of matter.<br>2. Draw and identify diagrams showing different states of matter. | |
| **REFERENCES** | CAPS page 41<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Boiling point, vapour, heating, cooling, particle model of matter. | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | √ | | Raising Questions | | | Recording Information | √ | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**MATTER AND MATERIALS**
**TERM 2**

<table>
<tr><th>CONTENT AND CONCEPTS</th><th>ACTIVITIES</th><th>RESOURCES</th></tr>
<tr><td></td><td>7. The teacher introduce the lesson setting up the experiment<br>8. Slowly heat up the ice cubes<br>9. Continue heating until all the ice cubes has melted<br>10. Continue heating the water until boiling point<br>11. Ask the learners to identify all states of matter that they have identified in the demonstration<br><br>12. The teacher uses the above diagram to explain the behaviour of particles in each state of matter.</td><td>• Ice cubes<br>• Bunsen burner<br>• Tripod stand<br>• Gauze<br>• Lighter<br>• Beaker<br>https://phet.colorado.edu/sims/html/states-of-matter/latest/states-of-matter_en.html</td></tr>
<tr><td>ASSESSMENT</td><td>5. Referring to the insert below, complete the following table using the particle model of matter.<br></td><td></td></tr>
</table>

| | | |
|---|---|---|
| | 6. Use the particle model of matter to explain why solids have a fixed shape but gases fill the shape of the container they are in.<br>7. Use the particle model of matter to explain why you can compress a gas easily, but you cannot compress a liquid very easily<br>8. Think of a bag of cake flour. You can pour out of the bag and into a mixing bowl. Does this mean the flour is a liquid? Explain whether you think the cake flour (and all powders) are solids or liquids | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION:** 30 minutes
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: MATTER AND MATERIALS**
**TERM 2**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: PARTICLE MODEL OF MATTER** | 1. Define the term 'diffusion'<br>2. To compare the rate of diffusion in liquid and gases |
| **SUB TOPIC:** Diffusion | 3. Use the particle model of matter to explain the rate of diffusion of a gas and a liquid |

| | | |
|---|---|---|
| **REFERENCES** | CAPS page 43<br>Sasol Inzalo workbook Gr.8A | |
| **TERMINOLOGY:** | Diffusion, | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | √ | | Raising Questions | | | Recording Information | √ | |
| Comparing | | | Predicting | | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION:** 30 minutes
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: MATTER AND MATERIALS**
**TERM 2**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • Diffusion is a process in which particles in liquids and gases move (separate and spread) from a highly concentrated area to an area with a lower concentration of those particles.<br><br>• Diffusion is faster in gases compared to liquids. | The teacher divide learners into manageable groups<br><br>1. Part 1 How fast do gases mix<br>• Pour some vanilla essence into the saucer<br>• Ask learners to raise their hand as soon as they smell the vanilla essence<br>• Record the time when the vanilla essence is poured out<br>• Record the time when the first learner puts his/her hand to indicate they can smell the vanilla essence<br>• Record the time when about half the learners in the class have raise their hands<br>•<br>2. Part 2 How fast do liquids mix?<br>• Each group fill the beaker with tap water and place it on their tables<br>• Use the dropper to place one or two drops of the food colouring<br>• Record the time when the liquids mix: write your observations<br>• Allow the liquids to mix without any disturbance/stirring<br>• Record the time when the liquids are fully mixed, in other words colour is uniformly spread throughout the water. | • Dropper<br>• Food colouring<br>• Tap water<br>• Vanilla essence<br>• Saucer<br>• Beakers |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES**
**LESSON PLAN**

**GRADE 8**
**MATTERS AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | 1. Express / communicate how the particle model of matter describes solids, liquids and gases? | |
| **SUB – TOP:** Change of state | | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS p. 42** | |
| **TERMINOLOGY:** | **Sublimation, deposition**. | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS** (√ skill addressed)

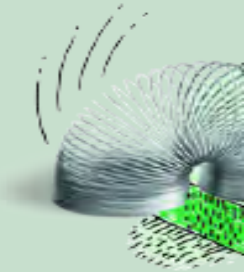
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |
| **CONTENT & CONCEPTS** | | | **ACTIVITIES** | | | **RESOURCES** | | |

**NATURAL SCIENCES**
**LESSON PLAN**

**GRADE 8**
**MATTERS AND MATERIAL**
**TERM 2**

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| Particles are arranged differently in a solid, liquid and a gas (CAPS pg 42)<br><br>- in a **solid**, the particles<br>• are closely packed in a regular arrangement<br>• do not move around but vibrate against each other<br>• have strong forces holding them together<br>• have small spaces between them<br><br>in a **liquid**, the particles<br>• are loosely arranged but still quite close together<br>• can move quite fast and slide past each other<br>• have weaker forces between them<br>• have small spaces between them<br>- in a **gas**, the particles<br>• have no particular arrangement<br>• move very fast<br>• have extremely weak forces between them<br>• have very big spaces between them compared to solids and liquids | 1. The teacher uses a diagram to illustrate and explain the arrangement of particles in a solid, liquid and gas. Sasol Inzalo Workbook p.153<br><br>2. The teacher uses a diagram to illustrate and explain the change of states. Sasol Inzalo Workbook p.154<br><br>3. The learners are given activity 1 and 2 as consolidation. | Sasol Inzalo Workbook p.152 -158<br><br>Scientific and or English Dictionary<br><br>Video / powerpoint on arrangements of particles in a solid, liquid and gas |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

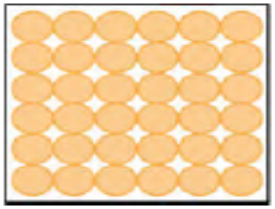
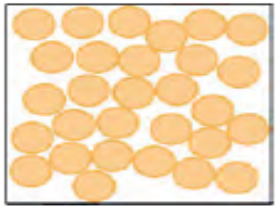
## ACTIVITY: Comparing solids, liquids and gases



Let's summarise what we have learnt about what the particle model of matter tells us about solids, liquids and gases.

**INSTRUCTIONS:**

1. Use the images of the different states to help you, and go back over the text in your workbook.

| | Solid  | Liquid  | Gas  |
|---|---|---|---|
| **Arrangement of particles** | | | |
| **Movement of particles** | | | |
| **Forces between particles** | | | |
| **Spaces between particles** | | | |

**NATURAL SCIENCES**
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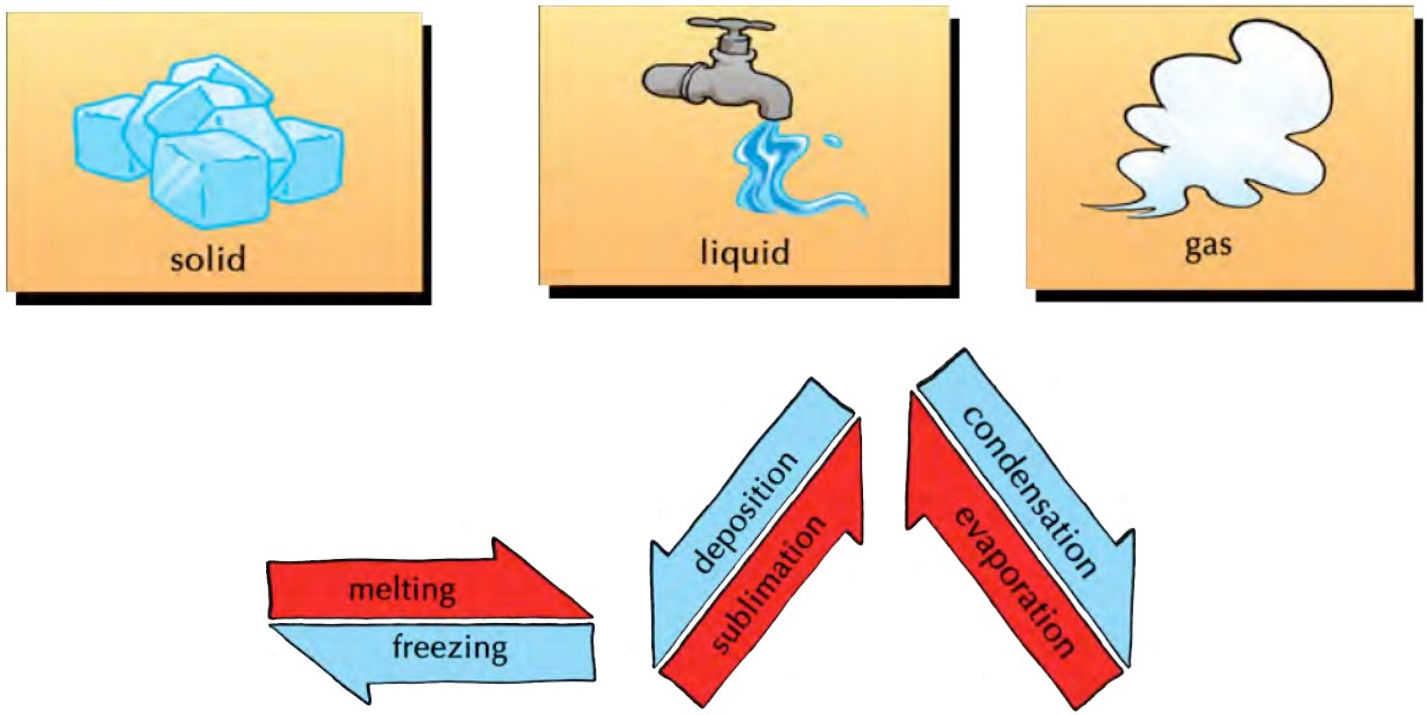
**ACTIVITY 2**

**INSTRUCTIONS:**

**1.** CUT out the following pictures and rearrange them to form a diagram that illustrates the change of state.

**2.** Use your diagram to answer the following questions



## QUESTIONS

1. What is the name of the process when a solid turns into a liquid?
2. What is the reverse process to melting?
3. What can we do to make ice melt quickly?
4. Explain the steps that a solid must go through to become a gas
5. What is the reverse process of evaporation?
6. When we heat something, are we adding energy to it or taking it away?
7. How do you think the particles in a substance behave when we give them more energy?

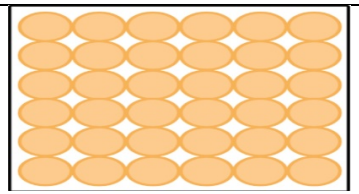
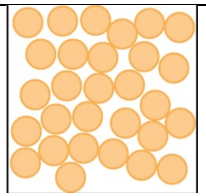
## ALTERNATIVE ACTIVITY FOR FORMAL ASSESSMENT

**1. Complete the table below that compares the different states of matter.**

| State | (ice)Solid | (water)Liquid | (steam)Gas |
|---|---|---|---|
| **Diagram** | 1.1 | 1.2 | O O<br>O<br>O<br>O O |
| **Spaces between the particles** | Very small | 1.3 | Big |
| **Forces between particles** | 1.4 | Weaker | Extremely Weak |
| **Arrangement of particles** | 1.5 | Loosely arranged | No arrangement |

**Answers:**

1. Melting
2. Freezing
3. Apply heat
4. It is a process called sublimation. Dry ice (carbon dioxide) is a solid. When dry ice is left in a room deposition occurs when the gas becomes a solid without going through the liquid phase.
5. Condensation
6. Adding energy
7. When heat is added the particles vibrate faster and the space between the particles increases.

| State | (ice)Solid | (water)Liquid | (steam)Gas |
|---|---|---|---|
| **Diagram** |  |  | O O O O O O |
| **Spaces between the particles** | Very small | 1.3 *Small* | Big |
| **Forces between particles** | 1.4 *Strong* | Weaker | Extremely Weak |
| **Arrangement of particles** | 1.5 *Closely packed,regular arrangement* | Loosely arranged | No arrangement |

**NATURAL SCIENCES**
**LESSON PLAN**

**GRADE 8**
**MATTERS AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | 2. Learners must comprehend the reasons for, and factors that influence diffusion | |
| **SUB – TOP:** Diffusion | | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS p. 43** | |
| **TERMINOLOGIES:** | Diffusion | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS** (√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ |
| Observing | √ | | Raising Questions | | | Recording Information | √ |
| Comparing | √ | | Predicting | √ | | Interpreting Information | √ |
| Measuring | | | Hypothesizing | √ | | Communicating | √ |
| Sorting & Classifying | | | Planning Investigations | √ | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • Diffusion is a process in which particles in liquids and gases move (separate and spread) from a highly-concentrated area to an area with a lower concentration of those particles | 1. The teacher explains the concept of diffusion. Learners are then given a worksheet that will guide their investigation of diffusion of liquids and gasses. | ○ Vanilla essence<br>○ Food Colouring<br>○ Worksheet<br>○ large glass beaker or other large clear glass container |

| | | |
|---|---|---|
| • Diffusion is faster in gases compared to liquids | 2. The teacher asks learners to predict what will happen if a few drops of food colouring is placed into a glass beaker filled with water.<br>3. The teacher then adds the colouring to the water **(no stirring)** and asks them to record their observations on the worksheet.<br>4. Step 3 is then repeated but mixture is stirred.<br>5. The teacher pours a small amount of vanilla essence onto a saucer and asks learners to record their observations.(in terms of smell) | ○ dropper<br>○ food colouring or ink<br>○ tap water<br>○ vanilla essence<br>○ shallow dish or saucer |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

## WORKSHEET: DIFFUSION

**INVESTIGATION:** Comparing the diffusion of particles in a gas and in a liquid

**INVESTIGATIVE QUESTIONS:**
1. Do particles diffuse (mix) faster when they are in the liquid state or in the gaseous state? Which particles will mix more quickly: gases or liquids?
2. Do particles diffuse faster with or without mixing?

**HYPOTHESIS:**
What are your predictions? Do you expect liquids to mix more quickly than gases, or the other way around? Will stirring influence the speed at which gases mix?

Write down your hypothesis below.

_____

_____



**NB!** This is not a **controlled experiment** as we are not measuring the rates of mixing of the liquids and gases under exactly the same conditions. We will make a simple comparison of the mixing rates, by seeing how long it takes each to mix under two different sets of conditions.

**MATERIALS AND APPARATUS:**
- Large glass beaker or other large clear glass container
- Dropper
- Food colouring or ink
- Tap water
- Vanilla essence
- Shallow dish or saucer

**METHOD:**
**Part 1: How fast do liquids mix?**
1. Fill a large, clear container with tap water and place it where everyone can see it.
2. Use a dropper to place one or two drops of the food colouring in the water. (depends on concentration)
3. Record the time at which the colouring is added to the water.
4. Look carefully at the two liquids mixing, and write down your observations below. Allow the liquids to mix, without any stirring.
5. Record the time when the liquids are fully mixed, in other words, when the colour is uniformly spread throughout the water.

**Part 2: How fast do liquids mix?**

1. Repeat steps **1 to 3**.
2. After adding the food colouring, stir the liquid.
3 Record the time when the liquids are fully mixed, in other words, when the colour is uniformly spread throughout the water.

**RESULTS AND OBSERVATIONS:**

1. What did you observe in the container immediately after the liquids were mixed?

_____

_____



2. How long did it take for the liquids to be fully mixed, until the colour was uniformly spread throughout the water?

---

3. How long did it take for the liquids to be fully mixed, until the colour was uniformly spread throughout the water when stirred?

_____

**Part 2: How fast do gases mix?**

**NB! This experiment should be performed with the windows closed.**

1. Raise your hand as soon as you can smell vanilla essence.
2. Pour some vanilla essence into the saucer.
3. Record the time when the vanilla essence is poured out.
4. Record the time when the first learner puts up his/her hand to indicate that they can smell the vanilla essence.
5. Record the time when roughly half of the learners in the class have their hands up, to indicate that they can smell the vanilla essence.
6. Record the time when the learners at the back of the class first smell the vanilla essence.
7. If there is enough time during your next Natural Sciences lesson, repeat steps 1-5. You should do everything exactly the same, but this time, you should move your arms and try to 'wave' the air towards the back of the class.

**RESULTS AND OBSERVATIONS:**

3. When you did **NOT wave your arms** during the experiment:
a) How long did it take until the first learners smelled the vanilla essence molecules?

_____

b) How long did it take until the last learners smelled the vanilla essence?

_____

4. When you **waved your arms** during the experiment:
a) How long did it take until the first learners smelled the vanilla essence molecules?

_____

b) How long did it take until the last learners smelled the vanilla essence?

_____

**CONCLUSIONS:**
What are your conclusions? (What are your answers to the investigative questions?)

_____

_____

**NATURAL SCIENCES**
**LESSON PLAN**

**GRADE 8**
**MATTERS AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | 3. Learners must display an understanding of the factors that influence diffusion | |
| **SUB – TOP:** Factors that influence diffusion | | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS p. 43** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | X |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | X |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | √ | | Raising Questions | | | Recording Information | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | √ |
| Measuring | | | Hypothesizing | | | Communicating | √ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES**
**LESSON PLAN**

**GRADE 8**
**MATTERS AND MATERIAL**
**TERM 2**

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| Factors that affect the rate at which particles diffuse.<br>The speed at which particles diffuse depends on several factors, namely:<br>• The mass of the particles: lighter particles will diffuse faster, because on average they move faster.<br>• The state of the particles: the particles in a gas are always moving fast; we say their average speed is high. The particles in a liquid travel more slowly.<br>• The temperature of the particles: temperature is a measure of the kinetic energy of the particles. The higher the temperature, the more energy the particles have and the faster they will move and diffuse.<br>• The size of the spaces between particles: If there are large spaces between the particles of one substance, the particles of another substance can move into those spaces easily.<br>• Particles diffuse because they are in **constant motion**. | 1. Using the analogy of an individual walking through a crowd at a music concert, explain the random movement of particles.<br>2. Using the particle model of matter you can now explain how the various states influence diffusion.<br>3. Use pole-play in order to get the learners to simulate diffusion in liquids and gasses. | ○ Sasao Inzalo workbook pp. 165 – 167<br>○ Data projector to project a photo of a large crowd of people |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

Activity 1:

Using the diagrams below, describe the factors that can influence the time it takes for a particle to move from point A to point B in:

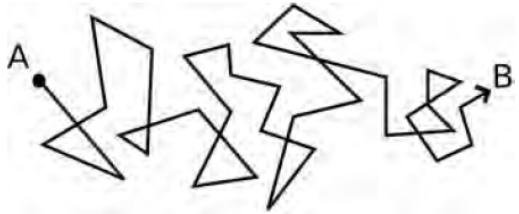
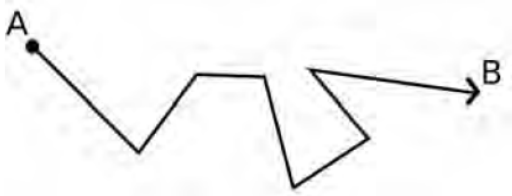
a. A liquid

_____

b. A gas

_____



| Liquid | Gas |
|---|---|
|   |   |

Answer :

a) The speed at which the particles move around inside the liquid depends on the energy of the particles. When we heat a liquid, we are giving the particles more energy and speeding them up.
b) In gases when heated, the particles move at even greater speeds.

**NATURAL SCIENCES**
**LESSON PLAN**

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**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | 4. Conduct an investigation into the particle model of matter that explores the changes of state of water and candle wax through heating.<br>5. Explain change of state influenced by heating in everyday life. (relevant examples) | |
| **SUB – TOP:** Change of state through heating | | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS p.43** | |
| **TERMINOLOGIES:** | Melting Evaporating, Boiling, Freezing, Solidifying, Sublimation, Deposition, Liquefying, condensation | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |

**NATURAL SCIENCES**
**LESSON PLAN**

**GRADE 8**
**MATTERS AND MATERIAL**
**TERM 2**

| Sorting & Classifying | | | Planning Investigations | √ | | | |
|---|---|---|---|---|---|---|---|

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Change of state**<br>• Heating and cooling can cause a material to change state<br><br>• The solid material first changes to a liquid (melting) when heated, and then it changes to a gas (evaporating or boiling) on further heating<br><br>• As a solid material is heated, the movement of the particles increases which enables them to move past each other and form a liquid<br><br>• The particles move much further apart from each other when the material changes from the liquid to the gas state | 1. The teacher explains change of state of matter through heating and cooling using a particle model diagram Sasol Inzalo Gr. 8A, (p169)<br><br>2. Learners investigate the change of state of water.<br><br>3. The learner applies the particle model theory to explain the changes of state from gas to liquid and from liquid to solid in revision activities. | • Textbooks: e.g. Sasol Inzalo Gr. 8A, 167- 170<br>• Worksheet<br>• Glass beakers<br>• Tap water<br>• Ice cubes / blocks<br>• Bunsen burner<br>• Tri-pod stand<br>• Gauze<br>• Matches / lighter<br>• Candle wax<br><br>Video clip |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION**<br><br>(record all recommendations to improve the lesson plan, lesson and assessment) | Progress: | Challenges: |
| | | |

**NATURAL SCIENCES GRADE 8**

**INVESTIGATION WORKSHEET: CHANGE OF STATE**

**MARKS: 30**

**Aim:**

To investigate the change of state when a substance is heated or cooled down.

**Investigative question:**

(**NOTE:** The answer to a proper investigative question is NOT yes or no.)

Consider the following two possible questions for this investigation:

**A:** Does the state of a substance change when it is heated or cooled?

**B:** What is the effect of heating and cooling on the state of a substance?

Choose the most appropriate investigative question. Only write down **A** or **B** and give a reason for your answer.

_____

_____ (2)

**Variables:**

Identify the **independent variable**: _____(1)

Identify the **dependent variable**: _____ (1)

**Method:**

*You can do the two investigations one after the other or simultaneously, depending on the availability of apparatus. Alternatively, half of the groups in the class can do the heating of candle wax and the other groups can do the heating of ice.*



Heating of candle wax:

1. Place a piece of candle wax in a heat resistant dish like an empty tin, a foil dish or a porcelain dish.
2. Place a wire gauze on a tripod stand with the dish on top of the gauze.
3. Place a bunsen burner or spirit lamp underneath the tripod stand.
4. Light the bunsen burner/spirit lamp and gently heat the candle wax.
5. Observe the change in state as the candle wax heats up. **Do not overheat the candle wax.**
6. Turn off the bunsen burner/spirit lamp and allow the wax to cool down again.
7. Record the change of state/observations in the table of results.

Heating of ice:

8. Place a few ice cubes in a dish.

9. Repeat steps 2, 3 and 4.

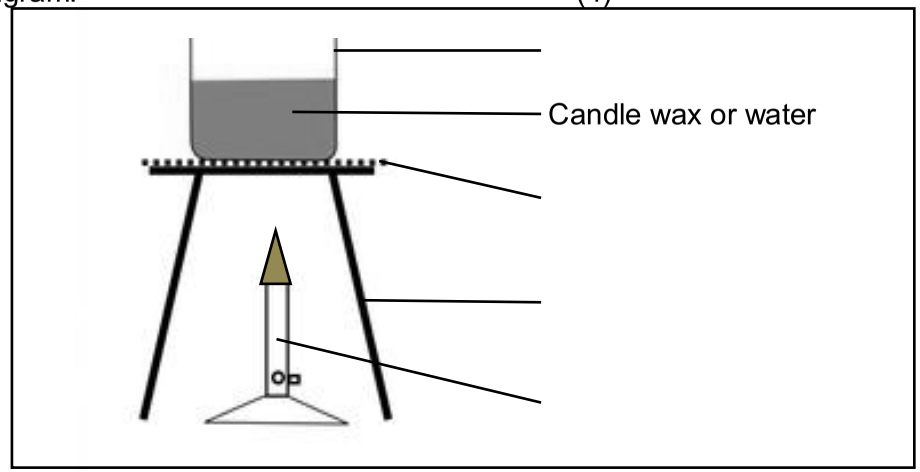
10. Observe the change in state of the ice. Keep on heating the water until it boils.

11. Turn off the bunsen burner/spirit lamp and allow the water to cool down again.

12. Record the change of state/observations in the table of results.

**Apparatus:**

Identify and label the missing parts in the diagram. (4)



**Results:** (5)

| | Observations during heating | Observations during cooling |
|---|---|---|
| **Candle wax** | | |
| **Ice** | (Mention **two** changes in state.) | |

**Safety measures:**

Why is it dangerous to overheat the candle wax?

_____(1)

What is the function of the wire gauze?

_____(1)

**Conclusion:**

| **Word bank:** energy, solid, gas, liquid, removed, added |
|---|

Complete the conclusion. Use words from the word bank:

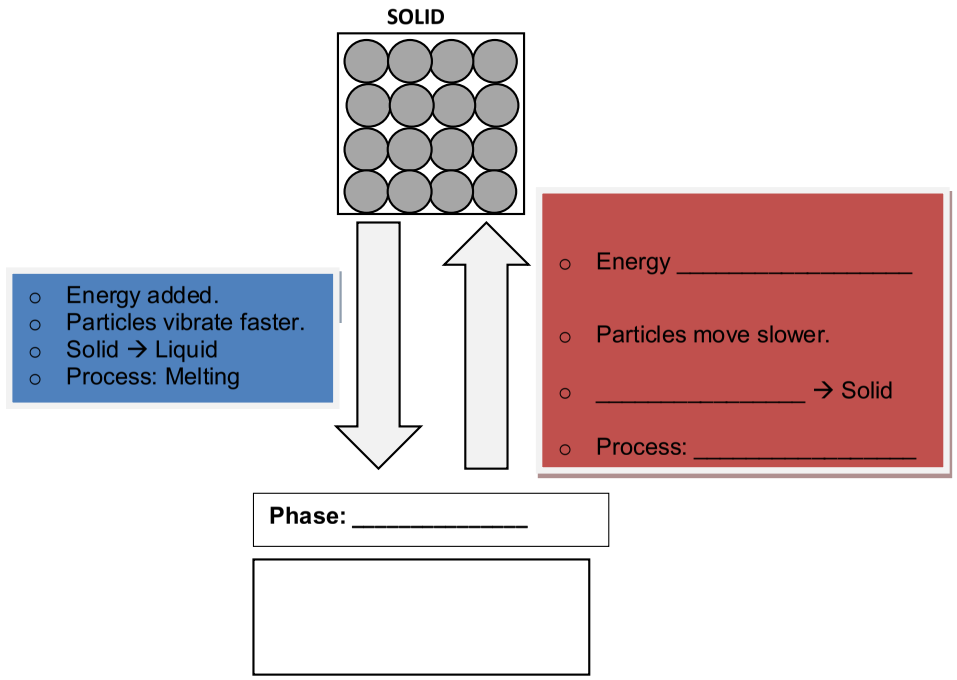
If energy is added to a solid, the solid turns into a _____.

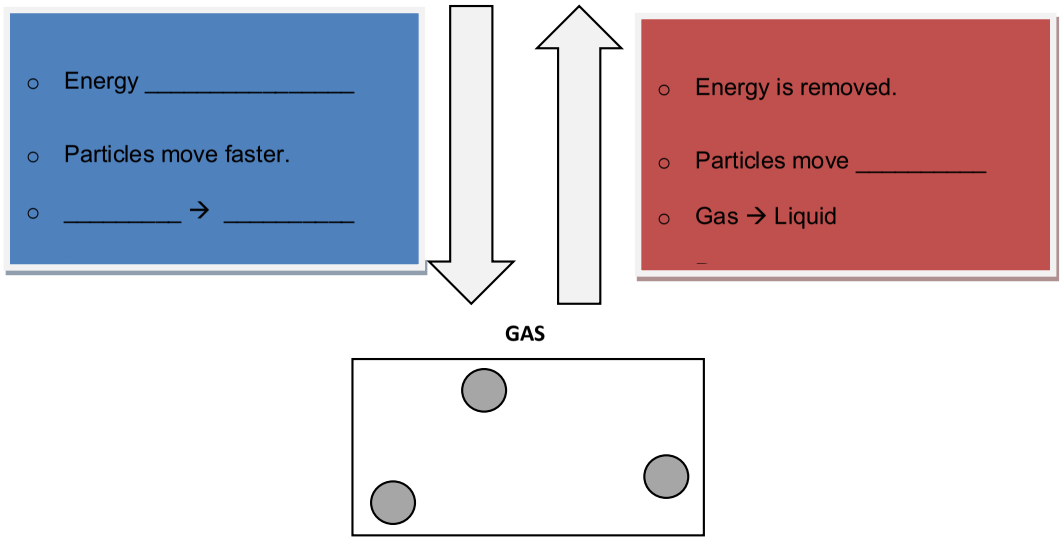
When _____ is added to a liquid, the liquid changes into a gas.

When energy is removed from a _____, it changes to a liquid. For the liquid to change into a solid, more _____ must be removed. (4)

**Diagrammatic representation of what happens during phase changes:**

Fill in the missing words to complete the diagram.






**MEMORANDUM**

**CHANGE OF STATE**

**Aim:**
To investigate the change of state when a substance is heated or cooled down.

**Investigative question:**
(**NOTE:** The answer to a proper investigative question is NOT yes or no.)

Consider the following two possible questions for this investigation:

**A:** Does the state of a substance change when it is heated or cooled?

**B:** What is the effect of heating and cooling on the state of a substance?

Choose the most appropriate investigative question. Only write down **A** or **B** and give a reason for your answer.

***B***; ✓ *a scientific investigation must be done do find the answer for question B and the answer to the question is not just yes or no.* ✓
(2)



**Variables:**

Identify the **independent variable**: *Heating or cooling of the substance.*✓ (1)

Identify the **dependent variable**: *The state of the substance* **OR** *the phase change.*✓ (1)

**Method:**
*You can do the two investigations one after the other or simultaneously, depending on the availability of apparatus. Alternatively, half of the groups in the class can do the heating of candle wax and the other groups can do the heating of ice.*

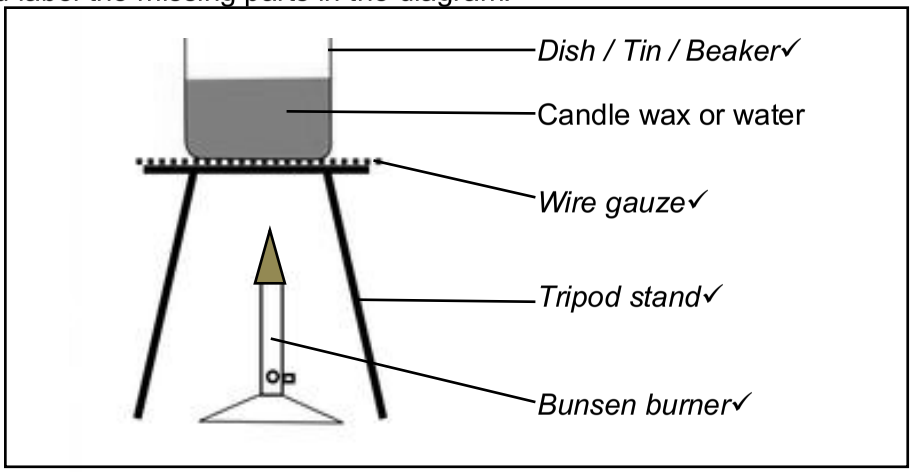
Heating of candle wax:
1. Place a few small pieces of candle wax in a heat resistant dish like an empty tin, a foil dish or a porcelain dish.
2. Place a wire gauze on a tripod stand with the dish on top of the gauze.
3. Place a bunsen burner or spirit lamp underneath the tripod stand.
4. Light the bunsen burner/spirit lamp and gently heat the candle wax.
5. Observe the change in state as the candle wax heats up. **Do not overheat the candle wax.**
6. Turn off the bunsen burner/spirit lamp and allow the wax to cool down again.
7. Record the change of state/observations in the table of results.

Heating of ice:

8. Place a few ice cubes in a dish.
9. Repeat steps 2, 3 and 4.
10. Observe the change in state of the ice. Keep on heating the water until it boils.
11. Turn off the bunsen burner/spirit lamp and allow the water to cool down again.
12. Record the change of state/observations in the table of results.

**Apparatus:**

Identify and label the missing parts in the diagram. (4)




**Results:** (5)

| | Observations during heating | Observations during cooling |
|---|---|---|
| **Candle wax** | *The (solid) candle wax melts and turns into a liquid.* ✓ | *The liquid candle wax turns into a solid again **OR** the liquid candle wax solidifies when it cools down.* ✓ |
| **Ice** | *The ice melts and turns into a liquid (water).* ✓<br>*The water evaporates and turns into a gas (water vapour).* ✓ | *The steam (water vapour) turns into a liquid (water) again.* ✓<br>*(Can be seen on the cooler parts of the container.)* |

**Safety measures:**

Why is it dangerous to overheat the candle wax?

*When candle wax gets very hot it releases fumes that are flammable.* ✓

***OR***

*When candle wax gets very hot the vapours produced can ignite.* ✓ (1)

What is the function of the wire gauze?

*To spread/conduct the heat evenly* ✓

***OR** to prevent direct contact of the glass with the flame.* ✓ (1)



**Conclusion:**

| **Word bank:** energy, solid, gas, liquid, removed, added |
|---|

Complete the conclusion. Use words from the word bank:

If energy is added to a solid, the solid turns into a *liquid.*✓

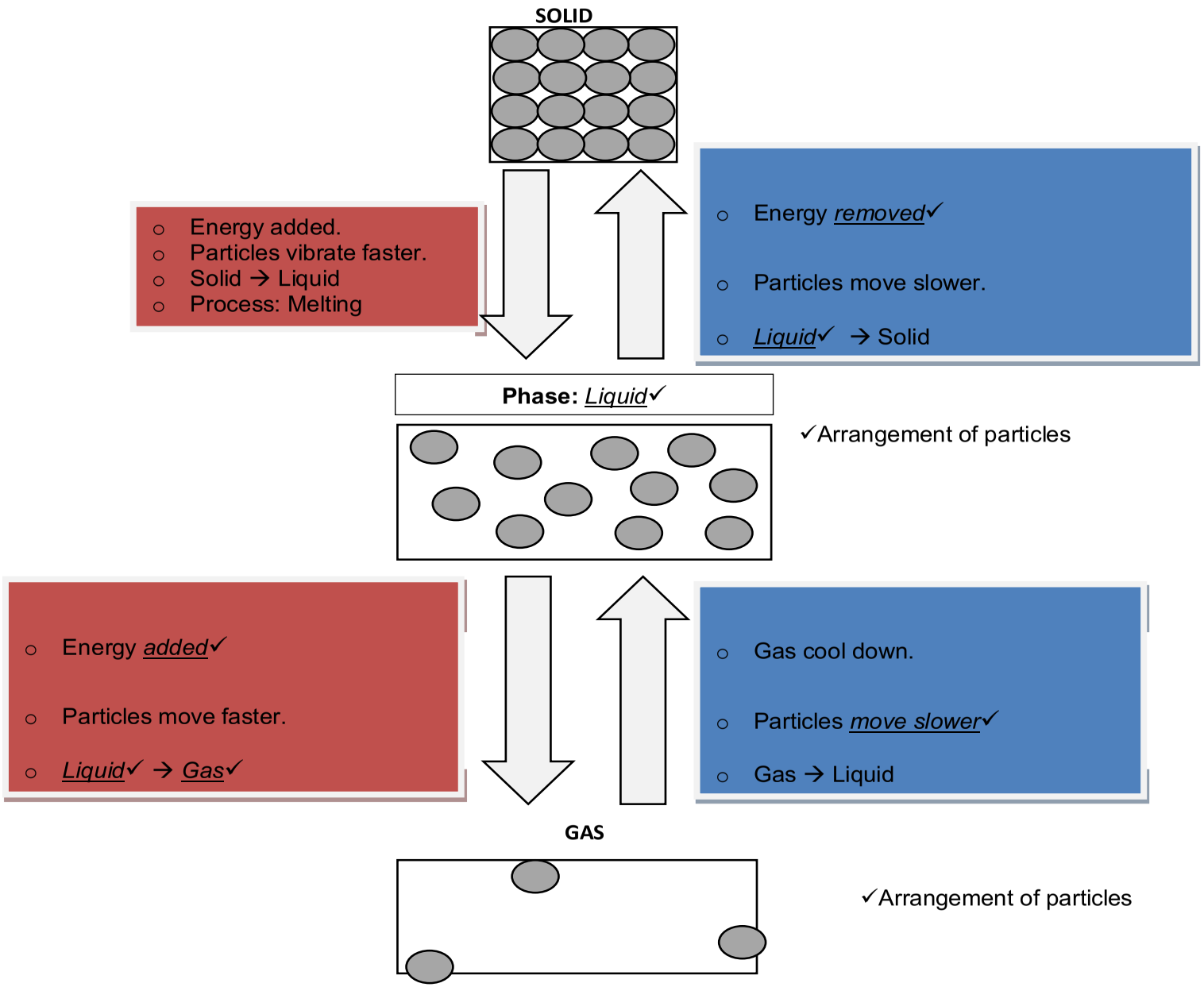
When *energy*✓ is added to a liquid, the liquid changes into a gas.

