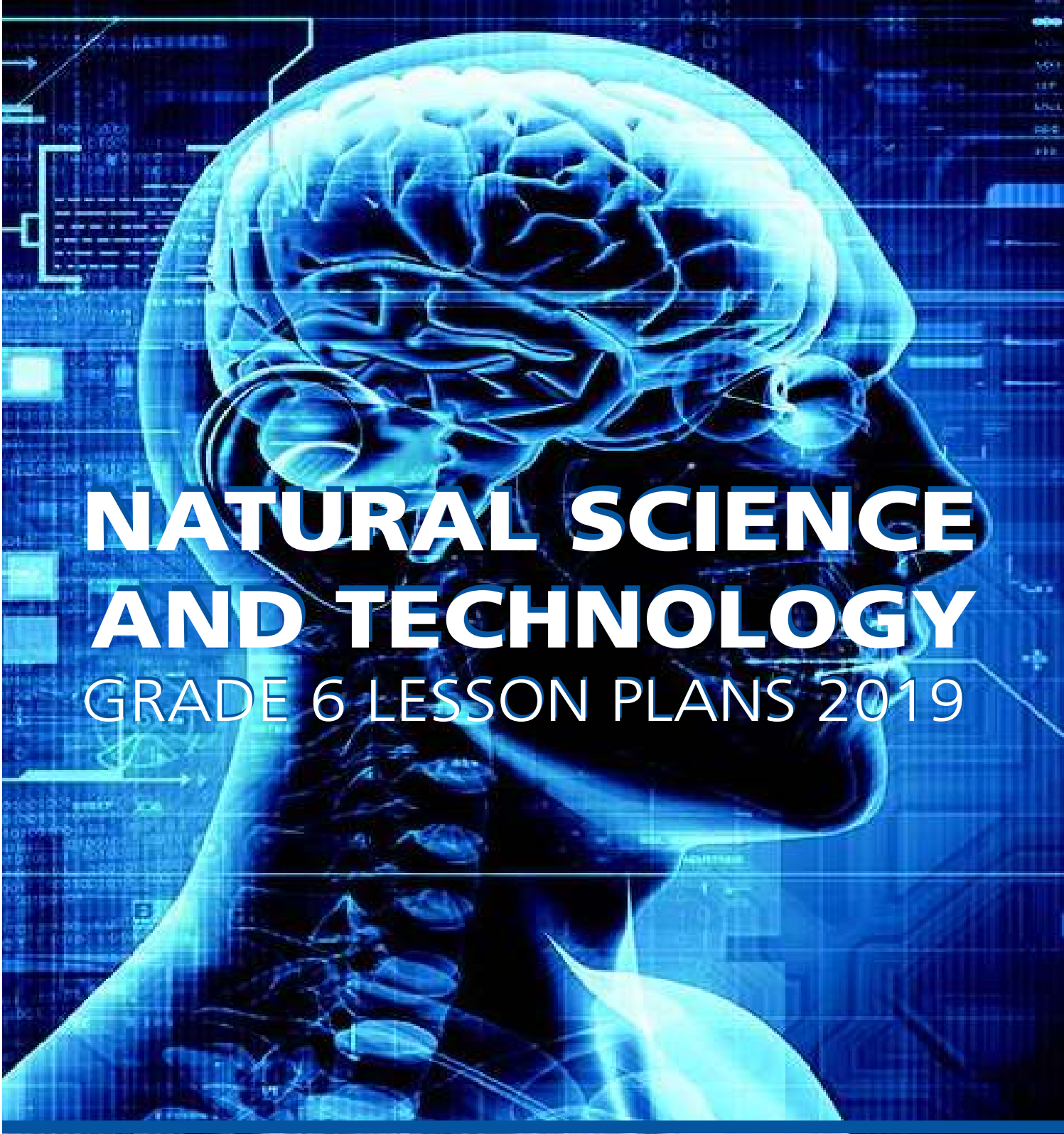




NATURAL SCIENCE AND TECHNOLOGY

GRADE 6 LESSON PLANS 2019



GAUTENG PROVINCE

EDUCATION

REPUBLIC OF SOUTH AFRICA

FOREWORD

Dear Natural Sciences & Technology teachers,

Welcome to the GDE Natural Sciences & Technology Lesson Plan Development Program. These lesson plans were designed as per the CAPS document, and covers all strands in Natural Sciences & Technology. 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 of importance to remember that much of the work done in future grades has to be firmly developed in the intermediate and senior phases, with a sound foundation in Natural Sciences & Technology, specialist subjects like Life Sciences and Physics will be able to flourish in the FET band.

Please take note that Natural Sciences & Technology 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 be 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 & Technology Team

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The Head of Department
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2000

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.

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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.

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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 seven 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.

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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 be 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.

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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.

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CONTENTS

GRADE 6

LIFE AND LIVING.....1

- PHOTOSYNTHESIS
- NUTRIENTS IN FOOD
- NUTRITION
- FOOD PROCESSING
- ECOSYSTEMS AND FOOD WEBS

MATTER AND MATERIAL.....127

- SOLID, LIQUIDS AND GASES
- MIXTURES
- SOLUTIONS AS SPECIAL MIXTURES
- DISSOLVING
- MIXTURES AND WATER RESOURCES
- PROCESSES TO PURIFY WATER

ENERGY AND CHANGE.....341

- ELECTRIC CIRCUITS
- ELECTRICAL CONDUCTORS AND INSULATORS
- SYSTEMS TO SOLVE PROBLEMS
- MAINS ELECTRICITY

PLANET EARTH AND BEYOND.....437

- THE SOLAR SYSTEM
- MOVEMENTS OF THE EARTH AND PLANETS
- THE MOVEMENT OF THE MOON
- SYSTEMS FOR LOOKING INTO SPACE
- SYSTEMS TO EXPLORE THE MOON AND MARS

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: THE SOLAR SYSTEM		- Describe the Solar System. - Describe the movement of planets around the Sun.			
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Terminology	Planet, Asteroid, Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity (Barnard, et al., 2013, p. 161)				
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY				
	2. UNDERSTANDING AND CONNECTING IDEAS				
	3. SCIENCE, TECHNOLOGY AND SOCIETY				
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		Making/Constructing
	Evaluating & Improving		Designing		
CONTENT		TEACHING & LEARNING ACTIVITIES			
The Sun, Planets and Asteroids		Teacher Activities		Learner Activities	
✓ The Sun (a star) is at the centre of our Solar System		Intro		Intro	
✓ There are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun		Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and night? Which movement of the Earth is responsible for the season? (You may add your own questions as different schools may use different textbooks).		Learners attempt to answer these questions orally. They observe the video clip, and may take down notes.	
✓ Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)		Show learners a short video clip or picture showing how the planets orbit the solar system (YouTube, 2015). Explain important concepts such as; the number of planets, main differences between planets such as size, orbit and position (see content).			
✓ The planets and Asteroids take different amounts of time to revolve around the Sun (Education, n.d.)					
✓ Every object has a gravitational					
				Resources	
				References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology</i> Grade 6. Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i> . Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d.	

NATURAL SCIENCES AND TECHNOLOGY: LESSON PLAN **GRADE 6**
PERIOD/DURATION: 30 MINUTES **STRAND: PLANET EARTH AND BEYOND**
CAPS INTERMEDIATE **TERM 4**

pull towards all other objects ✓ The bigger the object, the bigger its gravitational pull towards objects around it. ✓ The sun is the biggest object in our solar system, therefore all other objects around it, including planets and asteroids, are pulled towards it. ✓ The planets of the solar system are in constant motion around the sun and are constantly pulled towards the sun (sideways), this causes them to not shoot off into space or collide with the sun. the inward pull and sideways movement together cause the objects and the solar system to orbit the sun (Bezuidenhout, et al., 2013, p. 254) Notes * It is not necessary to memorize exact numbers of size of planets, number of moons, and distance from the Sun ** The number of moons around some planets may change as more are discovered *** It is not necessary to make the models of the Solar System to scale	Period 1: Teacher gave information about sun, planets and asteroids. Period 2: core of sun worksheet Body Instruct learners to complete an activity. Suggested activities include; order and relative size of planets (making a model) (Bezuidenhout, et al., 2013, pp. 260-261); (Barnard, et al., 2013, p. 162), research about the planets (Adatia, et al., 2013, p. 169); (Barnard, et al., 2013, p. 165), read and answer questions about planets (Adatia, et al., 2013, pp. 172-174), answer questions based on solar system (Barnard, et al., 2013, p. 161). Learner activity 1: writing notes about sun, planets and asteroids Period : complete worksheet about core of the sun Teacher does corrections with the learners.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. If the Sun has a gravitational pull on the planets, how come they do not collide with the Sun? What keeps the planets orbiting around the Sun? What is a Star? What are Asteroids? Consolidation Learners mark their own/peer's worksheet and do corrections.	<i>Curriculum And Assessment Policy Statement. Pretoria: Department of Basic Education. YouTube, 2014. Google. [Online]</i> Available at: https://www.google.co.za/url?=&source=web&rc=t&url=https://m.youtube.com/watch%3Fv%3D5aDSYTMqyQw&ved=OahUK_EwidnK3fgZnaAhWkIMAK_Hd5uA8sQo7QBCCswBA&usg=AOvVawIXdkbl_aMVXYibXlJqxtbk [Accessed 30 March 2018]. YouTube, 2015. <i>Google. [Online]</i> Available at: https://www.google.co.za/url?sa=t&source=web&rc=t&url=https://m.youtube.com/watch%3Fv%3DsmZkQbOn5m&ved=OahUKEwID9oaryZiaAhWIDMAKH_Rd-AikQtwillzAA&usg=AOvVawI4dnlHt_LTWQVlzHXnk_Y [Accessed 28 March 2018].
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		



2 Planets of the Solar System _ Videos for Kids _ It's AumSum Time.mp4

Period 1: The Solar System

The Sun, planets and asteroids

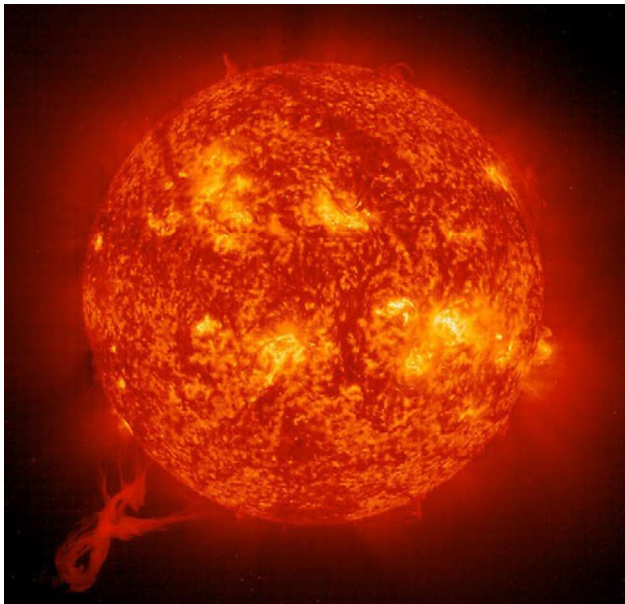
Do you remember what a solar system is? Our solar system is made up of the Sun and the planets. Let's take a look!

What is the Sun?

The Sun glows so fiercely that it is not safe to look straight at it, even though it is so far away. The sun is a ball of gases. The Sun is extremely hot: the temperature is about 15 000 000 degrees Celsius in the centre!

The surface is about 5 500 degrees

Celsius. That is extremely hot! Can you see the explosion from the surface of the Sun in the picture?



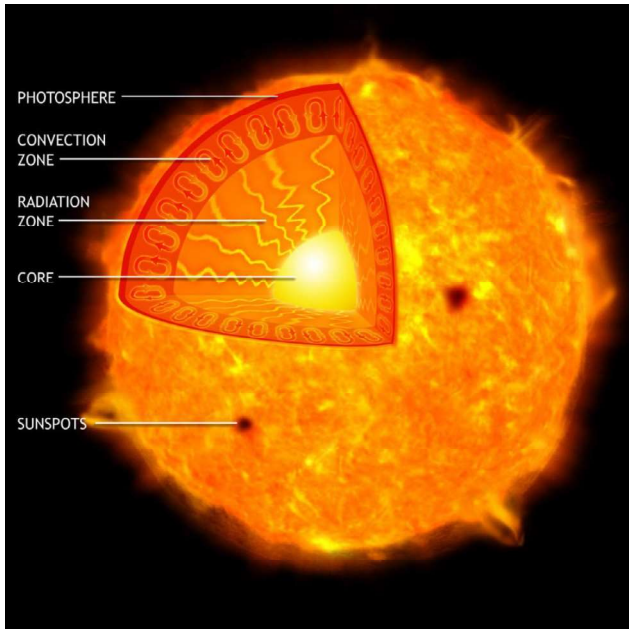
Can you see the big burst of gas from the sun in the bottom left?

The Sun is a star, because it produces its own energy. The Sun appears bigger and brighter because it is much nearer to earth than the other stars. The Sun is about 420 times bigger than the Earth and about 1700 times bigger than the Moon! The Sun is much further away than the Moon from the Earth. The Sun produces light and heat. The heat warms the surface of the Earth.

Period 2: ACTIVITY: The core of the Sun

INSTRUCTIONS:

1. Look at the picture of the sun showing the different layers inside.
2. Answer the questions.



QUESTIONS

1. Which is the hottest part of the Sun?

2. The Sun's energy comes from gases being squeezed together until hydrogen turns into helium. Where do you think the gases are squeezed together the hardest?

3. What are the dark spots on the surface of the Sun called?

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	Comparing	✓	Predicting	✓	Interpreting Information
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✓	The Sun (a star) is at the centre of our Solar System	Intro	Intro	References	
✓	There are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun	Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and night? Which movement of the Earth is responsible for the season? (you may add your own questions as different schools may use different textbooks). Show learners a short video clip or picture showing how the planets orbit the solar system (YouTube, 2015). Explain important concepts such as; the number of planets, main differences between planets such as size, orbit and position (see content).	Learners attempt to answer these questions orally. They observe the video clip, and may take down notes.	Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd.	
✓	Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)			Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd.	
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✓	Every object has a gravitational			Education, D. o. B., n.d.	

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CAPS INTERMEDIATE

GRADE 6
STRAND: PLANET EARTH AND BEYOND
TERM 4

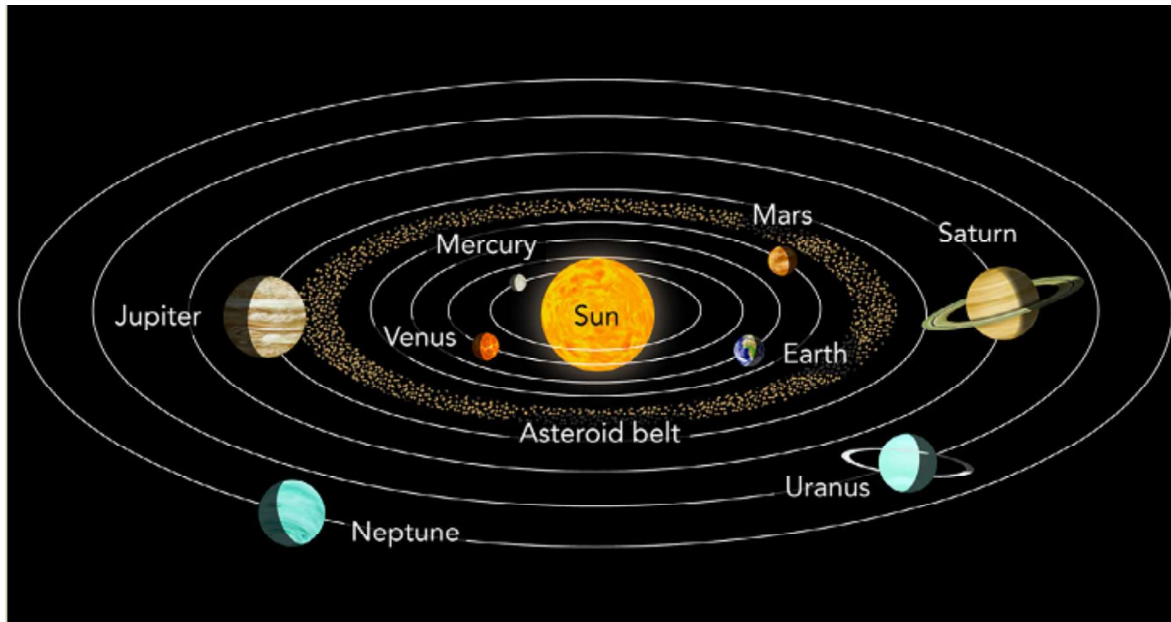
pull towards all other objects ✓ The bigger the object, the bigger its gravitational pull towards objects around it. ✓ The sun is the biggest object in our solar system, therefore all other objects around it, including planets and asteroids, are pulled towards it. ✓ The planets of the solar system are in constant motion around the sun and are constantly pulled towards the sun (sideways) Notes * It is not necessary to memorize exact numbers of size of planets, number of moons, and distance from the Sun ** The number of moons around some planets may change as more are discovered	Body Instruct learners to complete an activity about solar system Learner activity: Learners read and complete a worksheet about planets.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. If the Sun has a gravitational pull on the planets, how come they do not collide with the Sun? What keeps the planets orbiting around the Sun? What is a Star? What are Asteroids? Consolidation Learners mark their own/peer's worksheet and do corrections.	<i>Curriculum And Assessment Policy Statement: Pretoria: Department of Basic Education. YouTube, 2014. Google. [Online]</i> Available at: https://www.google.co.za/url?r=&source=web&rc=t=&url=https://m.youtube.com/watch%3Fv%3D5aDSYTMqyQw&ved=OahUKEwidnK3fgZnaAhWkIMAKHd5uA8sQo7QBCCswBA&usg=AOvVawIXdkbl-aMVXYibXlJqxtbk [Accessed 30 March 2018]. YouTube, 2015. Google. [Online]
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Grade 6 Worksheet

Name & Surname _____ Date: _____

The Solar System

1. Study the diagram of a Solar System below and answer the questions that follow.



(a) Define the term *Solar system* _____
 _____ (1)

(b) Write out the whole sentence below and complete it.

Use some of words from the box

☛ Mars ☛ Jupiter ☛ Venus ☛ piece of rock ☛ in orbit ☛ the Sun

Asteroids are ____ (1) ____ that move ____ (2) ____ around the Sun. The asteroid belt is in Space between the orbit of ____ (3) ____ and the orbit of ____ (4) ____.

 _____ (4)

(c) Which planet is closest to the Sun and which furthest? _____
 _____ (2)

(d) In which planet do we find life? Write a reason for your answer. _____
 _____ (2)

(e) How many days does it take the Earth to revolve around the Sun? _____ (1)

Total=10 Marks

Memorandum:

(a) Solar system-(Learner dependent answer) however learners can state that it is the Sun and all the objects that travel around it.✓

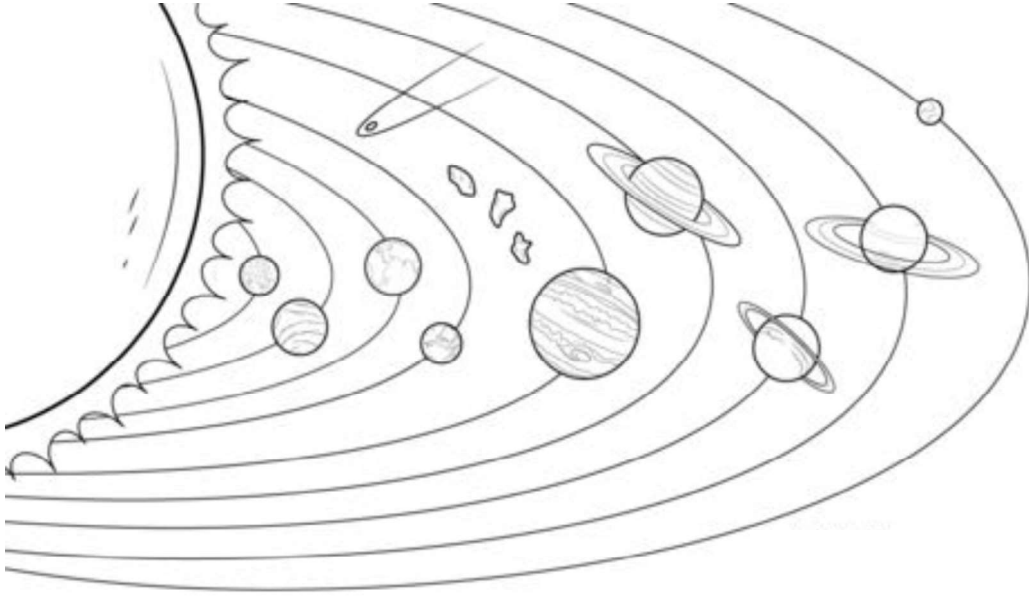
(b)

1. Piece of rock✓ 2. In orbit✓ 3. Jupiter/Mars✓ 4. Jupiter/Mars✓

(c) Mercury is closest planet to the Sun✓ and Neptune is furthest from the Sun✓.

(d) Planet Earth✓. There is water, good temperature, gases (oxygen, carbon dioxide), land. ✓

(e) 364 $\frac{1}{4}$ days✓



The Solar System Picture

ACTIVITY: Comprehension on the 8 planets of our solar system.

INSTRUCTIONS:

1. We have read a lot about the planets in our solar system.
2. Use all the information and images used in the Lesson to answer the following questions.

QUESTIONS:

1. Name all the planets in order starting from the one closest to the Sun.

- | | |
|----------|----------|
| 1. _____ | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

2. What are the 4 inner planets known as?

3. What are the 4 outer planets known as?

4. Which planet is the hottest?

5. On which planet do scientists think there might have been water long ago? Why?

6. Which planet has a "stormy" surface?

7. Venus also has an atmosphere like Earth, but we would not be able to breathe there. What gases make up the atmosphere on Venus?

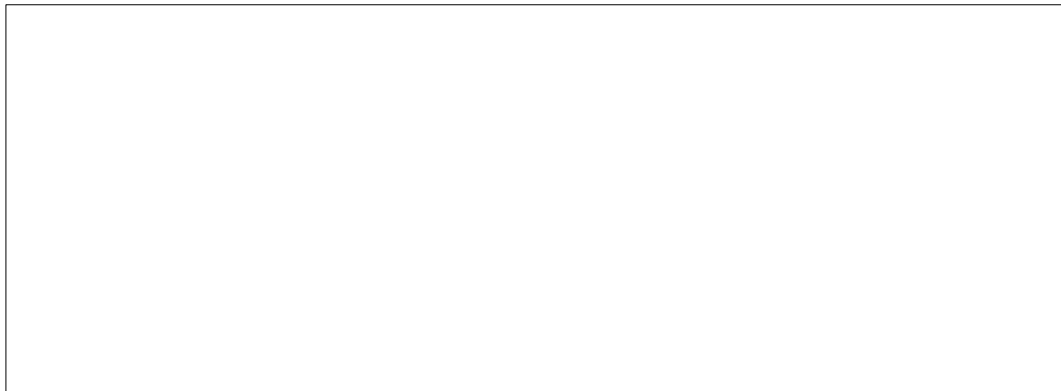
8. Which is the biggest planet in our solar system? What colour is it?

9. Which planet is blue-green in colour?

10. Saturn has rings around it. What are these rings made of?

11. Draw a picture of Saturn in the space below.

A Picture of Saturn



12. Asteroids are _____ that move _____ around the Sun. The asteroid belt is in Space between the orbit of _____ and the orbit of _____.

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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		Making/Constructing	
	Evaluating & Improving		Designing			
CONTENT		TEACHING & LEARNING ACTIVITIES				
The Sun, Planets and Asteroids		Teacher Activities		Learner Activities		
✓	The Sun (a star) is at the centre of our Solar System	Teacher distributed worksheets and read the story about Adventures of Halley's comet and explain difficult words		Intro Learners attempt to answer these questions orally. They observe the video clip, and may take down notes.		
✓	There are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun	Instruct learners to complete an activity. Suggested activities include: order and relative size of planets, answer questions based on solar system.		Learners listen to the story and answer the questions thereafter		
✓	Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)	Teacher does corrections with the learners.				
✓	The planets and Asteroids take different amounts of time to revolve around the Sun (Education, n.d.)					
✓	Every object has a gravitational					
				References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i> . Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d.		

NATURAL SCIENCES AND TECHNOLOGY: LESSON PLAN
PERIOD/DURATION: 30 MINUTES
CAPS INTERMEDIATE

GRADE 6
STRAND: PLANET EARTH AND BEYOND
TERM 4

pull towards all other objects ✓ The bigger the object, the bigger its gravitational pull towards objects around it.		Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. Consolidation Learners mark their own/peer's worksheet and do corrections.	<i>Curriculum And Assessment Policy Statement. Pretoria: Department of Basic Education. YouTube, 2014. Google. [Online]</i> A
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

PLANET EARTH AND BEYOND

READING MATTER: SOLAR SYSTEM

The Adventures of Halley's Comet

"Hi! My name is Halley's Comet. I was named after Edmund Halley, the first man to notice that I was coming back around the sun again and again. In fact, you can see me in your sky every 76 years. The last time I was around was in 1986. You will see me again in the year 2062. How old will you be then? My head is made up of dirty snow. I travel around the Sun and far out into space. As I come close to the Sun, my head heats up. Some of my snow evaporates and form a long tail.

Om my journeys around the Sun, I have passed all the planets in our Solar System. Over the years I have learnt a lot about them. I will tell you what I have learnt.

The study of stars, planets and moons is called astronomy. I know of nine planets that revolve around our star, the Sun. These planets with their moons, and the Sun make up a family, called the Solar System. Comets are also part of our Solar System.

The four planets that are the nearest to the Sun are rocky planets. If you could visit these planets, you would be able to walk on the ground on their surfaces. The next four planets are not rocky at all. They are much bigger than the rocky planets and they are made up of gas – huge balls of cloud. These large planets are called the Gas Giants. The outermost planet in the Solar System is another rocky planet.

Not all the planets have moons. I have counted four large moons around Saturn. There are millions of other pieces of ice and rock that go around it. This ice and rock make beautiful rings around Saturn. Jupiter has the same number of large moons as Saturn. They both have many small moons. Uranus has one large moon more than Jupiter. Neptune has three large moons, Mars has two small moons. Earth has only one, but little Pluto has at least four moons.

The planet Mercury is closer to the Sun. It has no atmosphere, so it can't hold its heat during night time. A Mercury day is so hot, you would be instantly burnt. A Mercury night is so cold you would freeze instantly.

Venus, the next planet, looks like the brightest planet in the sky, because the Sun reflects off its clouds making it shine brightly. Venus would be a terrible place for you to visit because on Venus the rain is made of Sulphuric acid. If it rained on you, you would turn to soup!

Then comes Mars. It is sometimes called the Red Planet, because the soil is an orange-red colour. Mars has the biggest volcano in the whole Solar System. The volcano is called Olympus Mons. Olympus Mons is the size of the whole South Africa, and its top is high as the top of the highest cloud.

Jupiter is next. It is the largest planet in our Solar System and has a great red spot, which is a very violent storm. The earth would fit into this great red spot. Even though Jupiter is so big, it spins very quickly. One day on Jupiter is only 10 hours long, with 5 hours of light and 5 hours of darkness.

Saturn, the second largest planet in the Solar System, is very beautiful planet to view through a telescope. You can clearly see its bright white rings.

People living on earth did not find out about Uranus until 1781. Neptune was only discovered in 1846. The furthest planet from the Sun, little Pluto, was discovered in 1930. It is so far away that it takes 250 years to travel around the Sun. Imagine only having a birthday only every 250 years!

Well that's about all I have found out on my journeys around the Solar System. Please help me to put this information into the table. Please teach me something new by reading other books and add interesting information to your table. You can tell me what you have found out when I visit you in 2062. Until I see you then, work hard and be good."

The Adventures of Halley’s Comet

Use the story “The Adventures of Halley’s Comet” and other books you may have to fill in the table below.

Order from the Sun	Name of the Planet	What is made from?	How many large moons does it have?	What other interesting information have you found out about this planet?	Would you want to live on this planet? Why?
1					
2					
3					
4					
5					
6					
7					
8					
9					

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: THE SOLAR SYSTEM		• Describe the Solar System.				
Content & Concepts/Subtopic: The Sun, Planets and Asteroids		• Describe the movement of planets around the Sun.				
Terminology	Planet, Asteroid, Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity (Barnard, et al., 2013, p. 161)					
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY					
	2. UNDERSTANDING AND CONNECTING IDEAS					
	3. SCIENCE, TECHNOLOGY AND SOCIETY					
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		Making/Constructing	
	Evaluating & Improving		Designing			
CONTENT		TEACHING & LEARNING ACTIVITIES				
Resources						
The Sun, Planets and Asteroids		Teacher Activities		Learner Activities		
✓	The Sun (a star) is at the centre of our Solar System	Ask background questions, e.g. What is milky way? Which movement of the Earth is responsible for the season?		Intro Learners attempt to answer these questions orally. They observe the video clip, and may take down notes.		
✓	There are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun	Instruct learners to complete an activity. Suggested activities include; Quiz questions and score sheets, read and answer questions about planets (Adatia, et al., 2013, pp. 172-174), answer questions based on solar system (Barnard, et al., 2013, p. 161).		Learners' activity: learners will complete the quiz worksheet. Teacher does corrections with the learners.		
✓	Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)			Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content.		
				Learners mark their own/peer's worksheet and do corrections.		

✓ The planets and Asteroids take different amounts of time to revolve around the Sun (Education, n.d.) ✓ Every object has a gravitational			
ASSESSMENT		Worksheet/textbook activity (Informal Assessment)	
TEACHER REFLECTION		Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.	

PLANET EARTH AND BEYOND

SOLAR SYSTEM

Question 1

What is the Earth's spinning motion called?

- A. Rolling
- B. Rotation
- C. Revolution
- D. Racing

Question 2

The Celestial objects like the Sun, other stars, and planets appear to move in the sky. We see them rise and set

- A. From North to South
- B. From South to North
- C. From East to West
- D. From West to East

Question 3

The moon orbits the Earth every _____

- A. 7 days
- B. 28 days
- C. 365 days
- D. 30 days

Question 4

What is the correct order of the planets in the Solar System, starting closest to the Sun?

- A. Mercury, Mars, Earth, Venus, Jupiter, Saturn, Uranus, Neptune, Pluto
- B. Mercury, Mars, Venus, Earth, Jupiter, Saturn, Uranus, Neptune, Pluto
- C. Mercury, Venus, Earth, Mars, Jupiter, Neptune, Uranus, Saturn, Pluto
- D. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto

Question 5

What elements are the atmospheres of Jupiter and Saturn primarily made of?

- A. Argon and Krypton
- B. Hydrogen and Helium
- C. Nitrogen and Carbon Monoxide
- D. Nitrogen and Methane

Question 6

Which planet is closest in size to the Earth?

- A. Mars
- B. Neptune
- C. Uranus
- D. Venus

Question 7

What is the largest planet in the solar system?

- A. Earth
- B. Jupiter
- C. Mars
- D. Neptune

Question 8

Which planet has the most extensive ring structure?

- A. Jupiter
- B. Neptune
- C. Pluto
- D. Saturn

Question 9

How many planets are there in our solar system?

- A. Eight
- B. Nine
- C. Ten
- D. Eleven

Question 10

How long does it take for light from the Sun to reach Earth?

- A. 1 minute
- B. 8 minute
- C. Instantaneous
- D. 24 hours

Question 11

The following is (are) true about Sun.

- A. It is made up of gases
- B. It has its own heat and light
- C. Sun is a star
- D. All of the above

Question 12

The different group of stars is known as

- A. Constellations
- B. Celestial bodies
- C. Asteroids
- D. Comet

Question 13

The following is called 'dwarf planet'

- A. Saturn
- B. Jupiter
- C. Mars
- D. Pluto

Question 14

Which of the following planets of the Solar System has the longest day?

- A. Mercury
- B. Jupiter
- C. Venus
- D. Earth

Question 15

Among the following planets, which is the brightest planet?

- A. Mercury
- B. Venus
- C. Mars
- D. Jupiter

Question 16

Which Planet is called the red Planet in our Solar System?

- A. Mercury
- B. Mars
- C. Jupiter
- D. Neptune

Question 17

The hottest planet is _____

- A. Mercury
- B. Venus
- C. Jupiter
- D. Saturn

Question 18

In order of their distances from the Sun, which of the following planets lie between Mars and Uranus?

- A. Earth and Jupiter
- B. Jupiter and Saturn
- C. Saturn and Earth
- D. Saturn and Neptune

Question 19

Which of the following is considered being a star?

- | | |
|----------|-----------|
| A. Moon | C. Sun |
| B. Earth | D. Galaxy |

Question 20

What is the name of the planet on which we are living?

- | | |
|------------|----------|
| A. Jupiter | C. Pluto |
| B. Mars | D. Earth |

QUIZ QUESTIONS SCORE SHEET

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Question 1								
Question 2								
Question 3								
Question 4								
Question 5								
Question 6								
Question 7								
Question 8								
Question 9								
Question 10								
Question 11								
Question 12								
Question 13								
Question 14								
Question 15								
Question 16								
Question 17								
Question 18								
Question 19								
Question 20								
Total								

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: THE SOLAR SYSTEM		- Describe the Solar System. - Describe the movement of planets around the Sun.				
Content & Concepts/Subtopic: The Sun, Planets and Asteroids						
Terminology	Planet, Asteroid, Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity (Barnard, et al., 2013, p. 161)					
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY					
	2. UNDERSTANDING AND CONNECTING IDEAS					
	3. SCIENCE, TECHNOLOGY AND SOCIETY					
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		Making/Constructing	
	Evaluating & Improving		Designing			
CONTENT		TEACHING & LEARNING ACTIVITIES				
The Sun, Planets and Asteroids		Teacher Activities		Learner Activities		
✓	The Sun (a star) is at the centre of our Solar System	Give learners an instructional worksheet on how to make a model using different processes.		Intro Learners will listen to instructions and follow process on making the solar system model.		
✓	There are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun	Evaluation sheet		Body Learners observe as teacher demonstrates.		
✓	Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)	Body Instruct learners to complete an activity. Suggested activities include; order and relative size of planets (making a model).		Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content.		
✓	The planets and Asteroids take different amounts of time to revolve around the Sun (Education, n.d.)	Consolidation Teacher moves around helping the learners.		Consolidation Learners will complete their planning and make their model in groups.		
✓	Every object has a gravitational					
				Resources		
				References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i> . Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d. C		

pull towards all other objects ✓ The bigger the object, the bigger its gravitational pull towards objects around it. ✓ The sun is the biggest object in our solar system, therefore all other objects around it, including planets and asteroids, are pulled towards it.			
ASSESSMENT	Worksheet/textbook activity (formal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

SOLAR SYSTEM

Period 1 and 2: Construct a simple model of the sun and the planets in our Solar System.

Name and Surname:

Class: Gr 6/____

INSTRUCTIONS

1. All work must be handed in on the due date set by the teacher
2. Failure to submit on the due date will result in a minus 10% for each day that the work is due
3. Copying will result in an immediate 0
4. If you are absent for a formal assessment, you must bring a doctor's letter.

Make a model of the solar system in which you:

- Show all the planets and the Sun
- Make clear the different sizes of the planets
- Make clear their distances from the Sun
- Show their main features.

Plan your model

1. Review the information you have on the planets.
2. Decide which key features you want to show about each.
3. Think about and decide:
 - How to make their round shapes of different sizes
 - How to arrange the planets in the correct order from the Sun
 - How to show their main features.

You can make your model in your own way, or make one like ours.

Assemble your materials

If you are making your own model, gather all the materials you will need. You can see our model on page 99 of the Sasol Inzalo workbook

If you are making a model like ours, you will need:

- A round piece of cardboard about 30 cm across, such as a thick paper plate. You can also draw around a large round object on a piece of cardboard from a box and then cut your round shape out.
- Sheets of construction paper or light cardboard – like cereal boxes.
- Scissors; tape; string.
- Material for colouring your paper – pencil, crayons, markers or paints and a brush.
- A compass or smaller round shapes like bottle lids for making circles.

- A tool to make holes in the cardboard, such as the end of a knitting needle, the sharp point of a pair of scissors, or a large nail.