When energy is removed from a *gas*,✓ it changes to a liquid. For the liquid to

change into a solid, more *energy*✓ must be removed. (4)

**Diagrammatic representation of what happens during phase changes:**

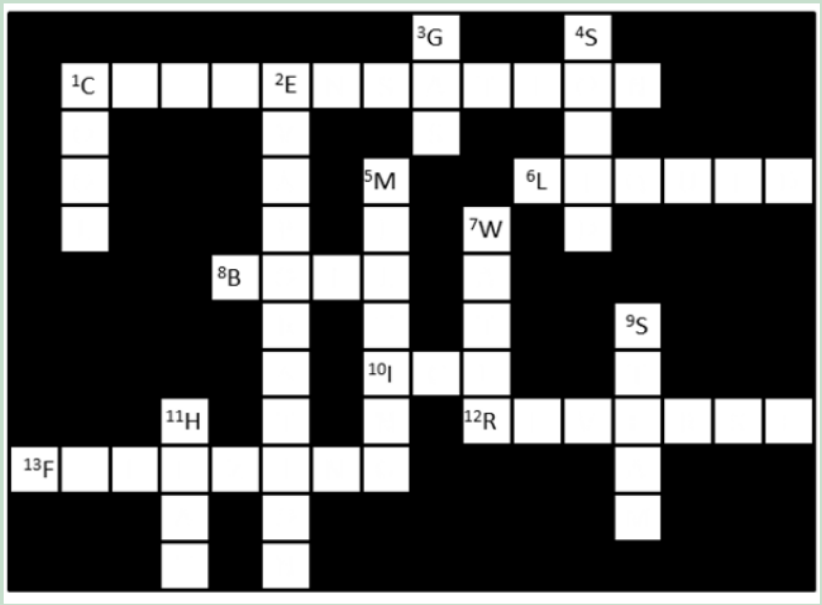
Fill in the missing word to complete the diagram.



## ACTIVITY: Changes of state

**INSTRUCTIONS:**

1. The crossword puzzle below can be completed by following the clues given below.
2. The 'Down' clues are for the vertical words in the puzzle and the 'Across' clues are for the horizontal words in the puzzle.
3. All the clues have to do with changes of state of materials, and the first letter of every word has been filled in to help you.




**Here are the clues:**

Down:

1. If we want to turn steam into water we have to _____ it. (4 letters)

2. The process of turning a liquid into a gas is called _____. (11 letters)

3. The particles of a _____ have large spaces between them. (3 letters)

4. The particles of a _____ are locked in position by strong forces. (5 letters)

5. A solid will change into the liquid state at its _____ point. (7 letters)

7. The liquid state of ice is called _____. (5 letters)

9. The gaseous state of ice is called _____. (5 letters)

11. If we want to turn water into steam we have to _____ it. (4 letters)

Across:

1. The process of turning a gas into a liquid is called _____. (12 letters)

6. The particles of a _____ are close together but they can flow and slide over each other. (6 letters)

8. The boiling point of a liquid is the temperature at which that liquid will start to _____. (4 letters)

10. The solid state of water is called _____. (3 letters)

**Answers:**

**ACROSS**

1. **Condensation**
6. **Liquid**
7. **Boil**
10 **Ice**
12. **Reverse**
13. **Freezing**

**DOWN**

1. **Cool**
2. **Evaporation**
3. **Gas**
4. **Solid**
5. **Melting**
7 **Water**
9 **Steam**
11 **Heat**

**NATURAL SCIENCES: LESSON PLAN**
**(Generic Information)**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | Learners will able to: | |
| **SUB – TOP:** Density, mass and volume | 1. Understand the relationship between density, mass and volume using an equation. Define density. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg 43** | |
| **TERMINOLOGIES:** | Density, Mass, Volume | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Density, mass and volume**<br>• the density of a material describes the amount of mass in a given volume of that material | 1. Before the lesson the teacher prepares blocks of different materials provided. | • Textbooks: e.g. Siyavula Explore Gr. 8A, p156- 158 |

| | | |
|---|---|---|
| **Density and states of matter**<br>• In general, gases are less dense than liquids and liquids are less dense than solids *[water is an exception as ice is less dense than water and therefore it floats]*<br>• The individual particles making up one material may have different masses compared to the individual particles making up another material. There are spaces in between the particles.<br>• The density of a material will depend on the kind of particles it is made up of and the size of the spaces between them.<br>• A material which has lower density will float on a liquid which has higher density, for example oil (lower density), will float on water (higher density) | 2. Learners will determine the relationship between ratio of mass and volume of different blocks and then compare the answers.<br>3. The teacher will introduce objects with the same volume but with different mass and compare them (by hand) in terms of their density, such as sponge, polystyrene, wooden and metal blocks of the same size.<br>4. The teacher then defines density as mass per unit volume of an object. | • Sponge block<br>• Polystyrene block<br>• Wood block<br>• Metal block |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**ACTIVITY:** Which material is more dense?

.

**MATERIALS:**

A variety of objects that have the same size (volume) but different densities:

- Sponge block
- Polystyrene block
- Wood block
- Metal block
- brick or stone.
- Any other relevant examples you can find



**INSTRUCTIONS:**

1. Handle all the different materials and compare their masses. You do not have to measure their masses on a scale. You can just feel how heavy they are in your hand.
2. Arrange them in order of increasing density. Do this activity as a group and discuss why some materials are more dense than others.
3. If you do have access to a triple beam balance (an electronic micro scale will also suffice), measure the masses of each of the objects.

a) List the blocks that you have used from the heaviest to the lightest.
b) Arrange the blocks according to the densities you have estimated by hand from highest to lowest.
c) How does the mass of the block (object) affect it's density?
d) How will the volume of the block (object) affect it's density?
e) Answer the questions 1 to 3 below.

1. Imagine a brick and a loaf of bread that are the same size. Would the brick or the bread have a greater volume?
2. Which one, the brick or the bread, has more mass?
3. Which one, the brick ot the bread, would have the greater density? Explain your answer.

1. Imagine a brick and a loaf of bread that are the same size. Would the brick or the bread have a greater volume?

_____

2. Which one, the brick or the bread, has more mass?

_____

3. Which one, the brick or the bread, would have the greater density? Explain your answer.

_____

_____

**NATURAL SCIENCES: LESSON PLAN**
**(Generic Information)**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | Learners will able to: | |
| **SUB – TOP:** Density, mass and volume | 2. Understand the relationship between density, mass and volume using an equation. Define density. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg 43** | |
| **TERMINOLOGIES:** | Density, Mass, Volume | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | X |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | X |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**(Generic Information)**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Density, mass and volume**<br>• the density of a material describes the amount of mass in a given volume of that material<br>**Density and states of matter** | 5. Before the lesson the teacher prepares blocks of different materials provided.<br>6. Learners will determine the volume and mass of different blocks by calculation.(use: V= l x b x h) | • Textbooks: e.g. Siyavula Explore Gr. 8A, p156- 158<br>• Sponge block<br>• Polystyrene block<br>• Wood block |
| • in general, gases are less dense than liquids and liquids are less dense than solids *[water is an exception as ice is less dense than water and therefore it floats]* | 7. Learners will determine the relationship between ratio of mass and volume of different blocks and then compare the answers.<br>8. The teacher then defines density as mass per unit volume of an object.<br>9. Teacher represents relationship between density, mass and volume using an equation:<br>Density= $\frac{mass}{volume}$ | • Metal block |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

1. List the blocks that you have used from the heaviest to the lightest.
2. Arrange the blocks according to the densities you calculated from highest to lowest.
3. How does the mass of the block (object) affect it's density?
4. How will the volume of the block (object) affect it's density?

| | |
|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: Density** | Learners will able to: |
| **SUB – TOP:** Density of solids, liquids and gases | 1. Conduct a practical task and identify densities of different solids, liquids and gases<br>2. Use particle model theory to explain why different solids, liquids and gases have different densities for a fixed volume. |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg. 44** |
| **TERMINOLOGIES:** | |

| | | |
|---|---|---|
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Density of different materials**<br>• Some materials have low density and some have high density. | 1. The learners conduct a practical task where they compare densities of different solids, liquids and gases. | • Textbooks: e.g. Siyavula Explore Gr. 8A, p178-180<br>• Marker |
| • For example a loaf of bread has a lower density than a clay brick of the same size the individual particles making up one material may have different masses compared to the individual particles making up another material. In addition, there are spaces between the particles<br><br>• The density of a material will depend on the kind of particles it is made up of and the size of the spaces between them. | 2. Learners will use the particle model to explain why gases have the lower density than liquids and liquids have lower density than solids for a fixed volume. | • 4 polystyrene cups<br>• Water<br>• Sand<br>• Flour |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

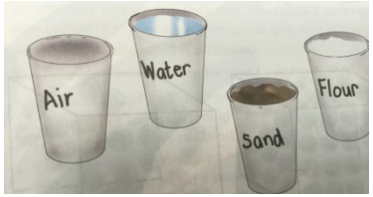
**Practical task:** densities of different solids, liquids and gases.

Resources required:

- Marker
- 4 polystyrene cups
- Water
- Sand
- Flour

Method

1. Label the cups Air, Flour, Sand and Water.
2. Leave the cup labelled Air empty.
3. Fill each of the other cups according to their labels.
4. Hold each of the cups in your hand and assess it's mass.
5. Place the cups in a row on the table, from heavy to light.




**Questions**

1. Which cup was the heaviest?
2. Which cup was the lightest?
3. Rank the materials from highest to lowest density.
4. What can you conclude about the densities of solids, liquids and gas?

**NATURAL SCIENCES: LESSON PLAN**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: Density** | Learners will able to: | |
| **SUB – TOP:** Density of different materials | 1. Understand that in nature some materials are more dense and some are less dense<br>2. Use particle model theory to explain why different solids, liquids and gases have different densities for a fixed volume. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg. 44** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • the density of a material will depend on the kind of particles it is made up of and the size of the spaces between them | 1. The learners conduct an investigation to determine which of the given materials has the highest density. | • Textbooks: e.g. Siyavula Explore Gr. 8A, p178-183<br>• Marker |
| • a material which has lower density will float on a liquid which has higher density, for example oil (lower density) will float on water (higher density) | 2. Learners will use the particle model theory to explain why the material determined in the investigation has the highest density. | • 4 polystyrene cups<br>• Water<br>• Sand<br>• Flour<br>• Mass balance or scale |
| **ASSESSMENT** | Investigation<br>Siyavula p. 180-183 | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: DENSITY** | Learners will able to: | |
| **SUB – TOP: DENISITY OF DIFFERENT MATERIALS** | 1. Use concept of density to determine which material would sink or float in a given liquid. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg.44** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | √ | | Doing Investigations | √ | |
| Observing | √ | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | √ | |
| Measuring | √ | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • the density of a material will depend on the kind of particles it is made up of and the size of the spaces between them<br>• a material which has lower density will float on a liquid which has higher density, for example oil (lower density) will float on water (higher density) | 1. The learners conduct a practical task of densities of different liquids.<br>2. Learners will use the concept to determine which material would sink or float between cooking oil and water.<br>3. The teacher will explain the concept of density in determining which material would sink or float in a given liquid.<br>4. The teacher will give learners a research on pollution of water by oil<br>5. Do a research on how oil has affected the oceans and shorelines around South Africa. | • Textbooks: e.g. Siyavula Explore Gr. 8A, p178-180<br>• Two glass beaakers<br>• Cooking oil<br>• Teaspoon<br>• Water |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**Practical task**

Material needed:

- Two glass beaakers
- Cooking  oil
- Teaspoon
- Water

**Method:**

1. Half fill a beaker with water
2. Pour some oil into water. Describe what happens.
3. Use a teaspoon to stir the oil and water mixture. Let it settle. Describe what happens.

**Questions**

1. Which liquid has the lower density? Give a reason for your answer.
2. Which liquid has the highest density? Give a reason for your answer.
3. Suggest three reasons why oil and water have different densities.

## INVESTIGATION: Comparing the densities of sand, flour, water and air



**INVESTIGATIVE QUESTION:**

Which material has the highest density: sand, flour, water or air?

**HYPOTHESIS:**

What do you predict: Which material has the highest density: sand, flour, water or air?

_____

**RESULTS AND OBSERVATIONS:**

What were the results of your investigation? Summarise them below. You can draw a table. If you were able to measure the mass of each cup, show your calculations for the density of each material.

**IDENTIFY VARIABLES:**

1. Which variables must be kept constant to make this a fair test?

_____

_____

2. What is the independent variable? (what is it that you have control over to change in this investigation?)

_____

3. What are the dependent variables? (Which variables will you be measuring?)

_____

_____

**MATERIALS AND APPARATUS:**

- four identical cups (paper or plastic)
- sand
- flour
- tap water
- triple beam balance or scale

**METHOD:**

You will be designing this investigation yourself. If you are working in groups, you need to first discuss how you are going to conduct (carry out) this investigation. This is the planning. Write down your proposed method in your notebook or on scrap paper. Discuss this with your teacher. Remember to also think about how you are going to record your results. After you have conducted the investigation, write down your method on the lines provided here. Summarise each step in sequence and number the steps.

_____

3. What steps did you include to ensure fair testing?

_____

_____

**CONCLUSION:**

What is your conclusion? (What is your answer to the investigative question?)

_____

_____

_____

_____

**Answers:**

1. Which variables must be kept constant to make this a fair test?
   *If a fixed volume (same size cup) of each material is used, then volume is the constant or fixed variable. The cups must all be made of the same material so that they have the same masses.*

2. What is the independent variable? (what is it that you have control over to change in this investigation?)
   *The independent variable is the type of material*.

3. What are the dependent variables? (Which variables will you be measuring?)
   *Mass is measured and used to calculate density*

   Conclusion
   *This investigation should show that equal volumes of these different materials have different masses and therefore different densities. You can also point out that they also compared materials in different states, and they also compared two solids, namely sand and flour.*

**NATURAL SCIENCES: LESSON PLAN**
**(Extended Information)**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: DENISITY OF DIFFERENT MATERIALS** | Learners will able to: | |
| **SUB – TOP: Calculating density** | 1. Calculate the density of different substances. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg.44** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | Identifying problems & issues | | Doing Investigations | | | |
| Observing | | Raising Questions | | Recording Information | | | |
| Comparing | √ | Predicting | √ | Interpreting Information | √ | | |
| Measuring | √ | Hypothesizing | | Communicating | √ | | |
| Sorting & Classifying | | Planning Investigations | | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • the density of a material will depend on the kind of particles it is made up of and the size of the spaces between them<br>• a material which has lower density will float on a liquid which has higher density, for example oil (lower density) will float on water (higher density)<br>  • An example of a calculation might look like this:<br>  •<br>  Mass of cup of flour = 150 g<br>  Volume of cup = 250 mL<br>  $D = m/V$<br>  = 150/250<br>  = 0,6 g/mL | 1. The teacher demonstrates a few conversions of everyday products to prepare learners to calculate density. Siyavula T.G. pg 230 - 231<br>2. The teacher then consolidates the content knowledge by allowing learners to observe and feel the weight of different material of the same size.<br>3. The teachers then does revision of the relationship between mass, volume and desity.<br>4. The teacher then demonstrates how to calculate the density of an object using a formula.<br>5. The learners are then given an activity to complete. | • Textbooks: e.g. Siyavula Explore Gr. 8A, p174 - 178<br>• Information table<br>• Activity sheet<br>• the same size (volume) but different densities: sponge, polystyrene, wood, metal, brick or stone.<br>• Video: www.stevespanglerscience.com/experiment/light-ice-cube-heavy-water bit.ly/1cxOpA4 |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

## ACTIVITY: Which material is more dense?

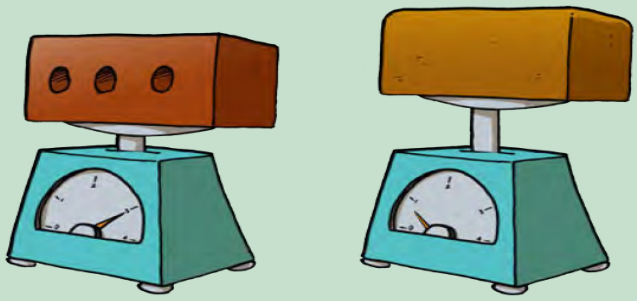
**MATERIALS:**

A variety of objects that have the same size (volume) but different densities: sponge, polystyrene, wood, metal, brick or stone.

**INSTRUCTIONS:**

1. Handle all the different materials and compare their masses. You do not have to measure their masses on a scale. You can just feel how heavy they are in your hand.
2. Arrange them in order of increasing density. Do this activity as a group and discuss why some materials are more dense than others.
3. If you do have access to a triple beam balance, measure the masses of each of the objects.

**QUESTIONS**:



1. Imagine a brick and a loaf of bread that are the same size. Would the brick or the bread have a greater volume?

---

2. Which one, the brick or the bread, has more mass?

---

3. Which one, the brick or the bread, would have the greater density? Explain your answer.

---

---

**ACTIVITY: Some density calculations**

**INSTRUCTIONS**

1. Below is a table with some different substances and their densities. Use this information to do the following calculations
2. Show how you worked out each answer and not forget to include the units in your answer.

| Material | Density (g/mL) |
|---|---|
| Water (liquid) | 1 |
| Ice | 0.917 |
| Glass | 2.6 |
| Salt | 2.2 |
| Chalk | 2.36 |
| Coal | 1.5 |
| Cork | 0.25 |

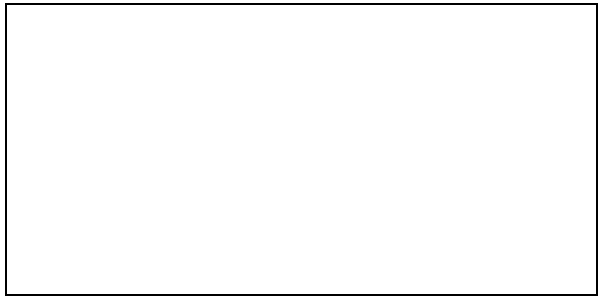


**Questions :**

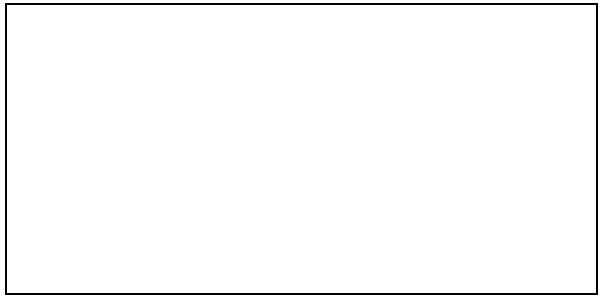
1. You have a 500g block of butter at home. You found out that its volume is 555mL. What is the density of the butter?

Show your calculation in the text box

2. Which is more dense, salt or chalk?
3. You have a large glass marble and you want to find out what its volume is. You measure the mass and find it to be 50 g. what is its volume?



4. You have a piece of coal and a piece of cork which are exactky the same size. Thay have the same volume of 100 mL. which one will have the greater mass? Calculate the exact mass of each piece.



**Answers:**

1. You have a 500g block of butter at home. You found out that its volume is 555mL. What is the density of the butter?
   D = m/V = 500/555 = 0.9 g/mL

2. Which is more dense, salt or chalk?
   *Chalk is more dense*.

3. You have a large glass marble and you want to find out what its volume is. You measure the mass and find it to be 50 g. What is its volume?
   Density of glass = 2.6 g/mL. D = m/V  V = m/D = 50/2.6 = 19.2 mL

4. You have a piece of coal and a piece of cork which are exactly the same size. They have the same volume of 100 mL. Which one will have the greater mass? Calculate the exact mass of each piece.
   *The coal will have the greater mass as it has a higher density. Mass of coal*: m = DV = 1.5 x 100 = 150 g Mass of cork: m = DV = 0.25 x 100 = 25 g.

**NATURAL SCIENCES: LESSON PLAN**
**(Extended Information)**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **LESSON OBJECTIVES:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | Learners will able to: | |
| **SUB – TOP:** Expansion and contraction of materials | 1. To define the concepts of expansion and contraction.<br>2. Use particle model to draw and explain the concept of expansion and contraction in solids, liquids and gases. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg. 44** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Expansion and contraction of materials**<br>• Solids, liquids and gases tend to expand when heated and contract when cooled<br>• Particles of liquids and gases are in a state of constant motion<br>• As a material is heated, the movement of the particles increases and they move further apart, therefore the material expands<br>• As a material is cooled, the movement of the particles decreases and they move closer together, therefore the material contracts<br>• When a material expands or contracts, the size and number of particles does not change. Instead, it is only the *spaces* between the particles that get bigger or smaller<br>• During expansion, the spaces between the particles get bigger<br>• During contraction, the spaces between the particles get smaller | **TEACHING & LEARNING ACTIVITIES**:<br>1. The teacher will explain the concept expansion and contraction of solids, liquids and gases using ball and stick apparatus or thermometer, or any other available resources.<br>2. Learners can also be shown a video clip on the theory of expansion and contraction of solids, liquids and gases.<br>3. The learners then use particle model theory to explain the concept of expansion and contraction of materials in an activity. | • Textbooks: e.g. Siyavula Explore Gr. 8A, p178-180<br>• Thermometer<br>• Ball and stick apparatus |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**In this activity How much longer?**

In this activity we will compare the expansion of different solid materials by drawing a graph. You will need the following information for your graph

| **Material** | **How far a 100m length of a material will expand when the temperature increases by $10^0$C** |
|---|---|
| Brass | 19mm |
| Iron | 12mm |
| Steel | 11mm |
| Platinum alloy | 10mm |
| Contrete | 11mm |
| Ordinary glass | 11mm |
| Ovenproof glass | 3.5 mm |

Draw a bar graph with 'Expansion' on the y-axis and 'Materials' as categories on the x-axis. Choose an appropriate title for your graph and label your y and x-axises

**QUESTIONS:**

1. Which material expands the most upon heating?

_____

2. Which material expands the least?

_____

3. Which solid would be the best material to **reinforce** concrete? (Hint: the reinforcing material should expand as much as the concrete, otherwise it will damage the concrete during expansion.)

_____

4. A man builds a house with large windows set in beautiful frames made of brass. The house is in a region where it gets very hot during summer. Imagine that the owner of the house has a problem: the windows of the house look beautiful in their shiny brass frames but they keep falling out during the summer months. As a scientist, how would you explain this and what would your advice to the owner of the house be? Should the frames be replaced? If so, with which material? What other solutions can you suggest?

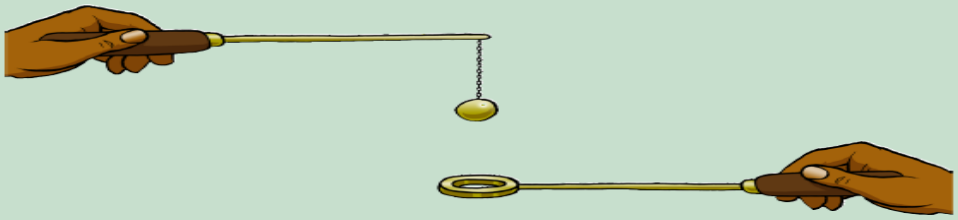
_____

_____

_____

_____

5. The following diagram shows a metal ball and ring apparatus. The ring and ball are both made of brass. At room temperature, the ball is just the right size to pass through the ring.



Do you think the ball will still fit through the ring when the ball has been heated?

_____

6. Do you think the brass ball will have more mass when it has expanded? Explain your answer.

7. What will happen to the brass ball when its temperature drops back to room temperature? Will it be larger than, smaller than, or the same size as before it was heated? Explain your answer.

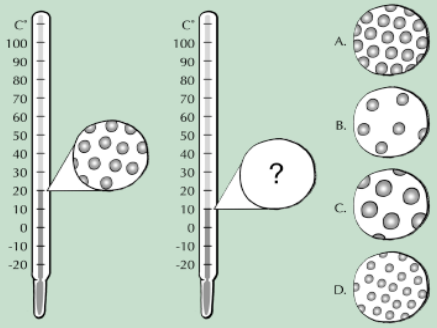
Now that we have seen that materials can expand, how can we explain expansion of a material in terms of the behaviour of the particles in that material?

We have learnt that when matter is heated, the particles of that matter will move faster and push further apart from each other. What happens to the particles in matter when it is cooled?

## ACTIVITY: How does a thermometer work?

The common glass thermometer is called a bulb thermometer. All bulb thermometers have a fairly large bulb that is connected to a long, thin tube. The thermometer has a brightly coloured liquid on the inside. Some thermometers contain mercury as it expands and contracts quite a lot when heated or cooled.

Look carefully at the following set of diagrams. They represent the same thermometer at two different temperatures.




**QUESTIONS:**

1. The drawings represent the particles in the liquid inside a thermometer. What is the temperature measured on the thermometer on the left?

_____

2. The drawing on the right is of the same thermometer, but slightly different. Can you tell the difference?

_____

3. Which of the circles (A, B, C, or D) is the best representation of the liquid in the thermometer on the right? Why did you choose this one?

_____

_____

_____

4. Does a material have less mass when it has contracted? Explain.

_____

_____

5. If the temperature was raised and the thermometer read 30°C, which circle would now best represent the particles in the liquid of the thermometer? Why?

_____



7. How does the density change when a material is heated? Why?

_____

_____

_____

**Answers:**

1. Which material expands the most upon heating?
   *Brass*

2. Which material expands the least?
   *Ovenproof glass*

3. Which solid would be the best material to reinforce concrete? (Hint: the reinforcing material should expand as much as the concrete, otherwise it will damage the concrete during expansion.)
   *Steel. It expands the same amount as concrete.*

4. A man builds a house with large windows set in beautiful frames made of brass. The house is in a region where it gets very hot during summer. Imagine that the owner of the house has a problem: the windows of the house look beautiful in their shiny brass frames but they keep falling out during the summer months. As a scientist, how would you explain this and what would your advice to the owner of the house be? Should the frames be replaced? If so, with which material? What other solutions can you suggest?
   *From the graph and the data in the table, we can see that brass expands much more than ordinary glass. When the weather is really hot, the brass expands so much that the window glass does not fit properly anymore and falls out. You could advise the owner to try the following: • Replace the brass frames with steel. Steels expands by the same amount as glass so the glass should stay in place. • Replace the large windows with smaller windows. Smaller items expand less because there is less matter that can expand. Note: In addition to the type of material, the amount of expansion also depends on how much material there is. This is why expansion is difficult to see in relatively small items. e.g. cooking pots. A key will still fit in a lock, even if the key has been lying in the hot sun, because expansion is not that noticeable in small items.*

5. The following diagram shows a metal ball and ring apparatus. The ring and ball are both made of brass. At room temperature, the ball is just the right size to pass through the ring. Do you think the ball will still fit through the ring when the ball has been heated?
   *The ball does not fit through the ring when the ball has been heated. Note: This is a great way to demonstrate contraction and expansion if you have one of these at your school. If you are doing a practical demonstration, get the learners to make a prediction before continuing with the demonstration. You can heat the ball in the flame of a Bunsen burner.*

6. Do you think the brass ball will have more mass when it has expanded? Explain your answer.
   *No, the brass ball cannot have a greater mass because it has not gained any mass*

7. What will happen to the brass ball when its temperature drops back to room temperature? Will it be larger than, smaller than, or the same size as before it was heated? Explain your answer.
   *The ball will contract to the same size as before because it has not gained or lost any mass. Note: If doing the practical demonstration, get the learners to make a prediction in the time that it takes for the ball to cool down*

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | 1. Understand the concept of gas pressure. | |
| **SUB – TOP:** PRESSURE | | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg.** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | X |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | X |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ |
| Observing | √ | | Raising Questions | | | Recording Information | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | √ |
| Sorting & Classifying | | | Planning Investigations | √ | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Pressure**<br>• A gas exerts a pressure because of the collisions of the particles with each other and against the sides of the container<br>• Pumping more gas into a container increases the number of gas particles in the container. This increases the number of collisions and therefore increases the pressure.<br>• *[**Note:** heating also increases the pressure by giving the particles more energy, making them move faster, and collide with greater force. We do not have to deal with this aspect of pressure in this grade]* | 1. The learners will complete the worksheet given.<br><br>The teacher consolidate the lesson by using the particle model theory to explain the concept of gas pressure | • Textbooks: e.g. Siyavula Explore Gr. 8A, p178-180<br>• Paper bag medium size<br>• Balloon<br>• Empty plastic cold drink or water bottles( 2 litre bottlea are preferably)<br>• Bicycle pump and tyre |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

## ACTIVITY: Understanding gas pressure

**MATERIALS:**

- brown paper bags (medium size)
- balloons
- empty plastic cold drink or water bottles (2-litre bottles are preferable)
- bicycle pump and tyre

**INSTRUCTIONS:**

1. This step requires a brown paper bag.
   a) Blow up a brown paper bag until it is fully inflated.
   b) Try blowing it up even more. See if you can make it pop by blowing into it.

c) Write two or three sentences to describe what it feels like to blow into the bag when it is 'empty', compared to when it is 'full' of air. Does it feel different? Is it more difficult to blow into the bag when it is already full?

_____

_____

_____

2. This step requires a balloon.
   a) Blow up the balloon until it is the size of an orange. Pinch it closed but do not tie a knot in the top.
   b) Now blow up the balloon as large as you can.
   c) Try blowing it up even more. See if you can make it pop by blowing into it.
   d) Write two or three sentences to describe what it feels like to blow into the balloon when it is 'empty', compared to when it is 'full' of air. Does it feel different? Is it more difficult to blow into the balloon when it is already full?
   e) Tie a knot in the top of an inflated balloon. Leave the balloon in the classroom and examine it again after one week. Does it look the same as when you inflated it a week ago? Perhaps it looks a bit like this balloon in the following photo:




*A deflated birthday balloon.*

   f) Remember to write your observations below.

_____

_____

4. This step requires a bicycle tyre and pump.
   a) Use the pump to pump air into the tyre. Continue to pump until it becomes too difficult to pump any more air into the tyre.
   b) Write 1 or 2 sentences about your observations.

_____

_____

**QUESTIONS:**

Try to answer the following questions by explaining what is happening to the air particles in each case. Use the words 'particles', 'collisions' and 'pressure' in your answers.

1. What happens when you blow up a paper bag or a balloon, or when you pump air into a tyre?

_____

_____

_____

2. When you blow into a paper bag, why does the bag pop or start to leak air after a while?

_____

_____

_____

3. When you blow into a balloon that is fully inflated, why does the balloon pop?

_____

_____

_____

_____

_____

5. Explain why you think it was impossible to blow up the balloon inside the bottle? Why was it possible to blow up the balloon when there was a hole in the bottle?

_____

_____

_____

_____

6. Why does it become more and more difficult to pump air into the bicycle tyre?

_____

_____

_____

**Answers:**

1. This step requires a brown paper bag. a) Blow up a brown paper bag until it is fully inflated. b) Try blowing it up even more. See if you can make it pop by blowing into it. c) Write two or three sentences to describe what it feels like to blow into the bag when it is 'empty', compared to when it is 'full' of air. Does it feel different? Is it more difficult to blow into the bag when it is already full?
   *It is easier to blow into the bag when it is 'empty', or when there is not much air in it and becomes increasingly more difficult to blow into as it fills with air. Note: If the bag is strong it may not be possible to pop it by blowing into it, because humans cannot blow with much force. A 'weak' bag may come apart at the seams or start to leak when the learners continue to force air into it beyond its capacity. Ask them to think about why this happens*

2. This step requires a balloon. a) Blow up the balloon until it is the size of an orange. Pinch it closed but do not tie a knot in the top. b) Now blow up the balloon as large as you can. c) Try blowing it up even more. See if you can make it pop by blowing into it. d) Write two or three sentences to describe what it feels like to blow into the balloon when it is 'empty', compared to when it is 'full' of air. Does it feel different? Is it more difficult to blow into the balloon when it is already full?
*The balloon is difficult to blow into at first. Thereafter it becomes more easy to blow air into the balloon. When the balloon becomes stretched 'to capacity' with air, it becomes more and more difficult to blow more air into it. Note: The balloon is difficult to blow into at first because the material (rubber) that the balloon is made of is still very tight. It can be relaxed somewhat by stretching the balloon before blowing into it, but the first one or two 'blows' will require some effort e) Tie a knot in the top of an inflated balloon. Leave the balloon in the classroom and examine it again after one week. Does it look the same as when you inflated it a week ago? Perhaps it looks a bit like this balloon in the following photo:*
*A deflated birthday balloon.*

   f) Remember to write your observations below.
   *After one week the balloon has become wrinkled and it is smaller than it was originally.*



3. This step requires a balloon and an empty plastic bottle. a) Stretch the balloon over the top of the bottle, with the balloon hanging down into the bottle. b) Blow into the balloon. What do you observe? Can you blow up the balloon? It is impossible to blow up the balloon. c) Now make a small hole in the bottom of the bottle. Blow into the balloon again. What do you observe now?
*The balloon swells up and fills the inside of the bottle.*

4. This step requires a bicycle tyre and pump. a) Use the pump to pump air into the tyre. Continue to pump until it becomes too difficult to pump any more air into the tyre. b) Write 1 or 2 sentences about your observations.
   *At first it is easy to pump air into the tyre but, the more you pump, the more difficult it becomes*.