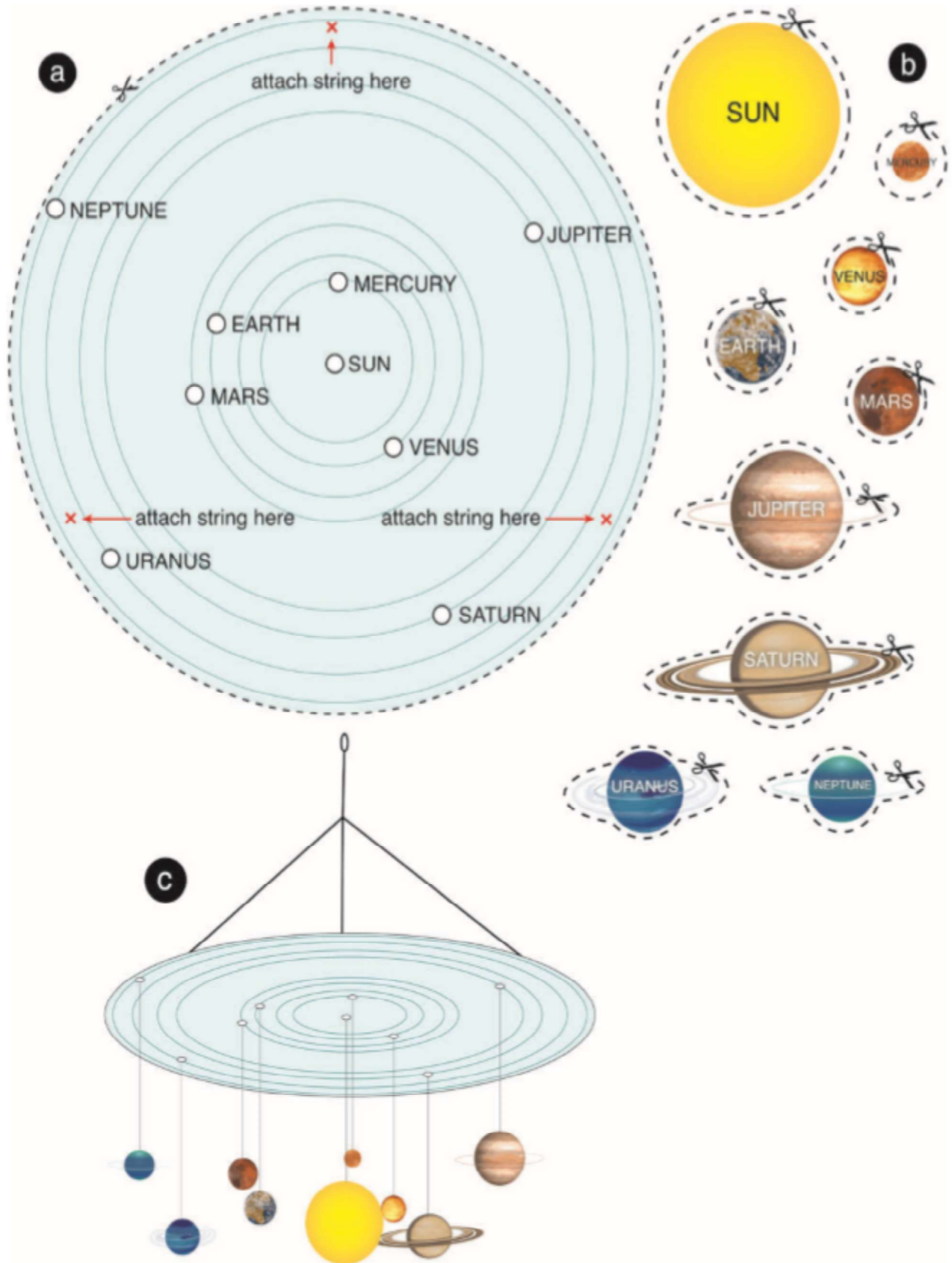
Make your model

If you are making our model, follow the steps shown below.

Period 3

Evaluate your model

- Does your model show the Sun and 8 planets?
- Are they arranged correctly, with the Sun in the centre and the planets in orbit around it?
- Are the planets the right sizes relative to each other and in the correct positions from the Sun?
- Are the correct features shown on each planet?
- Which members of the solar system are not shown in your model?
- Draw a line from top to bottom and from right to left across your circle. Where these two lines meet is the centre of the circle.
- Using a compass or different-sized round shapes, draw circles to show the orbits of the 8 planets. Take note of how close or far apart they are.
- Use your hole-making tool to punch 9 holes in the cardboard: – One in the centre where the Sun will hang – One somewhere on each circle (orbit) for a planet to hang from. These should not all be in a straight line from the Sun.
- Cut circles from cardboard or construction paper to represent the Sun and each of the planets. Make the Sun the biggest. Make Jupiter, Saturn, Uranus, and Neptune a bit smaller than the Sun. Make the remainder of the planets much smaller. Write the name of each planet on the back.
- Draw on and colour in each cut out circle to show the features of the planet it represents. You could also stick on some cut-out shapes of features.
- Cut out and colour a disc for Saturn's rings and fit it onto your model of Saturn.
- Tape a length of string to each planet and the Sun.
- Lace the other end of each string through the correct hole in the large cardboard circle. Tape the end of the string to the top side of the cardboard.
- To hang your model, tie three pieces of string to the top of the cardboard – then tie these three together. Tie them to a longer string (from which you'll hang your model).



Plan your model

Plan your model here in the space provided. Indicate what materials you will need.

Total: 15 Marks

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: THE SOLAR SYSTEM		- Describe the Solar System. - Describe the movement of planets around the Sun.			
Content & Concepts/Subtopic: The Sun, Planets and Asteroids					
Terminology	Planet, Asteroid, Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity (Barnard, et al., 2013, p. 161)				
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY				
	2. UNDERSTANDING AND CONNECTING IDEAS				
	3. SCIENCE, TECHNOLOGY AND SOCIETY				
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		Making/Constructing
	Evaluating & Improving		Designing		
CONTENT		TEACHING & LEARNING ACTIVITIES			
The Sun, Planets and Asteroids		Teacher Activities		Learner Activities	
✓	The Sun (a star) is at the centre of our Solar System	Instruct learners to complete an activity. Suggested activities include; order and relative size of planets, answer questions based on solar system (Barnard, et al., 2013, p. 161).		Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content.	
✓	Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)	Unscramble the names of planets and arrange them in order Consolidation Teacher does corrections with the learners.		Learners follow instructions and complete the worksheet?	
✓	The planets and Asteroids take different amounts of time to revolve around the Sun (Education, n.d.)			Consolidation Learners mark their own/peer's worksheet and do corrections.	
✓	Every object has a gravitational				
				Resources	
				References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i> . Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d.	

pull towards all other objects ✓ The bigger the object, the bigger its gravitational pull towards objects around it. ✓ The sun is the biggest object in our solar system, therefore all other objects around it, including planets and asteroids, are pulled towards it. ✓ The planets of the solar system are in constant motion around the sun and are constantly pulled towards the sun (sideways), this causes them to not shoot off into space or collide with the sun. the inward pull and sideways movement together cause the objects and the solar system to orbit the sun (Bezuidenhout, et al., 2013, p. 254)			Curriculum And Assessment
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Unscramble the names of the 8 planets. Identify them as rocky planets (terrestrial) or gas planets (Jovian). Arrange them in the order of their distance from the sun starting from the closest.

1. NUVSE
2. SMAR
3. PIETRUJ
4. UNNETPE
5. TAREH
6. ATSNUR
7. EYCMRUR
8. ASURNNU



Sequence	Names of planets	Type of planet (Terrestrial or Jovian)
1		
2		
3		
4		
5		
6		
7		
8		

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: THE SOLAR SYSTEM		- Describe the Solar System. - Describe the movement of planets around the Sun.				
Content & Concepts/Subtopic: The Sun, Planets and Asteroids						
Terminology	Planet, Asteroid, Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity (Barnard, et al., 2013, p. 161)					
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY					
	2. UNDERSTANDING AND CONNECTING IDEAS					
	3. SCIENCE, TECHNOLOGY AND SOCIETY					
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		Making/Constructing	
	Evaluating & Improving		Designing			
CONTENT		TEACHING & LEARNING ACTIVITIES				
Resources		References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i> . Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d. C				
The Sun, Planets and Asteroids		Teacher Activities		Learner Activities		
✓	The Sun (a star) is at the centre of our Solar System	Teacher did revision with the learners and summarise solar system and issued a worksheet about solar system		Body Learners listened as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content.		
✓	There are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun	Body Instruct learners to complete an activity. Suggested activities include: order and relative size of planets (Cross Puzzle).		Leaners completed the cross puzzle		
✓	Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)	Consolidation Teacher does corrections with the learners.		Consolidation Learners mark their own/peer's worksheet and do corrections.		
✓	The planets and Asteroids take different amounts of time to revolve around the Sun (Education, n.d.)					
✓	Every object has a gravitational					

pull towards all other objects ✓ The bigger the object, the bigger its gravitational pull towards objects around it. ✓ The sun is the biggest object in our solar system, therefore all other objects around it, including planets and asteroids, are pulled towards it. ✓ The planets of the solar system are in constant motion around the sun and are constantly pulled towards the sun (sideways), this causes them to not shoot off into space or collide with the sun. the inward pull and sideways movement together cause the objects and the solar system to orbit the sun (Bezuidenhout, et al., 2013, p. 254)			
ASSESSMENT TEACHER REFLECTION	Worksheet/textbook activity (Informal Assessment)	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.	

SOLAR SYSTEM

Solve the word puzzle by identifying the elements of the solar system concerning the following words:

ASTEROID, COMET, EARTH, JUPITER, MARS, MERCURY, NEPTUNE, PLUTO, SATURN, SUN, URANUS, VENUS



DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: Solar system		Explain what they will be studying in strand through the medium of a word bank or quiz			
Content & Concepts/Subtopic : The Sun, Planets and Asteroids					
Terminology	Solar system, Asteroids, Asteroids belt, satellite, star, planet, orbit				
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY				
	2. UNDERSTANDING AND CONNECTING IDEAS				
	3. SCIENCE, TECHNOLOGY AND SOCIETY.				
PROCESS SKILLS					
✓ Accessing & recalling Information		Identifying problems & issues		Doing Investigations	Making/Construction
Observing	✓	Raising Questions	✓	Recording Information	Evaluating and improving products
Comparing		Predicting		Interpreting Information	
Measuring		Hypothesizing	✓	Communicating	
Sorting & Classifying		Planning Investigations		Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
The sun (a star) is at the center of our solar system	The teacher: - Divides the learners into equal manageable groups. (Depending on the size of the class). - Gives the learners a Passage to read about the Solar System from HartRAO Booklet. Activity Worksheet 1.1 - Moves around the class and check if learners in Groups are following instructions and are reading with understanding. - After checking with all Groups, he/she tells the learners of the Game (Quiz) the Groups are going to play for points. Activity 1.3 (General Knowledge Questions based/not based on the Passage) ☐ Quiz instructions: - The teacher asks a question and learners are given 1 minute to discuss it	Textbooks, Worksheet, Dictionary

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
	and then respond. ☐ The Group that raises hands first gets the opportunity to answer the question. ☐ If the Answer is correct the Group gets a point and is recorded in Activity Worksheet 1D. ☐ At the end of the Quiz, the winning Group gets rewarded. ☐ (The rewards might be a bag of goodies, like sweets or pencils/pens or and rubbers etc. The teacher decides) 1. Learners: • Read the given passage with understanding. Activity Worksheet 1.1 • Identify unfamiliar words and write them in Activity Worksheet 1.2 to compile a Group or Class dictionary as Lesson on the Strand continues. • The learners in their respective groups discuss the answer. The first group that is ready raise their hands and respond to the question.	
ASSESSMENT	The learners will complete the quiz with understanding and the teacher will be able to pitch the level of instruction correctly	
TEACHER REFLECTION		

The solar system

1. Match the words in Column A with the description in Column B. Only write the number of your answer next to the correct alphabet letter.

Column A		Column B
a) Rotation		1. Caused by the rotation of the Earth.
b) Revolution		2. A system consisting of stars, planets, dust and gas.
c) Moon		3. layer of air that surrounds a body in space.
d) 365¼ day		4. Spinning of Earth on its axis.
e) Day and night		5. A natural satellite that orbits a planet.
f) Asteroid		6. A person who travels into space in a spacecraft.
g) Galaxy		7. Movement of Earth or other planets around the Sun.
h) 24 hours		8. A piece of rock that revolves around the Sun in an orbit.
i) Atmosphere		9. Length of time for Earth to turn once on its axis.
j) Astronaut		10. Length of time for Earth to travel around the Sun once

(10)

2. Write the names of the planets in order, beginning from the one that is closest to the Sun.

(4)

3. Which planet do you think is the coldest, and why?

(2)

4. Why do the planets all keep on moving in orbits around the Sun?

(2)

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Moons		• Investigate how the Sun lights the Moon.		
Content & Concepts/Subtopic -Moon and Sun relationship		• Explain that the moon looks different to us on different days throughout the month		
Terminology	orbit, phases, space, crater			
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY		✓	
	2. UNDERSTANDING AND CONNECTING IDEAS		✓	
	3. SCIENCE, TECHNOLOGY AND SOCIETY		✓	
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	Making/Constructing
	Evaluating & Improving		Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Moons  moons, including our moon do not give out their own heat and light  our moon can be seen from Earth because the light from the Sun shines onto its surface  on the moon we can see craters, lighter areas which are mountains, and darker areas	Teacher Activities: Introduces the topic: " Play the Moon song" Teacher settles the learners down to create learning atmosphere and then capture learners attention by asking learners to explain what they have learned about on the previous lesson about the moon. Teacher ask about the individual research on planets with moons and planets without the moons. Body Explain that today we will investigate how the Sun lights the Moon. Teacher facilitate group formations and then distribute the resources needed for investigation. Resources- small white balls; silver papers; dark marking pen;		-Textbook: Platinum NS/Tech grade 6, page 178 -Pictures of Moon Materials for investigation: -small white balls, silver papers, dark marking pen,

which are flat plains	torches. Teacher hands out worksheets to learners. Activity 1-Find the main idea about the Moon. Learner Activities: -Read and find the facts about the moon -Answer and ask questions, active participation in class. -Complete the given worksheet in class.	torches
ASSESSMENT	Informal task- learners complete the worksheet on Moon. (Practical Task)	
TEACHER REFLECTION		



Moon Phases Song.mp4

THE MOON

Period 1:Activity 1: Find the Main Idea

Find the main idea in the paragraph below. Write the main idea in your own words in the space provided. Then, write a concluding sentence for this paragraph.

Even though we can clearly see the moon at night, it is about 384 000 kilometers away from the Earth! However, the moon seems very close by when you consider that the sun is about 149 million kilometers away. Venus, the most visible planet, is about 260 million kilometers away from the Earth when it arrives at the furthest point along its orbit. Orion, the furthest constellation you can see without a telescope, is 32,600 light years away. A light year is the distance light travels within one year. One light year is equal to over 8 trillion kilometres!

Main idea:

Concluding sentence:



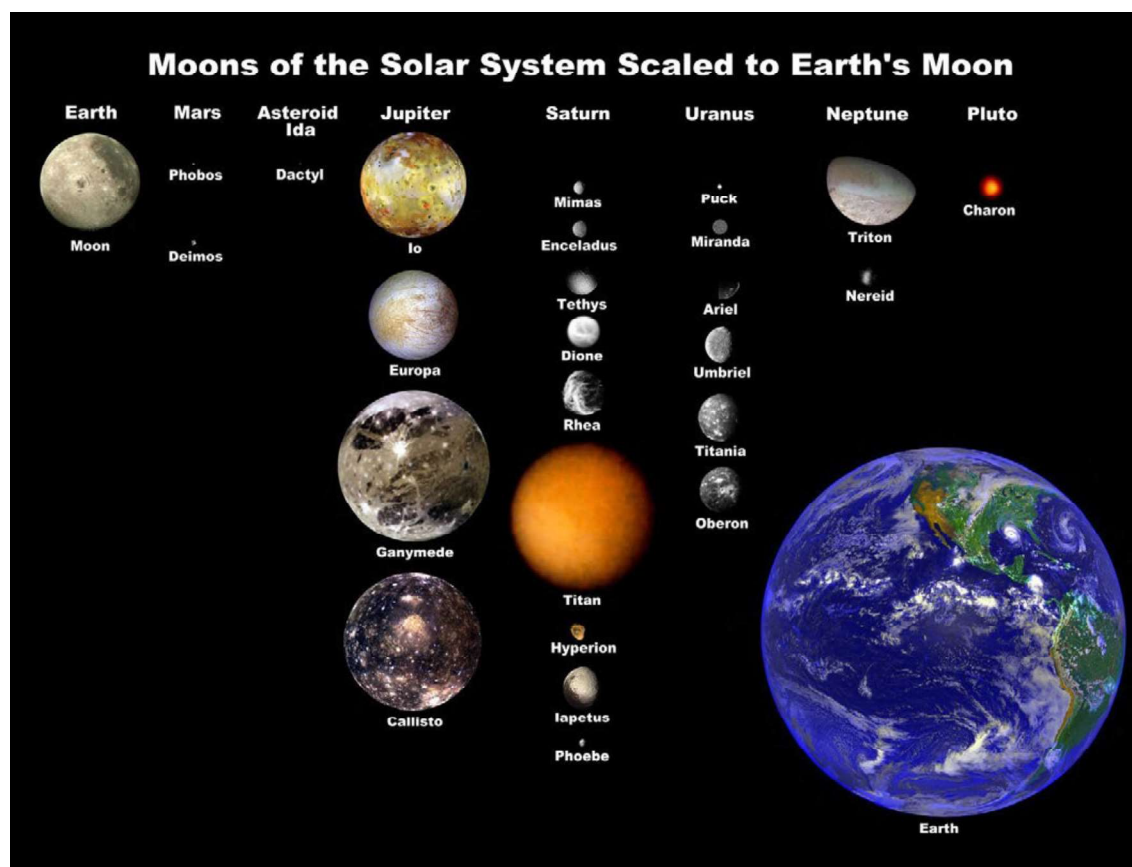
Period 2 : Activity 2

PLANET EARTH AND BEYOND

SUPPLEMENTARY MATERIAL TO ACTIVITY WORKSHEET 2A

SOLAR SYSTEM

MOONS IN OUR PLANETS



DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: Moons		- Describe the fact that the moon has different phases. - Explain that the moon looks different to us on different days throughout the month				
Content & Concepts/Subtopic						
-Moon's surface						
Terminology						
		orbit, phases, space, crater				
SPECIFIC AIMS		1. DOING SCIENCE AND TECHNOLOGY				✓
		2. UNDERSTANDING AND CONNECTING IDEAS				✓
		3. SCIENCE, TECHNOLOGY AND SOCIETY				✓
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		Making/Constructing	
	Evaluating & Improving		Designing			

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
Moons  moons, including our moon do not give out their own heat and light  our moon can be seen from Earth because the light from the Sun shines onto its surface  on the moon we can see craters, lighter areas which are mountains, and darker areas which are flat plains	Teacher Activities: <u>Introduces</u> the topic: “Moon” Explain that today we will begin a discussion about the moon. Teacher ask learners to describe when the best time is to see the moon (at night). Teacher ask learners if the moon can also be seen during the day (Yes, it can be seen during the day too. At different times of the month it is easier to see). Ask if the moon looks the same every time they look at it. Ask learners to explain how it changes. (Sometimes you can only see a little white silver and sometimes you can see the whole moon). Body Teacher explains more information about the moon. We can only see half of the moon from Earth, since the other side is always turned away from us. As the moon travels around the earth, we see different fractions of the moon, as it is lit by the Sun. -Our moon can be seen from earth because the light from the sun shines onto its surface. -“Waxing” means growing and is used to describe the moon as it grows from new moon to full moon. -“Waning” means shrinking and is used to describe the moon as it gets smaller	-Textbook -Pictures of Moon http://www.spacer.acers.com/pdf/moon-phases-lesson-plan.pdf Moon Demonstration: -Lamp=Sun -White ball=Moon -Head=Earth *NB: The Moon will orbit the Earth through the

	from full moon to new moon. -The “first quarter” is when the moon has completed $\frac{1}{4}$ of its orbit around the earth. This is when the moon looks like a “half-moon”. -The “last quarter” is when the moon has completed $\frac{3}{4}$ of its orbit around the earth and also looks like a “half-moon” to us. -On the moon, we can see craters, light areas which are mountains and darker areas which are flat plains. Consolidation: Teacher wraps up the lesson with asking learners questions about what they have learnt about and allow learners to ask clarification seeking questions and then give learners a worksheet to complete. Learner Activities: -Answer and ask questions, active participation in class. -Complete the given worksheet in class. -Curious about moons, learners do simple research on which planets have moon(s), the names of the moons and learners must find out that Mercury and Venus have no moon using own cell phone/computer lab/internet café.	learner holding the pencil attached to the white ball (hold straight). Learners will notice that no matter where the Moon is in its orbit, half of it will always be lit by the Sun.
ASSESSMENT	Informal task- learners complete the worksheet on Moon. Peer marking	
TEACHER REFLECTION		

The moon



Read the text and complete the table:

The moon is much smaller and lighter than the earth. So, its surface of gravity is much weaker than the Earth's. For this reason, the moon is not able to hold any atmosphere.

The moon is the only world, apart from the earth, that humans have actually walked on. The surface of the moon is covered by deep holes caused by rocks that have crashed into it from space.

The moon always shows the same face to the Earth because it takes the same time for it to spin around once as it does for it to orbit the Earth. Sometimes we can see all or most of the faces catching the sunlight, but at other times we can see a little or even none. In earlier times, humans had many different ideas about the face of the moon. The Japanese thought it was a rabbit making rice cakes. Some Europeans said it looked like a woman's face, while the Africans thought it looked like a giant crab.

Size of the moon:		Moon's surface full of:	
Atmosphere		Different ideas of the moon:	

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: Moons		- Describe the fact that the moon has different phases. - Explain that the moon looks different to us on different days throughout the month			
Content & Concepts/Subtopic					
-Moon’s surface					
Terminology	orbit, phases, space, crater				
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY				
	2. UNDERSTANDING AND CONNECTING IDEAS				
	3. SCIENCE, TECHNOLOGY AND SOCIETY				
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		Making/Constructing
	Evaluating & Improving		Designing		

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
Moons  moons, including our moon do not give out their own heat and light  our moon can be seen from Earth because the light from the Sun shines onto its surface  on the moon we can see craters, lighter areas which are mountains, and darker areas which are flat plains	Teacher Activities: <u>Introduces</u> the topic: “Moon” Teacher explains more information about the moon. We can only see half of the moon from Earth, since the other side is always turned away from us. As the moon travels around the earth, we see different fractions of the moon, as it is lit by the Sun. -Our moon can be seen from earth because the light from the sun shines onto its surface. -“Waxing” means growing and is used to describe the moon as it grows from new moon to full moon. -“Waning” means shrinking and is used to describe the moon as it gets smaller from full moon to new moon. -The “first quarter” is when the moon has completed $\frac{1}{4}$ of its orbit around the earth. This is when the moon looks like a “half-moon”. -The “last quarter” is when the moon has completed $\frac{3}{4}$ of its orbit around the earth and also looks like a “half-moon” to us. -On the moon, we can see craters, light areas which are mountains and darker areas which are flat plains.	-Textbook -Pictures of Moon http://www.spacer.acers.com/pdf/moon-phases-lesson-plan.pdf Moon Demonstration: -Lamp=Sun -White ball=Moon -Head=Earth *NB: The Moon will orbit the Earth through the

	Consolidation: Teacher wraps up the lesson with asking learners questions about what they have learnt about and allow learners to ask clarification seeking questions and then give learners a worksheet to complete. Learner Activities: -Answer and ask questions, active participation in class. -Complete the given worksheet in class. -Curious about moons, learners do simple research on which planets have moon(s), the names of the moons and learners must find out that Mercury and Venus have no moon using own cell phone/computer lab/internet café.	learner holding the pencil attached to the white ball (hold straight). Learners will notice that no matter where the Moon is in its orbit, half of it will always be lit by the Sun.
ASSESSMENT	Informal task- learners complete the worksheet on Moon. Peer marking	
TEACHER REFLECTION		

The Moon

The Moon travels around the Earth. This is called an “orbit”. The same side of the Moon always faces the Earth. It takes one month for the Moon to go around the Earth. The Moon is a little more than 200,000 miles from the Earth. It is about $\frac{1}{4}$ the size of the Earth. That means the Earth is four times larger than the Moon.

The Moon is a dry land that has millions of craters with rocks and dust. The surface of the Moon is covered with about two inches of dust. The Moon has no air or atmosphere around it, so it does not stay as comfortable and warm like the Earth. The temperature on the Moon is -170°F at night which is very cold, but it is 265°F during the day which is very hot. The hottest temperature on Earth is about 130°F , so the Moon can get over twice as hot!

If you stood on the Moon, the sky would look dark even in the daytime! That is because there is no air or atmosphere. There is also no sound because sound waves go through the air. The Moon is silent. There is no wind, rain or any other type of weather on the Moon. Neil Armstrong and Buzz Aldrin were astronauts who flew on the Apollo 11 rocket and landed on the Moon. They were the first people to walk on the Moon on July 20, 1969. They and other astronauts have taken Moon rocks to study from their trips to the Moon. Scientists found that the Moon rocks are similar to the rocks on Earth. Moon rocks are very old, about 4 billion years old.

Most scientists think the Moon was made after the Earth hit something in space. A large chunk of the Earth broke off and that became the Moon. Scientists think this happened 60 million years after the Earth was formed. This is how you write 60 million:

The Moon sometimes shimmers at night when we look up at the night sky and the Moon. “Shimmer” means to shine softly or with a flickering light or glow. The Moon does not shine by its own light, but by light from the Sun. We see the Moon because the Sun is shining on it.

Sometimes the Moon passes between the Sun and the Earth. When the Moon’s shadow falls on the Earth we see some parts of the Sun covered by the Moon. This is called a “solar eclipse”. This happens about two times a year.

When the Moon passes through the Earth’s shadow and the shadow blocks the sun’s light from hitting the Moon that is called a “lunar eclipse”. We don’t see part or the entire Moon during a lunar eclipse. These happen a few times a year, too.



Draw lines between the words and their meanings.

atmosphere	hole shaped like a bowl
billion	a complete circle; a path
million	1 000 000 000
solar eclipse	1 000 000
lunar eclipse	the air around the earth
crater	partial hiding of the sun by moon
orbit	partial hiding of the moon by sun

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Movements of the moon		• Learners must be able to explain the movements of the moon		
Content & Concepts/Subtopic				
Different appearances of the moon				
Lunar month vs calendar month				
Mention Muslim year according to Lunar year				
Terminology				
SPECIFIC AIMS		1. DOING SCIENCE AND TECHNOLOGY		
		2. UNDERSTANDING AND CONNECTING IDEAS		
		3. SCIENCE, TECHNOLOGY AND SOCIETY		
PROCESS SKILLS				
	Accessing & recalling Information		Identifying problems & issues	Doing Investigations
x	Observing	x	Raising Questions	x Recording Information
x	Comparing	x	Predicting	x Interpreting Information
x	Measuring	x	Hypothesizing	x Communicating
	Sorting & Classifying	x	Planning Investigations	Making/Constructing/Drawing
x	Evaluating & Improving		Designing	

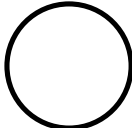
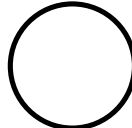
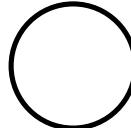
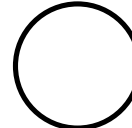
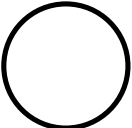
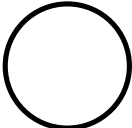
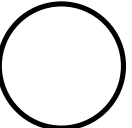
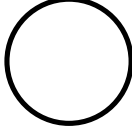
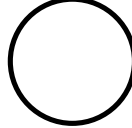
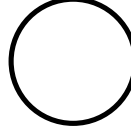
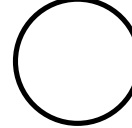
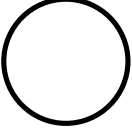
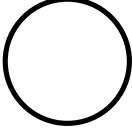
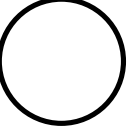
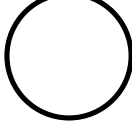
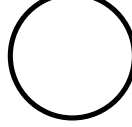
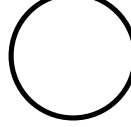
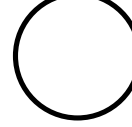
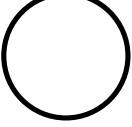
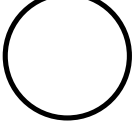
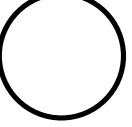
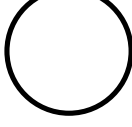
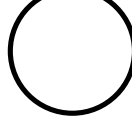
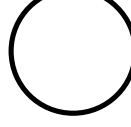
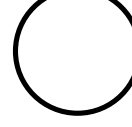
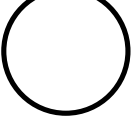
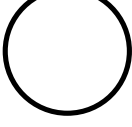
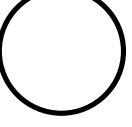
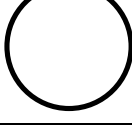
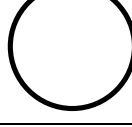
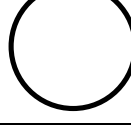
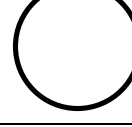
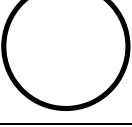
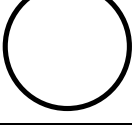
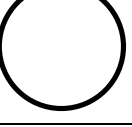
CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
- The moon is spinning and one complete rotation takes ABOUT 28 days. - The moon revolves around the earth and one revolution is also ABOUT 28 days	Act 1: Learners start with blank calendar to draw observation of appearance of moon before the October break (Say3 September) Observe appearance of moon every night. Record individually or in groups and report to class every week. If weather does not permit....go to news 24 weather forecast. Did you notice that the moon appears different every night? Act 2: Use a lamp without a shade to represent the sun. Put it on a high table Let learners sit together a distance away, and move around them with a ball on a		Blank calendar September 2018. Print from internet. Lamp and large white ball

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
Together the earth and moon revolve around the sun in one year	stick. Let them note the appearance of the light part and draw in few positions. Compare with calendar in act 1 Act 3: Learners watch video on Sci-Bono Resource of 2016 about movement of moon around earth and count days. (If resource is available). Teacher explains rotation and why we see only the near side of the moon. Explain revolution of moon. Learners can also make little model of the moon, earth and sun as in Siyavula book. Draw the phases of the moon and learn their names. Make sure we do the Southern Hemisphere. Draw table of comparison of the Sun (Star), earth (Planet) and moon. Include shape, size and ability to give light.	Sci-bono resource Siyavula book grade 6 B and Text book used by school
ASSESSMENT	Give a mark for observation sheet completed by every learner (Tick list), and questions about movements and names of phases (Memo)	
TEACHER REFLECTION	From previous experience I know that we must do observation calendar before school closes. Grade 6 camps, rainy weather and other constraints may hamper the process.	

Moon Phases Calendar

Instructions: Observe the Moon whenever you have a chance to see it. Always face the same direction (either South or North). Look from East to West to find the Moon. Draw the Moon's phase below and the date of your observation.

1. First look at the sky and find the moon.
2. Find the correct block below (Sunday-Saturday) and write down today's date on the block.
3. Decide what shape of the moon you see in the sky; draw the shape in the circle, and color the rest of the circle black..
4. Only leave white part as the moon you can see.
5. In class we will look at all the calendars and at an Internet picture of the moon from the night before. If you were not able to see the moon, you can fill in your moon calendar using the picture you see in class.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Date:	Date:	Date:	Date:	Date:	Date:	Date:
						
Date:	Date:	Date:	Date:	Date:	Date:	Date:
						
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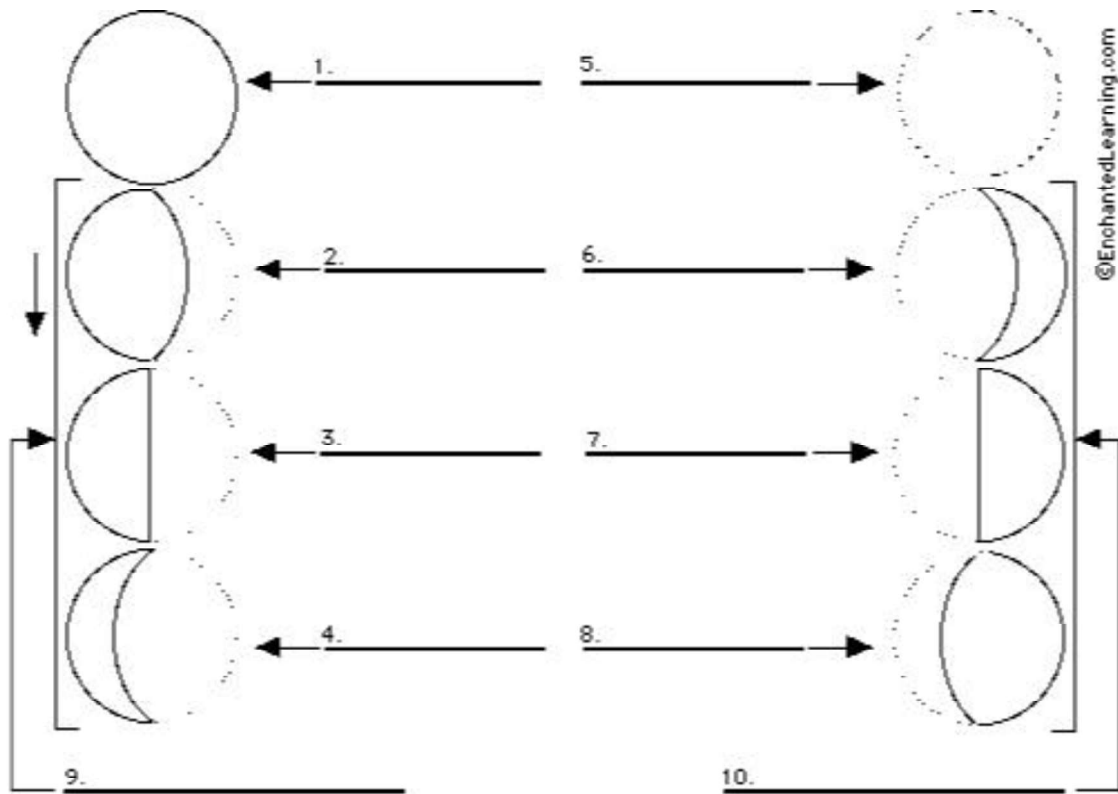
DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: Movements of the moon		● Learners must be able to identify phases of the moon and explain the movements of the moon	
Content & Concepts/Subtopic			
Identify Phases of the Moon			
Terminology			
SPECIFIC AIMS		1. DOING SCIENCE AND TECHNOLOGY	
		2. UNDERSTANDING AND CONNECTING IDEAS	
		3. SCIENCE, TECHNOLOGY AND SOCIETY	
PROCESS SKILLS			
	Accessing & recalling Information	Identifying problems & issues	Doing Investigations
x	Observing	x Raising Questions	x Recording Information
x	Comparing	x Predicting	x Interpreting Information
x	Measuring	x Hypothesizing	x Communicating
	Sorting & Classifying	x Planning Investigations	Making/Constructing/Drawing
x	Evaluating & Improving	Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
- The moon is spinning and one complete rotation takes ABOUT 28 days. - The moon revolves around the earth and one revolution is also ABOUT 28 days - Together the earth and moon revolve around the sun in one year	Act 1: Learners start with blank calendar to draw observation of appearance of moon before the October break (Say 3 September) Observe appearance of moon every night. Record individually or in groups and report to class every week. If weather does not permit....go to news 24 weather forecast. Did you notice that the moon appears different every night? Act 2: Use a lamp without a shade to represent the sun. Put it on a high table Let learners sit together a distance away, and move around them with a ball on a stick. Let them note the appearance of the light part and draw in few positions. Compare with calendar in act 1 Act 3: Learners watch video on Sci-Bono Resource of 2016 about movement of	Blank calendar September 2018. Print from internet. Lamp and large white ball Sci-bono

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
	moon around earth and count days. (If resource is available). Teacher explains rotation and why we see only the near side of the moon. Explain revolution of moon. Learners can also make little model of the moon, earth and sun as in Siyavula book. Draw the phases of the moon and learn their names. Make sure we do the Southern Hemisphere. Draw table of comparison of the Sun (Star), earth (Planet) and moon. Include shape, size and ability to give light.	resource Siyavula book grade 6 B and Text book used by school
ASSESSMENT	Give a mark for observation sheet completed by every learner (Tick list), and questions about movements and names of phases (Memo)	
TEACHER REFLECTION	From previous experience I know that we must do observation calendar before school closes. Grade 6 camps, rainy weather and other constraints may hamper the process.	

Identifying Phases of the Moon

Waxing Crescent – A little part of the moon's right side is lit.	New Moon - The moon's disk facing us is dark because the moon is between the sun and the Earth.
Full Moon - The moon's entire disk is lit because the Earth is between the sun and the moon.	Last Quarter - The left half of the moon's disk is lit.
Waxing Gibbous – About $\frac{3}{4}$ th of the right side moon's disk is lit.	Waning Crescent - A little part of the moon's left side is lit.
1st Quarter - The right half of the moon's disk is lit.	Waning Gibbous - About $\frac{3}{4}$ th of the left side moon's disk is lit.
Waxing – Getting larger.	Waning – Getting smaller.



Are Moons 1-4 waxing or waning?

Are Moons 5-8 waxing or waning?

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Moons		- Describe the fact that the moon has different phases. - Explain that the moon looks different to us on different days throughout the month		
Content & Concepts/Subtopic				
-Moon's surface				
Terminology	orbit, phases, space, crater			
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY			
	2. UNDERSTANDING AND CONNECTING IDEAS			
	3. SCIENCE, TECHNOLOGY AND SOCIETY			
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	Making/Constructing
	Evaluating & Improving		Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
Moons  moons, including our moon do not give out their own heat and light  our moon can be seen from Earth because the light from the Sun shines onto its surface  on the moon we can see craters, lighter areas which are mountains, and darker areas which are flat plains	Teacher Activities: The teacher explained on how other moons circle the planets and give learners cross word puzzle worksheet for them to complete thereafter. Consolidation: Teacher wraps up the lesson with asking learners questions about what they have learnt about and allow learners to ask clarification seeking questions and then give learners a worksheet to complete Learner Activities: -Answer and ask questions, active participation in class. -Complete the given worksheet in class. -Curious about moons, learners do simple research on discovering the moons that circle planets. And complete the word search puzzle.	-Textbook -Pictures of Moon http://www.spacer.acers.com/pdf/moon-phases-lesson-plan.pdf Moon Demonstration: -Lamp=Sun -White ball=Moon -Head=Earth *NB: The Moon will orbit the Earth through the learner holding the pencil

		attached to the white ball (hold straight). Learners will notice that no matter where the Moon is in its orbit, half of it will always be lit by the Sun.
ASSESSMENT	Informal task- learners complete the worksheet on Moon. Peer marking	
TEACHER REFLECTION		

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Movements of the earth and planets		• What cause day and night		
Content & Concepts/Subtopic: Rotation of the Earth				
Terminology	cloud, Moon, Sun, Star, Solar System, Revolve, Satellite, Atmosphere, Rotation, gravity			
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY			✓
	2. UNDERSTANDING AND CONNECTING IDEAS			✓
	3. SCIENCE, TECHNOLOGY AND SOCIETY			✓
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	Making/Constructing
	Evaluating & Improving		Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation (Earth) ✓ In our Solar System, each planet rotates (spins) on its own axis ✓ The planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night ✓ During rotation the side of the Earth facing the Sun	Teacher Activities Intro Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and night? Which movement of the Earth is responsible for the season? (<i>you may add your own questions as different schools may use different textbooks</i>). Show learners a short video clip or picture	Learner Activities Answer the worksheet about day and night	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
experiences daytime, and the opposite side of the Earth experiences night-time Revolution (Earth) ✓ All planets also revolve (travel) around the Sun in their own orbits ✓ Planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution	showing how the planets orbit the solar system. Explain important concepts such as; the number of planets, main differences between planets such as size, orbit and position (<i>see content</i>). Body Instruct learners to complete an activity. Suggested activities include; order and relative size of planets (What cause day and night) Consolidation Teacher does corrections with the learners.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. Consolidation Learners mark their own/peer's worksheet and do corrections.	
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		
Day / Night			

Day and Night

WORD BANK

Moon Stars Clouds Sun

What can you see
during the day?