1. What happens when you blow up a paper bag or a balloon, or when you pump air into a tyre?
   *Air particles are forced into the bag, balloon or tyre. The more you blow, the more particles are pushed into the bag, balloon or tyre. If there are more particles, there will be more collisions, and that means the pressure will be greater.*

2. When you blow into a paper bag, why does the bag pop or start to leak air after a while?
   *When the bag contains as many particles as it possibly can and we try to force even more particles into the bag, the force of the collisions of the particles against the inside of the bag becomes too much and the bag breaks.*

3. When you blow into a balloon that is fully inflated, why does the balloon pop?
   *When the balloon contains as many particles as it possibly can, it will be stretched to its maximum size. If we try to force even more particles into the balloon, the force of the collisions of the particles against the inside of the balloon becomes too much and the balloon pops. Note: Actually the polymer strands of the balloon tear apart as a result of the applied force.*

**NATURAL SCIENCES: LESSON PLAN**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | Learners will able to: | |
| **SUB – TOP:** Gas pressure | 1. Understand how heating or cooling a gas changes it's pressure. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg. 45** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

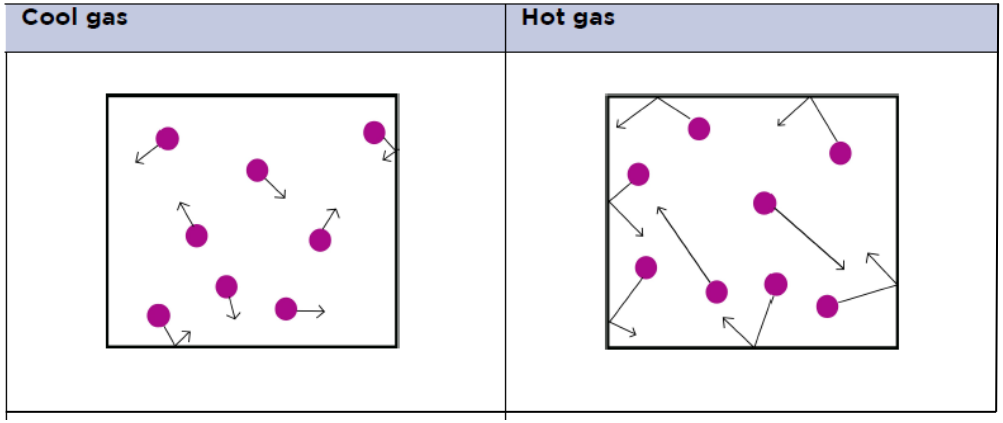
**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | √ | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Pressure**<br>• A gas exerts a pressure because of the collisions of the particles with each other and against the sides of the container | **TEACHING & LEARNING ACTIVITIES**:<br><br>Learners complete the activity given. | Textbooks: e.g. Siyavula Explore Gr. 8A, p200 |
| • Pumping more gas into a container increases the number of gas particles in the container. This increases the number of collisions and therefore increases the pressure<br><br>*[**Note:** heating also increases the pressure by giving the particles more energy, making them move faster, and collide with greater force. We do not have to deal with this aspect of pressure in this grade]* | Teacher guides the learners to conclude that heating a gas increases it's' pressure whereas cooling a gas decreases its 'pressure. | |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**Class activity: Pressure**

Refer to the diagram BELOW and answer the questions that follow:




**CONTAINER A** **CONTAINER B**

**Describe** what is happening in the diagram with reference to the two containers

a) The collisions of particles with the walls of the container,

b) The energy of the particles and

c) The pressure in the container

Container A:

_____

_____

_____

Container B

_____

_____

_____

**Answers:**

Container A

*Fewer and less energetic collisions*

Container B

*More and more energetic collisions*

**NATURAL SCIENCES: LESSON PLAN**

**GRADE 8**
**MATTER AND MATERIAL**
**TERM 2**

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **LESSON OBJECTIVES:** | |
| **TOPIC: Particle model of matter** | Learners will able to: | |
| **SUB – TOP: Gas pressure and volume** | 1. Understand the relationship between the pressure and volume of a gas( how does volume of a gas affect the pressure of a gas)<br>2. Explain using particle model theory the effect of changing volume of a gas on pressure of a gas. | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg. 45** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

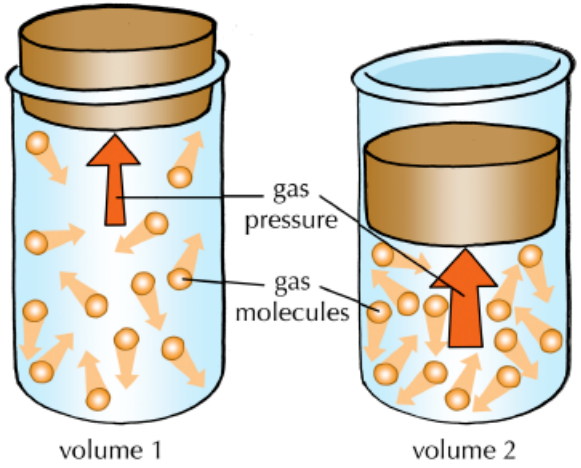
**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| Pumping more gas into a container increases the number of gas particles in the container. This increases the number of collisions and therefore increases the pressure | 1. Teacher guides the learners to conclude that increasing the volume decreases the pressure and decreasing the volume increases the pressure. ‘ | Siyavula Explore Gr. 8A, p201 |
| *[**Note:** heating also increases the pressure by giving the particles more energy, making them move faster, and collide with greater force. We do not have to deal with this aspect of pressure in this grade]* | 2. Learners complete the activity given. | |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**Class activity**

Refer to the diagram provided and answer the following question:




Describe what is happening in the diagram with reference to :

a) Volume of the container

b) Collisions of particles with the walls of the container,

c) Pressure in the container

_____

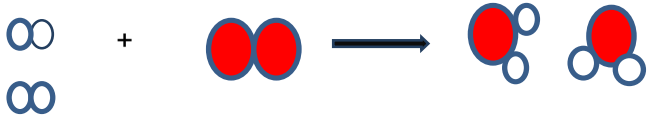
_____

_____

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Describe what is a chemical reaction is?<br>2. Describe what happens to atoms and the bonds between them during a chemical reaction?<br>3. Know how to identify the reactants and products of a reactions.<br>4. Give examples of chemical reactions are there in indigenous practices? | |
| **TOPIC: CHEMICAL REACTIONS** | | |
| **SUB – TOP: Reactants and products** | | |
| **REFERENCES** | **Sasol Inzalo Workbook pp 208 -219**<br>**CAPS pg. 45** | |
| **TERMINOLOGIES:** | Reactant, product, chemical equation, coefficients, fermentation | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

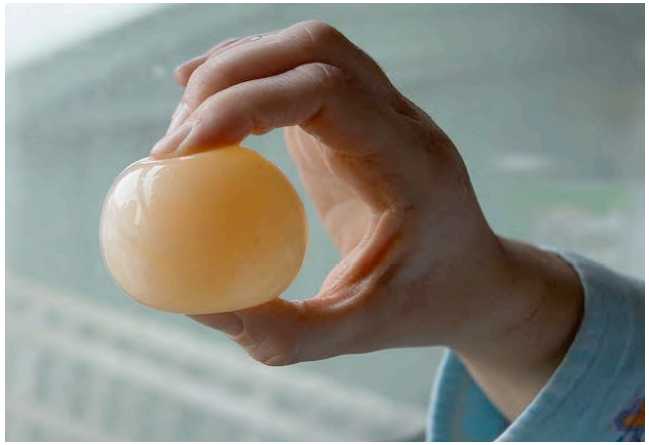
**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | √ | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Reactants and products**<br>substances can react with each other to form products with different chemical properties in a<br><br>chemical reaction, the substances that react with one another are called the *reactants*<br><br>in a chemical reaction, the substances that are produced are called the *products* of the reaction<br>• in reactions, re-arrangement of the atoms takes place, to form different products<br><br>**investigating** the chemical reaction that takes place when a whole egg is placed in white vinegar<br>*[the reactants, vinegar and the egg shell (calcium carbonate) react together to produce the products, carbon dioxide gas and a solution (calcium acetate)]*.<br><br>Make drawings to show what was observed. Show reactants (before) and products (after) the reaction has taken place<br><br>**investigating** what happens when you blow with a drinking straw through clear limewater in a beaker/ flask *[the reactants, carbon dioxide and calcium hydroxide react together to form the products, a white suspension of calcium carbonate and water]*.<br><br>Make drawings to show what was observed. Show reactants (before) and products (after) the reaction has taken place<br><br>indigenous knowledge includes some examples of useful chemical reactions such as fermentation in brewing [which produces carbon dioxide and ethanol (alcohol)] | **TEACHING & LEARNING ACTIVITIES**:<br><br>1. The teacher conducts a brief revision of: Atoms; Molecules; Elements and Compounds.<br>2. The teacher explains the concept of a chemical reaction as the breaking and formation of new bonds.<br>3. The teacher explains a chemical bond as a force that holds atoms together.<br>4. The teacher makes use of diagrams to describe chemical reactions.<br>5. The teacher gives examples to illustrate the concept of a chemical reaction e.g. reaction of hydrogen and oxygen to form water.<br>6. The teacher represents a chemical reaction using :<br>6.1 words<br>6.2 symbols<br>6.3 diagrams<br><br>Hydrogen + Oxygen → Water<br><br>$2\ H_2 + O_2 \rightarrow 2\ H_2O$<br><br> | **RESOURCES REQUIRED**:<br><br>• Textbooks: e.g. Siyavula Explore Gr. 8A,p. 208-211<br>• Eggs<br>• Glass<br>• White vinegar |

| ASSESSMENT | | |
|---|---|---|
| TEACHER REFLECTION | Progress: | Challenges: |

**ACTIVITY**: Can we use a chemical reaction to see inside an egg?



**MATERIALS** :

- White Vinegar
- A glass
- Eggs

**INSTRUCTIONS**

1. Cafefully place an egg in the glass. Be carefull not to crack the shell
2. Cover the egg with vinegar. Wait a few minutes. Can you see anything Happening on the surface of the eggshell?
    a) Write your observations below?
    b) What is this observation a sign of?
3. Leave the egg in vinegar for 4-5 days You should be able to complete the rest of the activity after this
4. After 4-5 days look at the eggshell in the vinegar and write down your obsevations.
5. Carefully scoop the egg out from the vinegar with a large spoon. Write down your observations.
6. Rub a powdery coating of the egg and put it in some clean water. What does it look like now?
7. Draw and label pictures of what the content of the glass looked like before and after the reaction took place.

**QUESTIONS**

1. What signs did you see that told you a chemical reaction had taken place?
2. Write a short paragraph to explain what happened to the eggshell?

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: PARTICLE MODEL OF MATTER** | 1. Understand the concepts reactant and product.<br>2. Identify reactants and products in a chemical reaction.<br>3. Make and Draw models showing chemical reactions. | |
| **SUB – TOP:** Change of state of matter | | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg.** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ |
| Observing | | | Raising Questions | | | Recording Information | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | √ |
| Measuring | | | Hypothesizing | | | Communicating | √ |
| Sorting & Classifying | | | Planning Investigations | √ | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| Make drawings to show what was observed. Show reactants (before) and products (after) the reaction has taken place | 1. The teacher gives examples to illustrate the concept of reactants and products e.g. The teacher provides examples e.g. | • Textbooks: e.g. Siyavula Explore Gr. 8A,p. 211-213 |
| | Carbon reacts with oxygen to form carbon dioxide<br><br>Carbon + Oxygen → carbon dioxide<br>$C + O_2 \rightarrow CO_2$<br>1. The teacher then explains a reactants as substances that react with one another during a chemical reaction and products as substances that are produced during a chemical reaction.<br>2. The teacher will write different chemical reactions in symbols and learners will make and draw models of the following reactions:<br>1.1 $2Na + Cl_2 \rightarrow 2NaCl$<br>1.2 $H_2 + Cl_2 \rightarrow 2HCl$<br>1.3 $2Mg + O_2 \rightarrow 2MgO$ | • Plastic beads or modelling clay or playdough or any other relevant materials |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

## ACTIVITY: Analysing the eggshell experiment

In the eggshell activity the calcium carbonate in the eggshell reacted with acetic acid and formed calcium acetate, carbon dioxide and water.

We can write this **chemical equation** as follows:

**eggshell + vinegar → calcium acetate + carbon dioxide + water**

**QUESTIONS:**

1. There are two starting substances **before** this chemical reaction takes place. What are they?

_____

2. There are three substances present **after** the reaction. What are these?

_____

3. What are the chemical formulae for the compounds water and carbon dioxide?

_____

4. We call the substances that are present before the chemical reaction has taken place, the **reactants**. What are the reactants of the eggshell experiment?

_____

5. What do you think happened to the reactants during the chemical reactions?

_____

6. We call the substances that are produced during the chemical reaction, the **products**. What are the products of the eggshell experiment?

Answer:

1. There are two starting substances before this chemical reaction takes place. What are they?
   *The eggshell (calcium carbonate) and vinegar (acetic acid).*

2. There are three substances present after the reaction. What are these?
   *They are calcium acetate, carbon dioxide and water.*

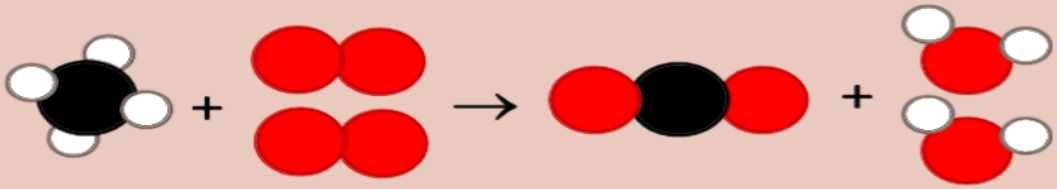
3. What are the chemical formulae for the compounds water and carbon dioxide?
   *Water is H2O and carbon dioxide is CO2.*

4. We call the substances that are present before the chemical reaction has taken place, the reactants. What are the reactants of the eggshell experiment?
   *The eggshell (calcium carbonate) and vinegar (acetic acid).*

5. What do you think happened to the reactants during the chemical reactions?
   *Use this to assess learner's understanding so far. They should mention that the reactants are used to make the products.*

6. We call the substances that are produced during the chemical reaction, the products. What are the products of the eggshell experiment?
   *They are calcium acetate, carbon dioxide and water*

5. Methane gas ($CH_4$) is a natural fuel gas that burns in oxygen gas to produce carbon dioxide and water. The reaction can be represented by the following diagram:



Key:
Carbon atoms (C): black
Oxygen atoms (O): red
Hydrogen atoms (H): white

a) Use the diagram and the 'key' below it to write formulae for each of the substances in the reaction. [4 marks]

| Name of compound | Formula |
|---|---|
| Methane | |
| Oxygen gas | |
| Carbon dioxide | |
| Water | |

b) What are the reactants of the above reaction? [2 marks]

_____

c) What are the products of the above reaction? [2 marks]

_____

**Answers:**

a) $CH_4$
$O_2$
$CO_2$
$H_2O$

b) What are the reactants of the above reaction?
*Methane ($CH_4$) and oxygen ($O_2$)*

c) What are the products of the above reaction?
*Water ($H_2O$) and carbon dioxide ($CO_2$)*

d) Write the names of the reactants and products under the colourful picture representations of each of the molecules.
*The equation should read as follows: methane + oxygen → carbon dioxide + water.*

| | |
|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: CHEMICAL REACTIONS** | 1. Explain the brewing of homemade beer |
| **SUB – TOP:** Reactants and products :Part 3 | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg. 45** |
| **TERMINOLOGIES:** | |

| | | |
|---|---|---|
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ |
| Observing | | | Raising Questions | | | Recording Information | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | √ |
| Sorting & Classifying | | | Planning Investigations | √ | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| I knowledge includes some examples of useful chemical reactions such as fermentation in brewing [which produces carbon dioxide and ethanol (alcohol)] | 1. The teacher discusses the brewing of sorghum beer in relation to reactants and products during fermentation product.<br>2. The learners brewing sorghum beer using resources identified.<br>3. Learners carry out a class activity. | • Textbooks: e.g. Siyavula Explore Gr. 8A,p. 211-213<br>• Sugar<br>• Sorghum<br>• Transparent container lid |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

## ACTIVITY: Studying the fermentation reaction

The basic reaction in the fermentation process can be summarised as follows:

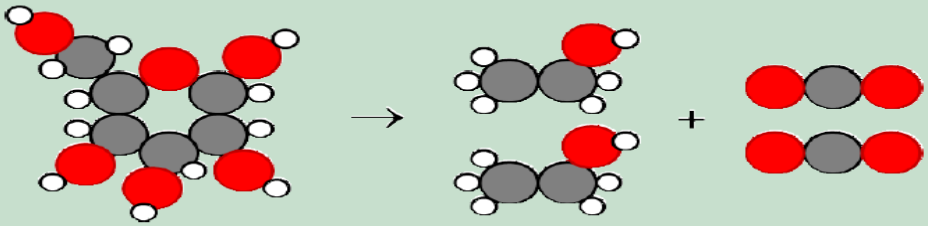
**glucose → alcohol + carbon dioxide**

What are the reactants and products in this reaction?

_____

_____

We can draw pictures of the molecules to show how the atoms are rearranged during the reaction:



In the diagram above, the grey atoms are carbon (C), the red atoms are oxygen (O) and the small, white ones are hydrogen (H). Write in the names of the compounds in this reaction.

Glucose does not change into alcohol and carbon dioxide by itself! Microorganisms like yeast and bacteria actively ferment glucose.

In South Africa, a popular drink is ginger or pineapple beer! The fizzy bubbles in the ginger beer or pineapple beer are bubbles of carbon dioxide produced by the yeast during fermentation. Let's make some ginger beer!

**INSTRUCTIONS:**

1. You need to research how to make traditional South African ginger beer.
2. Identify the different ingredients you will need.
3. Once you have done so, you can decide as a class about the best recipe you will use. You can then make ginger beer in class with your teacher.
4. Answer the questions that follow.

**QUESTIONS:**

1. What are the reactants in the reaction to make ginger beer?

_____

2. What is the product in the reaction taking place in the ginger beer?

_____

3. Why are there fizzy bubbles in the ginger beer?

4. Where do you think the gas came from?

5. Another example of where we see a chemical reaction taking place is when we burn wood in a fire, either in our homes or to cook food. The wood burns and produces carbon dioxide gas and water vapour. What are the products and reactants in this reactions?



Answers:

Glucose is the reactant and alcohol and carbon dioxide are the products

Glucose does not change into alcohol and carbon dioxide by itself! Microorganisms like yeast and bacteria actively ferment glucose.

The fizzy bubbles in the ginger beer or pineapple beer are bubbles of carbon dioxide produced by the yeast during fermentation.

1. What are the reactants in the reaction to make ginger beer?

*The chemical reaction occurs between sugar and fermenting fruit and the yeast. So the reactants are the sugar and fruit (ginger and raisins).*

2. What is the product in the reaction taking place in the ginger beer?*The product is carbon dioxide (and a very small amount of alcohol).*

3. Why are there fizzy bubbles in the ginger beer? *It is the carbon dioxide gas that is was trapped in the liquid.*

4. Where do you think the gas came from? *It is a result of the chemical reaction between the yeast, the sugar and the fermenting fruit.*

5. Another example of where we see a chemical reaction taking place is when we burn wood in a fire, either in our homes or to cook food.

*The wood burns and produces carbon dioxide gas and water vapour.*

What are the products and reactants in this reactions?

*The reactants are the wood and oxygen, and the products are the carbon dioxide and water.*

| | | |
|---|---|---|
| **DURATION:** 30 minutes | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: Chemical reactions** | | |
| **SUB – TOP: Reactants and Products part 4** | | |
| **REFERENCES** | **Sasol Inzalo Workbook**<br>**CAPS pg. 45** | |
| **TERMINOLOGIES:** | | |
| **SPECIFIC AIMS** (√ aim addressed) | 1. DOING SCIENCE | √ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | √ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS (**√ skill addressed)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | √ | | Identifying problems & issues | | | Doing Investigations | √ | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | √ | | Predicting | √ | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | √ | |
| Sorting & Classifying | | | Planning Investigations | √ | | | | |

| CONTENT & CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **investigating** what happens when you blow with a drinking straw through clear limewater in a beaker/ flask *[the reactants, carbon dioxide and calcium hydroxide react together to form the products, a white suspension of calcium carbonate and water]*. Make drawings to show what was observed. Show reactants (before) and products (after) the reaction has taken place. | 1. Learners carry out a practical activity of blowing $CO_2$ through clear lime water.<br><br>2. The teacher will lead the discussion of the practical task in terms of:<br>2.1 Observations before blowing and after blowing carbon dioxide.<br>2.2 Concept of chemical reaction.<br>2.3 Concept of reactants and products.<br>3. The teacher further discusses other chemical reactions from Life and Living (photosynthesis, respiration) showing reactants and products | **RESOURCES REQUIRED**:<br><br>• Textbooks: e.g. Siyavula Explore Gr. 8A,p.<br>• Drinking straw<br>• beaker<br>• clear lime water |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

## ACTIVITY: Some chemical reactions from Life and Living



1. Do you remember we used clear lime water to detect carbon dioxide in our breath in Chapter 1 in Life and Living? What colour did the clear lime water turn when we blew bubbles through it?

_____

2. Limewater is a solution of calcium hydroxide in water. A reaction occurs between the lime water and the carbon dioxide to produce a white substance in the water called calcium carbonate. What are the reactants and products in this reaction?

_____

_____

3. We say that we used the colour change of the lime water to detect the carbon dioxide in our breath. Carbon dioxide is the by-product of the chemical reaction that takes place during respiration in all organisms. Write a word equation for respiration.

_____

4. In Life and Living we spoke about the ingredients of respiration as we had not yet learned the terms reactant and product. What are the reactants and what are the products in respiration?

_____

_____

Answers:

ACTIVITY: Some chemical reactions from Life and Living

TEACHER'S NOTE

This activity reinforces some concepts learned in the beginning of the year in Life and Living about respiration and photosynthesis. CAPS suggests doing the experiment again where you blow bubbles through lime water. We did this in Chapter 1 this year as an activity, but you can repeat it briefly here to show the results again if learners do not remember it well.

1. Do you remember we used clear lime water to detect carbon dioxide in our breath in Chapter 1 in Life and Living? What colour did the clear lime water turn when we blew bubbles through it?

*It turned a milky white colour.*



2. Limewater is a solution of calcium hydroxide in water. A reaction occurs between the lime water and the carbon dioxide to produce a white substance in the water called calcium carbonate. What are the reactants and products in this reaction?

*The reactants are limewater (calcium hydroxide) and carbon dioxide and the products are calcium carbonate and water.*

3. We say that we used the colour change of the lime water to detect the carbon dioxide in our breath.

*Carbon dioxide is the by-product of the chemical reaction that takes place during respiration in all organisms.*

*Write a word equation for respiration. glucose + oxygen → energy + carbon dioxide + water*

4. In Life and Living we spoke about the ingredients of respiration as we had not yet learned the terms reactant and product. What are the reactants and what are the products in respiration?

*The reactants are glucose and oxygen. The products are energy, carbon dioxide and water.*

5. What are the reactants and products in photosynthesis?

*The reactants are carbon dioxide and water, the products are glucose and oxygen*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| | |
|---|---|
| **DURATION**<br>**TOPIC: Static Electricity**<br>**SUB TOPIC: Friction and static electricity** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Explain the concept of static electricity and friction<br>• Demonstrate the effects of static electricity using simple materials<br>• Demonstrate understanding of movement of electrons resulting in attraction and repulsion |
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 7-B** |
| **TERMINOLOGY:** | **Dynamo, electricity grid, generators turbines, nuclear fuels** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | ✓ | | Communicating | ✓ |
| Sorting & Classifying | ✓ | | Planning Investigations | ✓ | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Friction and static electricity**<br>• friction (rubbing) between certain materials (such as plastic, perspex, glass, nylon, wool, silk) transfers electrons between the atoms of the two materials being rubbed together<br>• the electrons move from one material causing a positive<br>charge on its surface, and causing a negative charge on the surface of the other material [It is only the electrons that are | • Learners discuss their experiences of effects of static electricity, for example, slight shock felt when taking of a jersey. Their hair standing up when touching certain objects.<br>• Teacher demonstrates static electricity generated by rubbing a comb on a cloth and attracting pieces of paper.<br>• Teacher explains in detail the movement of charges and the concept of an atom and its particles which are electron, protons and neutrons. | Plastic comb, pieces of paper, |

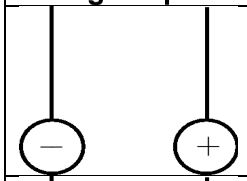
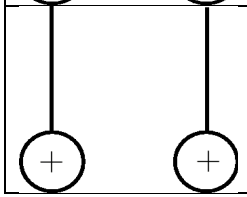
**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

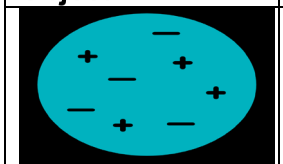
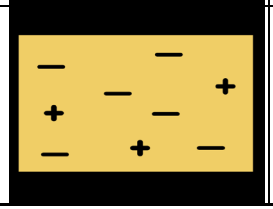
| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| transferred, protons and neutrons do not move]<br>• objects/materials with same/like charges repel each other<br>• objects/materials with opposite/unlike charges attract each other<br>• a discharge of the electrons causes the sparks or shock of static electricity, especially when the air is dry | | |
| **ASSESSMENT** | **RECOMMENDED ASSESSMENT ACTIVITY**<br><br>1. Complete the following sentences. Just write the missing word on the line below.<br>a) An object which has a negative charge is said to have _____ electrons than protons.<br>b) An object which has a positive charge is said to have _____ electrons than protons.<br>2. Sarah uses a plastic comb to comb her hair. The comb becomes negatively charged. The comb is negatively charged because the comb has:<br>a) gained electrons<br>b) gained protons<br>c) lost electrons<br>d) lost protons<br>3. A perspex strip was rubbed with a cloth and became positively charged. The correct explanation for why the perspex rod becomes positively charged is that:<br>a) The perspex rod got extra protons from the cloth.<br>b) The perspex rod got extra protons due to friction.<br>c) Protons were created as the result of friction.<br>d) The perspex rod lost electrons to the cloth due to friction. | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|

4. Look at the following images in the table. Redraw the images in the second column to show how the spheres will move because of the nature of the charges. Write an explanation in the last column.

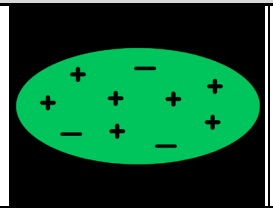
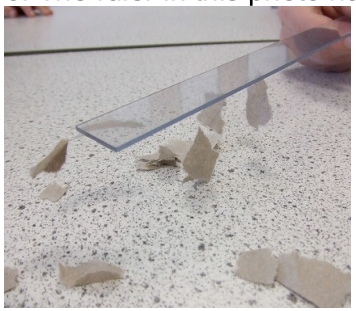
| Charged spheres | Draw how they will move | Explanation |
|---|---|---|
|  | | |
|  | | |

5. Complete the table by working out the overall charge on each object. State whether the object is positively charged, negatively charged or neutral and why.

| Object | Overall charge | Why is it positive, negative or neutral? |
|---|---|---|
|  | | |
|  | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |  | |
| | 6. The ruler in this photo has been rubbed with a cloth. Describe what is happening in this photo and why.<br><br>*What is happening?*<br><br>7. Sometimes, when you are pushing a trolley, you can get a small shock. Explain why this would happen.<br>8. Why does your jersey make a crackling sound when you pull it over your head?<br>9. The two girls in the photo are touching a charged Van de Graaf? Explain what is happening to them.<br><br>*What is happening in this photo?* | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

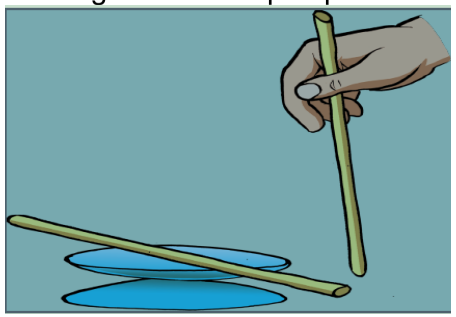
**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

**ACTIVITY 1:** Turning the wheel

**MATERIALS:**
- 2 curved watch glasses
- 2 perspex rods
- Cloth: wool or nylon
- Plastic rod
- Small pieces of torn paper

**INSTRUCTIONS:**
1. Place a watch glass upside down on the table.
2. Balance the second watch glass upright on the first watch glass.
3. Rub one of the perspex rods vigorously with the cloth.
4. Balance the perspex rod across the top of the watch glass.
5. Rub the second perspex rod vigorously with the same cloth.
6. Bring the second perspex rod close to the first perspex rod. What do you see happening?



7. Repeat the activity but instead of the second perspex rod, use the plastic rod. What do you see happening?
8. Next, bring a rod that you have rubbed close to small pieces of torn paper lying on the table. What do you observe?

**QUESTIONS:**
1. What happened when you brought the second perspex rod close to the first perspex rod?
2. What happened when you brought the plastic rod close to the first perspex rod?
3. What happened when you brought the plastic rod close to the pieces of paper?

**NATURAL SCIENCES: LESSON PLAN** **GRADE: 8**
**DURATION: 30 MINUTES** **ENERGY AND CHANGE**
**CAPS SENIOR PHASE** **TERM: 3**

**ACTIVITY 2:** Making a simple electroscope

**MATERIALS:**
• Glass jar, with lid
• 14 gauge copper wire, about 12 cm in length
• Plastic straw or plastic tubing
• 2 small pieces of aluminium foil
• Piece of wool cloth
• Plastic ruler
• Glass rod

**INSTRUCTIONS:**
Make your own electroscope (video) bit.ly/18JyxWc
1. Twist one end of the copper wire into a spiral shape. This will increase its surface area.
2. Make a hole in the jar lid and push a small piece of the plastic tubing through the hole.
3. Put the other end of the copper wire through the straw so that the spiral end is on the outside of the lid.
4. Make a hook out of the pointed end of the copper wire.
5. Cut two rectangular strips of aluminium foil.
6. Put each piece of aluminium foil onto the hook. Make a small hole in the aluminium foil to allow it to hang from the hook.
7. Carefully put the hook end of the copper wire into the glass jar and close the jar.
8. Rub the ruler with the wool cloth for a minute.
9. Bring the ruler close to the spiral end of the copper wire.

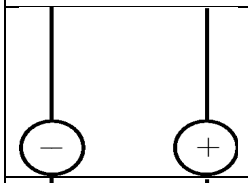
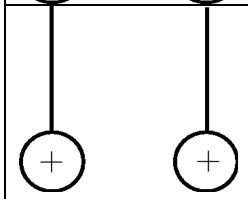
**QUESTIONS:**
1. What did you observe when you brought the ruler close to the copper wire?
2. What happens if you move the ruler away from the copper wire?
Why do the pieces of aluminium foil move apart? When you rubbed the plastic ruler with the wool cloth, the ruler became negatively charged. When the negatively charged ruler is brought close to the copper wire, the electrons on the wire are repelled downwards towards the aluminium foil. The pieces of aluminium foil then have extra electrons on them and they both become negatively charged. Two objects which are negatively charged will repel each other and so the pieces of aluminium foil move away from each other.
3. Write a short paragraph to explain what would happen if you brought a positively charged object close to your electroscope.

**NATURAL SCIENCES: LESSON PLAN** **GRADE: 8**
**DURATION: 30 MINUTES** **ENERGY AND CHANGE**
**CAPS SENIOR PHASE** **TERM: 3**

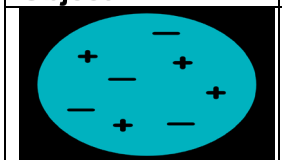
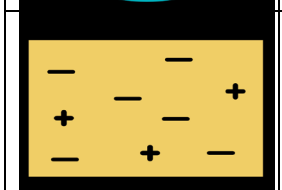
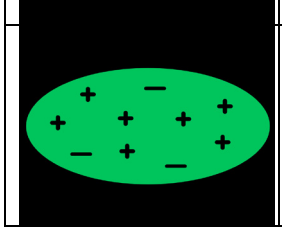
**MEMORANDUM**

**RECOMMENDED ASSESSMENT ACTIVITY**

1. Complete the following sentences. Just write the missing word on the line below.
a) An object which has a **negative** charge is said to have electrons than protons.
*An object which has a **negative** charge is said to have more electrons than protons.*
b) An object which has a **positive** charge is said to have electrons than protons.
*An object which has a **positive** charge is said to have fewer electrons than protons.*
2. Sarah uses a plastic comb to comb her hair. The comb becomes negatively charged. The comb is negatively charged because the comb has:
a) gained electrons
b) gained protons
c) lost electrons
d) lost protons
*Answer a.*
3. A perspex strip was rubbed with a cloth and became positively charged. The correct explanation for why the perspex rod becomes positively charged is that:
a) the perspex rod got extra protons from the cloth.
b) the perspex rod got extra protons due to friction.
c) protons were created as the result of friction.
d) the perspex rod lost electrons to the cloth due to friction.
*Answer d.*
4. Look at the following images in the table. Redraw the images in the second column to show how the spheres will move because of the nature of the charges. Write an explanation in the last column.

| Charged spheres | Draw how they will move | Explanation |
|---|---|---|
| | | |
|  | *Learners must draw the spheres moving towards each other.* | *The spheres have opposite charges, which attract, so they move towards each other.* |
|  | *Learners must draw the spheres moving away from each other.* | *The spheres have the same, positive charge and like charges repel, so they move away from each other.* |

5. Complete the table by working out the overall charge on each object. State whether the object is positively charged, negatively charged or neutral and why.

| Object | Overall charge | Why is it positive, negative or neutral? |
|---|---|---|
|  | *Charge = 4 + (-4) = 0* | *It is neutral as there are equal numbers of positive and negative charges.* |
|  | *Charge = 3 + (-6) = -3* | *It is negatively charged as there are 3 more negative than positive charges.* |
|  | *Charge = 7 + (-3) = 4* | *It is positively charged as there are 4 more positive charges than negative charges.* |

6. *Rubbing the ruler with a cloth transfers electron from the cloth to the ruler so the ruler now has an excess of electrons and it is negatively charged. The pieces of paper are neutral. When the negatively charged ruler is brought near to the paper pieces, they are attracted to the ruler as the electrons move around on the paper because of the large charge on the ruler. Electrons will move away from the ruler leaving a positive charge on the paper near the ruler, so they are attracted.*

7. *Friction between the floor and the trolley wheels causes a build-up of charge on the trolley. The charge is earthed by your body, causing the shock.*

8. *When you pull the jersey over your head the friction causes the jersey and your hair to become charged. The movement of electrons from your hair to the jersey releases energy in the form of light and sound.*

9. *The girls are touching the hollow dome of a Van de Graaff generator. The dome is positively charged so electrons are transferred from their bodies to the dome to discharge it. This causes their bodies and hair to become positively charged. Their hair strands now repel each other as they are all positive (like charges repel) and they rise up.*



ACTIVITY 1

6. Bring the second perspex rod close to the first perspex rod. What do you happening?
*The second perspex rod should repel the first one as they have like charges, so learners should see the second rod 'pushing' the first one around in a circle. You might need to rub the first perspex rod again, in between attempts, as the charge does dissipate*.

7. Repeat the activity but instead of the second perspex rod, use the plastic rod. What do you see happening?
*The rods now have opposite charges and so the second rod should be seen to 'pull' the other rod around in a circle.*
8. Next, bring a rod that you have rubbed close to small pieces of torn paper lying on the table. What do you observe?
*The learners should be able to pick up the pieces of paper with the charged rod.*

**QUESTIONS:**

1. What happened when you brought the second perspex rod close to the first perspex rod?
*When the rods are the same (i.e. both perspex) then the first rod should move away from the second and the top watch glass will turn in a circle.*
2. What happened when you brought the plastic rod close to the first perspex rod?
*When the two different materials are used then the first rod should move towards the plastic rod and the watch glass will turn in a circle towards the plastic rod.*
3. What happened when you brought the plastic rod close to the pieces of paper?
*The pieces of paper were attracted to the plastic rod.*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

**ACTIVITY 2**

**QUESTIONS:**

1. What did you observe when you brought the ruler close to the copper wire?
*The two pieces of aluminium foil moved apart.*

2. What happens if you move the ruler away from the copper wire?
*The aluminium foil pieces move back together.*

Why do the pieces of aluminium foil move apart? When you rubbed the plastic ruler with the wool cloth, the ruler became negatively charged. When the negatively charged ruler is brought close to the copper wire, the electrons on the wire are repelled downwards towards the aluminium foil. The pieces of aluminium foil then have extra electrons on them and they both become negatively charged. Two objects which are negatively charged will repel each other and so the pieces of aluminium foil move away from each other.