What can you see
at night?



Look, read and complete

WORD BANK

moon sun day Earth clouds

a. The _____ shines during the _____.



b. The _____ goes around the sun.



DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: Movements of the Earth and planets	• Explain the difference day time and night time. • Demonstrate and explain that different regions of the Earth do not experience daytime and night time at the same time.	
SUBTOPIC: Rotation of the earth		
Terminology	Solar systems, sphere, axis, rotation, spin, anti-clockwise	
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	✓	Raising Questions	✓	Interpreting Information
Observing	✓	Predicting	✓	Designing
Comparing		Hypothesizing	✓	Making/Constructing
Measuring		Planning Investigations		Evaluating
Sorting & Classifying		Doing Investigations		Communicating
Identifying problems & issues		Recording Information		

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation of the earth • In our Solar System, each planet rotates (spins) on its own axis • Because the Earth has the shape of a sphere, the Sun shines on only one side of the Earth at a time as it rotates. • The planet Earth is spinning (rotating) on its axis, and one complete rotation takes about 24 hours. We experience this as a day and a	In a dark room, the teacher uses the torch as the Sun to shine light on the Earth globe while learners are observing which side has light shining on it and which side is dark. The globe is turned slowly from west to east (anti-clockwise), still shining the torch on it. The teacher stops the globe so that the light shines on Europe. The learners attempt to answer these questions: Where is it day-time? Which countries on the globe are having night-time? Find South Africa on the globe.		Video clips Internet Globe Torch Curtains 4 paper persons

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
night • During rotation the side of the earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time. • Most places experience day-time and night-time once every 24 hours. When day-time appears, we normally say the Sun is rising. When night-time appears, we say the Sun is setting.	One learner is requested to stick a paper person on South Africa after it has been found. The teacher turns the globe so that the paper person is in the light (day) and then in the dark (night). Learners have to find day and night for the person in South Africa. The teacher places 4 paper persons on the globe as follows: Australia, Brazil, England and USA. Which countries will be at work while South Africa is experiencing night-time? Have a discussion about what situation each paper person is experiencing. Set the Earth to the same level as the torch. Ask oral questions. Let the learners imagine they are the paper persons on earth. Learners watch a video clip that explores the concepts of rotation, day, night and axis. Reference: https://youtu.be/pLI8sDZRSYg  video playback (3).mp4 An alternative video can also be used. Learners are to complete the activity sheet provided. This can be a homework activity.	
ASSESSMENT	Discussions; Watch video clip; Complete activity sheet.	
TEACHER REFLECTION		

TERMINOLOGY

Rotation of the Earth

- Solar system - system which consists of the Sun, the 8 planets, moons, comets, asteroids, dust and gas.
Sphere - shaped like a ball but slightly flattened on each end.
Spin - to turn round.
Axis - imaginary line that runs from North Pole region to the South Pole region of the Earth.
Rotation - the act of spinning about an axis
Anti-clockwise -

ACTIVITY WORKSHEET 1

The rotation of the Earth

1. What do the globe and the torch represent in this activity?
2. Is it possible to shine the light onto the entire globe at one time? Explain why you say so.
3. Describe how the amount of light on one part of the globe changes as it rotates.

MEMORANDUM

1. The globe represents the Earth and the torch represents the Sun.
2. No, because as the earth rotates (turn round and round). As this happens, the side of the earth facing the Sun will experience day-time while the side facing away from the Sun will experience night-time.
3. As the sun rotates, the dark side turns around into light and experiences day while the side in the light turns around into the dark and experiences night.

ACTIVITY WORKSHEET 2 (Paper persons activity)

1. Where is it day-time?
2. Which countries on the globe are having night-time?
3. Find South Africa on the globe.
4. 4 paper persons on the globe as follows:
Australia, Brazil, England and USA.
Which countries will be at work while South Africa is experiencing night-time?
5. Have a discussion about what situation each paper person is experiencing.

MEMORANDUM

1. Europe
2. Australia
3. The learners try and find SA on the globe
4. England and USA
5. Australia and Brazil will experience day-time almost at the same time, England and USA will also experience their days and nights at the same times of the day. This means when Australia and Brazil are experiencing day-time, both England and USA will be experiencing the night and vice versa.

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Movements of the earth and planets		• Demonstrates how day and night occurs in the model of the earth and a light sources. •		
Content & Concepts/Subtopic: Rotation of the Earth				
Terminology	Planet, Asteroid, Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity			
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY			
	2. UNDERSTANDING AND CONNECTING IDEAS			
	3. SCIENCE, TECHNOLOGY AND SOCIETY			
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	Making/Constructing
	Evaluating & Improving		Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation (Earth) ✓ In our Solar System, each planet rotates (spins) on its own axis ✓ The planet Earth is spinning,	Teacher Activities Intro Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and	Learner Activities Learners attempt to answer these questions orally. They name five electrical appliances.	✓ Equipment such as cells/batteries, conducting wires, light bulbs and switches

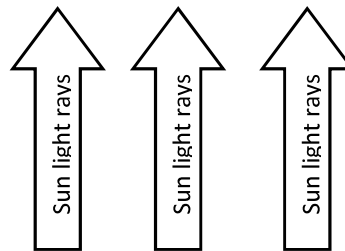
CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
and one complete rotation takes about 24 hours. We experience this as a day and a night ✓ During rotation the side of the Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time Revolution (Earth) ✓ All planets also revolve (travel) around the Sun in their own orbits ✓ Planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution	night? Which movement of the Earth is responsible for the season? <i>(you may add your own questions as different schools may use different textbooks).</i> Show learners a short video clip or picture showing how the planets orbit the solar system. Explain important concepts such as: the number of planets, main differences between planets such as size, orbit and position (see content). Body Instruct learners to complete an activity. Suggested activities include: order and relative size of planets (Day and Night) Consolidation Teacher does corrections with the learners.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. Consolidation Learners mark their own/peer's worksheet and do corrections.	✓ YouTube (https://www.youtube.com/watch?v=js7Q-r7G9ug)
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Day / Night

Day and Night

DAY

Heat and light travel from the sun to the earth's surface.



It is day time when the earth faces the sun.

NIGHT

It takes 24 hours for the earth to turn once. As the earth spins, day becomes night.



It is night time when the earth faces away from the sun.



Quick Quiz

How many hours does it take for the earth to turn once on it's own axis?

When it is day time, is the earth side facing the sun or facing away from the sun?

When it is night time, is the earth side facing the sun or facing away from the sun?

Why is it colder at night time than in the day time? Use the picture to help you.

Use a globe to find where you are in the world. Name another country that will be experiencing night time while you experience day time.

DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Movements of the Earth and planets	- Define revolution - Describe the direction and rate of Earth's revolution		
SUBTOPIC: Revolution of the earth			
Terminology	Revolution, orbit, axis, elliptical, tilt, year		
SPECIFIC AIMS	1. DOING SCIENCE 2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS 3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	✓ ✓	

PROCESS SKILLS	
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Accessing & recalling Information	✓	Raising Questions	✓	Interpreting Information	
Observing	✓	Predicting	✓	Designing	
Comparing		Hypothesizing		Making/Constructing	
Measuring		Planning Investigations		Evaluating	
Sorting & Classifying		Doing Investigations		Communicating	
Identifying problems & issues		Recording Information			

STRAND: PLANET EARTH AND BEYOND & SYSTEMS AND CONTROL
INTERMEDIATE PHASE

TERM 4

TERM 1

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Revolution of the earth All planets also revolve (move/travel around) the Sun in their own orbits.	The teacher puts the model of the Sun, Moon and Earth on the table where every learner can see it. S/he rotates the Earth on its axis. S/he then moves the Earth around the Sun in an orbit		Model of the Sun, Earth and Moon

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
- The movement of the planets around the Sun in an orbit is called a revolution. - The shape of the orbit is elliptical: Even the Earth revolves around the Sun in an elliptical orbit. - The distance of the planet from the Sun determines the length of its orbit, so because mercury is the planet closest to the Sun, it has the shortest orbit. It takes the shortest time to revolve around the Sun. - Earth is the third planet from the Sun. It takes it 365 $\frac{1}{4}$ days to revolve around the Sun. We experience this as a year. - The $\frac{1}{4}$ of the day is why we have a leap year every 4 years; we add the 4 quarters of each year to make a day to keep the calendar straight. The extra day is always 29 February. - The Earth rotates on its axis as it goes around the Sun. - For any given place on Earth the Sun goes past every 24 hours. - Shadows cast by the Sun change position and length during the course of the day. - The Earth is tilted at 23,5° to the plane of its orbit around the Sun and the angle is maintained as the earth orbits the Sun. - Seasons of the year are caused by the tilt of the Earth's axis.	(anticlockwise). Learners observe the teacher's demonstration. Learners watch a video clip that explores the concepts of revolution, orbit, axis, elliptical, tilt, year Reference: https://study.com. An alternative video can also be used.  videoplayback (27).mp4 Reference: http://m.youtube.com/watch Learners are to complete the activity sheet provided. This can be a homework activity.	that can show the Earth's movement Video clip

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
ASSESSMENT	Discussions; Watch video clip; Complete activity sheet.	
TEACHER REFLECTION		

TERMINOLOGY

Revolution of the Earth

Revolution - The length of time the Earth takes to travel around the Sun once.

Orbit - The path of one object in space around another. E.G. the path of the Earth around the Sun.

Axis - Imaginary line that runs from North Pole region to the South Pole region of the Earth.

Elliptical - Oval or egg - shaped.

Tilt - To move into a sloping position

Year - A period of 365¼ days (12 full months)

ACTIVITY WORKSHEET 1

The revolution of the Earth

1. Draw and label a diagram of the Earth orbiting around the Sun. Make sure that you include the following in your diagram:

- The Earth
- The tilt of the Earth's axis, always pointing in the same direction
- The rotation of the Earth on its axis
- The Sun
- The movement of the Earth around the Sun

MEMORANDUM



1. What do we call the movement of Earth on its axis?
2. In what direction does the Earth rotate on its own axis?
3. What do we call the movement of the Earth around the Sun?
4. Match the words in Column A with the description in Column B. Write your answers like in the example given:

Column A	Column B	Answer
EXAMPLE	EXAMPLE	6. g
1. Revolution	a) Length of time for Earth to travel around the Sun once	
2. Day and night	b) Movement of Earth or other planet around the Sun	
3. Rotation	c) Caused by the rotation of the Earth	
4. 24 hours	d) Length of time for Earth to turn once on its axis	
5. 365¼ days	e) Spinning of Earth on its axis	

MEMORANDUM

1. Rotation

NATURAL SCIENCE: LESSON PLAN
PERIOD/DURATION: 30 MINUTES
CAPS INTERMEDIATE

GRADE 6
STRAND: Earth and Beyond
TERM 4

2. Anti-clockwise
3. Revolution
- 4.

Column A	Column B	Answer
EXAMPLE	EXAMPLE	6. m
1. Revolution	f) Length of time for Earth to travel around the Sun once	1. g
2. Day and night	g) Movement of Earth or other planet around the Sun	2. h
3. Rotation	h) Caused by the rotation of the Earth	3. i
4. 24 hours	i) Length of time for Earth to turn once on its axis	4. f
5. 365¼ days	j) Spinning of Earth on its axis	5. f

ACTIVITY WORKSHEET 3 (Summary of Lesson 1 and 2)

The rotation of the Earth

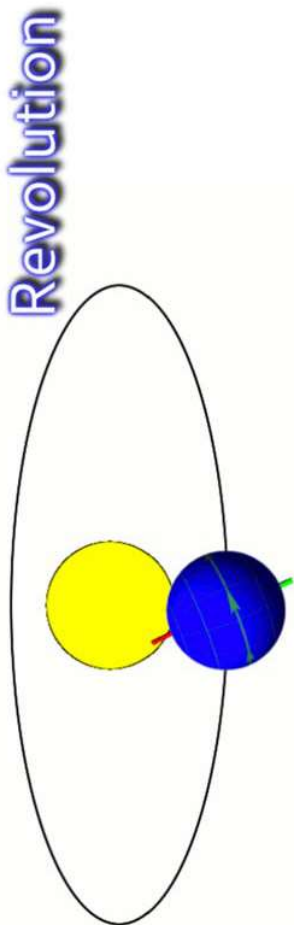
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During rotation, the side of the Earth facing away from the Sun experiences _____.	The Earth takes _____ to rotate on its axis.		During rotation, the side of the Earth facing the Sun experiences _____.
The rotation of the Earth causes _____ and _____.	Only half of the Earth can be in the _____ at any time.		

The revolution of the Earth

The revolution of the Earth

Planet Earth _____ around the Sun in an _____



One complete _____ around the Sun
takes _____ days. This is called
a _____

MEMORANDUM

The rotation of the Earth

The Earth takes 24 hours
to rotate on its axis.

During rotation, the side
of the Earth facing away
from the Sun
experiences night time.



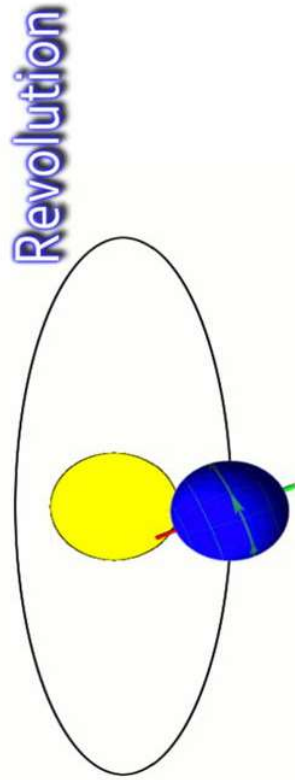
During rotation, the
side of the Earth
facing the Sun
experiences day time.

The rotation of the Earth
causes day and
night.

Only half of the Earth
can be in the Sun`s
light at any time.

The revolution of the Earth

Planet Earth revolves around the Sun in an orbit.



One complete revolution around the Sun takes 365½ days. This is called a year.

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Movements of the earth and planets		• Understand that the sun does not move		
Content & Concepts/Subtopic: Rotation of the Earth				
Terminology	, Moon, Sun, Star, Solar System, Revolve, Elliptical, Atmosphere, Rotation, gravity			
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY			
	2. UNDERSTANDING AND CONNECTING IDEAS			
	3. SCIENCE, TECHNOLOGY AND SOCIETY			
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	Making/Constructing
	Evaluating & Improving		Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation (Earth) ✓ In our Solar System, each planet rotates (spins) on its own axis ✓ The planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night ✓ During rotation the side of the	Teacher Activities Intro The teacher asked the question which one move between the earth and the sun? Explain important concepts such as: rotation, orbit and revolution (<i>see content</i>). Body Instruct learners to complete an activity..	Learner Activities To build the model of the earth movement around the sun.	✓ Equipment such as cells/batteries, conducting wires, light bulbs and switches ✓ YouTube (https://www.youtube.com/watch?v=...)

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time Revolution (Earth) ✓ All planets also revolve (travel) around the Sun in their own orbits ✓ Planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution	Consolidation Teacher does corrections with the learners.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. Consolidation Learners mark their own/peer's worksheet and do corrections.	youtube.com/watch?v=Is7Q-r7GG9ug
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Practical activity 1 To make a model to demonstrate the Earth's movement around the Sun

Aim:

In this practical activity you will make a model to demonstrate the Earth's movement around the Sun.

Apparatus:

- ☐ A ball – it must be round. A bigger ball is easier to work with. You can re-use the ball again.
- ☐ Crayons or marker pens to draw lines on the ball.

Method

- ☐ Study the drawing above.
- ☐ Take a crayon or marker pen and draw the equator on the ball.
- ☐ Write the word “equator” on the line.
- ☐ Write the words “North Pole” (this will form the top of the ball) and the “South Pole” (this will form the bottom of the ball) on the ball.
- ☐ Hold the ball in your hand and tilt it slightly to the right and look at the position of the “North Pole.” Look what happens to the “South Pole” if you tilt the ball. (You can only tilt the ball to the right as the Earth orbits the Sun counter clockwise.)

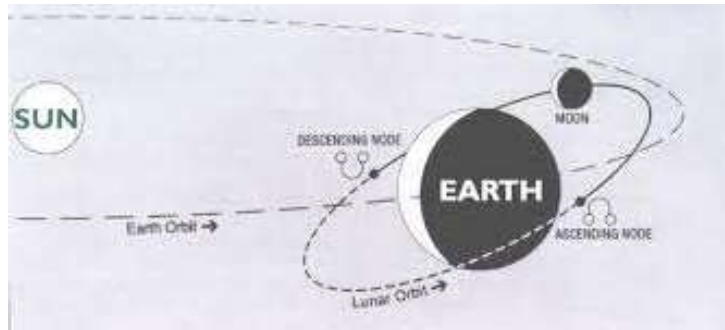
Result

Explain what happens to the North and South Poles if the Earth tilts slightly to one side.