3. Write a short paragraph to explain what would happen if you brought a positively charged object close to your electroscope.
*When a positively charged object is brought close to the electroscope the negative electrons are attracted towards the positively charged object and move up through the copper wire. This means that the pieces of aluminium have lost some electrons and so have an overall positive charge. Both pieces of aluminium foil are then positively charged. Like charges repel each other and so the pieces of aluminium foil move apart from each other.*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: Energy transfers in electrical systems**<br>**SUB TOPIC: Circuits and current electricity** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Display understanding of the concept of electric circuit<br>• Construct a simple electric circuit<br>• Define the notion of a closed circuit<br>• Draw and interpret circuit diagrams<br>• Identify components of a circuit |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 7-B** | |
| **TERMINOLOGY:** | **Electric circuit, closed circuit,** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | ✓ | | Communicating | ✓ |
| Sorting & Classifying | ✓ | | Planning Investigations | ✓ | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **Circuits and current electricity**<br>• a circuit is a system for transferring electrical energy<br>• a closed circuit is needed to make a device work, such as making a bulb light up *(refer to Grade 6 Energy & Change)*<br>• a circuit is a complete conducting pathway for electricity and has a number of components connected together: | • Teacher facilitates discussion on what learners already know about electric circuits and flow of charges. Examples of questions may include the following:<br>- What is an electric current?<br>- What is an electric circuit?<br>- Where does the energy come from in a circuit?<br>- What are components? | Bulb, cell and connecting wires |

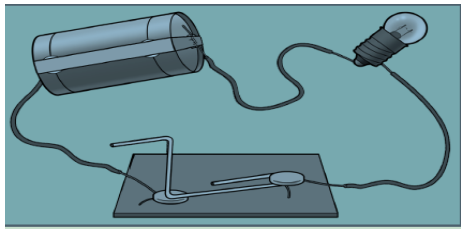
**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| -- from one terminal at the source of energy (cell/battery)<br>à along conducting material (wires) à through the device<br>(filaments of incandescent bulbs) à back to the other<br>terminal of the source of energy (cell/battery) | • Teacher divides learners into groups and provide them with a wire, a bulb and a cell to complete simple circuits and drawing simple circuit diagrams of the working combination | |
| **ASSESSMENT** | See activity 1 below | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**ACTIVITY 1:** A simple circuit

**INSTRUCTIONS:**
1. Look at the example of a simple circuit.
2. Answer the questions which follow.



**QUESTIONS:**
1. What are the parts that make up this system for transferring electrical energy?
2. Do you think this is an open or closed circuit? Explain your answer.
3. Which part is providing the source of energy?
4. What is the conducting material?
5. What type of energy does the battery have?
6. What is this energy transferred to when the circuit is closed and the electrons **move** through the wires?
7. What is the output of this system?
8. In most systems, the input energy is more than the useful output energy as some of the input energy is transferred to wasted output energy. In this simple circuit with a light bulb, what is the wasted output energy?

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

MEMORANDUM

1. What are the parts that make up this system for transferring electrical energy?
*They are the battery, conducting wires, light bulb and switch.*
2. Do you think this is an open or closed circuit? Explain your answer.
*It is closed as the switch is closed so it is a complete, unbroken pathway.*
3. Which part is providing the source of energy?
*The battery.*
4. What is the conducting material?
*The wires, made of metal.*
5. What type of energy does the battery have?
*Chemical potential energy.*
6. What is this energy transferred to when the circuit is closed and the electrons **move** through the wires?
*Potential energy is transferred to kinetic energy of the electrons.*
7. What is the output of this system?
*The bulb lights up, so it is light (and also heat).*
8. In most systems, the input energy is more than the useful output energy as some of the input energy is transferred to wasted output energy. In this simple circuit with a light bulb, what is the wasted output energy?
*The wasted energy is heat.*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: Energy transfer in electrical systems**<br>**SUB TOPIC: Circuits and current electricity** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Explain the uses of conducting wires and properties of metals<br>• Draw components of a circuit diagram and write symbols of electric components<br>• Explain sources of energy in an electric circuit |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** | |
| **TERMINOLOGY:** | **Conducting wires, chemical system, potential energy and kinetic energy** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | ✓ | | Communicating | ✓ |
| Sorting & Classifying | ✓ | | Planning Investigations | ✓ | | | |

| **CONTENT AND CONCEPTS** | **ACTIVITIES** | **RESOURCES** |
|---|---|---|
| **Components of a circuit**<br>• conducting wires are usually made of metal and carry electricity over a short or long distance<br>• switches provide a convenient way of controlling electrical circuits<br>• cells/batteries are chemical systems that are sources of Energy: cells store chemical substances (potential energy): when the circuit is completed, the chemicals react together to produce an electric current: an electric current is the flow of charges (kinetic energy) along a conductor | • Learners work individually to complete the table below and teacher facilitates discussion around learner responses. (See Activity 1 below).<br>• Learners draw simple circuit diagrams using questions in activity 1 below and answer the questions based on the simple diagrams<br>• Teacher consolidates the lesson by giving more examples of circuit diagrams and allows learners to discuss different components of the circuits. | |

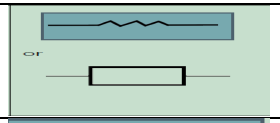
| | | |
|---|---|---|
| **ASSESSMENT** | See Activity 2 below | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

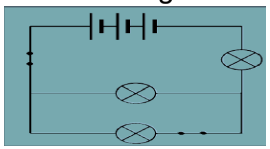
**ACTIVITY 1:** Components in an electric circuit

1. Complete the following table. List the function of the component and draw the circuit symbol. The last two rows have been filled in for you as you may not yet know these symbols, but we will be using them in this chapter.

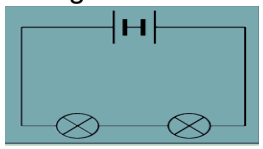
| Component | Function | Symbol |
|---|---|---|
| Cell | | |
| Torch bulb | | |
| Open switch | | |
| Closed switch | | |
| Electrical wire | | |
| Resistor | A component that opposes or inhibits electrical current in a circuit. It can also convert electrical energy to heat or light. |  |
| Variable resistor | A resistor whose resistance can be adjusted higher or lower. |  |

2. Let's now practice drawing some simple circuit diagrams. Draw the following circuit diagrams.
   I. A closed circuit with one cell, two light bulbs and a switch.
   II. An open circuit with two cells, two light bulbs and a switch.
   III. A closed circuit with 4 cells and one light bulb.

3. Look at the following circuit diagram. Identify the number of bulbs, switches and cells in this circuit.



4. What is wrong with the following circuit diagram? Does it represent a closed circuit? Explain your answer.



5. Why do you think it is useful to have a switch in a circuit?
6. Why are conducting wires made out of metal?

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

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**ENERGY AND CHANGE**
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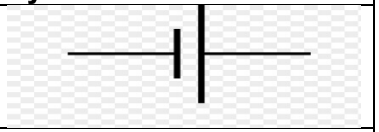
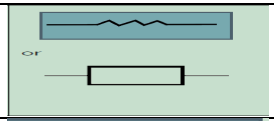
**ACTIVITY 1**

| Component | Function | Symbol |
|---|---|---|
| Cell | Energy source for a circuit. |  |
| Torch bulb | Provides a light source. | |
| Open switch | An open switch breaks the circuit and prevents current in the circuit | |
| Closed switch | A closed switch completes the circuit and allows current to move in the circuit. | |
| Electrical wire | Conducts electricity in the circuit. Provides a pathway. | |
| Resistor | A component that opposes or inhibits electrical current in a circuit. It can also convert electrical energy to heat or light. |  |
| Variable resistor | A resistor whose resistance can be adjusted higher or lower. |  |

4. What is wrong with the following circuit diagram? Does it represent a closed circuit? Explain your answer.
*The one cell is in the wrong position as the two negative terminal are facing each other, instead of the negative terminal of one cell being connected to the positive terminal of the next cell.*

5. Why do you think it is useful to have a switch in a circuit?
*A switch provides an easy way of opening or closing the circuit and therefore controlling the electric circuit*.

6. Why are conducting wires made out of metal?
*This is because metals are good conductors of electricity.*

**NATURAL SCIENCES: LESSON PLAN** **GRADE: 8**
**DURATION: 30 MINUTES** **ENERGY AND CHANGE**
**CAPS SENIOR PHASE** **TERM: 3**

**ACTIVITY 2:** Recycling of batteries

Batteries which no longer work must not be thrown away in recycling dustbins. They need to be recycled.

**INSTRUCTIONS:**
1. Work in small groups.
2. Find out why batteries should not be thrown away in normal dustbins. Write a paragraph to explain why.
3. Find out where you can recycle batteries in your community. Write down the details of the center(s) closest to where you live.

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Explain the concept resistance<br>• Identify resistors in a circuit<br>• Display understanding of resistance in a bulb<br>• State the unit for measuring resistance |
| | |
| **TOPIC: Energy transfer in electrical systems** | |
| **SUB TOPIC: Components of a circuit (resistors)** | |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 7-B** | |
| **TERMINOLOGY:** | | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

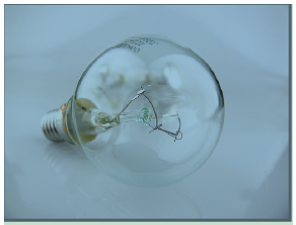
| **CONTENT AND CONCEPTS** | **ACTIVITIES** | **RESOURCES** |
|---|---|---|
| **Components of a circuit**<br>Resistors are made of materials that resist/oppose the flow of electrical current in a circuit. Resistors in a circuit have an influence on the amount of electric current flowing in that circuit. Some resistors (including bulb filaments, heating wires, elements in kettles/heaters/geysers/stoves) can heat to provide useful output energy. A light bulb such as a torch bulb contains a resistance wire called a filament. The filament heats up to be white hot when connected in a circuit. The resistance wire is connected to two contact points – the one end to the screw part (casing) and the other end to the solder knob at the bottom. The two contacts are separated by an insulator. | • Learners discuss the concept of resistance in a circuit.<br>• Learners discuss differences between conductors and insulators and provide examples of materials that are good and bad conductors of electricity.<br>• Teacher brings a kettle to boil water and allow learners to observe how the element of the kettle heats the water. | Incandescent light bulb, kettle. |

| | | |
|---|---|---|
| **ASSESSMENT** | See activity 1 below | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

**ACTIVITY 1:** Resistance in a light bulb



*An incandescent light bulb.*

**MATERIALS:**

- Light bulb
- Lamp

**INSTRUCTIONS:**

1. If you have light bulbs available, have a close look at the different parts; otherwise have a look at the photos provided here.
2. Read the information about how a light bulb works and identify the parts that have been numbered.
3. Answer the questions that follow.

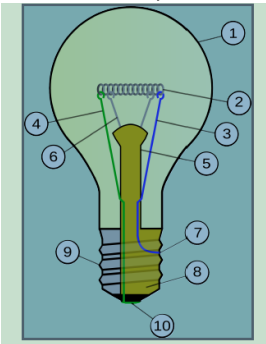



*Diagram of the parts of a light bulb.*

A light bulb consists of an air-tight enclosed glass case (number 1). At the base of the bulb are two metal contacts (numbers 7 and 10), which connect to the ends of an electrical circuit. The metal contacts are attached to two stiff wires, (numbers 3 and 4).
These wires are attached to a thin metal filament. Have a look at a light bulb. Can you identify the filament? This is number 2 in the diagram. The filament is made from tungsten wire. This is an element with high resistance.

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

**QUESTIONS:**

**TAKE NOTE**

Incandescent means to emit light as a result of being heated.

1. When the electrons move through the filament they experience high resistance. This means that they transfer a lot of their energy to the filament when they pass through. The energy is transferred to the surroundings in the form of heat and bright light. Describe the transfer of energy in this light bulb.
2. What is the useful energy output and what is the wasted energy output in this light bulb?
3. Can you see the filament is coiled? Why do you think this is so? Discuss this with your class and teacher.
4. The filament is mounted on a glass stem (number 5). There are two small support wires to hold the filament up (number 6). Why do you think the stem is made of glass?
5. The inside of the base of the bulb is made from an insulating material. This is the yellow part labeled number 8. On the outside of this is a metal conducting cap to which the wire is attached at (number 7). Why is the wire attached at 7 making contact with the metal conducting cap?

Answers:

1. When the electrons move through the filament they experience high resistance. This means that they transfer a lot of their energy to the filament when they pass through. The energy is transferred to the surroundings in the form of heat and bright light. Describe the transfer of energy in this light bulb.
*Electrical energy is transferred to heat and light.*

2. What is the useful energy output and what is the wasted energy output in this light bulb?
*Light is the useful output and heat is the wasted output.*

3. Can you see the filament is coiled? Why do you think this is so? Discuss this with your class and teacher. NOTE: This is an extension question as learners will only cover factors affecting resistance later so discuss this as a class.
*This is to fit a longer length of tungsten within a small space to increase the resistance, and therefore brightness of the bulb.*

4. The filament is mounted on a glass stem (number 5). There are two small support wires to hold the filament up (number 6). Why do you think the stem is made of glass?
*Glass is an electrical insulator so it will not conduct electricity and all the current will pass through the filament*.

5. The inside of the base of the bulb is made from an insulating material. This is the yellow part labeled number 8. On the outside of this is a metal conducting cap to which the wire is attached at number 7. Why is the wire attached at 7 making contact with the metal conducting cap?
*This is so that the electrical current can pass in through the electrical contact at number 10 and then through to the wire at number 7, which is touching the inside of the metal insulating cap.*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: ENERGY TRANSFER IN ELECTICAL SYSTEMS** | 1. Learners will be able to demonstrate the understanding of the heating effect of electrical current using the resistance wire. |
| Sub-topic: EFFECTS OF ELECTRICITY | |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Bulb filament; emit; heat; temperature | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>**A current can heat a resistance wire like bulb filament.** | **TEACHING & LEARNING ACTIVITY**:<br>**Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1.Teacher ask learners to discuss how a toaster produce heat<br><br>**Activities**:<br>**Part One**<br>2.The teacher gives apparatus to groups with the instruction sheet pg 31<br>3.Learners engage in activity and answer questions<br><br>**Part Two**<br>Teacher monitors the groups and offer support as they perform the practical task. | **RESOURCES REQUIRED**:<br>• Two cells<br>• Connecting wires<br>• Two nails<br>• Hammer<br>• A switch<br>• A piece of nichrome wire<br>Siyavula workbook 8B.pg 31 |
| **ASSESSMENT** | **Learners engage in activity 1 below.** | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

**ACTIVITY 1:**

Heating a wire in a circuit

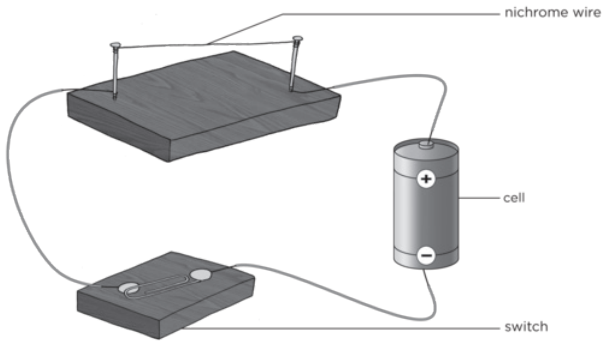
**MATERIALS:**

- 1,5 V cell
- conducting wires
- switch
- block of wood
- 2 nails
- hammer
- 10 cm of nichrome wire

You can easily make your own switch by sticking two metal drawing pins into a piece of wood with a metal paper clip in between, as shown in the diagram.

## INSTRUCTIONS: Heating a wire in a circuit

1. Hammer the two nails into the block of wood and attach the nichrome wire between the nails.
2. Build the following circuit and keep the switch open.




3. Feel the nichrome wire. Is it hot or cold?

4. Close the switch. Leave it on for a minute.
5. Open the switch again.
6. Feel the wire, briefly. Is it hot or cold?

**QUESTIONS:**

Remember that heat and temperature is not the same thing. Temperature is a measure of how hot or cold something is (measured in °C) whereas heat is the transfer of thermal energy from a hotter object to a colder object (measured in J).

When you felt the nichrome wire after the circuit had been on for a while, you felt an increase in **temperature** in your skin as **thermal energy,** which was transferred from the wire to your skin. Explain the heating effect of the electric current in the resistance wire.



1. List 2 useful applications of the heating effect of an electric current.

2. Choose one of the applications you listed in question 2 and explain how the heating effect of the electric current is used.

3. Look at the following photo of a toaster.



An electric toaster.

Can you see the glowing filament inside? Why does the element glow?

**Answers:**

3. Feel the nichrome wire. Is it hot or cold?

*The wire should be cold*

4. Close the switch. Leave it on for a minute. 5. Open the switch again.

6. Feel the wire, briefly. Is it hot or cold?

*The wire should be hotter than when they first touched it.*

1. When you felt the nichrome wire after the circuit had been on for a while, you felt an increase in temperature in your skin as thermal energy, which was transferred from the wire to your skin. Explain the heating effect of the electric current in the resistance wire.

TAKENOTE

*Remember that heat and temperature are not the same thing. Temperature is a measure of how hot or cold something is (measured in oC) where as heat is the transfer of thermal energy from a hotter object to a colder object (measured in J).*

*When the circuit is complete, there is a flow of charge (electric current). The electrons moving through the wire transferred energy to the wire in the form of heat. The particles in the wire therefore have more kinetic energy and so the temperature increases.*

2. List 2 useful applications of the heating effect of an electric current.

*Examples include: iron, kettle, heater, geyser, toaster.*

3. Choose one of the applications you listed in question 2 and explain how the heating effect of the electric current is used.

*Iron: The metal part of the iron has a high resistance and so it gets hot. This allows us to smooth out the creases in material.*

*Kettle: The element of the kettle has a high resistance and so it gets hot enough to boil the water.*

*Heater: The element in a heater has a very high resistance and so it gets very hot. The element heats the air around the heater.*

**NATURAL SCIENCES: LESSON PLAN**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**ENERGY AND CHANGE**
**TERM: 3**

Look at the following photo of a toaster.

An electric toaster.

Can you see the glowing filament inside? Why does the element glow?

*The electric current passes through the toaster and the element has a high resistance. Energy is transferred to the particles in the element so that they gain kinetic energy and the temperature of the wire increases. Some of the energy is also transferred as light to the surroundings and the wire glows.*

**NATURAL SCIENCES: LESSON PLAN 6** **GRADE: 8**

**DURATION: 30 MINUTES** **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| | |
|---|---|
| **DATE:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: ENERGY TRANSFER IN ELECTRICAL SYSTEMS** | 1. Learners will be able to **explain** the following concepts.<br>• Fuses<br>• Short Circuits |
| Sub-topic: **EFFECTS OF ELECTRICITY** | 2. Learners will be able to **explain** what happens to fuses when there is a short circuit<br>3.Learners will be able to **mention** the function of a fuse in an electrical circuit |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Fuse; short circuit; heat | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | |
| Observing | | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 6** **GRADE: 8**

**DURATION: 30 MINUTES** **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>**1.** Fuses are special wires which break the circuit when they overheat and melt.<br>2. A short circuit occur when an electric current takes the path of the lowest resistance | **TEACHING & LEARNING ACTIVITY**<br>**Introduction**<br>**Part One**<br>**Baseline Questions**:<br>1.Teacher ask learners Baseline questions<br>• What is heating effect<br>• Explain this heating effect<br><br>**Activities**:<br>**Part One**<br>1.The teacher explain key concepts to the learners:<br>• In detail the teacher explain what fuses are and their functions<br>• The teacher fully explain the concept of short circuit<br>2.The teacher set up a video clip for learners to watch<br>3.Learners engaged in watching the video on blowing fuses<br><br>**Part Two**<br>Teacher monitor the leaners | **RESOURCES REQUIRED**:<br>• Siyavula workbook 8B.pg 36<br>• Internet access |

| | | |
|---|---|---|
| **ASSESSMENT** | **Learners complete activity 1 below.** | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 6** **GRADE: 8**

**DURATION: 30 MINUTES** **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

ACTIVITY 1: How are fuses used in everyday circuits?

INSTRUCTIONS:

1. Find 1out about the common household appliances which uses fuses. Choose one of the appliances on which to focus your research.
2. Write a short paragraph describing the appliance and explaining why a fuse is necessary for that appliance.

_____

_____

_____

_____

_____

_____

This answer will depend on the appliance chosen. Ensure that the paragraph doesn't only describe the appliance but also explains why the fuse is necessary to prevent accidents.

**NATURAL SCIENCES: LESSON PLAN 7** **GRADE: 8**

**DURATION:** 30 MINUTES **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: ENERGY TRANSFER IN ELECTRICAL SYSTEMS** | 1.Learners will be able to demonstrate that a fuse is a special wire that which break the circuit when they overheat<br>2.Learners will be able to demonstrate that short circuit causes overheating |
| Sub-topic: EFFECTS OF ELECTRICITY | 3.Leaners will be able to explain the use of fuses in everyday life.it |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Fuse; short circuit; heat | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | |
| Observing | | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 7** **GRADE: 8**

**DURATION:** 30 MINUTES **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>**1. Fuses are special wires which break the circuit when they overheat and melt.**<br>**2. A short circuit occur when an electric current takes the path of the lowest resistance** | **TEACHING & LEARNING ACTIVITY**<br>**Activities**:<br>**Part One**<br>1.Teacher arrange learners in groups(pairs) and<br>2.Baseline questions on the previous lesson<br>• What is a fuse?<br>• Explain concept of short circuit.<br>3. give them the activity sheet on fuses and short circuit<br>4. Learners engage in activity and answer questions on the activity sheet.<br>**Part Two**<br>5. Teacher monitors the groups and offer support. | **RESOURCES REQUIRED**:<br>• three 1,5 V cells<br>• copper conducting wires with crocodile clips<br>• steel wool<br>• heat resistant mat or piece of wood<br>• torch light bulb<br>• variable resistor<br>• ammeter<br>• Siyavula workbook 8B.pg 33<br>Video link<br>https://www.youtube.com/watch?v=qgz1lskyYDU |
| **ASSESSMENT** | **Learners perform the practical task in activity one and complete the worksheet.** | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 7** **GRADE: 8**

**DURATION:** 30 MINUTES **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

## Activity 1: Melting metals

**MATERIALS:**

- three 1,5 V cells
- copper conducting wires with crocodile clips
- steel wool
- heat resistant mat or piece of wood
- torch light bulb
- variable resistor
- ammeter

An ammeter is used to measure the electric current in a circuit.

**NATURAL SCIENCES: LESSON PLAN 7**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

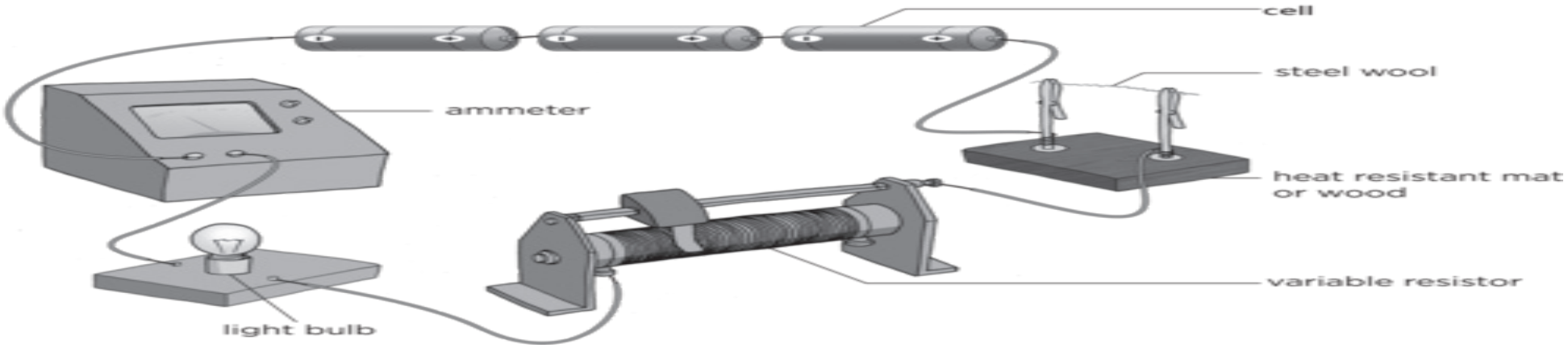
**GRADE: 8**

**STRAND: ENERGY AND CHANGE**

**TERM: 3**

**INSTRUCTIONS**

1. Set up a circuit according to the following picture.




Twist a few strands of steel wool into a wire.

2. Use the steel wool to complete the circuit.
3. Set the variable resistor to its highest resistance.
4. Close the switch. What do you observe?

5. Take note of the reading on the ammeter which measures the current in the circuit.
6. Open the switch.
7. Set the variable resistance to its lowest resistance.
8. Close the switch. What do you observe?

**NATURAL SCIENCES: LESSON PLAN 7** | **GRADE: 8**

**DURATION:** 30 MINUTES | **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** | **TERM: 3**

**QUESTIONS:**

1. Why is the light bulb included in the circuit?

2. When you decreased the resistance, what happened to the current? In other words, what happened to the reading on the ammeter?

3. What do you think happens to the electric current when the steel wool has burnt? Explain your



Take note of the reading on the ammeter which measures the current in the circuit.

- Open the switch.
- Set the variable resistance to its lowest resistance.
- Close the switch. What do you observe?

**NATURAL SCIENCES: LESSON PLAN 7**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**STRAND: ENERGY AND CHANGE**

**TERM: 3**

**QUESTIONS:**

1. Why is the light bulb included in the circuit?

2. When you decreased the resistance, what happened to the current? In other words, what happened to the reading on the ammeter?

3. What do you think happens to the electric current when the steel wool has burnt? Explain your

**Answers:**

2. Twist a few strands of steel wool into a wire.

*An ammeter is used to measure the electric current in a circuit. This must not be very thick. Just a few strands will do.*

3. Use the steel wool to complete the circuit.

4. Set the variable resistor to its highest resistance. 5. Close the switch. What do you observe?

*The light bulb should glow and the steel wool should warm up but not melt.*

6. Take note of the reading on the ammeter which measures the current in the circuit. 7. Open the switch. 8. Set the variable resistance to its lowest resistance. 9. Close the switch. What do you observe?

*The steel wool melts/burns and breaks up and the light bulb stops glowing.*

1. Why is the light bulb included in the circuit?

*The light bulb is a good indicator of whether or not there is a current in the circuit. If the light bulb glows it means there is electric current. If the light does not glow it means that there is no current (or there is a very small current). Sometimes though there might still be a very small electric current, but it does not provide enough energy to cause the light bulb to glow. This is why the light bulb gives a good indication, but an ammeter will provide the most definitive indication of whether there is a current or not.*

2. When you decreased the resistance, what happened to the current? In other words, what happened to the reading on the ammeter?

*The current increases when the resistance decreased. The ammeter reading increases.*

3. What do you think happens to the electric current when the steel wool has burnt? Explain your answer.

*The current stops because the circuit has been broken. There is no longer a complete pathway for the electrons to move.*

**NATURAL SCIENCES: LESSON PLAN 8** **GRADE: 8**

**DURATION:** 30 MINUTES **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: ENERGY TRANSFER IN ELECTRICAL SYSTEMS** | 1. Learners will be able to demonstrate that a current carrying conductor produces magnetic field around it.<br>2.Learners will be able to demonstrate that a current carrying conductor causes the needle of the compass to deflect |
| Sub-topic: EFFECTS OF ELECTRICITY | |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Magnetic field; electromagnet | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 8** **GRADE: 8**

**DURATION: 30 MINUTES** **STRAND: ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. **A current causes a magnetic field**<br>2. **Moving current in the conductor causes a magnetic field around it.** | **TEACHING & LEARNING ACTIVITY**<br>**Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1. The teacher asks learners the Baseline questions.<br>• What is a fuse?<br>• Explain the how does a fuse function<br>• Explain what is the danger of short circuit<br><br>**Activities**:<br>**Part One**<br>1.The teacher gives apparatus to groups with the instruction sheet pg. 37<br>2. Learners watch a video that explains magnetic effect prior the activity.<br>https://youtu.be/uj0DFDfQajw<br>3.Learners engage in activity and perform the investigation<br><br>**Part Three**<br>1Teacher monitors the groups and offer support. | **RESOURCES REQUIRED**:<br>• Three 1.5 V cells<br>• Insulated copper wires<br>• Switch<br>• Plotting compass bar magnets<br>• Piece of white paper<br>Siyavula workbook 8B.pg 37 |

| | | |
|---|---|---|
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 8**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**STRAND: ENERGY AND CHANGE**

**TERM: 3**

**ACTIVITY 1:**

# Magnetic field around a conductor

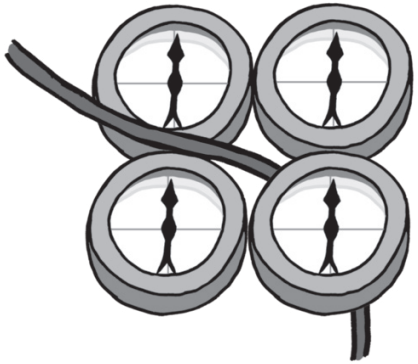
**MATERIALS:**

- plotting compasses
- three 1,5 V cells
- insulated copper conducting wires
- switch

**INSTRUCTIONS:**

1. Construct a circuit which contains the batteries, copper wires and the switch.

2. Put the plotting compasses on either side of the conducting wire as shown in the diagram, as well as below and above the conducting wire.



Plotting compasses placed around a conducting wire.

3. Keep the switch open. What do you notice about the needles of the plotting compasses?

4. Close the switch and observe what happens to the needles.

5. Draw a picture of the wire and plotting compasses in the space below:

6. What does the pattern of the compass tell us?

**Answers:**

3. Keep the switch open. What do you notice about the needles of the plotting compasses?

*The needles should point to magnetic north.*

4. Close the switch and observe what happens to the needles. 5. Draw a picture of the wire and plotting compasses in the space below: The drawing does not need to be assessed according to the learners drawing skills.

*What is important is that they see that the compass needles are aligned in a circle when the switch is closed.*

6. What does the pattern of the compasses tell us?

*That there is a magnetic field around the wire*

**NATURAL SCIENCES: LESSON PLAN 9**

**DURATION: 30 MINUTES**

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | | |
|---|---|---|
| **DURATION:**<br>**TOPIC: EFFECTS OF ELECTRICITY**<br>Sub-topic: : Electrolysis | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1.Learners will be able to explain the key terms :<br>• Electroplating<br>• Electrodes<br>• Electrolysis<br>• Cathode<br>• Anode | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Electrolysis; electrode; cathode; anode | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**NATURAL SCIENCES: LESSON PLAN 9**

**DURATION: 30 MINUTES**

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

| **CONTENT AND CONCEPTS** | **ACTIVITIES** | **RESOURCES** |
|---|---|---|
| **KEY CONCEPTS**<br>**1**. An electric current can cause a chemical reaction in a solution, and the process is called electrolysis.<br>2. Water can be broken down to produce oxygen and hydrogen.<br>3. Copper chloride solution can be broken down to copper metal and chlorine gas. | **TEACHING & LEARNING ACTIVITY**:<br>**Introduction**<br>**Activities**:<br>**Part One**<br>1.The teacher demonstrate that sugar water cannot conduct electricity by<br>• Making a circuit by connecting wires to the bulb<br>• Making a strong solution of sugar in the beaker<br>• Connecting each rod/plate on either end of the connecting of wires.<br>• Completing the circuit by inserting each rod in the solution<br>• Learners make observations | **RESOURCES REQUIRED**:<br>• Zinc rod/ plate<br>• Copper rod/plate<br>• LED bulb/torch bulb<br>• Connecting wires<br>• Beaker<br>• Concentrated sugar solution<br>• Concentrated salt solution<br>• Torch light bulb |

**NATURAL SCIENCES: LESSON PLAN 9**

**DURATION: 30 MINUTES**

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| 4. Chlorine is deposited on electrode(anode) and copper on electrode(cathode) | 2.The teacher repeat the same process but using salt this time<br>3. The teacher explains why salt water conducts electricity after learner attempted to give reasons for their observations.<br><br>**Part Two**<br><br>4.The teacher explains key terms :<br>• Electrolyte<br>• Electrolysis<br>• Electrodes<br>• Free ions<br>• Electroplating<br>5.The teacher consolidates the lesson by showing learners a video clip on electroplating<br>https://phet.colorado.edu/en/simulation/legacy/sugar-and-salt-solutions | |

| | | |
|---|---|---|
| **ASSESSMENT** | Learners define the following scientific terms: Electrolysis; electrode; anode; electrolyte and cathode. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 10**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: EFFECTS OF ELECTRICITY** | 1.Learners will be able to explain how does an electrolyte conducts electricity |
| Sub-topic: : Electrolysis | |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Electrolysis; electrode; cathode; anode | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 10**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>**1. An electric current can cause a chemical reaction in a solution, and the process is called electrolysis.**<br>**2. Copper chloride solution can be broken down to copper metal and chlorine gas.**<br>**3. Chlorine is deposited on electrode(anode) and copper on electrode(cathode)** | **TEACHING & LEARNING ACTIVITY**:<br>**Introduction**<br>**Activities**:<br>**Part One**<br>1. The teacher groups the learners in threes or fours.<br>2. The teacher explains that though the experiment was done in the second term, the focus now is about the effect of the electric current.<br>3. Learners perform the experiment and complete the activity below.<br><br>**Part Two**<br>**The teacher monitors and support learners as they perform the experiment.** | • beaker<br>• carbon electrode<br>• Sandpaper<br>• copper conducting wires(with crocodile clips)<br>• Copper chloride solution<br>• Torch bulb<br>• Power pack |

| | | |
|---|---|---|
| **ASSESSMENT** | Learners perform the experiment and complete the activity below. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 10**

**DURATION: 30 MINUTES**

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

ACTIVITY:Electrolysis

This activity might have been already done in Matter and Material when investigating the decomposition of copper chloride.We are going to do it again ,this time focusing on the effect of an electric current.

MATERIALS:

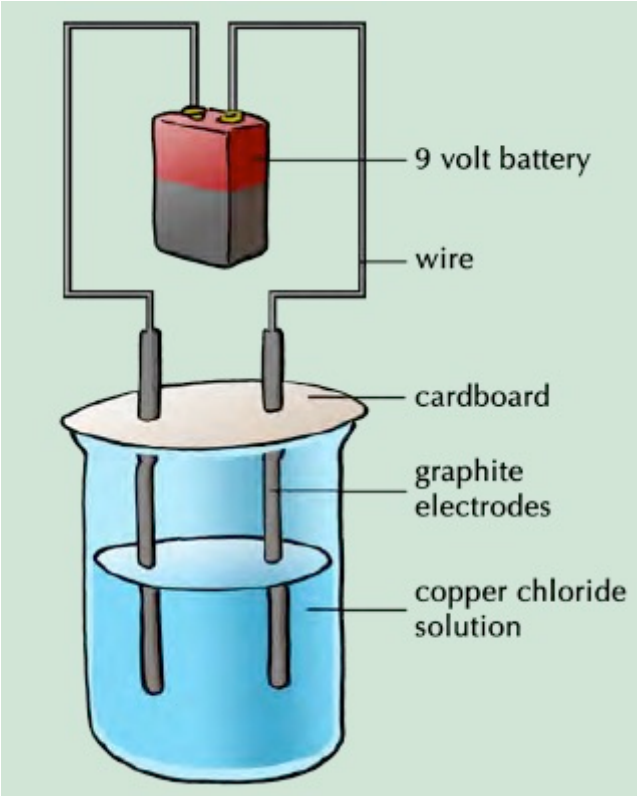
- 250 ml beaker
- 2 carbon electrode
- Sandpaper
- 3 copper conducting wires(with crocodile clips)
- Copper chloride solution
- Torch bulb
- Power pack

INSTRUCTIONS:

1. Sand down the electrode with the sandpaper to make sure they are clean.
2. Connect the conducting wire from one electrode to the torch bulb and another wire from the torch bulb to the negative terminal of the power source.
3. Connect the crocodile clip from the second electrode to the positive terminal of the power source.
4. Pour 100 ml copper chloride solution into the beaker.
5. Put the electrodes into the beaker. Make sure that they do not touch each other.
6. Look at the electrodes. What do you observe?

_____

7. Turn on the power source .Leave it for a few minutes.




The set up might look something like this, which you have seen before. You might also have a light bulb connected in the circuit.

**NATURAL SCIENCES: LESSON PLAN 10**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

QUESTIONS:

1. When you switch the power source, does the torch bulb glow?

_____

2. What do you observe happening at the two different electrodes?

_____

_____

3. Can you smell anything? What do you think this is?

_____

4. What is happening to the copper chloride solution when the electric current is passed through it?

_____

_____

5. If you switch off the power source, what happens?

_____

6. What is the causing the separation of copper chloride?

_____

7. Why is it important that you do not let the carbon electrodes touch each other while the current is flowing?

_____

**NATURAL SCIENCES: LESSON PLAN 10**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**Answers:**

1. When you switch on the power source, does the torch bulb glow?

   *Yes. If the torch bulb does not glow then there is no current in the circuit. Make sure that the electrodes are not touching each other and neither are the crocodile clips. The crocodile clips must not be touching the solution either*.

2. What do you observe happening at the two different electrodes?

   *One of the electrodes should be developing a layer of copper and there should be bubbles developing at the other electrode.*

3. Can you smell anything? What do you think this is?

   *Learners should be able to smell the chlorine gas.*

4. What is happening to the copper chloride solution when the electric current is passed through it?

   *The copper chloride solution is being chemically separated into pure, solid copper and chlorine gas.*

5. If you switch off the power source, what happens?

   *Bubbles are no longer forming at the electrode because the reaction has stopped*.

6. What is causing the separation of the copper chloride?

   *The electric current is separating the copper chloride*.

7. Why is it important that you do not let the carbon electrodes touch each other while the current is flowing?

   *It would cause a short circuit. The electrical current will then not move through the copper chloride and no separation will occur.*

**NATURAL SCIENCES: LESSON PLAN 11**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | | |
|---|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: : TOPIC: SERIES AND PARALLEL CIRCUITS** | 1. Define series circuits.<br>2.Learners will be able to investigate the effect of adding more resistors in series | |
| **SUB TOPIC:** Series Circuits | 3.Learners will be able to mention what happens to the brightness of the bulb when more bulbs are added<br>4.Learners will be able to draw graphs of number of resistors and brightness of the bulbs | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGIES:** | Electrolyte; ammeter | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 11** **GRADE: 8**

**DURATION:** 30 MINUTES **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| Series circuits – single pathway for the current to pass through. The current is the same everywhere in the circuit but every time a resistor is added in series the overall current in the circuit decreases. | **Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1. Teacher recaps the previous lesson by asking learners questions.<br>• What is an electrolyte?<br>• Explain why an electrolyte is able to conduct electricity.<br><br>**Activities**:<br>**Part Two**<br>1.The teacher gives apparatus to groups with the instruction sheet pg. 53 -57<br>2.The teacher explains what is an Ammeter and its function<br>3. The teacher explains how an Ammeter is connected.<br>4. Learners engage in activity 1 and answer questions.<br><br>**Part Three**<br>1.The teacher consolidates the lesson by explaining to leaners why households are not wires in series | • 1,5 V cells<br>• 3 torch bulbs<br>• insulated copper<br>• conducting wires<br>• switch<br>• ammeter<br>SaSol Inzalo Workbooks 8 B pg. 53-57 |

| | | |
|---|---|---|
| **ASSESSMENT** | 1. The teacher instructs the learners to complete the activity below after completing the experiment.<br>2. The teacher asks the learners to predict what is likely to happen when more resistors are added in series. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 11**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

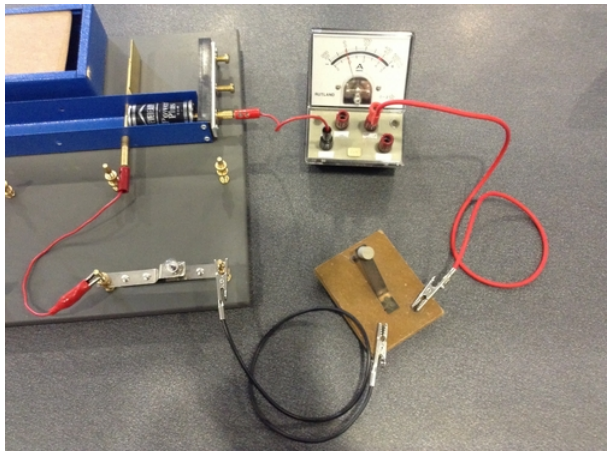
**TERM: 3**

## ACTIVITY 1:

- 1,5 V cells
- 3 torch bulbs
- insulated copper conducting wires
- switch
- ammeter

**METHOD:**

Construct the circuit with the cell, the ammeter, 1 bulb and the switch in series.



**NATURAL SCIENCES: LESSON PLAN 11** **GRADE: 8**

**DURATION:** 30 MINUTES **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

A photo showing the setup.

1. Close the switch or the circuit if you are not using a switch.
2. Note how brightly the bulb is shining and write down the ammeter reading. Draw a circuit diagram.
3. Open the switch.
4. Add another light bulb into the circuit.
5. Close the switch.
6. Note how brightly the bulbs are shining and write down the ammeter reading. Draw a circuit diagram.
7. Open the switch.
8. Add the third light bulb into the circuit.
9. Close the switch.
10. Note how brightly the bulbs are shining and write down the ammeter reading. Draw a circuit diagram for the last circuit you built.



**RESULTS:**

1. Complete the table.
2. Draw a graph to show the relationship between the number of bulbs and the current.

| Number of cells | Brightness of the bulb | Reading of the ammeter (Amperes) |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |

**ANALYSIS:**

What happened to the brightness of the bulbs as the number of bulbs increased?

When you had two bulbs, did they glow with the same brightness, or was one brighter than the other?

When you had three bulbs, did they glow the same as each other or was one brighter than the others?

What do your answers to the previous questions tell you about the current in the series circuit?

What happened to the reading on the ammeter as you added more bulbs in series?

**CONCLUSION:**

Based on your answers, what happened to the current when more bulbs were added in series?

Is your hypothesis accepted or rejected?

**NATURAL SCIENCES: LESSON PLAN 11** **GRADE: 8**

**DURATION:** 30 MINUTES **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

**Answers:**

ANALYSIS:

1. What happened to the brightness of the bulbs as the number of bulbs increased?

*The bulbs got dimmer as more bulbs were added*.

2. When you had two bulbs, did they glow with the same brightness, or was one brighter than the other?

*The bulbs glowed with the same brightness*.

3. When you had three bulbs, did they glow the same as each other or was one brighter than the others?

*The bulbs glowed with the same brightness.*

4. What do your answers to the previous questions tell you about the current in the series circuit?

*If all the bulbs glow the same, it means that they all experience the same current. This means that the current is the same everywhere in a series circuit*.

5. What happened to the reading on the ammeter as you added more bulbs in series?

*The ammeter reading decreased.*

CONCLUSION

1. Based on your answers, what happened to the current when more bulbs were added in series?

*As more bulbs were added, the current decreased.*

2. Is your hypothesis accepted or rejected?

*This answer will depend on the hypothesis written by the learner at the start of the investigation.*

**NATURAL SCIENCES: LESSON PLAN 12** **GRADE: 8**

**DURATION:** 30 MINUTES **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| | | |
|---|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: : TOPIC: SERIES AND PARALLEL CIRCUITS** | 1. Learners will be able to investigate the effect of adding more cells in series.<br>2. Learners will be able to compare the brightness of the bulb to the number of cells | |
| **SUB TOPIC:** Series circuits | | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGIES:** | Cells; bulbs; resistors; current and series | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | ✓ | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | | ✓ | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | | ✓ | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 12** **GRADE: 8**

**DURATION:** 30 MINUTES **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Series circuit provides only one pathway<br>2. Current is the same everywhere in the circuit<br>3. The overall current decreases in the circuit every time resistors are added in series | **Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1.Teacher ask learners the following questions:<br>• What is the relationship between the number of resistors to the brightness of the bulbs in series?<br>• Explain what happens to when one bulb in series is taken out.<br>• What is series circuit?<br>**Activities**:<br>**Part Two**<br>1.The teacher gives apparatus to groups with the instruction sheet pg.57 -59<br>2. The teacher reminds learners of what an ammeter is and how it is supposed to be connected.<br>3. Learners engage in activity and answer questions<br><br>**Part Three**<br>Teacher monitor the groups and offer support | • three 1,5 V cells<br>• insulated copper conducting wires<br>• ammeter<br>• 2 torch light bulbs (or 1 torch light bulb and one resistor)<br>Sasol Inzalo Workbook 8 B pg. 57 - 59 |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 12** | **GRADE: 8**

**DURATION:** 30 MINUTES | **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** | **TERM: 3**

## ACTIVITY 1: How does adding more cells in series affect the current?

### APPARATUS

- three 1,5 V cells
- insulated copper conducting wires
- ammeter
- 2 torch light bulbs (or 1 torch light bulb and one resistor)

**METHOD:**

1. Construct a circuit with 1 cell, the ammeter and the two torch light bulbs.
2. Observe the brightness of the bulbs and record the ammeter reading in the table of results. Draw a circuit diagram
3. Add a second cell in series and observe the brightness of the bulbs. Draw a circuit diagram of your circuit.
4. Record the ammeter reading in the table of results. Draw a circuit diagram.
5. Add a third cell in series and observe the brightness of the bulbs. Draw a circuit diagram of your circuit.
6. Record the ammeter reading in the table of results. Draw a circuit diagram.

**RESULTS:**

Complete the table:

| Number of cells | Brightness of the bulb | Reading on the ammeter(Amperes) |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |

**CONCLUSION:**

What can you conclude from the shape of the graph?

**Answers:**

CONCLUSION:
1. What can you conclude from the shape of the graph?
   *As the number of cells connected in series increases, so does the current strength.*

2. Is your hypothesis true or false?
   *This answer depends on the learner's original hypothesis*

**NATURAL SCIENCES: LESSON PLAN 13**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: SERIES AND PARALLEL CIRCUITS** | 1. Learners will be able to draw a conclusion about the current strength at different points in a series circuit.<br>2. Leaners will be able to compare the current strength at different point in the series circuit. |
| **SUB TOPIC:** Current strength at different points in series | |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGIES:** | Current strength | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | ✓ | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 13**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Measuring current strength<br>2. Drawing conclusion by comparing values measured. | **Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1. Teacher asks learners the following questions<br>• What is the effect of adding more resistors in series?<br><br>**Activities**:<br>**Part Two**<br>1. The teacher gives apparatus to groups with the instruction sheet pg. 60-62.<br>2. Learners engage in activity 1 and answer questions.<br><br>**Part Three**<br>1.The teacher consolidates the lesson by showing children how electrons move:<br>Web link: http://phet.colorado.edu/en/simulation/signal-circuit | • Insulated copper connecting wires.<br>• two 1,5V cells<br>• two torch light bulbs<br>• ammeter<br>Siyavula workbook 8 B.pg 60 - 62 |

| | | |
|---|---|---|
| **ASSESSMENT** | **The teacher monitors and supports the learners as they perform the practical investigation and complete the activity 1 below.** | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 13** | **GRADE: 8**

**DURATION:** 30 MINUTES | **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** | **TERM: 3**

## ACTIVITY 1:

Testing the current strength

**INVESTIGATIVE QUESTION:** Is the current strength the same at all points in a series circuit?

**HYPOTHESIS:** Write a hypothesis for this investigation. What do you think will happen in this investigation?

---

**MATERIALS AND APPARATUS:**

- Insulated copper connecting wires.
- two 1,5V cells
- two torch light bulbs
- ammeter

**METHOD:**

1. Set up a series circuit with two cells and two torch light bulbs in series with each other.
2. Insert an ammeter in series between the positive terminal of the battery and the first torch bulb.
3. Measure the current strength using the ammeter. Draw a circuit diagram of this set up.
4. Remove the ammeter and close the circuit again.
5. Insert the ammeter in series between the two torch bulbs.
6. Measure the current strength using the ammeter. Draw a circuit diagram of this set up.
7. Remove the ammeter and close the circuit again.
8. Insert the ammeter in series between the last torch bulb and the negative terminal of the batteries.
9. Measure the current strength using the ammeter. Draw a circuit diagram of this set up.

**NATURAL SCIENCES: LESSON PLAN 13**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**RESULTS:**

Complete the following table:

| Position of the ammeter in circuit | Ammeter reading (A) |
|---|---|
| Between the cell and the first pathway | |
| In the first pathway | |
| In the second pathway | |
| In the third pathway | |
| Between the cell and the first pathway | |



**CONCLUSIONS:**

Write a conclusion based on your results.

**NATURAL SCIENCES: LESSON PLAN 13**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**Answers:**

TEACHER'S NOTE

*The ammeter readings should be the same at any point in the series circuit.*

CONCLUSIONS:

1. Write a conclusion based on your results.

   *The current strength is the same at any point in a series circuit.*

2. Is your hypothesis true or false?

   *This answer will depend on the hypothesis written by the learner at the start of the investigation*

**NATURAL SCIENCES: LESSON PLAN 14**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: SERIES AND PARALLEL CIRCUITS** | 1. Learners will be able to investigate the effect of parallel resistors. |
| **SUB TOPIC: Parallel Series** | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B |
| **TERMINOLOGY:** | Parallel |
| **SPECIFIC AIMS** | 1. DOING SCIENCE ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 14**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Parallel circuits provide two or more pathway for the current passing through it, but the overall current increases when more resistors are added in parallel. | **Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1. The teacher asks learners to compare the current strength of different points in the series circuit.<br>**Activities**:<br>**Part Two**<br>1. The teacher gives apparatus to groups with the instruction sheet pg.64 - 67<br>2 .Learners engage in activity and answer questions<br><br>**Part Three**<br>3. Teacher monitors the groups and offer support when they perform the practical task.<br>4. The teacher consolidates the lesson by showing children the video clip<br>Web Link : https://youtu.be/x2EuYqj_0Uk?t=98 | • 1,5 V cell<br>• three identical torch bulbs<br>• insulated copper conducting wires<br>• switch<br>• ammeter<br>Siyavula workbook 8B.pg .64 - 67 |
| **ASSESSMENT** | The teacher instructs the learners to perform the experiment and to complete the activity provided below. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 14**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

## ACTIVITY 1: How does adding resistors in parallel affect the current strength?

**AIM:** To investigate the effect of adding resistors in parallel on the current strength.

**HYPOTHESIS:** Write a hypothesis for this investigation.

---

**MATERIALS AND APPARATUS:**

- 1,5 V cell
- three identical torch bulbs
- insulated copper conducting wires
- switch
- ammeter

**METHOD:**

1. Construct the circuit with the cell, ammeter, one bulb and the switch in series.
2. Close the switch.
3. Note how brightly the bulb is shining and record the ammeter reading. Draw a diagram of your circuit.
4. Open the switch.
5. Add another light bulb, in parallel to the first, into the circuit.
6. Close the switch.
7. Note how brightly the bulbs are shining and record the ammeter reading.
8. Open the switch.
9. Add the third light bulb, in parallel to the first two, into the circuit.
10. Close the switch.
11. Note how brightly the bulbs are shining and record the ammeter reading.

**NATURAL SCIENCES: LESSON PLAN 14**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**RESULTS:**

Complete the table:

| Numbers of cells | Brightness of the bulbs | Reading of the Ammeter (A) |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |

Draw a graph to show the relationship between the number of bulbs and the current.

**NATURAL SCIENCES: LESSON PLAN 14**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**ANALYSIS:**

What happened to the brightness of the bulbs as the number of bulbs increased?

When you had two bulbs, did they glow with the same brightness or was one brighter than the other?

When you had three bulbs, did they glow the same brightness or was one brighter than the others?

What do your answers to the previous questions tell you about the current in the parallel branches of the circuit?

What happened to the reading on the ammeter as you added more bulbs in parallel?

**CONCLUSION:**

Based on your answers, what happened to the current when more bulbs were added in parallel?

---

Is your hypothesis true or false?

**Answers:**

ANALYSIS:

1. What happened to the brightness of the bulbs as the number of bulbs increased?
   *The bulbs got dimmer as more bulbs were added.*

2. When you had two bulbs, did they glow with the same brightness, or was one brighter than the other?
   *The bulbs glowed with the same brightness.*

3. When you had three bulbs, did they glow the same as each other or was one brighter than the others?
   *The bulbs glowed with the same brightness*.

4. What do your answers to the previous questions tell you about the current in the series circuit?
   *If all the bulbs glow the same, it means that they all experience the same current. This means that the current is the same everywhere in a series circuit.*

5. What happened to the reading on the ammeter as you added more bulbs in series?
   *The ammeter reading decreased*

CONCLUSION:

1. Based on your answers, what happened to the current when more bulbs were added in series?
   *As more bulbs were added, the current decreased.*

2. Is your hypothesis accepted or rejected?
   *This answer will depend on the hypothesis written by the learner at the start of the investigation*

**NATURAL SCIENCES: LESSON PLAN 15**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: SERIES AND PARALLEL CIRCUITS** | 1. Define parallel circuits<br>2. Learners will be able to investigate the effect of adding cells in parallel. |
| **SUB TOPIC:** Parallel Circuits | 3.Learners will be able to draw conclusion from results<br>4.Learners will be able to write a hypothesis for the investigation |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Parallel | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 15**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. The overall current increases when more resistors are added in parallel circuit. | **Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1.The teacher ask learners to :<br>• Explain what the function of the cell is.<br>• Compare the brightness of bulbs in parallel.<br>**Activities**:<br>**Part Two**<br>1. The teacher gives apparatus to groups with the instruction sheet pg.67 -69<br>2. The teacher explains reemphasise the function of a cell in the circuit.<br>3. Learners engage in activity and answer questions.<br><br>**Part Three**<br>4.The teacher monitors the groups and offer support | • three 1,5V cells<br>• one torch light bulb<br>• insulated copper<br>• conducting wires<br>• ammeter<br>Siyavula workbook 8B.pg. 67-69 |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 15**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

## ACTIVITY 1: What happens to the current strength when cells are connected in parallel?

**AIM**: To investigate how increasing the number of cells connected in parallel affects the current strength in a circuit.

**HYPOTHESIS:** Write a hypothesis for this investigation.

---

**MATERIALS AND APPARATUS**

- three 1,5V cells
- one torch light bulb
- insulated copper conducting wires
- ammeter

**METHOD:**

1. Set up a circuit which has one cell, the ammeter and the torch light bulb in series with each other. Draw a circuit diagram of your circuit.
2. Observe the brightness of the bulb and record the ammeter reading.
3. Connect another cell in parallel with the first cell. **N.B.** To connect the second cell in parallel, connect a wire from the positive terminal of the first cell to the positive terminal of the second cell. Connect another wire between the negative terminal of the first battery and the negative terminal of the second battery. Draw a circuit diagram of your circuit.
4. Observe the brightness of the bulb and record the ammeter reading.
5. Connect a third cell in parallel to the other two cells. Draw a circuit diagram of your circuit.
6. Observe the brightness of the bulb and record the ammeter reading.

**NATURAL SCIENCES: LESSON PLAN 15**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**RESULTS:**

Complete the table:

| Number of cells in parallel | Brightness of bulbs | Reading on the ammeter (A) |
|---|---|---|
| | | |
| | | |
| | | |

**CONCLUSION:**

What did you notice about the brightness of the bulbs?

What did you notice about the ammeter readings?

What conclusion can you draw from your results?

**Answers:**

CONCLUSION:

1. What did you notice about the brightness of the bulbs?

   *The brightness of the bulbs should not change.*

2. What did you notice about the ammeter readings?

   *The ammeter readings are the same.*

3. What conclusion can you draw from your results?

   *Adding cells in parallel does not change the overall current strength.*

**NATURAL SCIENCES: LESSON PLAN 16**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DATE:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: SERIES AND PARALLEL CIRCUITS** | 1. Learners will be able to investigate which material offers higher resistance.<br>2. Learners will be able to arrange materials according to their resistivity. |
| **SUB TOPIC: D**ifferent metals conduct electricity differently in a series circuit | |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Resistance | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 16** **GRADE: 8**

**DURATION:** 30 MINUTES **ENERGY AND CHANGE**

**CAPS SENIOR PHASE** **TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Electric conductivity of different metals.<br>2. Resistance in different metals | **Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1. The teacher asks learners to explain what resistance is.<br>2. The teacher ask learners properties of metals<br><br>**Activities**:<br>**Part One**<br>1.The teacher gives apparatus to groups with the instruction sheet pg.73 – 74<br>2. The teacher explains to learners what resistance is.<br>3. Learners engage in activity and answer questions.<br><br>**Part Two**<br>4.Teacher monitor the groups and offer support<br>The teacher consolidates the lesson by discussing linking the popular use of copper to its resistance to the flow of current. | **RESOURCES REQUIRED**:<br>• a cell<br>• torch light bulb<br>• insulated copper wires<br>• lengths of copper, aluminium, zinc and nichrome wire<br>• crocodile clips (if available)<br>Siyavula workbook 8B.pg. 73 - 74 |
| **ASSESSMENT** | Learners perform the experiment as per educator's instruction and complete the activity below. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 16**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

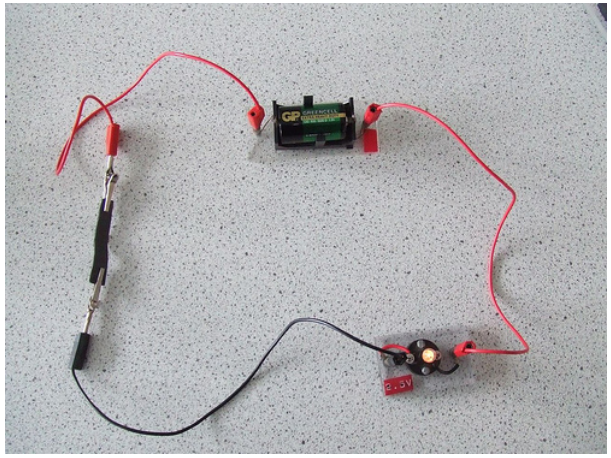
## ACTIVITY 1:

**MATERIALS:**

- a cell
- torch light bulb
- insulated copper wires
- lengths of copper, aluminium, zinc and nichrome wire
- crocodile clips (if available)

**INSTRUCTIONS**

1. Build a circuit with the cell and the torch light bulb and leave a gap for the metal to be tested. You can use crocodile clips at the end of each piece of metal for easy insertion.
2. Insert each metal into the circuit (one at a time).



An example circuit with a cell, a light bulb and the piece of metal being tested.

[link]

Observe the brightness of the bulb.

**NATURAL SCIENCES: LESSON PLAN 16**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**QUESTIONS:**

1. Draw a circuit diagram of your apparatus.

2. Why can we use the brightness of the bulb to qualitatively measure resistance?

3. List the metals in order of increasing resistance.

4. Why do you think copper is used for connecting wires in electrical circuits?

**NATURAL SCIENCES: LESSON PLAN 16**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**Answers:**

1. Draw a circuit diagram of your apparatus.

   *An example circuit diagram with the break in the circuit where metals are to be tested shown on the left.*

2. Why can we use the brightness of the bulb to qualitatively measure resistance?

   *High resistance opposes the movement of electrons, decreasing the current so there is less energy for the light bulb. The higher resistance wire will cause the bulb to be dimmer than the lower resistance wire.*

3. List the metals in order of increasing resistance.

   *Copper, aluminium, zinc and nichrome*.

4. Why do you think copper is used for connecting wires in electrical circuits?

   *Copper has an extremely low resistance, and so has a minimal effect on the overall resistance of the circuit. Other materials would add to the overall resistance of the circuit, decreasing the maximum possible current in that circuit.*

**NATURAL SCIENCES: LESSON PLAN 17**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: SERIES AND PARALLEL CIRCUITS** | 1. Learners will be able to investigate which metal offers higher resistance.<br>2. Learners will be able to arrange different metals according to their resistivity. |
| **SUB TOPIC: Different metals conduct electricity differently** | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B |
| **TERMINOLOGY:** | Resistance |
| **SPECIFIC AIMS** | 1. DOING SCIENCE ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 17**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Electric conductivity of different metal.<br><br>2. Resistance | **Introduction**<br>**Part One**<br>**Baseline Questions**: (Group discussion or in pairs)<br>1. The teacher asks learners to explain what resistance is.<br>2.The teacher ask learners properties of metals<br><br>**Activities**:<br>**Part One**<br>1.The teacher gives apparatus to groups with the instruction sheet pg.73 – 74<br>2. The teacher explains to learners what resistance is.<br>3. Learners engage in activity 1 and answer questions.<br><br>**Part Two**<br>1. Teacher monitors the groups and offer support.<br>The teacher consolidates the lesson by discussing linking the popular use of copper to its resistance to the flow of current | **RESOURCES REQUIRED**:<br>• a cell<br>• torch light bulb<br>• insulated copper wires<br>• lengths of copper, aluminium, zinc and nichrome wire<br>• crocodile clips (if available)<br>Siyavula workbook 8B.pg. 73 - 74 |
| **ASSESSMENT** | 1. Learners are grouped depending the size of the class and perform the experiment.<br>2. Learners complete activity 1 below. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 17**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

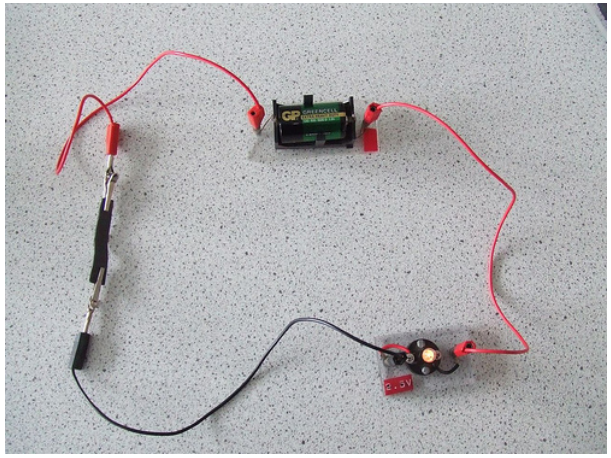
## ACTIVITY 1: Which metal offer the most resistance?

**MATERIALS:**

- a cell
- torch light bulb
- insulated copper wires
- lengths of copper, aluminium, zinc and nichrome wire
- crocodile clips (if available)

**INSTRUCTIONS**

1. Build a circuit with the cell and the torch light bulb and leave a gap for the metal to be tested. You can use crocodile clips at the end of each piece of metal for easy insertion.
2. Insert each metal into the circuit (one at a time).



An example of the circuit with a cell, a light bulb and the piece of metal being tested.[link]

Observe the brightness of the bulb.

**NATURAL SCIENCES: LESSON PLAN 17**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

**QUESTIONS:**

1.Draw a circuit diagram of your apparatus.

2.Why can we use the brightness of the bulb to qualitatively measure resistance?

3.List the metals in order of increasing resistance.

4.Why do you think copper is used for connecting wires in electrical circuits?

**NATURAL SCIENCES: LESSON PLAN 17**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

**Answers:**

1. Draw a circuit diagram of your apparatus.

   *An example circuit diagram with the break in the circuit where metals are to be tested shown on the left.*

2. Why can we use the brightness of the bulb to qualitatively measure resistance?

   *High resistance opposes the movement of electrons, decreasing the current so there is less energy for the light bulb. The higher resistance wire will cause the bulb to be dimmer than the lower resistance wire.*

3. List the metals in order of increasing resistance.

   *Copper, aluminium, zinc and nichrome*.

4. Why do you think copper is used for connecting wires in electrical circuits?

   *Copper has an extremely low resistance, and so has a minimal effect on the overall resistance of the circuit. Other materials would add to the overall resistance of the circuit, decreasing the maximum possible current in that circuit.*

**NATURAL SCIENCES: LESSON PLAN 18**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: OUTPUT DEVICES IN COMPLEX CIRCUITS** | 1. Learners will be able to identify output devices. |
| **SUB TOPIC:** Identifying output devices | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B |
| **TERMINOLOGY:** | Output; device; beepers; buzzers; LED and motors. |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 18**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Electric conductivity of different metal.<br>2. Resistance | **The teacher:**<br>1. Explains to learners the meaning of output device and complex circuits.<br>**(Complex circuit is simply a category used to describe any circuit that is not a series, parallel, or a series- parallel circuit)**<br>2. Learners can be referred to grade 8 Technology because outputs devices are dealt with. | **RESOURCES REQUIRED**:<br>• Siyavula workbook 8B.pg. 74 |

| | | |
|---|---|---|
| **ASSESSMENT** | **Identify** five household output devices and **state** the uses and type of output energy. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 18**

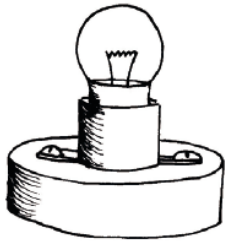
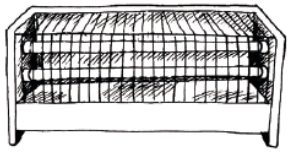
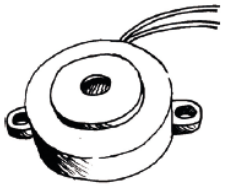
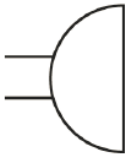
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| Output devices | | |
|---|---|---|
|  |  or  | A bulb, also called a lamp: Bulbs are also resistors. |
|  |  | A heater: The resistance wire in a heater gets hot when electrical current flows throw it. |
|  |  | A buzzer or a beeper produces sound as an output. |
|  |  | An electric motor: It converts electrical energy into rotational |

Example of the output devices.

**NATURAL SCIENCES: LESSON PLAN 19**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: OUTPUT DEVICES IN COMPLEX CIRCUITS** | 1. Learners will be able to **draw** and **interpret** energy conversion flow diagrams for an output device |
| **SUB TOPIC:** Output devices energy flow diagrams | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B |
| **TERMINOLOGY:** | Joule; input energy, incandescent bulb. |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 19**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Energy flow diagrams (output device useful and 'wasted' energy) | 1.The teacher will give a brief explanation of the energy transfer taking place and illustrate this using energy flow diagrams (output device useful and 'wasted' energy) | **RESOURCES REQUIRED**:<br>Siyavula workbook 8B.pg. 75-76 |
| **ASSESSMENT** | Learners will engage in an activity and answer questions: **Identify** output devices and **Draw** energy flow / Sankey diagrams. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 19**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

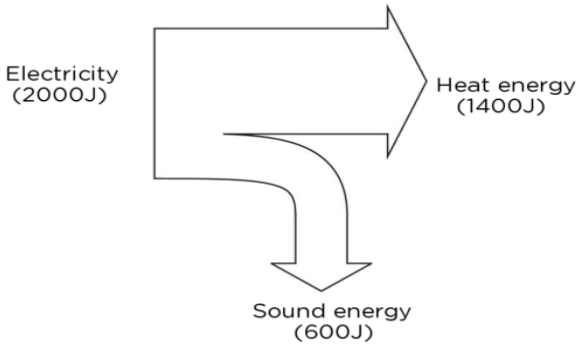
ACTIVITY: Sankey diagrams

You might have drawn Sankey diagrams in Grade 7.If not, here is some quick revision.

In an energy system, input energy is transferred to useful output energy and wasted output energy. A Sankey diagram is a visual proportional representation of the energy transfers that happens in a system.

For example, a kettle uses about 2000 J of input energy, but only about 1400 J is used to heat the water. The remaining 600 J is wasted as sound. Here is Sankey diagram to represent the energy transfer.






Questions:

We will now compare an LED with an incandescent light bulb.

1. Draw the Sankey diagram for an LED if the input energy is 100 J, 75 J of energy is used to produce light and the rest is lost as heat.

2. Draw the Sankey diagram for a filament light bulb if the input energy is 100 J, the wasted heat energy is 80 J and the rest produces light.

3. Which bulb do you think is more efficient? Explain your answer.

_____

_____

**NATURAL SCIENCES: LESSON PLAN 20**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: : TOPIC: Series and Parallel circuits** | 1. Learners will be able to understand the history of the use of electricity.<br>2.Learners will do more research about careers in electricity |
| **SUB TOPIC:** Output devices | |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Engineering | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | |
| Observing | | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 20**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>History of electricity/ careers in electrical engineering | 1. The teacher will play a video about an electricity timeline animation for consolidation of history of electricity production. http://resources.schoolscience.co.uk/britishenergy/14-16/index.htm | **RESOURCES REQUIRED**:<br>Library books or internet |
| **ASSESSMENT** | 1. Learners will work in the group of three or four to research on the history of electricity production following the instructions in activity 1 below.<br>2. Individual learners will do activity 2 below about the careers related to electricity production. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 20**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

**ACTIVITY 1: History of electricity production:**

**INSTRUCTIONS:**

1. Work in groups of three or four.
2. Research the history of electricity production. How was electricity discovered and how did electricity become widely used?
3. Create the basic timeline for the discovery of electricity and it's production.



**ACTIVITY 2: Careers**

**INSTRUCTIONS:**

1. Choose a career related to electricity production.
2. Write a short paragraph describing the career. Include the information on how one can study or prepare for your chosen career.

**NATURAL SCIENCES: LESSON PLAN 21**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: : TOPIC: Visible Light** | |
| **SUB TOPIC:** Radiation of Light | 1. Learners will be able to describe a luminous object.<br>2. Learners will be able to list examples of luminous objects resistors. |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Emission; radiation; luminous; rectilinear | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 21**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Light is emitted from luminous objects e.g. sun and light bulbs.<br>2. Light travels in the straight line<br>3. Light travels through an empty space at a speed of 300 000 kilometres per second | **Introduction**<br>1.The asks learners the following key questions to introduce the lesson:-<br>•Where does light come from?<br>•How does light travel<br>•How fast do they think light travels from the sun to the earth?<br>•How do mirrors work?<br><br>2. The learners respond to the questions posed.<br>3. The teacher then describes different forms objects that produce light as luminous objects.<br>4. The teacher highlights the Sun and a Light bulb as well-known luminous objects that produce light.<br><br>5. The teacher plays a video clip to consolidate the lesson. | **Web links**:<br>• https://youtu.be/2-NGTMK-fCo (4 min 23 sec) |
| **ASSESSMENT** | Learners explain the following terms: emission; radiation ; luminous; rectilinear | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 22**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | | |
|---|---|---|
| **DURATION:**<br>**TOPIC: : TOPIC: Visible Light**<br>**SUB TOPIC:** Radiation of Light | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. The learners will be able to demonstrate the understanding that light travels in a straight line by making a simple pinhole camera.<br>2. Learners will be able to know the speed of light. | |
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Radiation; ray | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 22**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1. Light travels in the straight line<br>2. Light travels through an empty space at a speed of 300 000 kilometres per second | **Introduction**<br>The teacher will introduce the lesson by explaining that light travel through the space with a very high speed from the sun to the earth.<br>**ACTIVITIES**:<br>1. The teacher presents the content as prescribed by CAPS page 49 and Siyavula 8B page 85-89.<br>2. Learners will in groups complete activity 1. | • Cardboard box<br>• paper<br>• sticky tape<br>• Candle (and matches) or lighter<br>• drawing pin |
| **ASSESSMENT** | The learners answer questions on the practical worksheet as they undertake the investigation | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 22**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

**ACTIVITY 1: Make a pinhole camera**

**Method**:

1. Paint the inside of the box black.
2. Cover the open end with the tissue paper. Make it as smooth as possible.
3. Use a sticky tape to keep the paper in position
4. Make a small hole (pinhole) at the other end of the box.
5. Hold the box about 30cm away from you and point it at an object that is well lit. e.g. (candle or torch)
   Look through the viewer
6. Answer the questions in the worksheet below.

**Worksheet**

1. What do you notice about the object you are viewing?
2. Draw a ray diagram to explain the image formed on the tissue paper at the back of the pinhole camera.
3. What happens if you move the object you are viewing further away from the camera?
4. What will happen if you increase the size of the pinhole?
5. How can you improve this camera?