Movement of the Earth / Moon

The earth turns on it's own axis as well as orbiting the sun. The moon also turns very slowly on it's own axis, orbiting the earth as well as orbiting the sun

This seems like a very complicated movement but can be understood easily when you study the picture below:

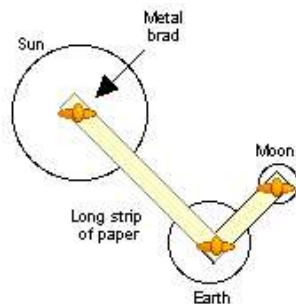


Build your own solar movement system

You will need the following:

Material	Tools
Cardboard	Pencil
Butterfly clips	Ruler
	Scissors
	Compass

1. Draw a long rectangle with your ruler and pencil on a cardboard
2. Draw a short rectangle with your ruler and pencil on a cardboard
3. Draw three different sized circles with your compass and pencil on a paper
4. The out the different shapes from the cardboard
5. Asseble all the pieces according to the sketch
6. Play with the model and observe the movements of the earth and moon



Instructions

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: Movement of the Moon		• Demonstrate the movement of earth using a model.	
SUBTOPIC: Rotation of the Moon			
Terminology		Rotation, orbit, axis, satellite, phases of the Moon	
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	✓	Raising Questions	✓
Observing	✓	Predicting	✓
Comparing		Hypothesizing	
Measuring		Planning Investigations	
Sorting & Classifying		Doing Investigations	
Identifying problems & issues		Recording Information	
		Interpreting Information	
		Designing	
		Making/Constructing	
		Evaluating	
		Communicating	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation of the Moon The Moon is a ball of rock in space.	Teacher explains that in the same way as the Earth spins on its own axis, the Moon also spins on its own axis. It takes about 28 days for the Moon to		Torch (Sun) Ping pong ball on a stick (Moon) A learner (his/her

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
atmosphere) - Our moon can be seen from the earth because the light from the Sun shines onto its surface. - The Moon is closer to the Earth than the Sun. - The Moon is smaller than the Earth. - The Moon is the Earth's only natural satellite and its closest space body. - The Moon orbits around the Earth. - The Moon does not give out its own heat or light.	S/he starts a "New Moon" with the Moon between the Sun and Earth. - The learner stands in the light of the torch and at a good distance from it. - His/her head represents the Earth so that her eyes have the view that we would see from the surface of the Earth. - The "Moon" is held out at arm's length and in the direction of the light. - How much of the bright sunlit side of the Moon can s/he see? It takes the Moon 28 days to rotate the Earth. - To show this the learner can turn slowly on the same spot to the right. (clock-wise). - After each quarter turn, let the learner stop and see how much of the Moon's surface is having light from the Sun. - Let the learner explain to the classmates what she can see. - The learner must keep turning until s/he has done one complete turn. - When all the learners have observed what was happening, let them discuss what they have seen. E.g. why does the Moon change shape? The teacher explains that we refer to this change of shapes as the phases of the Moon each month. Reference: http://m.youtube.com/watch  videoplayback.mp4 Learners are to complete the activity sheet provided. This can be a homework activity.	Earth) Video clip

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
ASSESSMENT		
TEACHER REFLECTION	Discussions; Watch video clip; Complete activity sheet.	

TERMINOLOGY

Rotation – the act of spinning about an axis
Orbit - The path of one object in space around another. E.G. the path of the Earth around the Sun.
Axis - Imaginary line that runs from North Pole region to the South Pole region of the Earth.
Satellite – man-made or natural object that revolves around a planet.
Phases of the Moon – the changing shape of the bright part of the Moon.

ACTIVITY WORKSHEET 1

The rotation of the Earth

1. What is a satellite?
2. How long does it take the Moon to rotate on its own axis?
3. Does the Moon produce its own light? Substantiate your answer.
4. Why can footprints from the 1st moon landing still be seen on the surface of the Moon even today?

Memorandum

1. Man-made or natural object that revolves around a planet.
2. 28 days
3. No, The Moon shines because of the Sun's light falling on it. The side of the Moon facing the Sun will be lit.
4. Because the Moon does not have an atmosphere, so there is no erosion by wind or water in the moon. The water on the Moon is frozen ice.

DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:
TOPIC: Movement of the Earth and Planets	- Describe rotation and revolution - Describe the movement of earth and moon around the Sun.
Content & Concepts/Subtopic: Rotation of the earth and the moon	

Terminology	, Moon, Sun, Revolve, Elliptical, Atmosphere, Rotation, gravity				
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY				✓
	2. UNDERSTANDING AND CONNECTING IDEAS				✓
	3. SCIENCE, TECHNOLOGY AND SOCIETY				✓
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		Making/Constructing
	Evaluating & Improving		Designing		

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation (Earth) ✓ In our Solar System, each planet rotates (spins) on its own axis ✓ The planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night ✓ During rotation the side of the Earth facing the Sun	Teacher Activities Intro The teacher asked the question which one move between the earth and the sun? Explain important concepts such as rotation, orbit and revolution (<i>see content</i>). Body Instruct learners to complete an activity.. Consolidation	Learner Activities To build the model of the earth movement around the sun.	✓ Equipment such as cells/batteries, conducting wires, light bulbs and switches ✓ YouTube (https://www.youtube.com/watch?v=js7Q-)

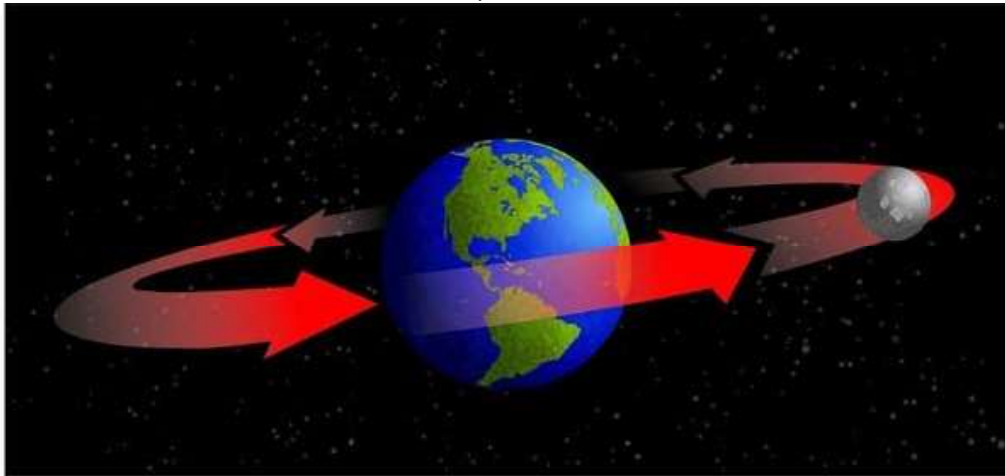
CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
experiences daytime, and the opposite side of the Earth experiences night-time Revolution (Earth) ✓ All planets also revolve (travel) around the Sun in their own orbits ✓ Planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution	Teacher does corrections with the learners.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. Consolidation Learners mark their own/peer's worksheet and do corrections.	r7G9uq
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Movement of the Earth / Moon

So the person watching will say that the ball has rotated, and also revolved.
The real Moon takes about 28 days to rotate once.

Revolution (Moon)

The Moon also revolves in orbit around the Earth, as you saw in the last activity. The Moon takes about 28 days to complete one orbit. The force of gravity between the Earth and the Moon holds the Moon so that it always faces us on Earth.



The Moon revolves around the Earth.

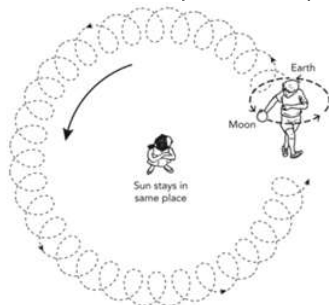
Make a model of the Earth and Moon revolving around the Sun

MATERIALS:

- a white ball
- two people who have practised the model in the previous activity

INSTRUCTIONS:

- You must use your bodies and the white ball to act out this model of the Earth and Moon revolving around the Sun.
- Work together in small groups to decide how you are going to perform this model.
- You must put together the movement of the Moon around the Earth from the last activity, and the movement of the Earth with its Moon, around the Sun.
- Then perform the movements for the class.
- So the model you must perform will be like this diagram shows.



Acting out the Moon and Earth moving around the Sun

- The Moon travels in an orbit around the Earth in about 28 days.
- The Moon rotates on an axis which also takes about 28 days.
- We always see only one side of the Moon.
- Together, the Earth and Moon revolve around the Sun.

Complete the sentences using all the words from the word box. write the sentences out in full on the lines below and number each sentence.

- The Sun stays in _____
- The Earth rotates on its own _____
- The Moon revolves _____
- The _____ revolve together in a big circle around the Sun.
- We only ever see _____ of the Moon.

Word box

Moon and the Earth
 around the Earth
 one side
 axis
 the same place

Complete the table comparing the Sun, Earth and Moon. Some answers having been filled in for you.

Question	Sun	Earth	Moon
What is the object classified as?			A Moon
What is the shape?			
What is the size relative to the other objects being discussed here?	The Sun is the biggest.		
What is the movement in relation to other objects?		The Earth revolves around the Sun.	
What is the object made of?			rock
Can this object produce light?			No, the Moon reflects the Sun's rays.
Is there water present?			

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO: • Demonstrate the movement of Moon using a model.
TOPIC: Movements of the Earth and planets		
SUBTOPIC: Revolution of the Moon		
Terminology	Revolution, orbit, axis, satellite	
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	✓	Raising Questions	✓	Interpreting Information
Observing	✓	Predicting	✓	Designing
Comparing		Hypothesizing		Making/Constructing
Measuring		Planning Investigations		Evaluating
Sorting & Classifying		Doing Investigations		Communicating
Identifying problems & issues		Recording Information		

CONTENT	TEACHING & LEARNING ACTIVITIES
Revolution of the moon - The Moon revolves in a pathway or orbit around the Earth. - It takes about 28 days for the Moon to complete a revolution around the Earth. - The movement of the Moon around the	The teacher puts the model of the Sun, Moon and Earth on the table where every learner can easily observe what happens. S/he spins the Moon on its axis. While the Moon is still spinning, s/he moves the Moon along its orbit around the Earth. The Moon should take the same amount of time to spin on its axis as it does to complete its orbit around the Earth.

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Movements of the earth and planets		• Reading with understanding		
Content & Concepts/Subtopic: Rotation of the Earth				
Terminology	Calendar, axis, tilt, equinox, Moon, Revolve, Elliptical, Rotation, gravity, orbit			
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY			✓
	2. UNDERSTANDING AND CONNECTING IDEAS			✓
	3. SCIENCE, TECHNOLOGY AND SOCIETY			✓
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	Making/Constructing
	Evaluating & Improving		Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation (Earth) ✓ In our Solar System, each planet rotates (spins) on its own axis ✓ The planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night	Teacher Activities Intro Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and night? Which movement of the Earth is responsible for the season? <i>(you may add your own questions as different per</i>	Learner Activities ; reading the passage	✓ Equipment such as cells/batteries, conducting wires, light bulbs and switches ✓ YouTube

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
✓ During rotation the side of the Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time Revolution (Earth) ✓ All planets also revolve (travel) around the Sun in their own orbits ✓ Planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution	school system. Explain important concepts such as, axis, orbit and position (see content). Body Instruct learners to complete an activity. Suggested activities include: matching column on movement of the earth Consolidation Teacher does corrections with the learners.	Learners will complete the worksheet about rotation and revolution of the earth Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. Consolidation Learners mark their own/peer's worksheet and do corrections.	(https://www.youtube.com/watch?v=js7Q-r7G9ug)
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Movement of the Earth / Moon

Earth in Space

How does Earth move in space?

What causes the cycle of seasons on Earth?

The study of the moon, stars, and other objects in space is called **astronomy**. Ancient astronomers studied the movements of the sun and moon. They thought Earth was standing still and the sun and moon were moving. The sun and moon seem to move mainly because Earth is rotating on its **axis**, the imaginary line that passes through Earth's center and the North and South poles. The spinning of Earth on its axis is called its **rotation**. **Earth's rotation on its axis causes day and night. It takes Earth about 24 hours to rotate once on its axis.**

The movement of one object around another object is called **revolution**. Earth completes one revolution around the sun once every year. Earth's path as it revolves around the sun is called its **orbit**. Earth's orbit is a slightly elongated circle, or ellipse.

Many cultures have tried to make a workable calendar. A **calendar** is a system of organizing time that defines the beginning, length, and divisions of a year. This is not easy because Earth takes about 365 1/4 days to circle the sun, and 12 moon cycles make up fewer days than a calendar year.

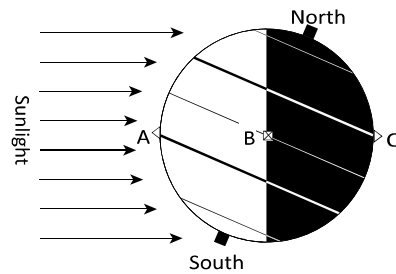
Sunlight hits Earth's surface most directly at the equator. Closer to the poles, sunlight hits Earth's surface at an angle. That is why it is generally warmer near the equator than near the poles.

Earth has seasons because its axis is tilted as it moves around the sun. Earth's axis is tilted at an angle of 23.5° from vertical. As Earth revolves around the sun, its axis is tilted away from the sun for part of the year and toward the sun for part of the year. When the north end of Earth's axis is tilted toward the sun, the Northern Hemisphere has summer. At the same time, the south end of Earth's axis is tilted away from the sun. As a result, the Southern Hemisphere has winter. The hemisphere tilted toward the sun has more daylight hours than the hemisphere tilted away from the sun. The combination of direct rays and more hours of sunlight heats the surface more than at any other time of the year.

On two days each year, the sun reaches its greatest distance north or south of the equator. Each of these days is known as a **solstice**. Halfway between the solstices, neither hemisphere is tilted toward the sun. On those two days, the noon sun is directly overhead at the equator. Each of these days is known as an **equinox**, meaning "equal night." During an equinox, the length of nighttime and daytime are about the same.

Earth in Space

Use the following figure to answer questions 1 through 3. Write your answers on a separate sheet of paper.



1. In the diagram, what season is it in South Africa?
2. Would a person at each of the points A, B, and C see the sun? If so, where would the sun be in the sky?
3. What movement of the sun (sunrise/sunset) does the person standing at point B see? Explain.

Match each term with its description by connecting the number of the correct term on the left to the letter beside the description on the right e.g. 9=T.

TERM	
1	Astronomy
2	Axis
3	Rotation
4	Revolution
5	Orbit
6	Calendar
7	Equinox
8	Solstice

MATCH

DESCRIPTION	
A	The path of Earth as it revolves around the sun
B	System of organizing time that defines the beginning, length, and divisions of a year
C	Line passing through Earth's centre and poles
D	The study of the moon, stars, and other objects in space
E	The sun is farthest north or south of the equator at this time.
F	Movement of Earth around the sun
G	Movement of Earth around its axis
H	The noon sun is directly overhead at the equator at this time.

DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO: • Demonstrate the rotation and revolution of Moon around the Earth using body movements • Drawing and writing about the movements of the Moon in relation to the earth and the solar system • Making a comparison table between the Sun, the Earth and the Moon		
TOPIC: Movements of the Earth and planets			
SUBTOPIC: Rotation and revolution of the Moon			
Terminology	Revolution, rotation		
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	✓	Raising Questions	✓	Interpreting Information	
Observing	✓	Predicting		Designing	
Comparing		Hypothesizing		Making/Constructing	
Measuring		Planning Investigations		Evaluating	
Sorting & Classifying		Doing Investigations		Communicating	
Identifying problems & issues		Recording Information			

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
Rotation and Revolution of the Moon • The Moon is spinning and 1 complete rotation takes 28 days. • The Moon revolves around the Earth and 1 revolution also takes about 28 days. • Together, the Earth and the Moon revolve around the	Let the learners stand against the class walls. One learner holds the Sun, another holds the Earth and the 3rd holds the Moon. Demonstrate the Earth orbiting the Sun. The learner holding the Earth walks in an anticlockwise direction in a circle around the Sun. At the same time, this learner (Earth) should rotate slowly in an anticlockwise direction to show the Earth's rotation as it orbits the Sun. Demonstrate the Moon orbiting the Earth. The learner holding the Moon walks in an anticlockwise direction in a circle around the Earth. At the same time, this learner (Moon) should rotate slowly in an anticlockwise direction to show the Moon's rotation as it orbits the Earth. Now demonstrate the Earth-Moon systems orbiting the Sun (this can be pretty tough). While turning, the Earth and the Moon learners should walk in an anticlockwise direction around the Sun. This demonstrates that the Earth is rotating, that the Moon is rotating and that the Earth-Moon system is revolving around the Sun. Remember that all the movements of the Moon and the Earth occur continuously at a steady speed.	Soccer ball (Sun) Tennis ball (Earth) Table tennis ball (Moon)

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
Sun.	 videoplayback (4).mp4 Reference: http://m.youtube.com/watch	
ASSESSMENT	Discussions; Complete activity sheet.	
TEACHER REFLECTION		

ACTIVITY WORKSHEET 1

Match the movement in Column A with its description in Column B and the length of time it takes in Column C.

You may use the options more than once:

Column A	Column B	Column C
1. Rotation of the Earth	a) Moves around the Sun in an elliptical orbit b) The Moon rotates on its axis and revolves around the Earth. The Earth rotates on its own axis and together with the Moon revolves around the Sun c) Moves around the Earth in an elliptical orbit d) Spins on its axis	28 days
2. Rotation of the Moon		1 year 24 ours
3. Revolution of the Earth		
4. Revolution of the Moon		
5. Revolution of the Earth and Moon system around the Sun		

Memorandum:

Column A	Column B	Column C
1. Rotation of the Earth		
2. Rotation of the Moon		
3. Revolution of the Earth		
4. Revolution of the Moon		
5. Revolution of the Earth and Moon system around the Sun		

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:		
TOPIC: Movements of the earth and planets		• Explain what an electric circuit is.		
Content & Concepts/Subtopic: Rotation of the Earth		• Recall the components of a simple electric circuit.		
Terminology	Moon, Sun, Star, Shadow, Revolve, Elliptical, Atmosphere, Rotation, gravity (Day-to-Day, 161)			
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY			
	2. UNDERSTANDING AND CONNECTING IDEAS			
	3. SCIENCE, TECHNOLOGY AND SOCIETY			
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		Making/Constructing
Evaluating & Improving		Designing		

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Rotation (Earth) ✓ In our Solar System, each planet rotates (spins) on its own axis ✓ The planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night	Teacher Activities Intro Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and night? Which movement of the Earth is responsible for the season? (<i>you may add your own questions as different</i>)	Learner Activities Learners will observe the movement of their shadow	✓ Equipment such as cells/batteries, conducting wires, light bulbs and switches ✓ YouTube

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
✓ During rotation the side of the Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time Revolution (Earth) ✓ All planets also revolve (travel) around the Sun in their own orbits ✓ Planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution	<i>schools may use different textbooks).</i> Show learners a short video clip or picture showing how the planets orbit the solar system. Explain important concepts such as; the number of planets, main differences between planets such as size, orbit and position (<i>see content</i>). Body Instruct learners to complete an activity. Suggested activities include; order and relative size of planets (Find East and West) Consolidation Teacher does corrections with the learners.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. Consolidation Learners mark their own/peer's worksheet and do corrections.	(https://www.youtube.com/watch?v=js7Q-r7G9ug)
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

MOVEMENT OF THE EARTH / MOON

ACTIVITY: Find East and West

- A place where you can stand in the early morning

INSTRUCTIONS:

1. Look at the picture of Sophie at sunrise and answer the questions.

QUESTIONS:

1. Which is Sophie's right hand? Show her right hand with your finger.

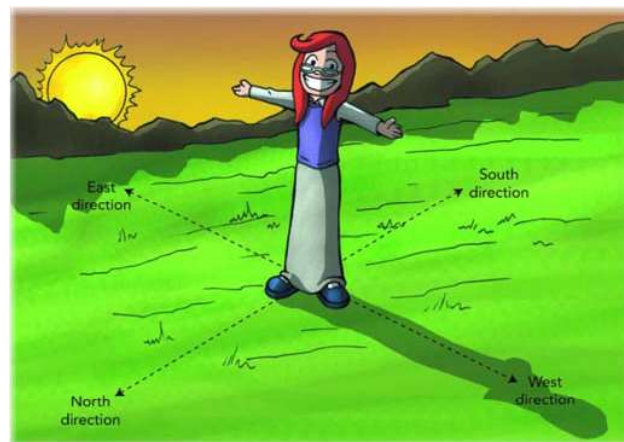
2. Why do we see a shadow of Sophie on the ground?