**NATURAL SCIENCES: LESSON PLAN 22**

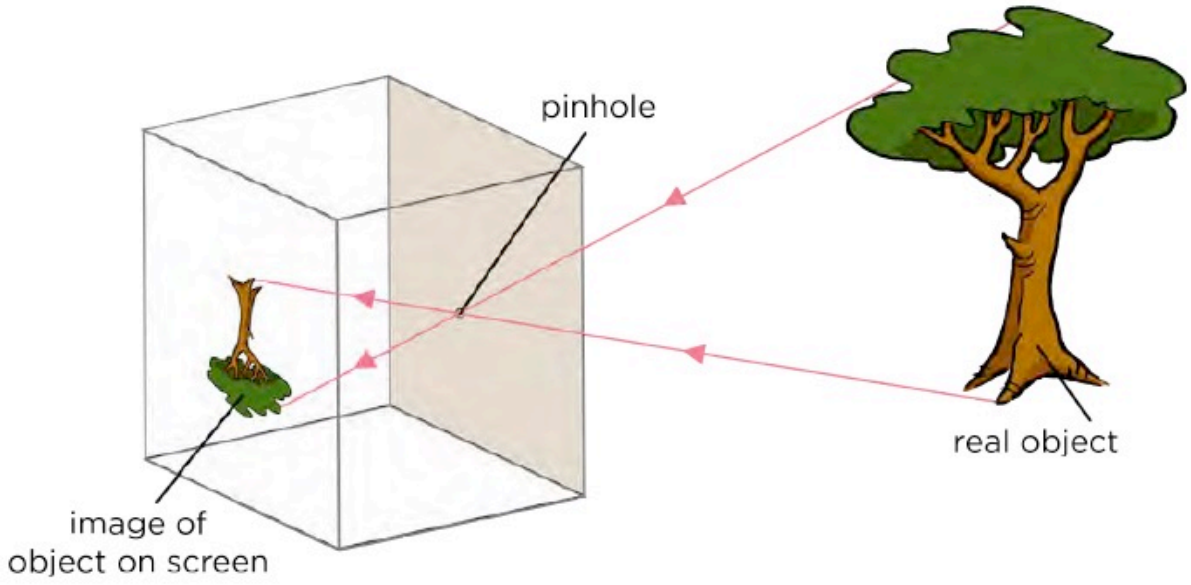
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**




AN EXAMPLE OF PINHOLE CAMERA

The learners should notice that the image is upside down

When you move closer to the object, the image appears bigger than when you move further away

We see objects because light reflects off them and enters our eyes. If the image is upside down it means that the light from the bottom of the object has arrived at the top of the screen and the light from the top of the object has reached the bottom of the screen

**NATURAL SCIENCES: LESSON PLAN 23**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: Visible Light** | Learners will demonstrate the understanding that white light consists of different colours by practically splitting white light. |
| **SUB TOPIC: Radiation of Light** | |
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** |
| **TERMINOLOGY:** | Spectrum; frequency; wavelength; white light/visible light |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 23**

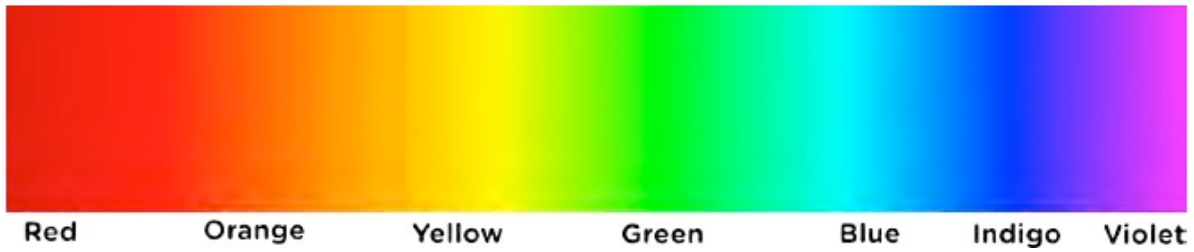
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>White light consists of spectrum of different frequencies and wavelengths. | **Introduction:**<br>1. The teacher introduces the lesson by explaining the concepts of electromagnetic spectrum and visible light spectrum. The teacher describes spectrum of visible light as part of a spectrum of electromagnetic radiation and as light that we are able to see.<br><br>ACTIVITIES:<br>1. The teacher presents the content on CAPS page 50 and Siyavula page 89-91.The diagram below shows seven colours of the white light.<br>2. In cases where schools do not have apparatus, they can use a class of water and let the light shine on the glass. This effectively works outside.<br><br><br> | • Glass<br>• Water<br>• Ray box/laser pointer/sun<br>• Triangular Perspex prism<br>White background (e.g. a white cardboard) |

| | | |
|---|---|---|
| **ASSESSMENT** | Learners will complete activity 1 below in groups. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 23**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

ACTIVITY 1: Splitting white light

**Method**:

1. Place the triangular prism on a white background.
2. Switch on the ray box and direct the light ray at an angle onto one surface of the prism.
3. Place a white cardboard in a vertical position on the other side of the prism.
4. Note your observations

**QUESTIONS**:

1. Draw the picture showing what you observe.

2. Write the description of what you observe.

3. Write down the order in which the colours appear.

4. If you repeat the experiment, does the order of the colours change?

5. What do different colours we see tell us about the composition of the white light?

**NATURAL SCIENCES: LESSON PLAN 23**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

**Answers:**

1. Draw a picture showing what you observe. The drawing should show the beam of white light entering the prism, passing through and emerging on the other side as the 7 colours of the visible spectrum.
   *They must note the relative bending of red versus violet light.*

2. Write a description of what you observed.
   *The white light enters the prism, passes through it and emerges on the other side as a beam of seven colours (a rainbow).*

3. Write down the order in which the colours appear.
   *Red, orange, yellow, green, blue, indigo, violet.*

4. If you repeat the experiment, does the order of the colours change?
   *No, the order is always the same.*

5. What do the different colours we see tell us about the composition of white light?
   *They tell us that white light is a mixture/blend/combination of the 7 colours of the visible spectrum*

**NATURAL SCIENCES: LESSON PLAN 24**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: : TOPIC: Visible Light** | 1. Learners will be able to explain how the rainbow is formed. |
| **SUB TOPIC:** Spectrum of visible light | 2. Learners will be able to identify colours that are refracted most and those that are refracted the least |

| | | |
|---|---|---|
| **REFERENCES** | Sasol Inzalo workbooks- Natural Sciences Grade 8-B | |
| **TERMINOLOGY:** | Refraction; reflection; medium | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

**SCIENCE PROCESS SKILLS**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | |
| Observing | | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 24**

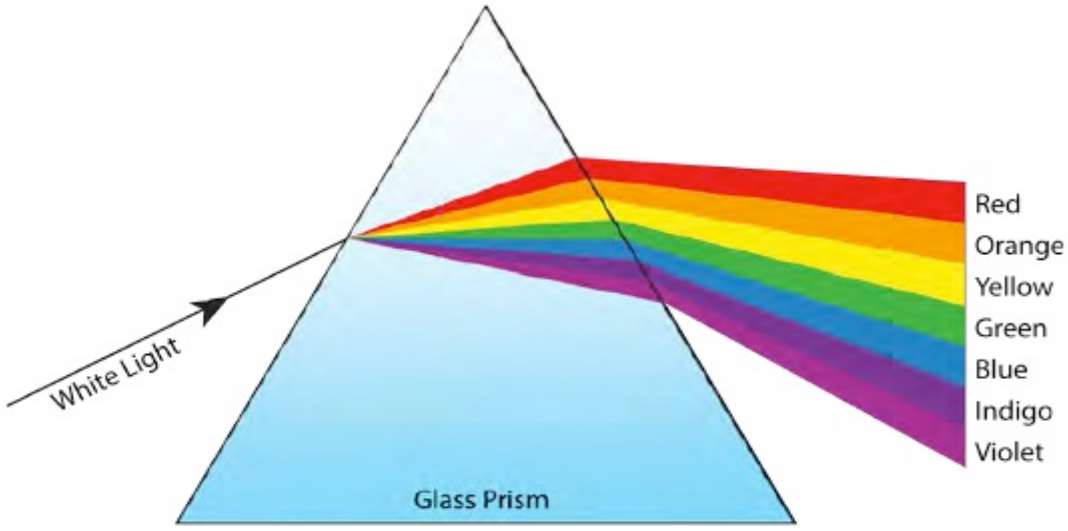
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>A rainbow is seen<br>1.when light falls on water droplet in the air and is refracted and dispersed into the different colours.<br>2.the light at the violet, indigo, blue range of the spectrum has the highest frequency(short wavelength) and the orange and the red light has the lowest frequency(longest wavelength) | **Introduction:**<br>1.The teacher introduces the lesson about the observations of the previous lesson e.g.<br>• What did you observe when light shines on the triangular prism?<br>• What do you see in the sky after the rainfall in the sunny day?<br>ACTIVITIES :<br>2. The teacher will explain that the observations made are because light is refracted when it moves from one medium to another.<br>3. The teacher will group learners to discuss how the rainbow is formed and report back.<br>4.The teacher will consolidate with the content as prescribed by CAPS in page 50<br><br><br>4.Violet, indigo and blue has the highest frequency(short wavelength) and orange and red has the lowest frequency(longest wavelength) | • Sasol Inzalo |

**NATURAL SCIENCES: LESSON PLAN 24**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | | |
|---|---|---|
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 25**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: : TOPIC: Visible Light** | 1. The learners will be able to define transmission of light |
| **SUB TOPIC:** Opaque and transparent substances | 2. The learners will be able to predict materials that will allow transmission of light<br>3. The learners will be able to classify objects as opaque, transparent and translucent substances. |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** | |
| **TERMINOLOGY:** | Opaque; transparent; translucent; transmit | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | | | Raising Questions | | | Recording Information | |
| Comparing | | | Predicting | ✓ | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 25**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1.light cannot pass through opaque surfaces<br>2.opaque substances cast shadows on the side facing away from the light sources<br>3.light passes through transparent substances | **Introduction**<br>1.The teacher introduce the lesson by asking learners whether light will pass through substances like glass, wall, plastic water ,etc. Any source of light can be used as the demonstration where light is directed on different substances.<br>Activity:<br>2. The teacher explains the answers /observations with the content in CAPS page 50. | • Light Source<br>• Glass, plastic, water, wall, cardboard |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 25**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

**Activity worksheet:**

1. From the list of substances given state whether they are transparent, translucent or opaque.

A cardboard, Water in a clear glass, A brick, A frosted glass pane, An A4 sheet of paper, A metal, A clear glass pane, Aluminium foil, toilet paper, Styrofoam cup, wood, coloured plastic. Lay, cellophane, book, clear plastic, filters, water and glass.

| Transparent substance | Translucent substance | Opaque substance |
|---|---|---|
| | | |
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**NATURAL SCIENCES: LESSON PLAN 26**

**GRADE: 8**

**DURATION: 30 MINUTES**

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: Visible Light** | 1. The learners will be able explain how a shadow is formed. |
| **SUB TOPIC: Opaque and transparent substances** | |
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** |
| **TERMINOLOGY:** | Opaque; transparent; translucent; transmit |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>**opaque substances cast shadows on the side facing away from the light sources** | **Introduction**<br>1. The teacher will ask learners the revision questions to describe the opaque substances and the transparent substances.<br>2. The teacher will give an explanation of the type of lights that can be cast on a screen.<br>A: Emitted light and Transmitted light can be cast onto a screen. Absorbed light does not go through an object and can therefore not be cast on a screen. Hence a shadow forms behind the object. The shadow takes the shape of the object.(CAPS page 50)<br>3. The learners will undertake the investigation as in the prescribed method. | • A torch<br>• Cardboard<br>• Retort stand<br>• Screen<br>• scissors |

**NATURAL SCIENCES: LESSON PLAN 26**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | | |
|---|---|---|
| **ASSESSMENT** | Learners perform activity one below. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 26**

**GRADE: 8**

**DURATION: 30 MINUTES**

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

## ACTIVITY: Shadow Play

## MATERIALS:

- A torch
- Cardboard
- Retort stand
- Screen
- Scissors



**Method:**

1. Place the light source about 2 metres from the screen.
2. Place a retort stand half way between the screen and the light source.
3. Put different cardboard shapes on the retort stand one at a time.
4. Switch on the light source and observe image on the screen.
5. Note your observations about the different images of the different shapes.
6. Now move the retort stand closer to the screen and closer to light source.
7. Note your observations in each case.

QUESTIONS:

1. The distance between the shapes and the light source was kept the same. What do you think would have happened if the distance was decreased?
2. Explain why the cardboard cast the shadow?

**Answers:**

1. The distance between the shape and the light source was kept the same. What do you think would have happened to the shadow if the distance was increased?

*The answer calls for learners to predict something they have not tested. The shadow should become larger if the object is closer to the light source and smaller if the object is further from the light source*

2. Explain why the cardboard casts a shadow but the clear plastic does not.

*Light travels in straight lines. It cannot bend around an object. Light cannot pass through the cardboard and so a shadow is formed. Light can pass through the clear plastic and so the area behind the plastic is bright*

**NATURAL SCIENCES: LESSON PLAN**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
|---|---|
| **TOPIC: : TOPIC: Visible Light** | 1. Learners will be able to compare the concepts of Transmission of Light and Absorption of Light. |
| **SUB TOPIC: Absorption of** light | 2. Learners will be able to identify objects that absorb light. |
| | 3. Learners will be able to determine the colour of objects because of absorption. |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** | |
| **TERMINOLOGY:** | Absorption | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1.light can be absorbed by surfaces of some materials<br>2.light is absorbed differently by different materials<br>3.mateials have colour because it has absorbed some colours in the spectrum<br>4.a black object absorbs all the colours and the white object reflects all the colours | **Introduction**<br>1. The teacher introduces the lesson by asking learners about the three types of objects according to transmission of light.<br>2. The teacher will ask learners to describe three categories in terms of absorption of light.<br><br>ACTIVITIES:<br>The teacher uses pictures to illustrate how see the colour of objects. CAPS page 50 | • A picture of a green leaf<br>• A picture of a red ladybird<br>• A picture of a white surface<br>• A coloured plastic film / A coloured glass pane |

**NATURAL SCIENCES: LESSON PLAN**

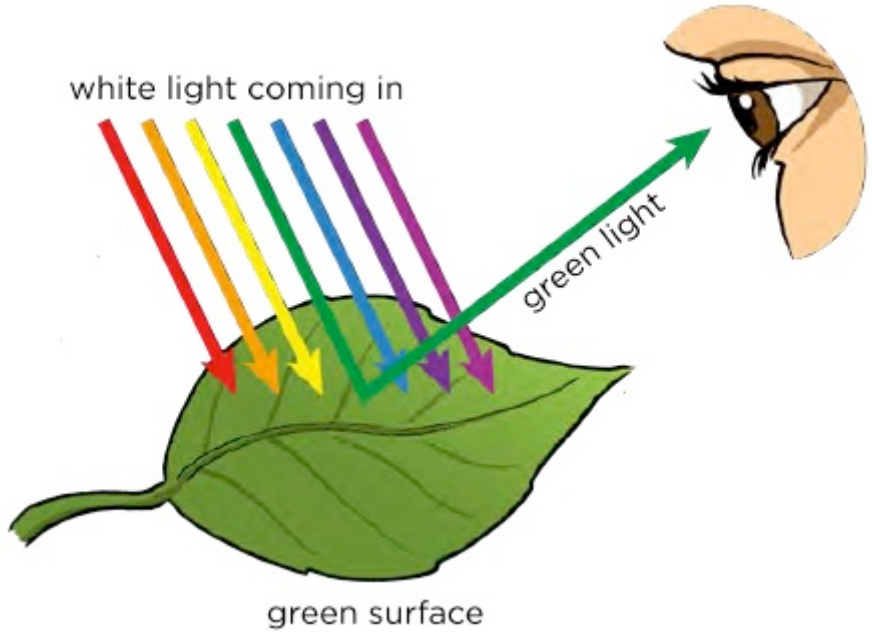
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |  | |

**NATURAL SCIENCES: LESSON PLAN**

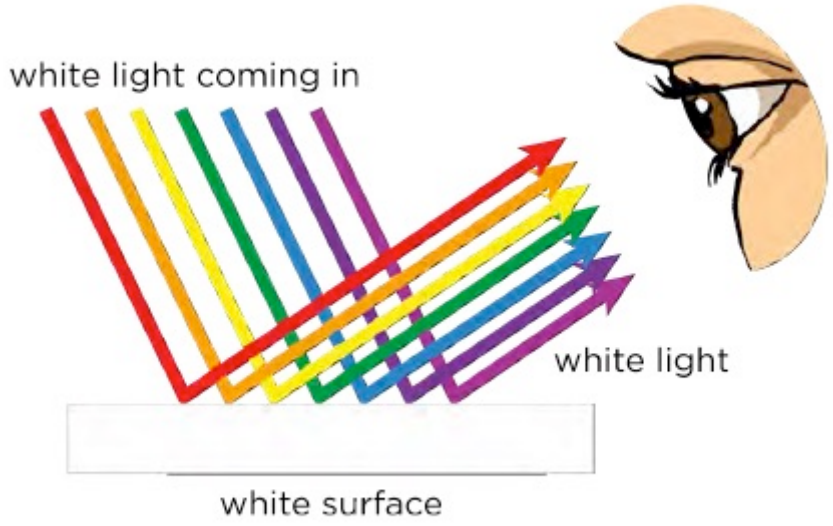
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |  | |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

ACTIVITY: Why do objects look red under red light?

MATERIALS:

- Piece of red plastic to act as a filter
- Light source
- White object

INSTRUCTIONS:

1. Place a white object on the desk.
2. Switch on the light source and place the red plastic in front of the light.
3. Shine the light (with the red plastic in front) onto the piece of white paper.

QUESTIONS:

1. What colour was the paper under normal light?
2. Why does the page appear white under normal light?
3. What did you see when the red plastic filter shone on the white page?
4. Explain why the paper changed colour?

**NATURAL SCIENCES: LESSON PLAN 28**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: Visible Light** | 1. The learners will be able to explain the above key concepts about the reflection of light. |
| **SUB TOPIC: Reflection of Light** | 2.The learners will be able to draw a ray diagram and label Normal, angle of incidence, angle of reflection, incident ray and reflected ray |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** | |
| **TERMINOLOGY:** | Normal; angle of incidence; angle of reflection; incident ray; reflected ray | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 28**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1.light is reflected in most of the surfaces including mirrors<br>2.Light can change its direction when it is reflected<br>3.in reflection the angle of incidence and the angle of reflection are equal<br>5.the angle of incidence and the angle of reflection are measured from the normal<br>6.on smooth surfaces, all light is reflected in same direction<br>7. on rough surfaces, reflected light is scattered. | **Introduction**<br>**1.** The teacher introduces the lesson by asking learners to explain reflection.<br>2..The teacher explains the concepts of the 'normal', 'incident ray', 'reflected ray', 'angle of incidence' and 'angle of reflection'.<br>• Option 1 - The teacher illustrates the concepts using a video footage from a video link.<br>• Option 2 – The teacher illustrates the concepts using a labelled diagram from a web link.<br>• Option 3 – the teacher illustrates the concepts using a labelled diagram on a A3 chart paper<br><br>4.The teacher presents the content as prescribed by CAPS on page 51 | • Ray box<br>• A pencil<br>• A protractor<br>• Clothing pegs<br>• A pane of mirror<br><br>**Web links**:bit/GABdNZ |

**NATURAL SCIENCES: LESSON PLAN 28**

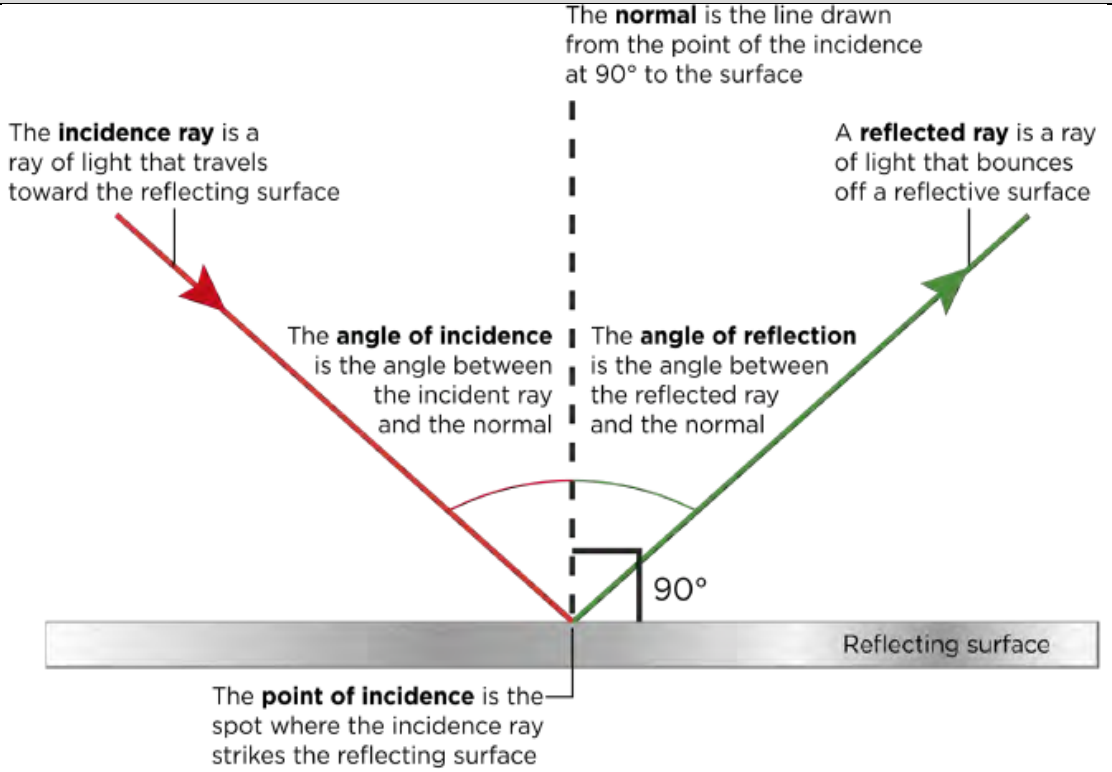
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |  | |
| **ASSESSMENT** | | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 29**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: Visible Light** | |
| **SUB TOPIC: Reflection of Light** | 2.The learners will be able to investigate how light is reflected from a smooth surface (e.g. a mirror) |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** | |
| **TERMINOLOGY:** | Normal; Angle of incidence, Incident ray; Angle of reflection; Reflected ray | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 29**

**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS** | **Introduction**<br>**Learners perform the practical activity based on the theory done on the previous lesson.** | • Ray box<br>• A pencil<br>• A protractor<br>• Clothing pegs<br>• A pane of mirror |
| **ASSESSMENT** | The teacher prepares the investigation by placing all necessary resources at different learner stations. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 29**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

ACTIVITY: The relationship between the angle of incidence and reflection.

MATERIALS:

- Ray box
- A pencil
- A protractor
- Clothing pegs
- A pane of mirror

**Method:**

1. Make use of clothing pegs / prestik to keep the mirror in a vertical position on a table.
2. Place the protractor in a horizontal position against the surface of the mirror.
3. Use a protractor to draw a line along the $90^0$ angle. This line is referred to as a Normal line
4. Switch on the ray box and shine the light ray at angle of $30^0$ to the Normal line. This angle is referred as the 'Angle of Incidence'
5. Now measure the angle of Reflection
6. What can you say about the angle of reflection?
7. Repeat steps 4 to 6 using a $60^0$ angle of incidence.
8. What can you say about the new angle of reflection?

**NATURAL SCIENCES: LESSON PLAN 30**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: : TOPIC: Visible Light**<br>**SUB TOPIC: Seeing Light** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>1. Learners will be able to identify, name and give function of eye parts responsible for vision<br>2. Learners will be able to explain the process of how we see objects |
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** |
| **TERMINOLOGY:** | **Cornea; iris; pupil; retina** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | ✓ |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | ✓ |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| **CONTENT AND CONCEPTS** | **ACTIVITIES** | **RESOURCES** |
|---|---|---|
| **KEY CONCEPTS**<br>**1.the colours that are reflected enter the eye**<br>**2.special receptor cells in the eye's retina are stimulated by specific colours** | **Introduction**<br>1. The teacher relates the process of how reflection of light helps us to see objects around us. The teacher explains the process of seeing and makes learners aware that the eye receptors are stimulated by light. The object seen is upside down as seeing is a reflection process. | • **Sasol Inzalo 8b** |

**NATURAL SCIENCES: LESSON PLAN 30**

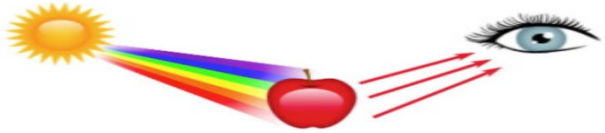
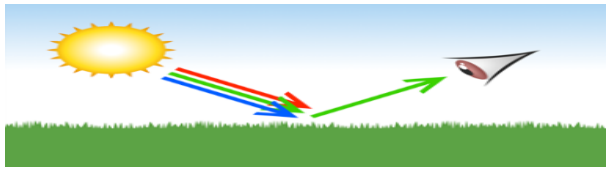
**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **3. in the eye, light energy is converted to electrical nerve impulses**<br><br>**4.impulses travel to the brain and the brain interprets them as our perceptions of light**<br><br>**5.the colours of light are absorbed by the surface of an object do not reach the eye** | <br> | |
| **ASSESSMENT** | Learners are instructed to work in group of 3 to research about the careers in optics. Research needs to be submitted in three days. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 30**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

Activity: Research in careers in optics

There are many different careers in the field of geometric optic.

INSTRUCTIONS:

1. Work in groups of three.
2. Interview someone in the field of geometrics and find out how they chose their career and what and where they studied.
3. Write a paragraph explaining the career and the study options available in order to qualify for that career.
4. Here are examples in careers in geometrics.
    a) Optometry
    b) Ophthalmology
    c) Optoelectronics
    d) Illumination engineering

**NATURAL SCIENCES: LESSON PLAN 31**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: : TOPIC: Visible Light** | 1.The learners will be able to conduct an investigation to determine the refraction of light |
| **SUB TOPIC: Refraction of Light** | 2. Learners will be able to draw a ray diagram through a rectangular prism |

| | | |
|---|---|---|
| **REFERENCES** | **Sasol Inzalo workbooks- Natural Sciences Grade 8-B** | |
| **TERMINOLOGY:** | Transparent ; medium; Incident ray; Refraction ; Transmitted ray | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | ✓ | | Doing Investigations | ✓ |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | ✓ | | Interpreting Information | ✓ |
| Measuring | ✓ | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

**NATURAL SCIENCES: LESSON PLAN 31**

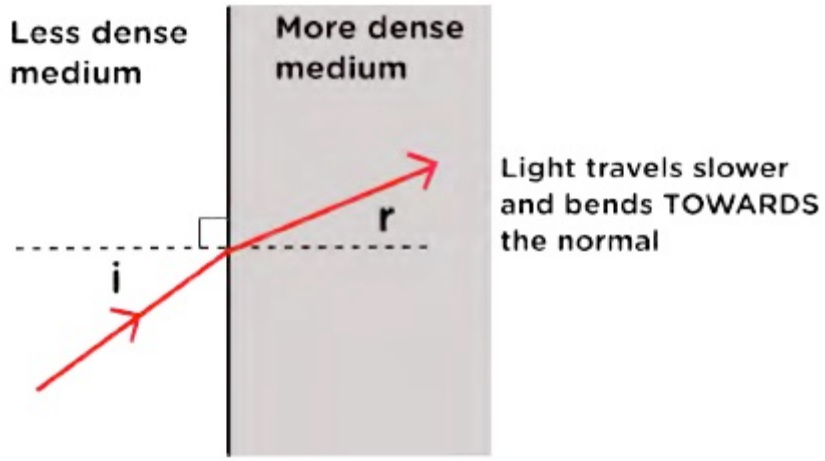
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **KEY CONCEPTS**<br>1.light can be refracted by transparent substances<br>2.light can change its direction when it is refracted<br>3.light entering a transparent medium at an angle, changes direction towards the normal in that medium<br>4.light travelling out of the medium changes the direction away from the normal<br>5.a triangular prism is able to refract and disperse white light into the colours observed in a rainbow<br>6.a lens is able to refract and focus light | **Introduction**<br>1. The teacher will ask revision questions on the definitions of transparent objects, translucent objects and opaque objects.<br>2. The teacher will remind the learners about then phenomenon of 'Reflection' and then define the new term of 'Refraction'.<br>3. The teacher will then explain that a transparent medium will be used so as to observe passage of a light ray through a rectangular prism.(CAPS page 51)<br>4. Learners will then do an investigation to determine if a light ray is refracted as it moves through the prism.<br> | • Ray box<br>• Rectangular prism<br>• 2 Protractors |

**NATURAL SCIENCES: LESSON PLAN 31**

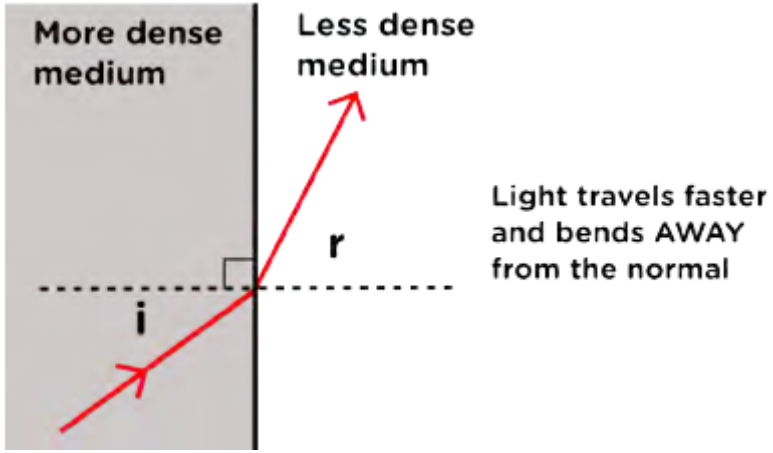
**DURATION:** 30 MINUTES

**CAPS SENIOR PHASE**

**GRADE: 8**

**ENERGY AND CHANGE**

**TERM: 3**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |  | |
| **ASSESSMENT** | Learners engages with the activity below | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 31**

**GRADE: 8**

**DURATION:** 30 MINUTES

**ENERGY AND CHANGE**

**CAPS SENIOR PHASE**

**TERM: 3**

**Activity: Refraction of light through a rectangular prism**

**MATERIALS:**

- Ray box
- Rectangular prism
- 2 Protractors

**Method:**

1. Place a protractor against the surface of the rectangular surface (as indicated in the diagram)
2. Let a light ray to enter the rectangular prism perpendicularly (along the 90% line) to its surface.
3. What happens to the direction of the light ray inside the prism?
4. What happens to the direction of the light ray leaves the prism?
5. Now shine a light ray at an angle of 45% to the surface of the rectangular prism.
6. What happens to light ray inside the prism?
7. What happens to light ray that leaves the prism?
8. What can you conclude about the directions of the light entering the prism and the light leaving the prism?
9. What name do we give to

   9.1 a light ray entering a prism?

   9.2 a light ray travelling inside a prism?

   9.3 a light ray leaving a prism?

**NATURAL SCIENCES: LESSON PLAN 1**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: The Solar System**<br>**SUB TOPIC: The Sun** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Explain how the Sun emits light and heat energy<br>• Mention the type of reaction that occurs in the Sun<br>• Mention the components of the Sun<br>• Mention the position of the Sun in the Solar system<br>• Mention the size of the Sun compared to other stars |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 53** |
| **TERMINOLOGY:** | **Sun, star, nuclear reaction, nuclear fusion** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • The Sun is like all other stars- it produces large amount of heat and light continuously<br>• The energy in our Sun comes from powerful nuclear reactions during | • The teacher revises some concepts related to the Sun and Earth taken up in the previous grades.<br>• Introduce to the learners the term solar system and explain to them that our planet Earth, the Sun and Moon are a part of the solar system.<br>• The teacher explains the position and the size of the Sun in the Solar system as compared to the other Stars<br>• Nuclear reaction is also explained by first indicating the constituents of the Sun as helium and hydrogen gases as well as other gases. After that the reaction of the two gases will be explained. Pg 145 Siyavula (LB) or any text book with relevant information.<br>• Learners observe the Sun using a pinhole camera and answer the questions as in Pages 147-149 | Siyavula workbooks , any relevant text book, Charts<br>Telescope<br>Binoculars<br>Mirror |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| which hydrogen gas changes into helium gas | Siyavula workbooks (learner's book- LB), teachers guide (TG) pages 171 – 173, the teacher consolidates by discussing with the learners the findings. Any relevant book can be used | |
| **ASSESSMENT** | **The learners will do the following activity in their class- work books.** | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 1** **GRADE: 8**
**DURATION: 30 Minutes** **STRAND: PLANET EARTH AND BEYOND**
**CAPS SENIOR PHASE** **TERM 4**

**ACTIVITY:**

**Answer the following questions in you class-work books:**

1. Name gases that the Sun is mostly made of.
2. Discuss how the Sun emits large amounts of heat and light energy.
3. What type of reaction occurs in the Sun?
4. Is the Sun the biggest star in the universe?
5. Where is the Sun positioned in the Solar System?
6. Why don't we observe the Sun by looking directly to it?



**MEMORANDUM**

1. Helium and Hydrogen gases.
2. Nuclear fusion creates heat and light. The amount of solar heat and light is enough to light up on Earth's days and keep our planet warm enough to support life.
3. Nuclear reactions
4. No, there are many stars which are much larger than the Sun.
   The Sun appears so large compared to the other stars because it is so much closer to us than any other star.
5. The Sun lies at the center of the Solar System.
6. To avoid permanent damage of the eyes

**NATURAL SCIENCES: LESSON PLAN 2**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: The Solar System**<br>**SUB TOPIC: Objects around the Sun** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Identify different objects orbiting the Sun<br>• Differentiate between a planet and a dwarf planet<br>• Identify the locations of the asteroid belt, Kuiper belt and Oort cloud in the Solar System |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 53** |
| **TERMINOLOGY:** | **Planet, dwarf planet, orbit, Solar System** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • A variety of objects orbit the Sun-eight planets and their moons, rocky asteroids, outer dwarf planets and many distant icy and dusty objects in the Kuiper Belt and Oort Cloud, at the edge of the Solar System | **ACTIVITIES :**<br>• The teacher explains different objects around the solar system; namely the 8 planets and moons, asteroids, dwarf planets as well as icy and dusty objects such as comets.<br>• Learners watch the video on Solar System<br>Solar System Orbit Video.mp4<br>• Learners will observe planets rotating on their own axis and revolving around the Sun.<br>• The teacher explains to the learners that all planets have moons that are rotating and revolving around them except Mercury and Venus. **Refer Siyavula TG page 186**,and any available textbooks | Siyavula workbooks , any relevant text book, Charts Video |

**NATURAL SCIENCES: LESSON PLAN 2**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | | |
| **ASSESSMENT** | **Activity:**<br><br>**Learners answer the following questions in their class activity book**<br><br>1. What is the Solar System?<br>2. What is the difference between a planet and a dwarf planet?<br>3. What type of planets are Jupiter, Saturn, Uranus and Neptune? Why are they called that?<br>4. What do we call a path that a body in space follows as it travels around another body?<br>5. Which planets are terrestrial planets and why are they called that?<br><br>**MEMORANDUM**<br><br>1. Solar System is the Sun and everything that travels around it.<br>2. A planet travel around the Sun in a regular circular path called an orbit, almost spherical in shape and can be able to keep its orbital path clear of other objects while Dwarf Planet is a planet that is not able to keep its path clear of other objects.<br>3. Jupiter, Saturn, Uranus and Neptune are outer gas giants because they are made up mostly of gases and liquid.<br>4. Orbit<br>5. Mercury, Venus Earth and Mars they are made of rocks | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 3**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: The Solar System** | • Mention the features of planets: diameter, distance from the Sun, number of moons, composition, surface temperature, time to orbit the Sun |
| **SUB TOPIC: Objects around the Sun** | |

| | | |
|---|---|---|
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 53** | |
| **TERMINOLOGY:** | **Terrestrial** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |



| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| All planets and other objects in the Solar System have their own features including size, distance from the Sun, number of moons known, composition, surface temperature, time it takes for one object to orbit the Sun. | **ACTIVITIES:** The teacher uses the information given in the table below to show different features of planets. | Siyavula workbooks , any relevant text book, Charts |

| Planet | Size/ Diameter in (km) | Distance from the Sun (millions of km | Number of Moons | Composition | Surface temperature in ($^0$C) | Day length (Rotation) | Year length (Revolution) |
|---|---|---|---|---|---|---|---|
| Mercury | 48 800 | 58 | 0 | Rocky | -180 to 427 | 59 days | 88days |
| Venus | 12 100 | 108 | 0 | Rocky | 471 | 243 days | 225 days |
| Earth | 12 756 | 150 | 1 | Rocky | -88 to 58 | 23h56min | 365 days |
| Mars | 6 794 | 228 | 2 | Rocky | -87 to -5 | 24h31min | 687 days |

**NATURAL SCIENCES: LESSON PLAN 3**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

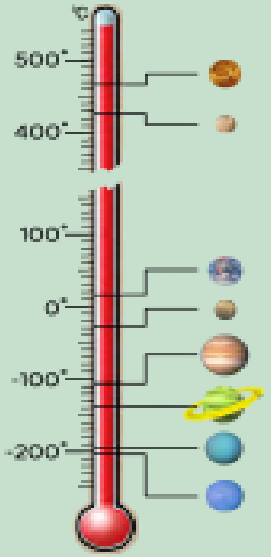
**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

<table>
<tr><th>CONTENT AND CONCEPTS</th><th>ACTIVITIES</th><th>RESOURCES</th></tr>
<tr><td></td><td>
<table>
<tr><td>Jupiter</td><td>143 200</td><td>778</td><td>63</td><td>Gas</td><td>-148 Av</td><td>9h55 min</td><td>12 years</td></tr>
<tr><td>Saturn</td><td>120 000</td><td>1 427</td><td>63</td><td>Gas</td><td>-178 Av</td><td>10h42 min</td><td>29 years</td></tr>
<tr><td>Uranus</td><td>51 800</td><td>2 871</td><td>27</td><td>Gas</td><td>-216 Av</td><td>17h12 min</td><td>84 years</td></tr>
<tr><td>Neptune</td><td>49 528</td><td>4 498</td><td>13</td><td>Gas</td><td>-214 Av</td><td>16h6 min</td><td>165 years</td></tr>
</table>
</td><td></td></tr>
<tr><td>ASSESSMENT</td><td colspan="2">Activity:<br><br>Learners will do the following activities in their class work books</td></tr>
<tr><td>TEACHER REFLECTION</td><td>Progress:</td><td>Challenges:</td></tr>
</table>

## ACTIVITY: Planetary Temperatures

**INSTRUCTIONS:**

1. Look at the table, it shows the surface temperatures of each of the pl
2. Correctly label each of the planets on the thermometer using the temperature information provided in the table.




| Planet | Temperature (°C) |
|---|---|
| Mercury | 167 |
| Venus | 464 |
| Earth | 15 |
| Mars | -65 |
| Jupiter | -110 |
| Saturn | -140 |
| Uranus | -195 |
| Neptune | -200 |

**QUESTIONS:**

1. Which planet has the lowest average temperature?

   _____

2. Why do you think this is?

   _____

3. What do you notice about the average temperatures of the terrestrial planets compared with the gas giants?

   _____

4. If you exclude Venus, how does the ordering of the planets from the Sun compare with their average temperature?

   _____

   _____

**ACTIVITY 2:** Comparing the inner and outer planets

**INSTRUCTIONS:**

Use the information in the table below to answer the questions that follow.

| Planet | Density ($kg/m^3$) | Diameter (km) | Distance from the Sun (million km) | Day length (hours) | Year length (Earth days) |
|---|---|---|---|---|---|
| Mercury | 5427 | 4879 | 57.9 | 4222.6 | 88 |
| Venus | 5243 | 12104 | 108.2 | 2802.0 | 224.7 |
| Earth | 5514 | 12756 | 149.6 | 24.0 | 365.25 |
| Mars | 3933 | 6792 | 206.6 | 24.7 | 687.0 |
| Jupiter | 1326 | 142984 | 740.5 | 9.9 | 4331 |
| Saturn | 687 | 120536 | 1352.6 | 10.7 | 10747 |
| Uranus | 1271 | 51118 | 2741.3 | 17.2 | 30589 |
| Neptune | 1638 | 49528 | 4444.5 | 16.1 | 59800 |

**QUESTIONS:**

1. Given that the density of water is 1000 kg/m3, which of the planets would float on water? Explain your answer.

   _____
   _____

2. Compare the densities of the rocky planets and the gas giants. Which type of planet tends to be denser? Explain why.

   _____
   _____

3. Which planet has the shortest day?

   _____
   _____

4. Compare the day length for the rocky planets and the gas giants. Which type of planet tends to have the shortest day? What does this tell you about how fast the two types of planet rotate on their axis?

   _____
   _____

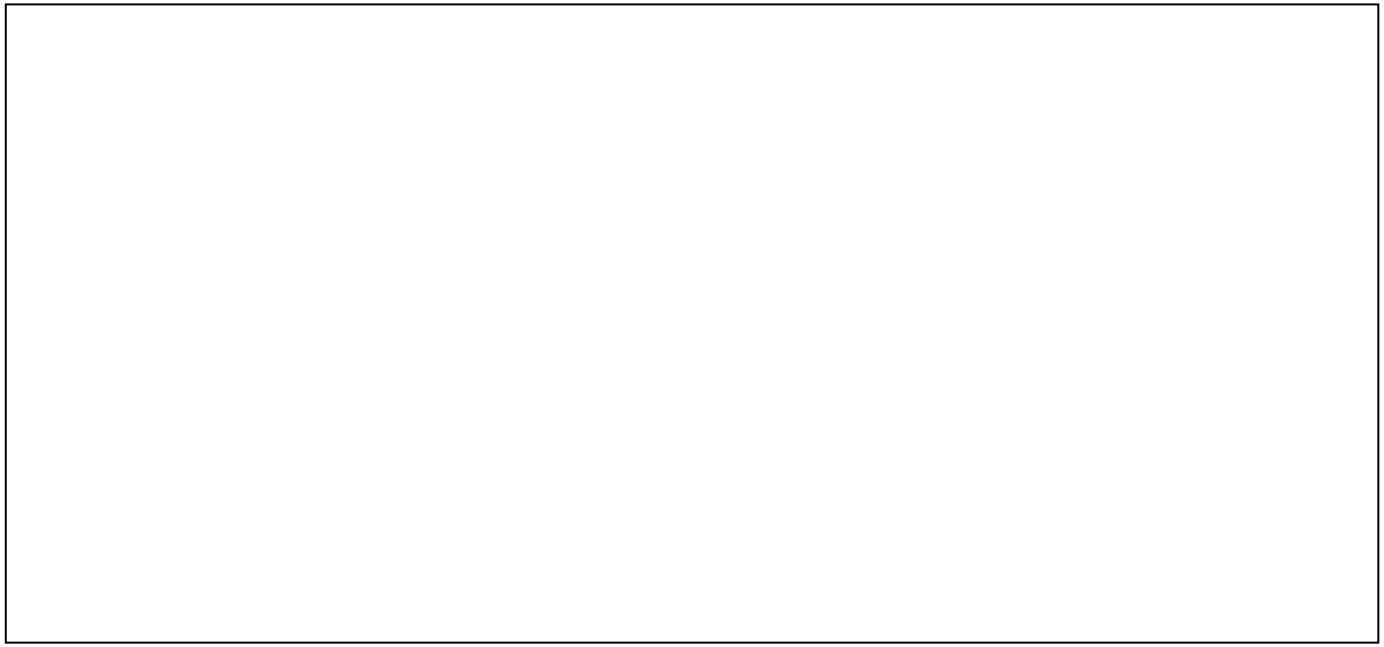
5. Which planet orbits around the Sun the fastest? Why is this?

   _____
   _____

6. Which planet's year is shorter than its day?

   _____
   _____

7. Plot a bar graph to show the distance each planet is from the Sun. Use the following space for your graph.



**MEMORANDUM**

**ACTIVITY 1**

1. Which planet has the lowest average temperature?

   *Neptune.*

2. Why do you think this is?

   *It is the furthest planet from the Sun.*

3. What do you notice about the average temperatures of the terrestrial planets compared with the gas giants?

   *The average temperatures of the terrestrial planets are much higher than the average temperatures of the gas giants.*

4. If you exclude Venus, how does the ordering of the planets from the Sun compare with their average temperature?

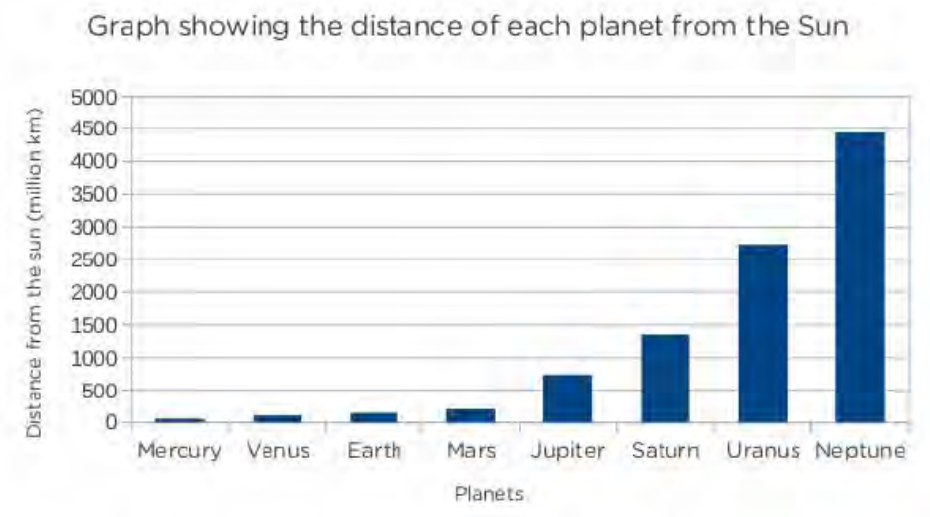
   *In general, the further away from the Sun a planet is, the lower its temperature.*



**ACTIVITY 2**

1. Given that the density of water is 1000 kg/m3, which of the planets would float on water? Explain your answer.
   *Saturn would float on water as its density is less than that of water.*
2. Compare the densities of the rocky planets and the gas giants. Which type of planet tends to be denser? Explain why.
   *The inner rocky (terrestrial) planets are denser than the outer gas giants, as the inner planets are made of solid rock, which is denser than gas.*
3. Which planet has the shortest day?
   *Jupiter.*
4. Compare the day length for the rocky planets and the gas giants. Which type of planet tends to have the shortest day? What does this tell you about how fast the two types of planet rotate on their axis?
   *The gas giants tend to have the shortest days which means that these planets must spin on their axes faster than the terrestrial planets.*

5. Which planet orbits around the Sun the fastest? Why is this?
   *Mercury, because it is the closest planet to the Sun and has the least distance to cover.*
6. Which planet's year is shorter than its day?
   *Mercury.*
7. Plot a bar graph to show the distance each planet is from the Sun. Use the following space for your graph.



**NATURAL SCIENCES: LESSON PLAN 4**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DATE:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Identify objects around the Sun<br>• Differentiate amongst asteroid, meteoroid, meteor, comet and meteorite |
| **TOPIC: The Solar System** | |
| **SUB TOPIC: Objects around the Sun** | |

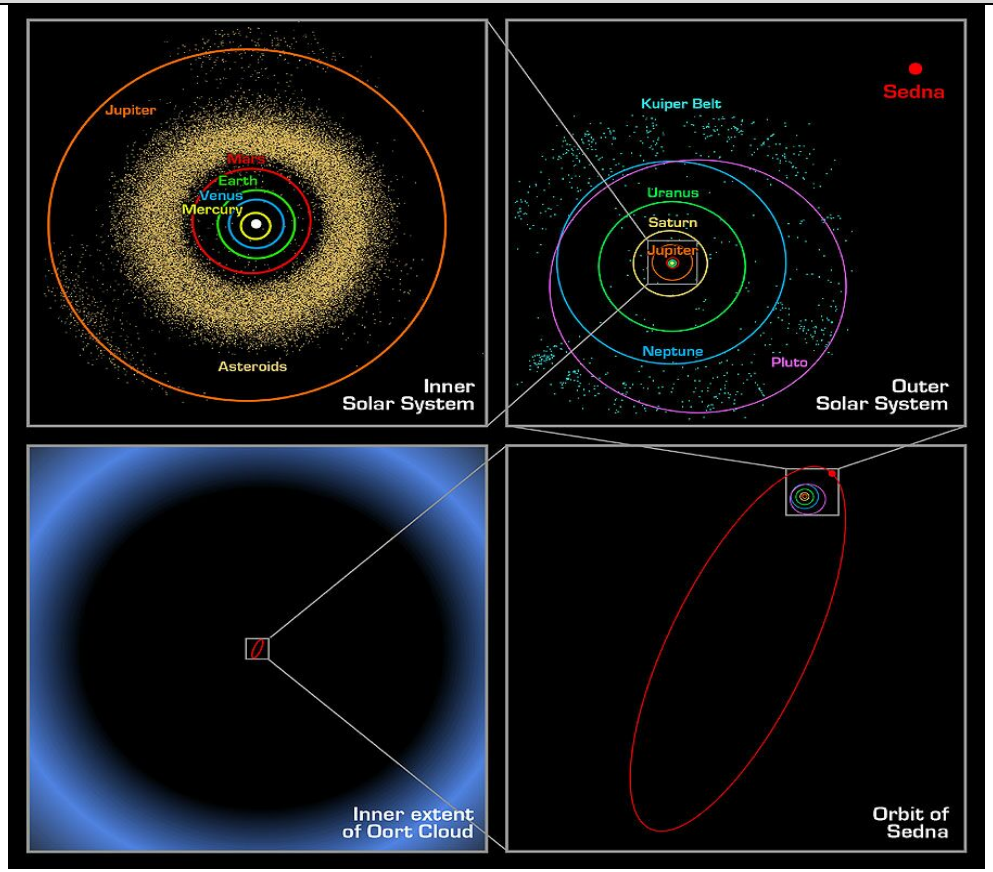
| | | |
|---|---|---|
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 53** | |
| **TERMINOLOGY:** | **Dwarf planet, comet, Oort cloud, asteroid belt, Kuiper belt** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| Comets from the Oort Cloud come close to the Sun from time to time | • The teacher explains different objects around the solar system; namely the Asteroids; Comets; outer dwarf planets; dusty and icy objects in the Kuiper Belt and Oort Cloud.<br>• Learners watch the video on Solar System<br><br>Solar System 101 - National Geographi<br>• Learners will observe planets together with Asteroids; Comets; outer dwarf planets; dusty and icy objects in the Kuiper Belt and Oort Cloud rotating on their own axis and revolving around the Sun.<br>• Explanation on the Asteroids; meteoroids; meteors; meteorites; comets; dusty and icy objects in the Kuiper Belt and Oort Cloud will be done. | Siyavula workbooks , any relevant text book, Charts<br>Video |

NATURAL SCIENCES: LESSON PLAN 4
DURATION: 30 MINUTES
CAPS SENIOR PHASE

GRADE: 8
STRAND: PLANET EARTH AND BEYOND
TERM 4

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |  | |

**NATURAL SCIENCES: LESSON PLAN 4**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **ASSESSMENT** | **Activity:**<br><br>**Learners answer the following questions in class work books either as home work or class activity**<br><br>1. What is the asteroid belt?<br>2. What is the difference between an asteroid and a meteoroid<br>3. Describe the location of the Oort Cloud and Kuiper Belt<br>4. Which two places do comets believed to originate from?<br>5. What is a comet made up of?<br><br>**MEMORANDUM**<br><br>1. Asteroids belt is the area where asteroids are found.<br>2. An asteroid is one of large rocks found in space, they do not have enough gravity to pull themselves into the shape of a ball while Meteoroid is a solid object in space that is smaller than an asteroid<br>3. The Kuiper Belt and Oort Cloud are found at the edge of the Solar System<br>4. Comets come from the Oort Cloud on the edge of the Solar System<br>5. A Comet is made of frozen gases and a bits of rock | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|
| | | |

**NATURAL SCIENCES: LESSON PLAN 5**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: The Solar System**<br>**SUB TOPIC: Objects around the Sun** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Explain what a Solar System is<br>• Explain what a planet is<br>• Identify and explain objects around the Sun |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 53** |
| **TERMINOLOGY:** | **Planet, dwarf planet,, orbit, Solar System** |

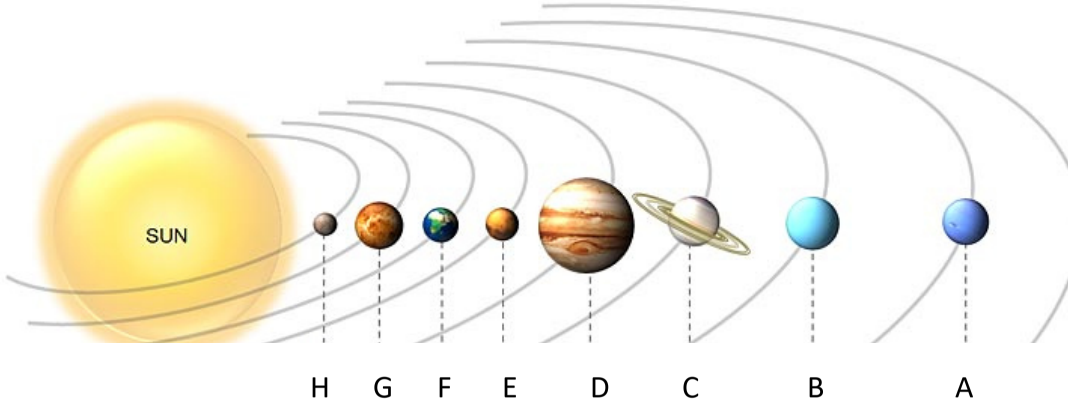
| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • The solar System looks like a flat disc or plate. The Sun spins (rotate) at the Centre and the planets and all other objects orbit around it in the same direction<br>• Gravity is the force that keeps all these objects in their stable, predictable orbits around the Sun | • The teacher revise with the learners different objects around the solar system; namely the Planets (giant and outer planets)<br>• The teacher explains to the learners that all planets have moons that are rotating and revolving around them except Mercury and Venus. Refer Siyavula TG page 186,and available textbooks | Siyavula workbooks, any relevant text book, |

**NATURAL SCIENCES: LESSON PLAN 5**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **ASSESSMENT** | **Activity:**<br><br>Learners answer the following questions in their books<br><br>1. Name the star at the centre of the Solar system<br>2. Tabulate the differences between terrestrial planets and gas giants in terms of the following: number of moons, rings, rotation and proximity to the Sun.<br>3. Why is Pluto no longer regarded as a planet?<br>4. Refer to the figure below that shows the Solar system. Write the labels of the parts numbered A to H<br><br>Solar System<br><br> | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|

**NATURAL SCIENCES: LESSON PLAN 5**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

**MEMORANDUM**

1. The Sun is the star at the Centre of the Solar system.
2. The differences between terrestrial planets and gas giants in terms of the following: number of moons, rings, rotation and proximity to the Sun.

| Planet | Rings | Proximity to the Sun (millions of KM) | Number of Moons | Rotation |
|---|---|---|---|---|
| Mercury | NO | 58 | 0 | 59 days |
| Venus | NO | 108 | 0 | 243 days |
| Earth | NO | 150 | 1 | 23h56min |
| Mars | NO | 228 | 2 | 24h31min |
| Jupiter | YES | 778 | 63 | 9h55 min |
| Saturn | YES | 1 427 | 63 | 10h42 min |
| Uranus | YES | 2 871 | 27 | 17h12 min |
| Neptune | YEs | 4 498 | 13 | 16h6 min |

3. Pluto is no longer regarded as Planet because it can't keep its path clear of other objects.
4. A=Neptune, B=Uranus, C=Saturn, D= Jupiter, E=Mars, F= Earth, G=Venus, H= Mercury

**NATURAL SCIENCES: LESSON PLAN 6** **GRADE: 8**
**DURATION: 30 Minutes** **STRAND: PLANET EARTH AND BEYOND**
**CAPS SENIOR PHASE** **TERM 4**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** |
| **TOPIC: The Solar System** | • Mention the position of the Earth on the Solar system |
| **SUB TOPIC: The Earth's position in the Solar System** | • Mention conditions that enable Earth to be only planet that supports life |

| | | |
|---|---|---|
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 53** | |
| **TERMINOLOGY:** | **Sun, star, nuclear reaction** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |



| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • The Earth is the third planet from the Sun.<br>• The Earth is the only planet that is known to support life.<br>• The conditions that support life on Earth include :<br>- Temperature: Earth's distance from the Sun provides the ideal temperature range<br>- Water is a liquid, gas or solid in the Earth's temperature range | • The teacher asks learners the features of all planets.<br>• The teacher let the learners compare the Earth Planet with its neighboring Planets namely Venus and Mars. | Siyavula workbooks , any relevant text book, Charts |

| **Property** | **Venus** | **Earth** | **Mars** |
|---|---|---|---|
| **Distance from the Sun ( millions of km)** | 108 | 150 | 228 |
| **Surface Temperature ( $^0$C)** | 471 | -88 to 58 | -87 to -5 |

The teacher explains using information from above table including Oxygen and Sunlight,

**NATURAL SCIENCES: LESSON PLAN 6**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| - Sunlight provides the energy in the food chain<br>- Oxygen: early life forms and algae produced enough oxygen for the evolution of more sophisticated life forms | | |
| **ASSESSMENT** | **Activity:**<br>**Learners do the following activity in their class work books** | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|

**NATURAL SCIENCES: LESSON PLAN 6**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

**ACTIVITY:** The Sun's Habitable Zone

| Property | Venus | Earth | Mars |
|---|---|---|---|
| **Distance from Sun (AU)** | 0.7 | 1.0 | 1.5 |
| **Average Temperature (°C)** | 464 | 15 | -63 |

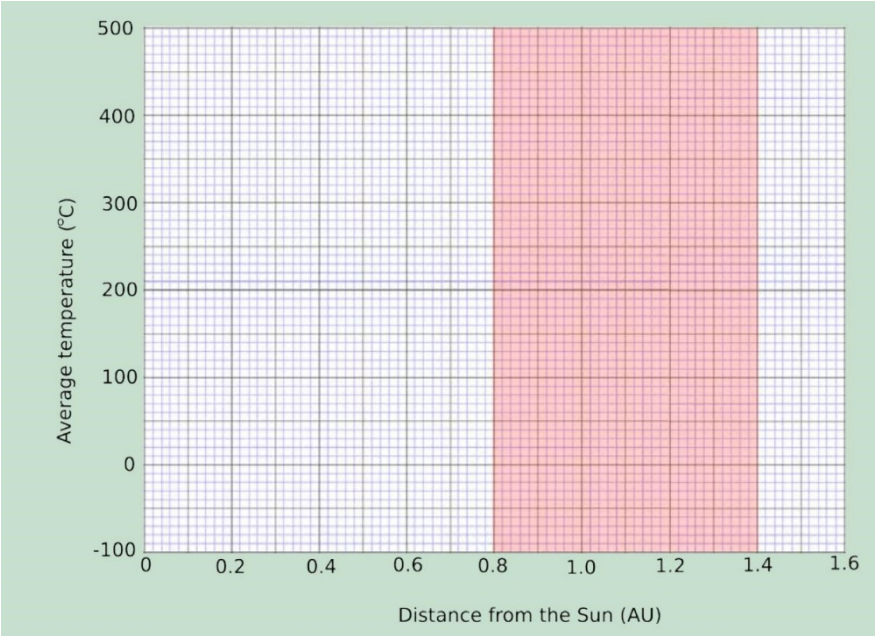
**MATERIALS:**

- pencil
- ruler

**INSTRUCTIONS:**

1. Look at the data provided in the table. It shows the distance from the Sun for three planets (in units of one Earth-Sun distance or Astronomical Unit). It also shows the average temperature on each planet in degrees Celsius.
2. Plot a graph to show the data in the table. Mark each point with an X.
3. The Sun's habitable zone extends from 0.8 to 1.4 AU and is shaded in red in the graph paper. This is the region where scientists think a planet has to lie in order for there to be life on the planet.

Graph showing the average temperature and the distance from the Sun of Venus, Earth and Mars.



**QUESTIONS:**

1. What is the average temperature on Venus?

   _____

2. Can liquid water exist on Venus? Why?

   _____

3. What is the average temperature on Mars?

   _____

4. Is liquid water likely to be found on Mars? Why?

   _____

5. What is the average temperature on Earth?

   _____

6. Can liquid water exist on Earth? Why?

   _____

   _____

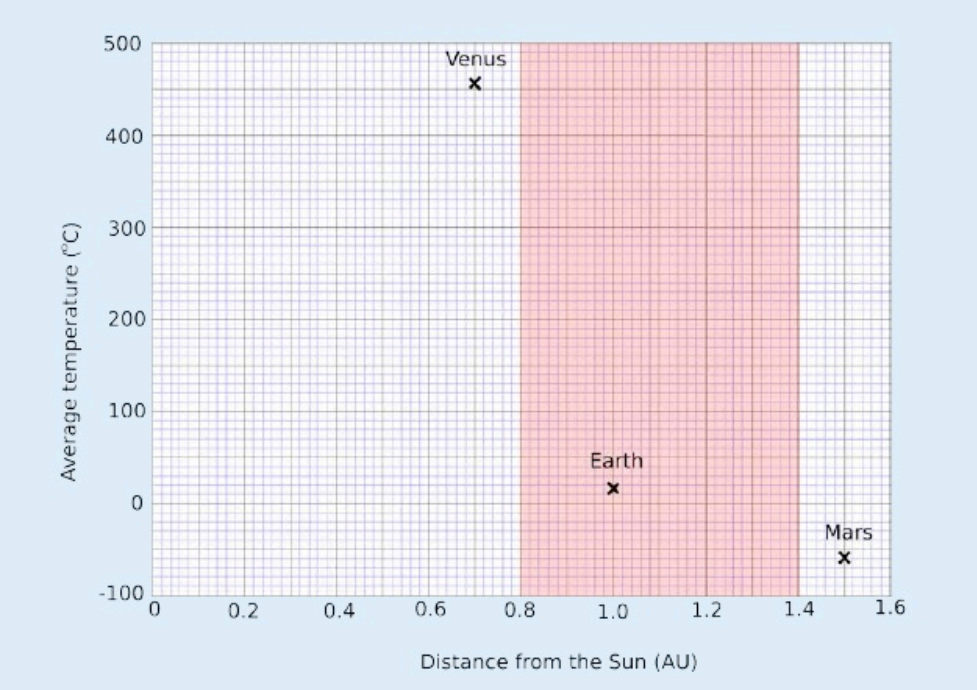
7. Which planet/s lie within the Sun's habitable zone (the red shaded region in the graph)? The average temperature on Earth is a moderate 15 °C. Because of this

   _____

**NATURAL SCIENCES: LESSON PLAN 6**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

**Memorandum**




**QUESTIONS:**

1. What is the average temperature on Venus?
   *464 °C.*
2. Can liquid water exist on Venus? Why?
   *No, it is too hot. Water boils at 100 °C.*
3. What is the average temperature on Mars?
   *-63 °C.*
4. Is liquid water likely to be found on Mars? Why?
   *No, it is too cold. Water freezes at 0 °C.*

5. What is the average temperature on Earth?
   *15 $^{o}$C.*
6. Can liquid water exist on Earth? Why?
   *Yes, because the temperature on Earth is between water's melting and boiling points.*
7. Which planet/s lie within the Sun's habitable zone (the red shaded region in the graph)?
   *Only Earth.*

**NATURAL SCIENCES: LESSON PLAN 7**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: Beyond the Solar System**<br>**SUB TOPIC: The Milky Way galaxy** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Define galaxy<br>• Relate the Solar system to the Milky Way galaxy<br>• Draw the Milky Way<br>• Identify shapes or types of the galaxies<br>• Able to demonstrate the shape of the Milky Way Galaxy with a spiral shape |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 54** |
| **TERMINOLOGY:** | **Galaxy, black hole, dark matter** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | ✓ | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | ✓ |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • Our Solar System is in the Milky Way Galaxy<br>• A Galaxy is a collection of stars held together by their mutual gravity<br>• Our Sun is only one of billions of stars in the Milky Way Galaxy<br>• Our Sun is located towards the edge of the Milky Way Galaxy in one of the spiral arms<br>• From the Earth, looking towards the center of the Milky Way Galaxy, we see a hazy path of | • The teacher will explain what a Galaxy is.<br>• The teacher demonstrates the shape and the features of the Milky Way Galaxy with a spiral shape using the video.<br><br>Milky Way in 3D.mp4<br>• Learners must observe and identify the features of the Milky Way Galaxy refer to Siyavula teachers guide or any relevant text book. | Siyavula workbooks , any relevant text book, Video |

**NATURAL SCIENCES: LESSON PLAN 7**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| light across the sky<br>• Ancient Greeks describe it as a spilled milk | | |
| **ASSESSMENT** | **Activity:**<br>**Learners will do the following activity in a form of Home-Work** | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|
| | | |

**NATURAL SCIENCES: LESSON PLAN 7**
**DURATION: 30 MINUTES**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

**ACTIVITY:** Draw the Milky Way

**MATERIALS:**

- black paper
- white crayon, pencil or paint
- glue - optional
- glitter or sand - optional
- newspaper for working on
- white or silver pencil/pen for labelling
- sticker - optional

**INSTRUCTIONS:**

.

1. Draw or paint a picture of the Milky Way. The galaxy has five major spiral arms, and some smaller ones including our Orion Arm. The galaxy also has a bulge in the middle.
2. If you are going to use glitter or sand, glue along your spiral arms and in the central bulge.
3. Scatter glitter or sand over the picture, each grain represents a star in our Milky Way.
4. Tilt the picture onto the newspaper to remove any excess glitter.
5. Label each of the major arms of the Milky Way Galaxy.
6. On the Orion Arm place a sticker or mark a point halfway out from the galaxy centre. This marks the position of the Sun.

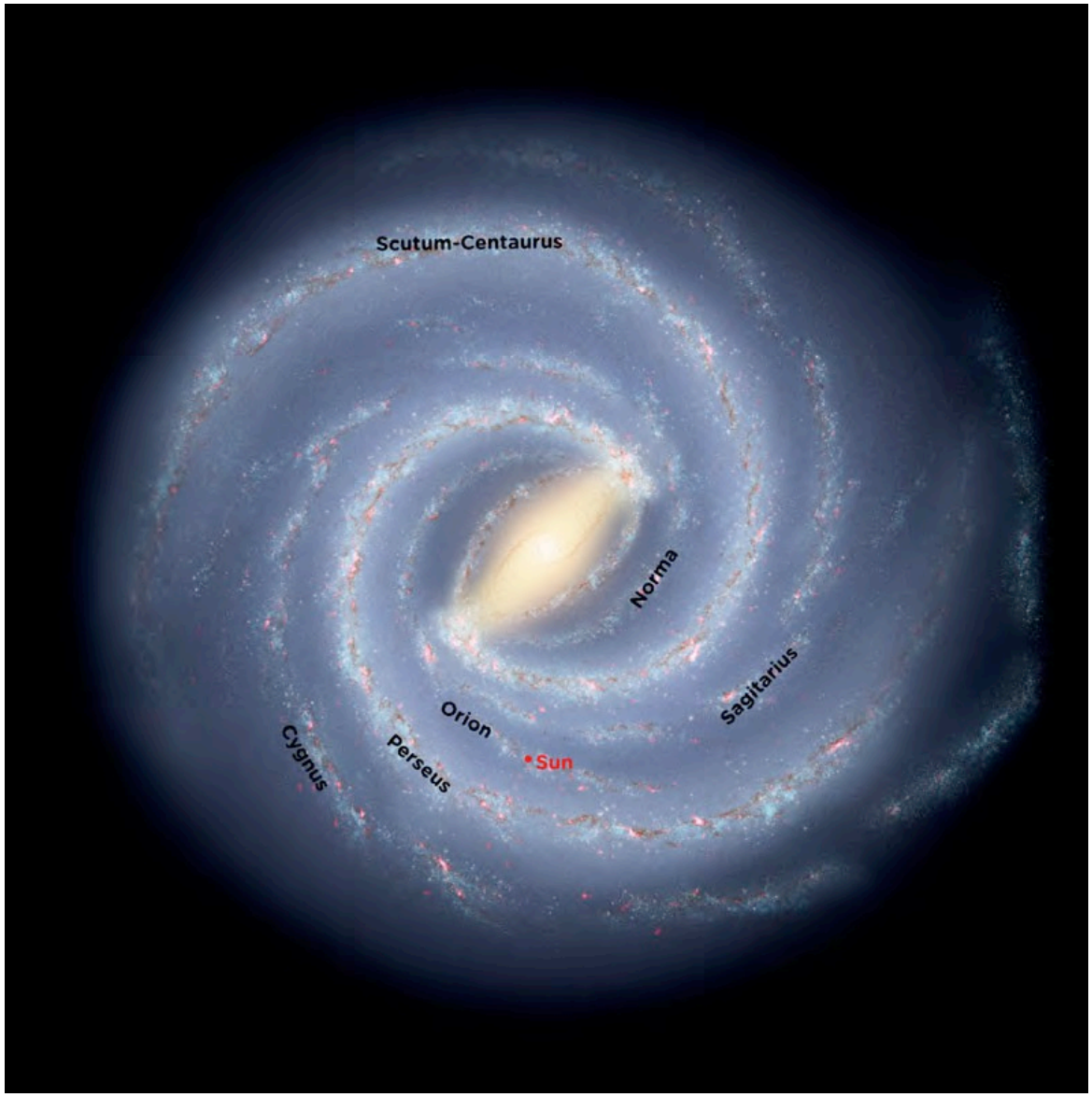
**MEMORANDUM**

- The aim of this activity is to reinforce the idea that the Milky Way Galaxy is a spiral galaxy with five major spiral arms in addition to some smaller arms. Learners will also be reminded that the Sun and Earth are not at the centre of the galaxy, but rather about half way out along a minor arm called the Orion Arm.

- Below is the picture of Milky Way

NATURAL SCIENCES: LESSON PLAN 7
DURATION: 30 MINUTES
CAPS SENIOR PHASE

GRADE: 8
STRAND: PLANET EARTH AND BEYOND
TERM 4



**NATURAL SCIENCES: LESSON PLAN 8**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DURATION:**<br>**TOPIC: Beyond the Solar System**<br>**SUB TOPIC: Our nearest star** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Know that the Sun is the nearest star to the Earth<br>• Mention that Alpha Centauri is the nearest visible star<br>• Mention that Alpha Centauri is 4.2 light years away<br>• Identify the Southern Cross constellation on the night sky |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 54** |
| **TERMINOLOGY:** | **Constellation** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • The Sun is the nearest star on Earth<br>• The star called the *Alpha Centauri* is the nearest easily visible star to the Sun (it is the brighter of the two Pointers of the Southern Cross constellations) | • The learners will watch the video and observe the Sun spots and the Sun flares<br>• They must observe other nearest stars such as *Alpha Centauri (A and B) and Proxima Centauri*<br>Alpha Centauri B (1).mp4 Amazing video of massive solar flare e<br>• The teacher consolidate the lesson by discussing with the learners what they saw in the video, emphasizing what constellations are, Alpha Centauri and Proxima Centauri using any relevant text book | Siyavula workbooks, any relevant text book, Charts Video |

**NATURAL SCIENCES: LESSON PLAN 8**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **ASSESSMENT** | **Activity 1:**<br><br>**Answer the following questions in the class work books**<br><br>1. Give the name of the galaxy in which the Solar System is found.<br>2. Answer the following questions on the Southern Cross constellation<br>2.1. Define Constellation<br>2.2. Provide a drawing of the Southern Cross.<br>2.3. Is the constellation visible from the Northern Hemisphere? Why?<br>3. The nearest star to the Solar System is *Alpha Centauri,* which is about four light years away. Explain what is meant by 'four light years'<br><br>**Activity 2**<br><br>**Practical Activity:**<br><br>Can be done in a form of Homework<br><br>**Learners must demonstrate the shape of the Milky Way**<br>**They will need:** Beans or Rice or course sand Large flat Surface<br>**Method:**<br>Use the beans or Rice to represent stars. Work on a flat surface. Demonstrate the shape of the Milky way. Show:<br>• Show the Spiral shape<br>• The Spiral arms<br>• Where there is a concentration of stars<br>• The position of the Sun,. | |

**NATURAL SCIENCES: LESSON PLAN 8**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | | RESOURCES |
|---|---|---|---|
| **TEACHER REFLECTION** | Progress: | Challenges: | |

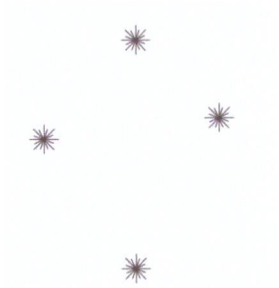
**MEMORANDUM**

**Activity 1**

1. Milky Way

2.1. An arrangement of stars and planets into an image

2.2.