3. In which direction is her shadow pointing?

4. If Sophie looks straight in front of her, in which direction is she looking?

Now find the direction of East in your classroom. You must point to the place where you see the Sun come up in the morning. In the classroom, stretch out your arms and point in the direction of East and West. Clean the floor and stick some insulating tape on the floor so that everyone can remember which direction is East and which direction is West.

What does the word "direction" mean? You can walk in a **direction** towards a place. If the wind blows, you see leaves moving in the same **direction** as the wind. Remember, a direction is not a place that you can reach!



DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: Movement of the earth and planets		• Describe the Solar System.				
Content & Concepts/Subtopic: The moon		• Describe the movement of planets around the Sun.				
Terminology	Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity (Barnard, et al., 2013, p. 161)					
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY					✓
	2. UNDERSTANDING AND CONNECTING IDEAS					✓
	3. SCIENCE, TECHNOLOGY AND SOCIETY					✓
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		Making/Constructing	
	Evaluating & Improving		Designing			
CONTENT		TEACHING & LEARNING ACTIVITIES				Resources
Rotation (Earth)		Teacher Activities		Learner Activities		References Text book, inzalo
✓ In our Solar System, each planet rotates (spins) on its own axis		Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and night? Which movement of the Earth is responsible for the season?		Intro Learners attempt to answer these questions orally. They observe the video clip, and may take down notes.		
✓ The planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night		Body Instruct learners to complete an activity. Suggested activities include: (revision about the movement of the earth and the moon). Consolidation Teacher does corrections with the learners.		Body Consolidation Learners mark their own/peer's worksheet and do corrections.		
✓ During rotation the side of the Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time						
Revolution (Earth)						
✓ All planets also revolve (travel) around the Sun in their own orbits						

✓ Planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution		
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)	
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.	

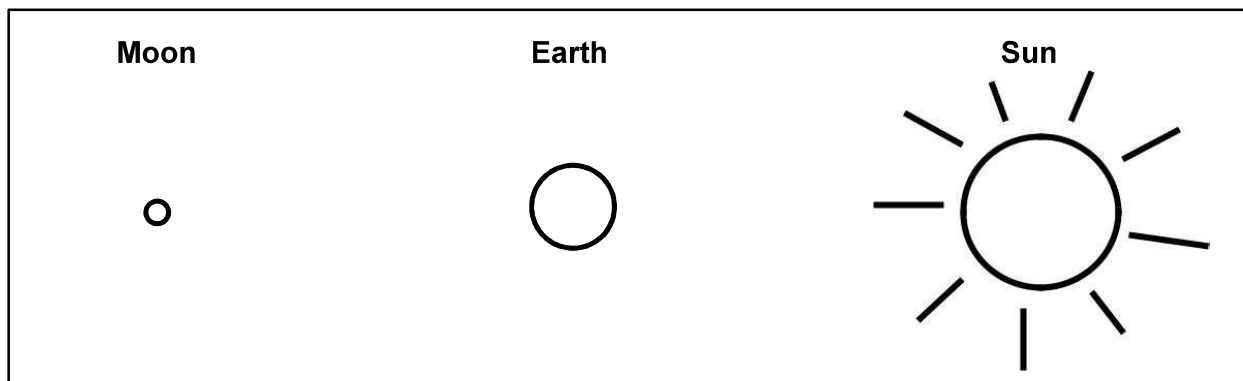
Movement of the Earth / Moon

Multiple Choice

- 1. Why does the moon appear to move across the sky during the night?**
 - A. It travels around Earth every day.
 - B. Earth rotates on its axis.
 - C. It is extremely far away.
 - D. All objects in space are moving.

- 2. What happens when you see the moon's "phases" change? The moon appears to change?**
 - A. colour
 - B. location
 - C. shape
 - D. distance

Use this diagram to answer the next two questions.



- 3. What phase of the moon would you see on this night?**
 - A. first quarter moon
 - B. last moon
 - C. new moon
 - D. full moon

- 4. How many days would pass before the moon was on the other side of Earth?**
 - A. 7
 - B. 14
 - C. 21
 - D. 28

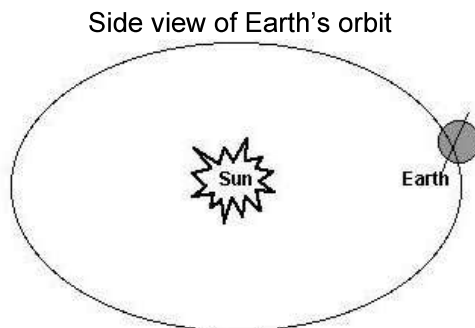
- 5. Why do we see phases of the moon during a month?**
- A. We see only the lighted part of the moon as it moves around Earth.
 - B. Parts of the moon are covered by Earth's shadow.
 - C. Volcanoes on the moon change its shape.
 - D. The moon is smaller when it is farther from us.
- 6. Which of the following would be a way to investigate the phases of the moon?**
- A. Watch it all night.
 - B. Draw it every night for a month.
 - C. Measure the moon with a ruler.
 - D. Make measurements every Wednesday for a year.
- 7. Which of the following correctly describes the movement of Earth, moon and sun?**
- A. Moon revolves around sun, Earth revolves around moon.
 - B. Sun revolves around moon, moon revolves around Earth.
 - C. Moon revolves around Earth, Earth revolves around sun.
 - D. Sun and moon revolve around Earth.
- 8. What is the movement of Earth on its axis called?**
- A. phases
 - B. flotation
 - C. revolution
 - D. rotation
- 9. What is the movement of Earth around the sun called?**
- A. precipitation
 - B. random movement
 - C. revolution
 - D. rotation
- 10. What causes the apparent movement of objects across the sky during a day or night on Earth?**
- A. revolution of Earth in its orbit
 - B. rotation of Earth on its axis
 - C. location of Earth in space
 - D. objects are moving around Earth
- 11. If you watched the night sky for several hours, in which direction would the stars appear to be moving?**
- A. North
 - B. South
 - C. East
 - D. West

Constructed Response

1. Describe how the moon would change if you observed it every night for a month.
As-sume it starts as a full moon.

2. What are you seeing when you see a half moon?

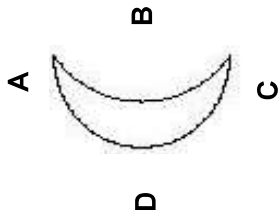
Use this diagram to answer the next two questions



3. Label Earth's orbit.
4. Label Earth's axis.
5. Draw the position of the moon on this diagram, showing where it would be in a New Moon phase.

8.3.3

Use this picture of the moon to answer the next two questions:



6. Which letter shows the direction of the sun in relation to the moon? _____
7. Make a drawing showing where the moon, sun and Earth would be for this phase of the moon.

DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: Movement of the Moon	• Compare the Sun (a star), the Earth (a planet) and the Moon w.r.t. shape, composition, size, movement in relation to other space objects and ability to produce light.	
SUBTOPIC: Sun, Earth and Moon		
Terminology	Star, planet, composition,	
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	✓	Raising Questions	✓	Interpreting Information	
Observing	✓	Predicting		Designing	
Comparing		Hypothesizing		Making/Constructing	
Measuring		Planning Investigations		Evaluating	
Sorting & Classifying		Doing Investigations		Communicating	
Identifying problems & issues		Recording Information			

CONTENT		TEACHING & LEARNING ACTIVITIES		Resources
Comparison between the Sun, Earth and Moon • The Sun, Moon and the Moon are objects in our		The teacher draws up a table about the Sun, Moon and Earth in which learners will be engaged in getting the answers for. The knowledge		Video clips Internet

CONTENT	TEACHING & LEARNING ACTIVITIES				Resources
Solar System. - The Sun is a star at the centre of our Solar System. - The Earth is one of the 8 planets in our Solar System. - The Moon is the Earth`s only natural satellite. - Both the Earth and the Moon revolve around the Sun. - The Sun is much bigger than all the 8 planets in the Solar System. It is more than 1 million times bigger than the Earth. - The Moon is much smaller than the Earth. It is just like a small dot if you compare it to the Sun. About 49 Moons could fit inside the Earth. - The 3 objects are the same in shape. I.e. sphere - The Sun is composed of about ¾ of hydrogen and ¼ helium. In its core, the Sun is very dense and hot. - The Earth is composed of	gained in the previous lessons should be used in getting the correct answers.				Globe Torch Curtains 4 paper persons
		Sun	Moon	Earth	
	Size	420 bigger than the Earth	1 third the size of the earth	Bigger than the Moon but smaller than the Sun.	
	Shape	Round	Different shapes	Round	
	Composition	Sunspots, Core, Radiation zone, Convection zone and Photosphere	Craters, rocks, dust	Rocks	
	Rotation	No movement	28 days	24 hours	
	Revolution	No movement	28 days	365 days	
	Orbiting on own axis	No axis	Have axis	Have axis	
	Ability to produce light	Produce its own light	Reflects the sun`s light	No light of its own	
	Learners are to complete the activity sheet provided. This can be a homework activity.				

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
	Reference: http://m.youtube.com/watch  videoplayback (31).mp4 Discussions: Watch video clip; Complete activity sheet.	
ASSESSMENT		
TEACHER REFLECTION		

ACTIVITY WORKSHEET 1

QUESTION	THE SUN	THE EARTH	THE MOON
What is the object classified as?			A moon
What is the shape?			
What is the size relative to the other objects discussed here?	The Sun is the biggest		
What is the movement in relation to other objects?		The Earth revolves around the Sun	
What is the object made of?			Rock,
Can this object produce light?			No, the Moon reflects the Sun's light (rays)
Is there water present?			

MEMORANDUM

QUESTION	THE SUN	THE EARTH	THE MOON
What is the object classified as?	Star	Planet	A moon
What is the shape?	Round	Round	Round
What is the size relative to the other objects discussed here?	The Sun is the biggest	The Earth is bigger than the Moon and much smaller than the Sun.	The Moon is the smallest.
What is the movement in relation to other objects?	The Sun stays in the same place.	The Earth revolves around the Sun	The Moon revolves around the rotating Earth, while the Earth revolves around the Sun.
What is the object made of?	hot gas (mostly hydrogen and helium)	solid rock, magma, water and gases in the atmosphere	Rock
Can this object produce light?	Yes	No, it reflects the Sun's light.	No, the Moon reflects the Sun's light (rays)
Is there water present?	No	Yes	No

NATURAL SCIENCE: LESSON PLAN	
PERIOD/DURATION: 30 MINUTES & BEYOND AND INTERMEDIATE PHASE CONTROL	
DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:
TOPIC: Systems for looking into Space	- State the main purpose of the telescope - Identify the main components of the telescope.
SUBTOPIC: Telescopes	
Terminology	Astronomers, astronomy and telescope
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE

PROCESS SKILLS

GRADE 6					
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 & LEARNING ACTIVITIES	Resources
Telescopes - telescopes are used to look into space and gather information - South Africa has built and uses some of the largest telescopes	Teacher read the case study together with the learners in class. Activity worksheet Learners read a Case study with the teacher in class: Activity worksheet. The teacher explains as he/she reads with the learner's the difficult terminology. The PPT is used and pictures are shown and explained to learners. Learners look at the PPT with curiosity, and are allowed to ask questions that will be open for discussions. Give learners Activity worksheet and Learners work on Activity worksheet.	Worksheets Chalkboard Internet Websites such as "Mieliestronk" for Afrikaans handles, maps, The scope of microscope, clickers (or) STANDARD: PLANET EARTH

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
		small sound devices)
		Siyavula book grade 6 B and Text book used by school
ASSESSMENT	Suggestion: Let learners build a simple telescope and explain how it works	
TEACHER REFLECTION		

Case Study

Telescopes

The telescope was first discovered by the Dutch. In Holland, a lot of the people were sailors and sea-explorers so they used their telescopes at sea to see if ships far away on the horizon were friends or maybe pirates. A telescope makes faraway things look bigger and closer.

Galileo Galilei was a professor of mathematics at the University of Padua, Italy. In 1609 he heard that somebody in Holland had made a telescope, and he worked out how to make one himself. Galileo used his telescope to look at the planets in the night sky, and he made careful notes of what he saw there. He was the first person to see that Jupiter had moons. He saw that Saturn has rings and he saw that Venus has phases like the Moon has. He also used his telescope to show people that the Milky Way was really made of billions of stars. He wrote books that taught people about telescopes and what they could show us in the night sky.

Today there are big telescopes in many parts of the world, and these telescopes have cameras to photograph the sky. Telescopes have shown us that there are thousands of millions of stars that we could not see with our naked eyes. Some of those stars are so far away that their light has been travelling for millions of years to reach us.

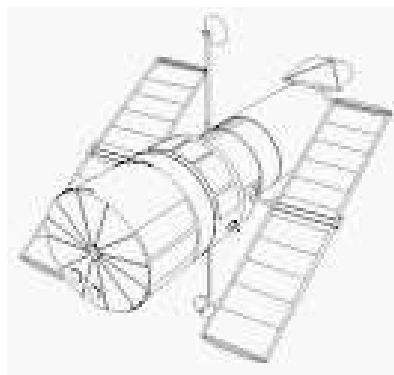
The Southern African Large Telescope

One of the biggest telescopes in the world is here in South Africa, near the town of Sutherland. The telescope is called the Southern African Large Telescope or SALT. The telescope uses lenses and a very big mirror to see the stars and take photographs of them.

The Square Kilometre Array (SKA)

The SKA is a different kind of telescope for looking at the stars. Stars send out energy in light but also in radio waves. The SKA will receive radio waves that our eyes cannot see. An array means a large number of the same items. For example, when the desks in your classroom are all lined up neatly, we can call that an array of desks.

The SKA will have an array of several thousand dishes like those in the picture. When you add together the area of all the dishes, the total area will be the same as one square kilometre. A square kilometer is an area in the shape of a square and the sides are each 1 km long. The area of the square will be 1 km^2 . That is why the telescope is called the Square Kilometre Array.



The Hubble Telescope

The Hubble Space Telescope is a large telescope in space. It was launched into orbit by space shuttle Discovery on April 24, 1990. Hubble orbits about 547 kilometers (340 miles) above Earth. It is the length of a large school bus and weighs as much as two adult elephants. Hubble travels about 5 miles per second: That is like traveling from the eastern coast of the United States to the western coast in 10 minutes. Hubble is solar-powered.

Hubble takes sharp pictures of objects in the sky such as planets, stars and galaxies. Hubble has made more than one million observations. These include detailed pictures of the birth and death of stars, galaxies billions of light years away, and comet pieces crashing into Jupiter's atmosphere.

Scientists have learned a lot about the universe from these pictures. Many of them are beautiful to look at.

What Makes Hubble different from other telescopes?

Earth's atmosphere alters and blocks the light that comes from space. Hubble orbits above Earth's atmosphere, which gives it a better view of the universe than telescopes have at ground level.

Answer the following questions:

1. What do we use a telescope for?

2. Before Galileo, nobody knew that the planet Jupiter had moons. What was the reason?

3. What does SKA stand for?

4. Why are the words 'square kilometre' in the name?

5. With a telescope we can see a lot of stars. Why did we not know about all those stars before there were telescopes?

6. Astronomers build their telescopes far away from cities. Why do you think they do this?

Discussion

Discuss the following questions with your group and report back to the class:

1. Are there more stars than we can see at night? Why?
2. How do scientists find out what stars consist of, how hot, how far and how large they are?
3. Why can't we see the planets in detail with our naked eyes but have beautiful photo's of them?



DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: systems for looking into space	• Understanding terminology • Recalling information	
Content & Concepts/Subtopic: Telescopes		

SUBTOPIC: Telescopes	
Terminology	Astronomers, astronomy and telescope
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE

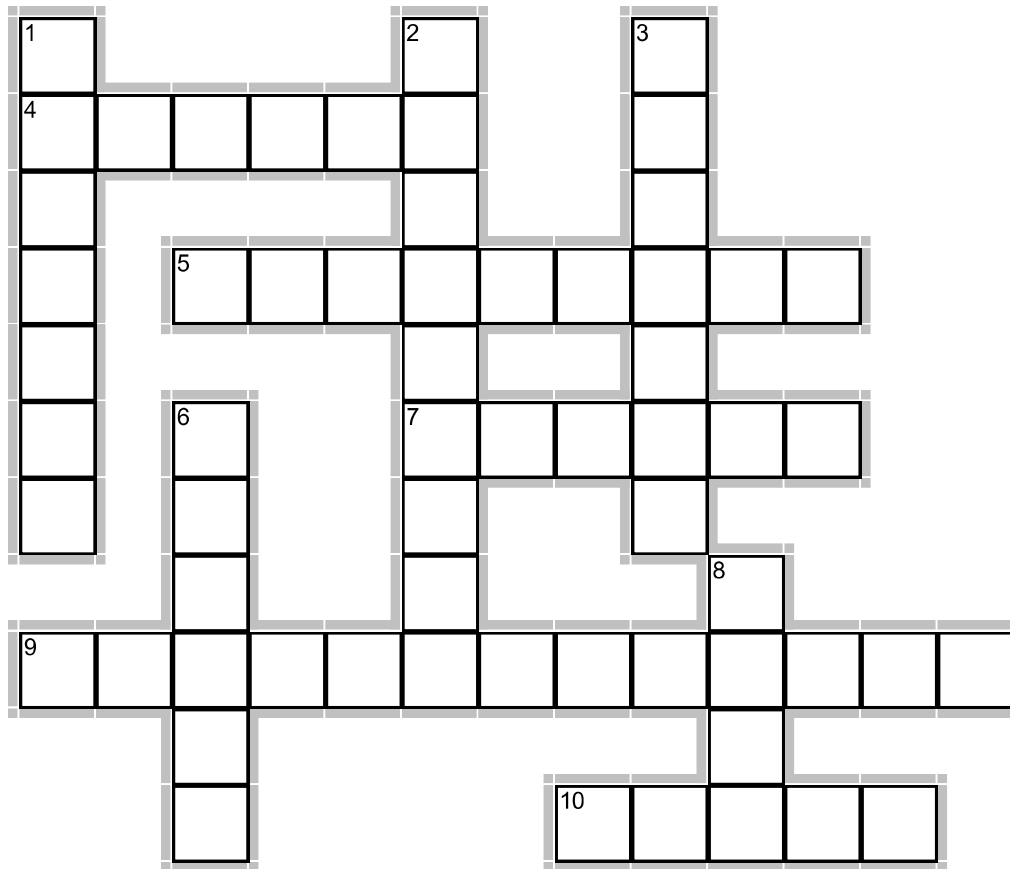
PROCESS SKILLS

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	TEACHING & LEARNING ACTIVITIES	Resources
• Telescopes • • telescopes are used to look into space and gather • information • • South Africa has built and uses some of the largest • telescopes	Teacher discussed the puzzle together with the learners in class. Activity worksheet Learners complete a puzzle: Activity worksheet. The teacher explains as he/she reads with the learner's the difficult terminology. The PPT is used and pictures are shown and explained to learners. Learners look at the PPT with curiosity, and are allowed to ask questions that will be open for discussions. Give learners Activity worksheet and Learners work on Activity worksheet.	Worksheets Chalkboard Internet Websites such as "Mieliestronk" for Afrikaans handlenses, The scope of a microscope, clickers (Or small sound devices) Siyavula book grade 6 B and Text book used by school
ASSESSMENT	Suggestion: Let learners build a simple telescope and explain how it works	
TEACHER REFLECTION		

Space Exploration

Solve the following word puzzle as best as you can. You may team up with a friend to assist each other.