2.3 No, it is close to the South Pole/ Antarctica

3. It takes light from the star four years to reach the Earth

**Activity 2**

**Suggested answers and assessments**

Allow learners to demonstrate the shape of the Milky Way Galaxy, using beans or rice or coarse sand. This activity serves to reinforce the theoretical knowledge learners acquired during the lesson

**NATURAL SCIENCES: LESSON PLAN 9**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **DURATION:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Explain the concepts: light year, light hour, light minute<br>• Convert light year, light hour and light minute to kilometers and vice versa |
| **TOPIC: Beyond the Solar System** | |
| **SUB TOPIC: light years, light hours. Light minutes** | |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 54** |
| **TERMINOLOGY:** | **Constellation** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | | | Raising Questions | ✓<br>✓ | | Recording Information | ✓ |
| Comparing | | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • People use light years to measure distances to stars and other objects beyond the Solar System<br>• A light year is the distance that light travels in one year<br>• One light year is equal to about 10 trillion kilometers ( km)<br>• *Alpha Centauri* is 42 trillion km away | **ACTIVITIES:**<br><br>• The teacher explains to the learners that a light year is the distance that light travels in one year at 300 000km per second, it is used for measuring distances such as those between galaxies.<br>• The following information can be used to elaborate:<br>- 1 light second = 300 000km<br>- 1 light minute = 18 million km<br>- 1 light hour = 1,1 billion km<br>- 1 light day = 25 billion km | Siyavula workbooks , any relevant text book, Charts |

**NATURAL SCIENCES: LESSON PLAN 9**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • A light hour is the distance that light travels in one hour<br>• A light minute is the distance that light travels in one minutes<br>• The Earth is about 8 light minutes away from the Sun | - 1 light year = 9,5 Trillion km<br>• The teacher explains to the learners what light hour and light minutes mean. | |
| **ASSESSMENT** | **Activity:**<br>**Learners will do the following activity** | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|

**ACTIVITY**

**INSTRUCTIONS:**

1. The table below shows the distance that each planet lies from the Sun in kilometres (km) and then in light hours or light minutes.

2. Study the table and answer the questions that follow.

**Distances of each planet from the Sun.**

| PLANET | DITANCE FROM THE SUN ( MILLION KM) | DISTANC FROM THE SUN IN LIGHT HOUR OR MINUTES |
|---|---|---|
| Mercury | 57.9 | 3.2 light minutes |
| Venus | 108.2 | 6.0 light minutes |
| Earth | 149.6 | 8.3 light minutes |
| Mars | 227.9 | 12.7 light minutes |
| Jupiter | 778.6 | 43.3 light minutes |
| Saturn | 1433.5 | 1.3 light hours |
| Uranus | 2872.5 | 2.7 light hours |
| Neptune | 4495.1 | 4.2 light hours |

**NATURAL SCIENCES: LESSON PLAN 9**
**DURATION: 30 Minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | **QUESTIONS:**<br>1. How far away from the Sun is Earth?<br>2. How long does light take to travel from the Sun to the Earth?<br>3. What does the answer to (2) imply about our view of the Sun?<br>4. How many times further away from the Sun than the Earth is Neptune?<br>5. How far away from the Sun is Neptune in light hours?<br>6. How long does light from the Sun take to reach Neptune?<br>7. Imagine you have a cousin living on Neptune. You and your cousin both decide to look at the Sun, each of you using a telescope with a special solar filter so as not to damage your eyes. As you are watching the Sun you suddenly notice a big blob of gas thrown off in a massive solar flare. You cousin says she cannot see it. Why is that? | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|

**MEMORANDUM**

**QUESTIONS:**

1. How far away from the Sun is Earth?
   *8.32 light minutes.*
2. How long does light take to travel from the Sun to the Earth?
   *8.32 minutes.*
3. What does the answer to (2) imply about our view of the Sun?
   *We see the Sun as it was 8.32 minutes ago.*
4. How many times further away from the Sun than the Earth is Neptune?
   *30 times further. This is calculated by dividing the distance from the Sun to Neptune by the distance from the Sun to Earth: 4495/150 = 30.*
5. How far away from the Sun is Neptune in light hours?
   *4.17 light hours.*
6. How long does light from the Sun take to reach Neptune?
   *4.17 hours.*

**NATURAL SCIENCES: LESSON PLAN 10**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **Duration:**<br>**TOPIC: Beyond the Solar System**<br>**SUB TOPIC: Beyond the Milky Way galaxy** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Estimate the size of the observable universe<br>• Explain what the Local Group is<br>• Identify shapes or types of the galaxies |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 54** |
| **TERMINOLOGY:** | **Merger, Local Group, universe** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **SCIENCE PROCESS SKILLS** | | | | | | |
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | | |
| Observing | | | Raising Questions | | | Recording Information | | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | | |
| Measuring | | | Hypothesizing | | | Communicating | | |
| Sorting & Classifying | | | Planning Investigations | | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • our Milky Way Galaxy is only one of billions of galaxies scattered across the Universe<br>• the size of the observable Universe is estimated to be about 28 billion light years<br>• galaxies have various shapes and sizes | • The teacher explains the position, sizes and shapes of different Galaxies across the Universe using charts and video.<br><br>The largest galaxies in the universe (1).m | Siyavula workbooks , any relevant text book, Charts<br>Video |

**NATURAL SCIENCES: LESSON PLAN 10**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | | |
| **ASSESSMENT** | **Activity:**<br><br>**LEARNER ACTIVITY: Comparing Galaxies**<br><br>**QUESTION: 1**<br><br>**INSTRUCTIONS**<br><br>1. Look at the images of the six galaxies used in this activity.<br>2. Write down in the table what type of Galaxy our Milky Way Galaxy is.<br>3. Write down in the table below what type of Galaxy you think each Galaxy is | |

**NATURAL SCIENCES: LESSON PLAN 10**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | | RESOURCES |
|---|---|---|---|
| | **NAME OF GALAXY** | **TYPE OF GALAXY** | |
| | <br>The Milky Way Galaxy | | |
| | <br>Galaxy M 89. The galaxy is 60 million light years away. | | |

**NATURAL SCIENCES: LESSON PLAN 10**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | | RESOURCES | |
|---|---|---|---|---|
| | <br>Galaxy NGC 4622. The galaxy is 111 million light years away. | | | |
| | <br>The large Magellanic Cloud galaxy. This Satellite galaxy of our own Milky way Way is only 163 000 light years away | | | |

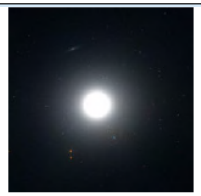
| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br>The Spindle Galaxy, 44 million light years away.<br><br>**QUESTION: 2**<br><br>Arrange the galaxies in the table above in increasing order of distance from our Milky Way Galaxy | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|
| | | |

**NATURAL SCIENCES: LESSON PLAN 10**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

## MEMORANDUM

| Galaxy Name | Galaxy type |
|---|---|
|  Milky Way Galaxy. | Barred spiral galaxy (because it has spiral arms with a bright, central bar) |
|  Galaxy M 89, 60 million light years away. | Elliptical galaxy (because it is round and smooth with no spiral arms) |
|  Galaxy NGC 4622, 111 million light years away. | Spiral galaxy (because it has spiral arms) |
|  The Large Magellanic Cloud galaxy. This satellite galaxy of our own Milky Way is only 163 000 light years away. | Irregular galaxy (it does not have spiral arms and is not a smooth oval shape like elliptical galaxies. It looks like an irregular shape) |

| Galaxy Name | Galaxy type |
|---|---|
|  The Spindle Galaxy, 44 million light years away. | Lenticular galaxy (because disk shaped, with a central bulge, but no spiral arms) |

**Question 2**

The LMC, the Spindle Galaxy, M 89, NGC 4622.

**NATURAL SCIENCES: LESSON PLAN 11**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

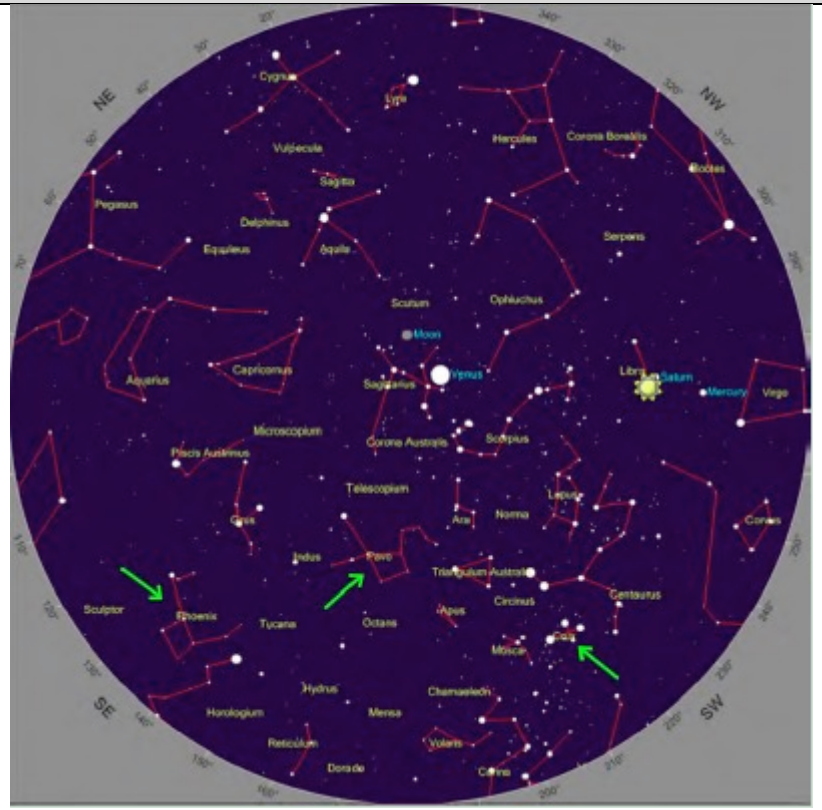
| | | |
|---|---|---|
| **Duration:** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:** | |
| **TOPIC: Looking into space** | • Identify planets and constellations in the night sky | |
| **SUB TOPIC: Early viewing of space** | | |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 54** | |
| **TERMINOLOGY:** | **Telescope, astronomy, astronomer** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | ✓ |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | ✓ |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • people can see planets and stars in the night sky<br>• stars can be arranged into visible constellations<br>• Some constellations have stories linked to them | • The teacher will display a poster of night sky (star map) and ask the learners what they see in the poster. | Siyavula workbooks , any relevant text book, Charts |

**NATURAL SCIENCES: LESSON PLAN 11**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

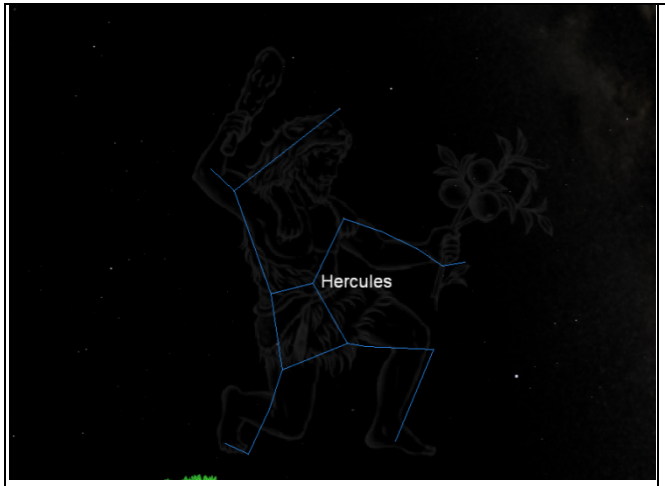
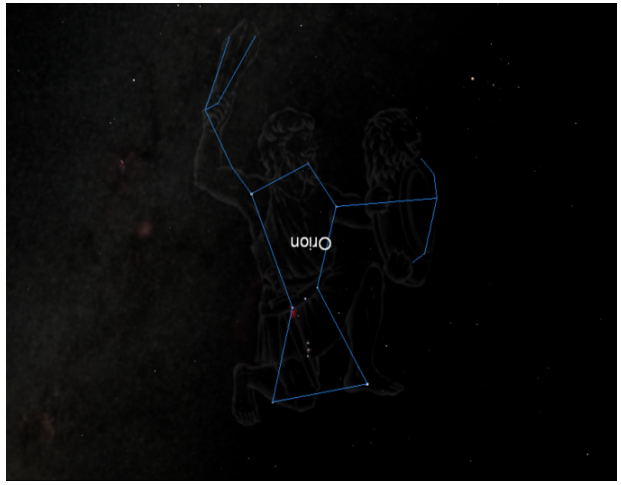
| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |  | |

**Poster**

- The teacher asks learners questions such as:
  - What can you see in the poster?
  - What are patterns of star called?
  - What information do we get when we observe the night sky?
  - How did people in ancient times observe the night sky?

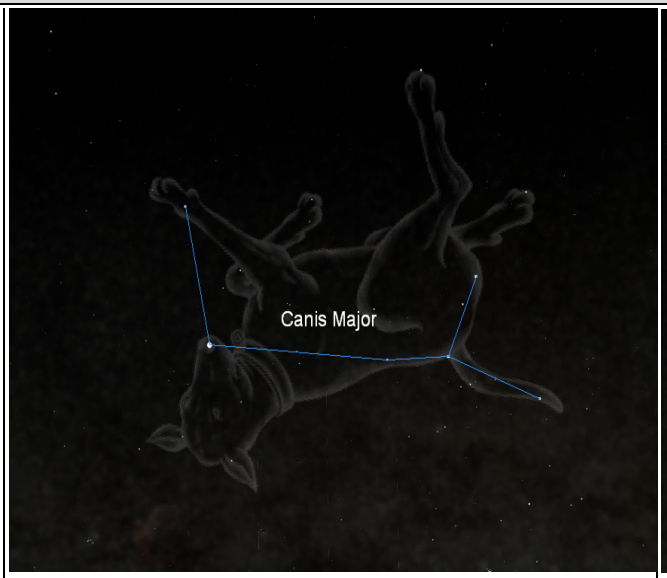
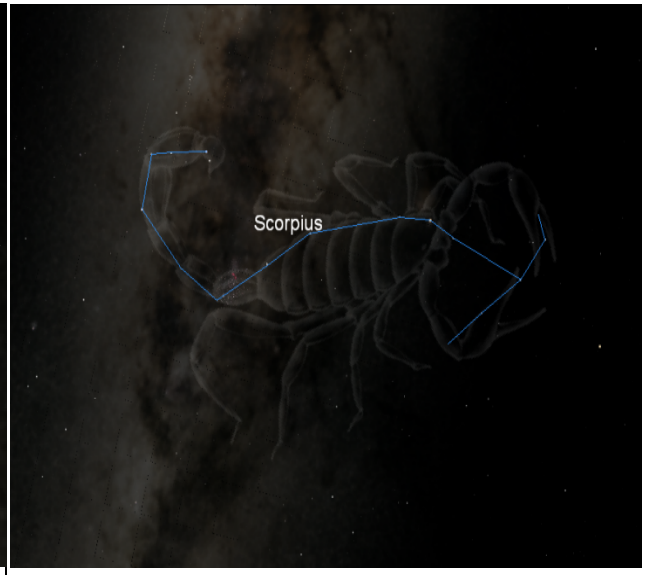
**NATURAL SCIENCES: LESSON PLAN 11**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | • The teacher allows learners to come up with their responses and discuss with them the importance of observing the night sky in ancient times and modern times.<br>• The teacher shows the learners posters of different constellations and explains how each is named.<br><br> | |

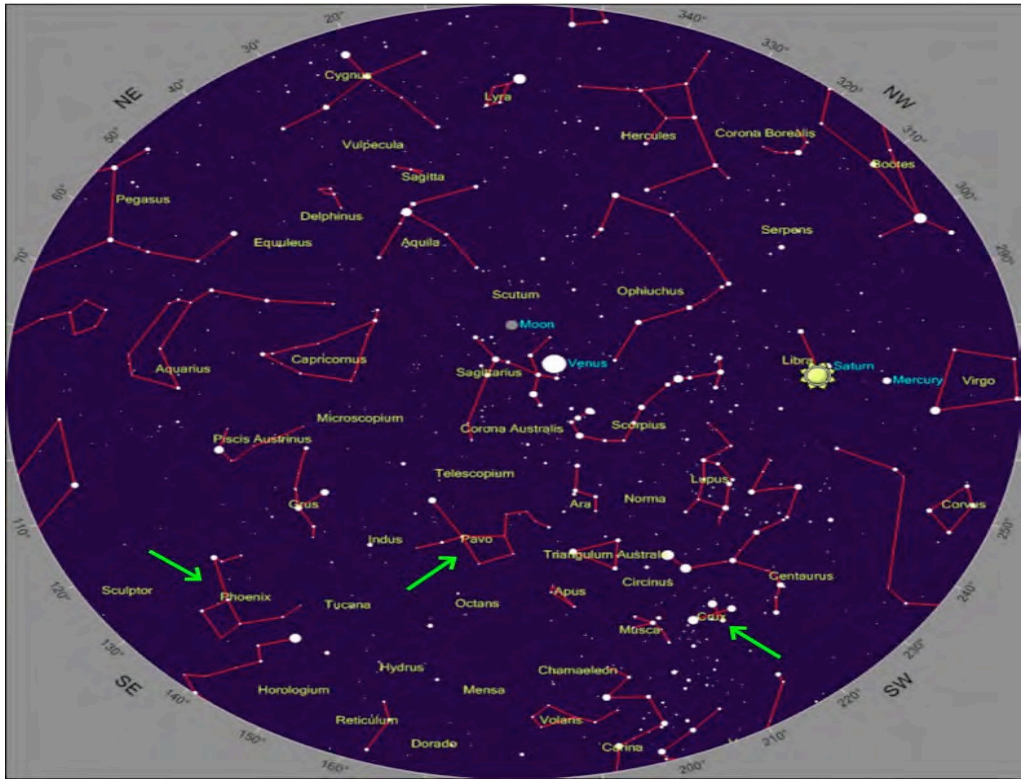
NATURAL SCIENCES: LESSON PLAN 11
DURATION: 30 minutes
CAPS SENIOR PHASE

GRADE: 8
STRAND: PLANET EARTH AND BEYOND
TERM 4

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| |   | |

NATURAL SCIENCES: LESSON PLAN 11
DURATION: 30 minutes
CAPS SENIOR PHASE

GRADE: 8
STRAND: PLANET EARTH AND BEYOND
TERM 4

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **ASSESSMENT** | **ASSESSMENT:**<br><br>**Learner Activity**<br><br><br> | |

**NATURAL SCIENCES: LESSON PLAN 11**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

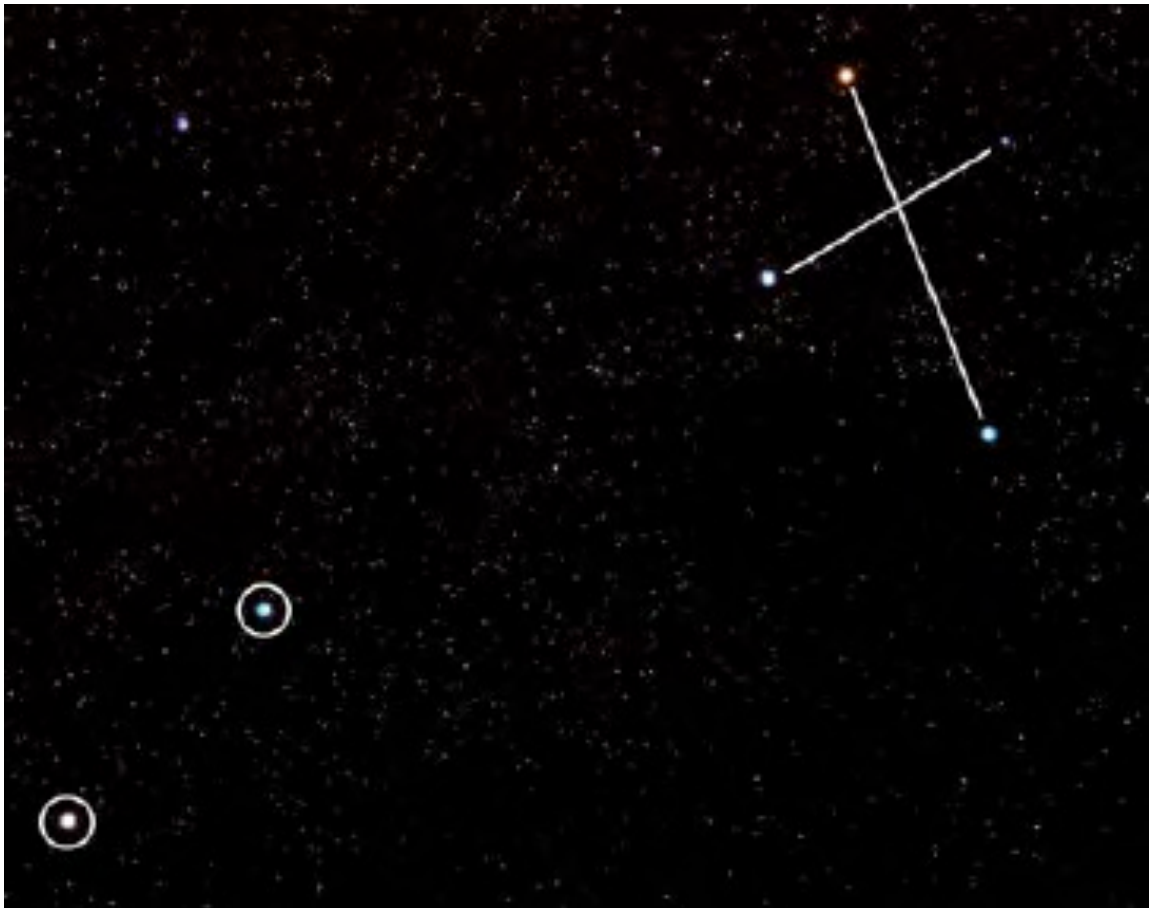
**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | **INSTRUCTIONS:**<br>1. Go outside at night with your star map.<br>2. Wait a few minutes to let your eyes adjust to the dark.<br>3. Try to identify the following constellations in the sky: Crux (indicated with green arrows on the star map).<br>5. See if you can spot any of the planets, these will not twinkle like the stars do. | |
| **TEACHER REFLECTION** | Progress: | Challenges: |

**NATURAL SCIENCES: LESSON PLAN 11**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

**MEMORANDUM**



*The Southern Cross or Crux (top right) and the Pointers (bottom left).*

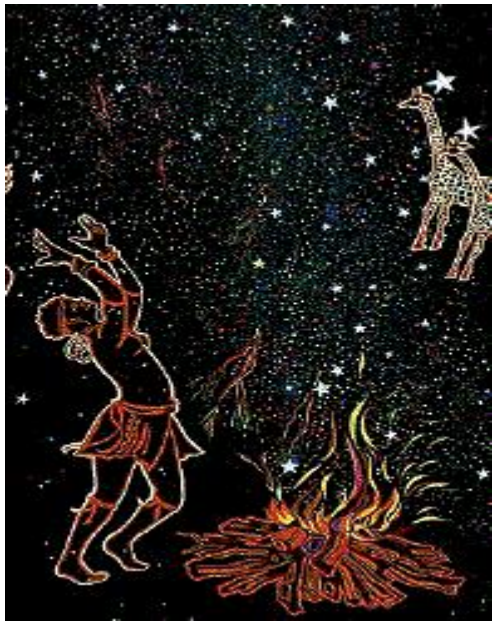
**NATURAL SCIENCES: LESSON PLAN 12**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | | |
|---|---|---|
| **Duration:**<br>**TOPIC: Looking into space**<br>**SUB TOPIC: Early viewing of space** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Identify constellations in the night sky identified by different cultures<br>• Relate the stories linked to the constellations identified by different cultures | |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 54** | |
| **TERMINOLOGY:** | **Telescope, astronomy, astronomer** | |
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | | | Raising Questions | | | Recording Information | |
| Comparing | | | Predicting | | | Interpreting Information | |
| Measuring | | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • different cultures have identified and named certain constellations<br>• some constellations have stories linked to them | • The teacher explains to the learners that early cultures tended to associate the stars and planets they saw in the night sky with animals or gods and told stories, which were passed on from generations to generations.<br>• Learners must be allowed to tell stories about stars and planets as they are interpreted in their culture.<br>• The teacher shows the learners the picture of the story of the Khoisan people. | Siyavula workbooks , any relevant text book, Charts |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br><br>A strong-willed girl became so angry when her mother would not give her any of a delicious roasted root that she grabbed the roasting roots from the fire and threw the roots and ashes into the sky, where the red and white roots now glow as red and white stars, and the ashes are the Milky Way. *Dornan. The Bushmen (1925).*<br><br>And there the road is to this day. Some people call it the Milky Way; some call it the Stars' Road, but no matter what you call it, it is the path made by a young girl many, many years ago, who threw the bright sparks of her fire high up into the sky to make a road in the darkness. *Leslau, Charlotte and Wolf. African Folk Tales (1963).* | |

**NATURAL SCIENCES: LESSON PLAN 12**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **ASSESSMENT** | **Activity:**<br>Learners answer the following questions<br><br>Learners must go and research more stories about how different cultures identify and name certain constellations. | |
| **TEACHER REFLECTION** | Progress: / Challenges: | |



**MEMORANDUM**

This is a research activity for learners to complete. They will study ancient stories about a constellation of their choice. The teacher can either provide them with books or printed resources or if they have access to the internet the teacher could ask them to conduct an online search. The teacher may ask learners to pick South African stories, or they could extend their research to other countries for comparisons with South African star lore. The teacher can ask learners to present their story to the class either as an oral presentation or a poster, or they can turn this into a writing task.

**NATURAL SCIENCES: LESSON PLAN 13**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

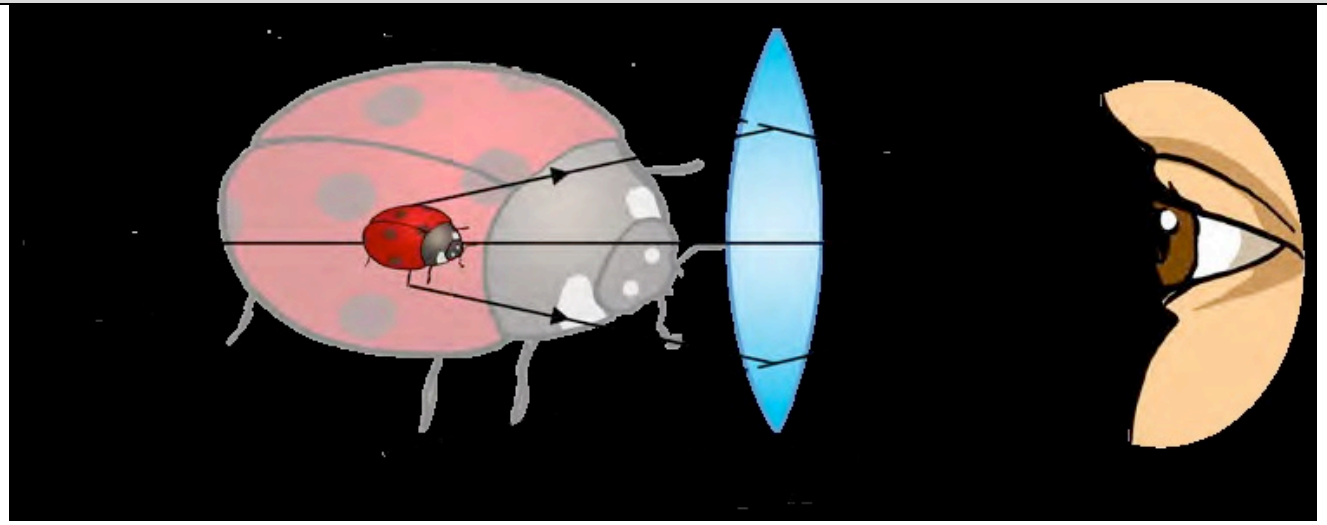
| | |
|---|---|
| **Duration:**<br>**TOPIC: Looking into space**<br>**SUB TOPIC: Telescope** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Define what a telescope is<br>• Explain how a telescope works |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 55** |
| **TERMINOLOGY:** | **Telescope, astronomy, astronomer** |
| **SPECIFIC AIMS** | 1. DOING SCIENCE ✓<br>2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS ✓<br>3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | ✓ | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | ✓ | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| **CONTENT & CONCEPTS:**<br>• people can see more details in the sky when they use telescope<br>• a telescope forms an image of the object and magnifies it (makes it look bigger) | • The teacher helps the learners in understanding the principle on which a telescope works and the role of lenses and mirrors in a telescope.<br>• The teacher explains how different lenses e.g. concave and convex lenses work using picture below: | Siyavula workbooks , any relevant text book, Charts<br>Telescope |

NATURAL SCIENCES: LESSON PLAN 13
DURATION: 30 minutes
CAPS SENIOR PHASE

GRADE: 8
STRAND: PLANET EARTH AND BEYOND
TERM 4

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| | <br>• The teacher will show learners how to calculate the magnification of a telescope. | |
| **ASSESSMENT** | **Activity:**<br><br>Learners will do the following Activity: | |

**NATURAL SCIENCES: LESSON PLAN 13**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

<table>
<tr><th>CONTENT AND CONCEPTS</th><th colspan="2">ACTIVITIES</th><th>RESOURCES</th></tr>
<tr><td></td><td colspan="3"><u>ACTIVITY</u><br><br>1. Learners must do scientific drawing of a telescope with labels to explain how the telescope works.</td></tr>
<tr><td>TEACHER REFLECTION</td><td>Progress:</td><td colspan="2">Challenges:</td></tr>
</table>

**NATURAL SCIENCES: LESSON PLAN 13**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

MEMORANDUM

In this activity learners choose a telescope they want to focus on and a draw a picture of the telescope labelling the parts and describing what each part does. They can use the examples in this chapter or they can search online for examples of optical and radio telescopes.

**NATURAL SCIENCES: LESSON PLAN 14**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| | |
|---|---|
| **Duration:**<br>**TOPIC: Looking into space**<br>**SUB TOPIC: Telescope** | **OBJECTIVES: LEARNERS MUST BE ABLE TO:**<br>• Identify and describe the most important telescopes in South Africa and their locations.<br>• Differentiate between optical and radio telescopes<br>• Identify good conditions for looking into space |
| **REFERENCES** | **Senior Phase Grades 7-9: CAPS Document Page 55** |
| **TERMINOLOGY:** | **Atmosphere** |

| | | |
|---|---|---|
| **SPECIFIC AIMS** | 1. DOING SCIENCE | |
| | 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS | ✓ |
| | 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE | |

| **SCIENCE PROCESS SKILLS** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accessing & recalling Information | ✓ | | Identifying problems & issues | | | Doing Investigations | |
| Observing | | | Raising Questions | | | Recording Information | |
| Comparing | ✓ | | Predicting | | | Interpreting Information | |
| Measuring | ✓ | | Hypothesizing | | | Communicating | |
| Sorting & Classifying | | | Planning Investigations | | | | |

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • there are different types of telescopes including:<br><br>- optical telescopes receive light and focus it by refraction (using lenses) or reflection<br><br>(using mirrors) such as SALT (Southern Africa Large Telescope), and the Hubble Space telescope<br><br>- radio telescopes receive radio waves and focus them by reflection (typically using a metal receiving dish) such as the SKA (Square Kilometre Array) | • The teacher explains different types of telescopes to the learners<br>- Optical telescopes e.g Southern Africa Large Telescope (SALT), Hubble Space telescope<br>✓ Optical lenses collect visible light from different celestial bodies.<br>✓ There are two types of optical telescopes viz. refracting and reflecting telescopes<br>✓ Refracting telescope uses lenses to collect and focus the light from distant objects.<br>✓ Reflecting telescope uses mirrors to collect and focus the light from distant object. | Siyavula workbooks , any relevant text book, Charts |

**NATURAL SCIENCES: LESSON PLAN 14**
**DURATION: 30 minutes**
**CAPS SENIOR PHASE**

**GRADE: 8**
**STRAND: PLANET EARTH AND BEYOND**
**TERM 4**

| CONTENT AND CONCEPTS | ACTIVITIES | RESOURCES |
|---|---|---|
| • good conditions for looking into space include cloudless skies with limited light and air pollution<br>• South Africa has many locations that meet these requirements | - Radio Telescopes e.g. Square Kilometer Array (SKA), MeerKAT<br>✓ Radio telescopes detect radio waves coming from different objects.<br>✓ They can be used in bad weather as they are not blocked by clouds. | |
| **ASSESSMENT** | **Activity:**<br>Learners answer the following questions | |

| TEACHER REFLECTION | Progress: | Challenges: |
|---|---|---|
| | | |

**Activity**

1. What do astronomers call patterns of stars in the sky?
2. Name three famous southern constellations.
3. What do optical refracting telescopes use to collect and focus light from distant objects?
4. What do optical reflecting telescopes use to collect and focus light from distant objects?
5. List two advantages that reflecting telescopes have over refracting telescopes.
6. What sort of light do radio telescopes detect?
7. List two advantages that radio telescopes have over optical telescopes.
8. Why are X-ray telescopes located in space?
9. Why does the Hubble Space Telescope produce such sharp images even though it is much smaller than most professional ground based telescopes?
10. Why should astronomers look at objects at different wavelengths?
11. What is the name of the largest optical telescope located in the Northern Cape?
12. List three reasons why the SALT telescope is located near Sutherland in the Northern Cape.
13. How many dishes will the MeerKAT array have?
14. How many dishes will the SKA array have?
15. List two areas of astronomy that will be studied using the SKA telescope.

MEMORANDUM

1. What do astronomers call patterns of stars in the sky?
   *Constellations.*
2. Name three famous southern constellations.
   *Learner-dependent answer. Answers could include, Orion, the Southern Cross, Pavo the Peacock, the Phoenix.*
3. What do optical refracting telescopes use to collect and focus light from distant objects?
   *Refracting telescopes use lenses to collect and focus light.*
4. What do optical reflecting telescopes use to collect and focus light from distant objects?
   *Reflecting telescopes use mirrors to collect and focus light.*
5. List two advantages that reflecting telescopes have over refracting Telescopes.
   *Examples include: the glass of the mirror does not have to be perfect throughout, only the surface has to be perfect. The mirror can be supported across the whole of its back so it won't sag. Making large mirrors is easier and cheaper than making big lenses. They do not suffer from chromatic aberration.*
6. What sort of light do radio telescopes detect?
   *They collect radio waves.*
7. List two advantages that radio telescopes have over optical telescopes.
   *Radio telescopes can be used when it is cloudy and they can be used both during the day and during the night whereas optical telescopes need clear skies and can only be used at night.*
8. Why are X-ray telescopes located in space?
   *X-rays are absorbed by the Earth's atmosphere and so do not make it to the ground. So telescopes to detect X-rays must be placed above the Earth's atmosphere in space.*
9. Why does the Hubble Space Telescope produce such sharp images even though it is much smaller than most professional ground based telescopes?
   *Because the images are not smeared out by the turbulence in the Earth's atmosphere.*

10. Why should astronomers look at objects at different wavelengths?
    *To get a complete picture of the object they want to study.*
11. What is the name of the largest optical telescope located in the Northern Cape?
    *The Southern African Large Telescope, SALT.*
12. List three reasons why the SALT telescope is located near Sutherland in the Northern Cape.
    *It is far from any cities and their associated light pollution, it is dry there, it is at high altitude.*
13. How many dishes will the MeerKAT array have?
    *64 dishes.*
14. How many dishes will the SKA array have?
    *3000 dishes.*
15. List two areas of astronomy that will be studied using the SKA telescope.
    *Answers could include: exoplanets, magnetism in space, pulsars and gravity, galaxy evolution and star formation.*