Across

4. Space vehicle
5. Machine orbiting the moon, earth or another planet
7. Used to take pictures of objects
9. Pattern of stars
10. Square Kilometre

Down

1. Space vehicle
2. Used to study the moon, planets and stars from earth
3. Discovery of Jupiter's moons
6. Eight orbiting the sun
8. Sun outside our solar system

DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO: • Construct a model of a telescope using recyclable materials	
TOPIC: THE SOLAR SYSTEM		
Content & Concepts/Subtopic: Telescopes		

SUBTOPIC: Telescopes		
Terminology	Astronomers, astronomy and telescope	
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY	
	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		TEACHING & LEARNING ACTIVITIES			Resources

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
• Telescopes • • telescopes are used to look into space and gather information • • South Africa has built and uses some of the largest telescopes	Teacher will discuss activity worksheet and provide step by step instructions on how to build a telescope Learners need to bring all the raw materials from home in order to complete attached activity sheet. Learners can work individually or in groups. The teacher explains as he/she reads with the learner's the difficult terminology. The PPT is used and pictures are shown and explained to learners.	Worksheets Chalkboard Internet Websites such as "Mieliestronk" for Afrikaans handlenses, The scope of a microscope, clickers (Or small sound devices) Siyavula book grade 6 B and Text book used by school
ASSESSMENT	Suggestion: Let learners build a simple telescope and explain how it works	
TEACHER REFLECTION		

Telescopes: Period 1

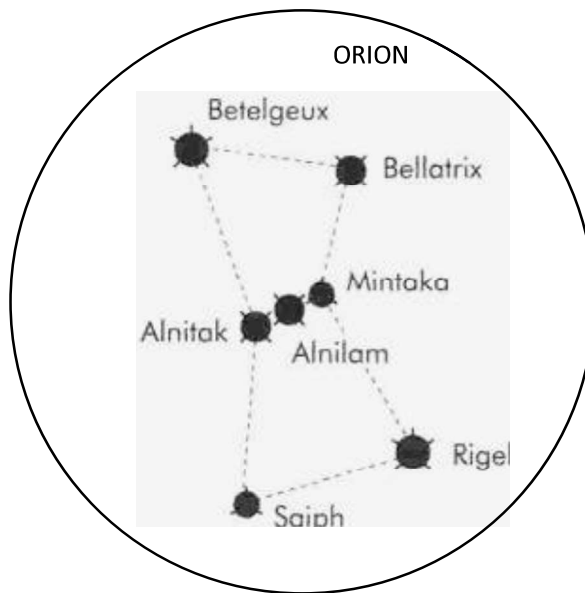
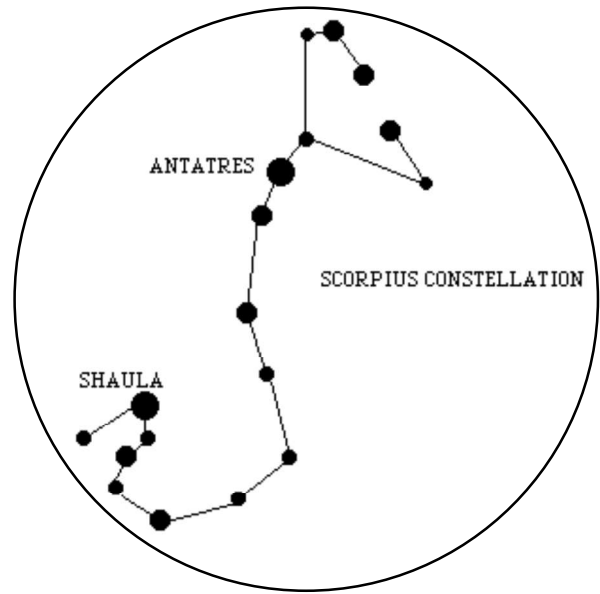
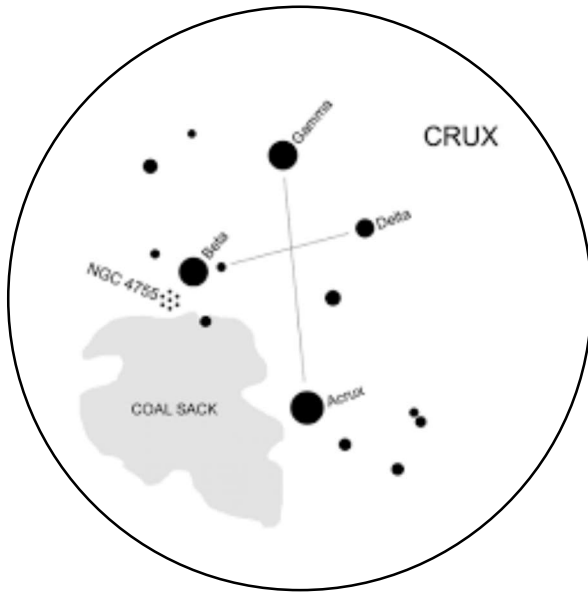
Build your own “telescope”

You will need the following:

Material	Tools
Black cardboard paper	Scissors
Cellotape	Small pin
Glue stick	Pencil

1. Roll the cardboard into a tube
2. Tape it with the cellotape to keep it in a tubular shape
3. Cut out the circular patterns below of the stellar constellations
4. Arrange them on another cardboard
5. Lightly paste the shape onto the cardboard so it cannot move but can be removed easily later
5. Trace the circular shape on the cardboard with the pencil
6. Use the pin and pierce very small holes through the dark spots on the circular pattern through the cardboard
7. Remove the circular shapes
8. Cut out the circular drawing on the cardboard paper
9. Tape them to the end of each tube
10. Hold up to the light, look through and observe your very own star patterns which is called constellations!





DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: THE SOLAR SYSTEM		• Describe the Solar System.			
Content & Concepts/Subtopic: The Sun, Planets and Asteroids		• Describe the movement of planets around the Sun.			
Terminology		Planet, Asteroid, Galaxy, Moon, Sun, Star, Solar System, Revolve, Elliptical, Star lore, Satellite, Atmosphere, Rotation, gravity (Barnard, et al., 2013, p. 161)			
SPECIFIC AIMS		1. DOING SCIENCE AND TECHNOLOGY			
		2. UNDERSTANDING AND CONNECTING IDEAS			
		3. SCIENCE, TECHNOLOGY AND SOCIETY			
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		Making/Constructing
	Evaluating & Improving		Designing		
CONTENT		TEACHING & LEARNING ACTIVITIES			
The Sun, Planets and Asteroids		Teacher Activities		Learner Activities	
✓	The Sun (a star) is at the centre of our Solar System	Intro Ask background questions, e.g. Why can we see stars at night? Which movement of the Earth is responsible for day and night? Which movement of the Earth is responsible for the season? (you may add your own questions as different schools may use different textbooks). Show learners a short video clip or picture showing how the planets orbit the solar system (YouTube, 2015). Explain important concepts such as; the number of planets, main differences between planets such as size, orbit and position (see content).		Intro Learners attempt to answer these questions orally. They observe the video clip, and may take down notes.	
✓	There are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun				
✓	Each planet has its own features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons)				
✓	The planets and Asteroids take different amounts of time to revolve around the Sun (Education, n.d.)				
✓	Every object has a gravitational				
		Resources			
		References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i> . Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d.			

pull towards all other objects ✓ The bigger the object, the bigger its gravitational pull towards objects around it. ✓ The sun is the biggest object in our solar system, therefore all other objects around it, including planets and asteroids, are pulled towards it. ✓ The planets of the solar system are in constant motion around the sun and are constantly pulled towards the sun (sideways), this causes them to not shoot off into space or collide with the sun. the inward pull and sideways movement together cause the objects and the solar system to orbit the sun (Bezuidenhout, et al., 2013, p. 254) Notes * It is not necessary to memorize exact numbers of size of planets, number of moons, and distance from the Sun ** The number of moons around some planets may change as more are discovered *** It is not necessary to make the models of the Solar System to scale	Body Instruct learners to complete an activity. Suggested activities include; order and relative size of planets (making a model) (Bezuidenhout, et al., 2013, pp. 260-261); (Barnard, et al., 2013, p. 162), research about the planets (Adatia, et al., 2013, p. 169); (Barnard, et al., 2013, p. 165), read and answer questions about planets (Adatia, et al., 2013, pp. 172-174), answer questions based on solar system (Barnard, et al., 2013, p. 161). Consolidation Teacher does corrections with the learners.	Body Learners observe as teacher demonstrates. Learners complete an activity from a worksheet (or textbook). Questions must be in line with prescribed content. If the Sun has a gravitational pull on the planets, how come they do not collide with the Sun? What keeps the planets orbiting around the Sun? What is a Star? What are Asteroids? Consolidation Learners mark their own/peer's worksheet and do corrections.	<i>Curriculum And Assessment Policy Statment.</i> Pretoria: Department of Basic Education. YouTube, 2014. <i>Google</i>. [Online] Available at: https://www.google.co.za/url?r=t&source=web&rc=t&url=https://m.youtube.com/watch%3Fv%3D5aDSYTMqyQw&ved=OahUKewidnK3fgZnaAhWklIMAKHd5uA8sQo7QBCCswBA&usg=AOvVawIXdkbl-aMVXYibXlJqxtbk [Accessed 30 March 2018]. YouTube, 2015. <i>Google</i>. [Online] Available at: https://www.google.co.za/url?sa=t&source=web&rc=t&url=https://m.youtube.com/watch%3Fv%3DsmZkQbOn5m&ved=OahUKEwID9oarvZiaAhWIDMAKHd-Ad-AikQtwillzAA&usg=AOvVawI4dnlHtLTwQVLzHXnkY [Accessed 28 March 2018].
ASSESSMENT TEACHER REFLECTION	Worksheet/textbook activity (Informal Assessment) <i>Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.</i>		

Telescopes: Period 2

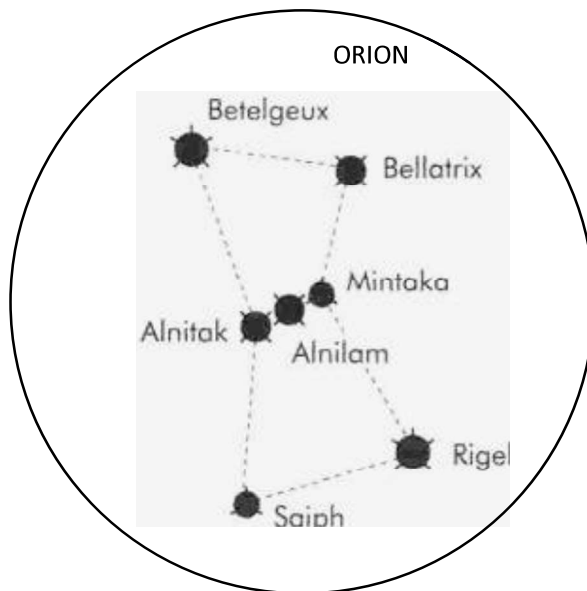
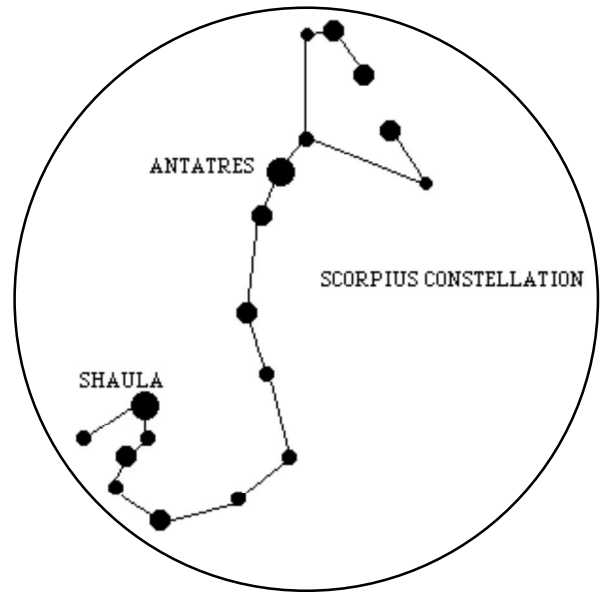
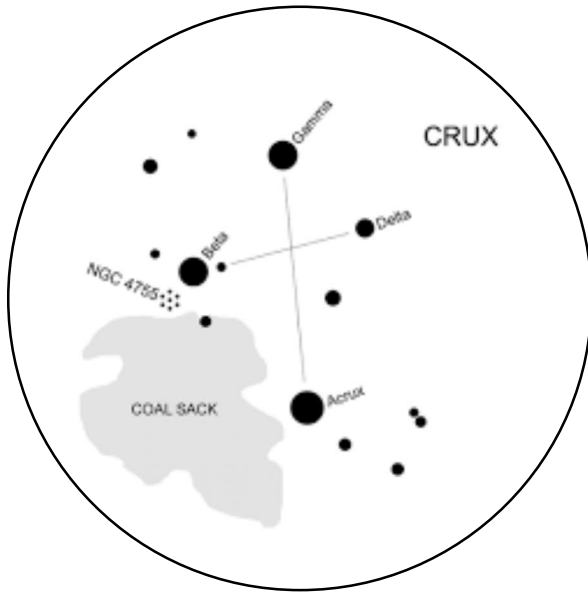
Build your own “telescope”

You will need the following:

Material	Tools
Black cardboard paper	Scissors
Cellotape	Small pin
Glue stick	Pencil

1. Roll the cardboard into a tube
2. Tape it with the cellotape to keep it in a tubular shape
3. Cut out the circular patterns below of the stellar constellations
4. Arrange them on another cardboard
5. Lightly paste the shape onto the cardboard so it cannot move but can be removed easily later
5. Trace the circular shape on the cardboard with the pencil
6. Use the pin and pierce **very** small holes through the dark spots on the circular pattern through the cardboard
7. Remove the circular shapes
8. Cut out the circular drawing on the cardboard paper
9. Tape them to the end of each tube
10. Hold up to the light, look through and observe your very own star patterns!





DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: Systems for looking into Space	• State the main purpose of the telescope • Identify the main components of the telescope.	
SUBTOPIC: Telescopes		
Terminology	Astronomers, astronomy and telescope	
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY	
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	✓

PROCESS SKILLS

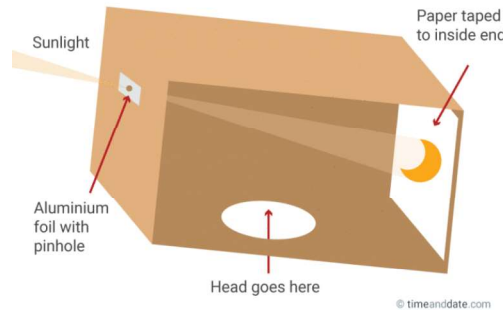
Accessing & recalling Information	✓	Identifying problems & issues	✓	Doing Investigations	
Observing	✓	Raising Questions	✓	Recording Information	✓
Comparing	✓	Predicting	✓	Interpreting Information	✓
Measuring		Hypothesizing	✓	Communicating	✓
Sorting & Classifying		Planning Investigations			

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
• Telescopes • telescopes are used to look into space and gather information • South Africa has built and uses some of the largest telescopes	Teacher gave instructional sheet on how to build a pin hole projector with the learners in class. Activity worksheet Learners follow instructions and build the pin hole projection in groups: Activity worksheet. Give learners Activity worksheet and Learners work on Activity worksheet.		Worksheets Chalkboard Internet Websites such as “Mieliestronk” for Afrikaans handlenses, The scope of a microscope, clickers (Or

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
		small sound devices) Siyavula book grade 6 B and Text book used by school
ASSESSMENT	Suggestion: Let learners build a pin hole projector and explain how it works	
TEACHER REFLECTION		

Constructing a pinhole projector (period 1)

A simple and safe way to watch a solar eclipse is with a box pinhole projector. It is easy to make from a cardboard box and ordinary household items.



Project the Sun

Never look directly at the Sun without proper eye protection. You can seriously hurt your eyes and even go blind.

Projecting the Sun in a box projector, with binoculars or a telescope, or using only 2 pieces of cardboard is a safe and easy way to see a solar eclipse.

Projector Using a Box

This type of pinhole projector works on the same principle as a basic pinhole projector. However, the box makes this projector much sturdier and easier to set on a surface. And it only requires a few extra items to construct.

You Need:

Material	Tools
a long cardboard box or tube	scissors
duct / masking tape	a pin or a thumbtack
aluminum foil	a sharp knife or paper cutter
a sheet of white paper	

Method:

- Cut a rectangular hole at the end of the box. You can tape 2 boxes together to make a long box. The longer the box, the larger the projected image.
- Using the scissors, cut out a piece of the aluminum foil slightly larger than the rectangular hole. Make sure the foil is completely flat and not crinkled.
- Tape the foil over the rectangular hole in the box.
- Use the pin to poke a tiny hole in the center of the foil.
- Tape the sheet of paper on the inside of the other end of the box.
- Stand with your back toward the Sun. Place the box over your head with the pinhole towards the Sun. Adjust your position until you see a small projection, a reversed image, of the eclipsed Sun on the paper inside the box.

Using a Tube?

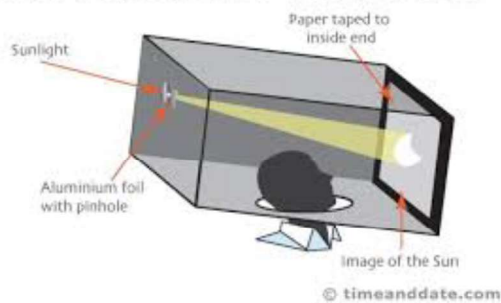
If you are using a long tube or taping 2 tubes together, cut the end of the tubes and tape the foil with a pinhole on 1 end. On the other end, tape a piece of white paper over the end of the tube. This will act as the screen. Close to this end, cut a rectangular hole using the knife. This will be your viewing window.

With your back toward the Sun, point the end with the foil toward the Sun, angling the tube along the Sun's rays. Look into the tube through the viewing window until you see a reversed image of the eclipsed Sun on the screen.

Keep Safe!

- **Never look at the Sun directly** without protective eye gear. Even sunglasses cannot protect your eyes from the damage the Sun's rays can do to them.
- Always keep your back toward the Sun while looking at a pinhole projection.
- Do not look at the Sun through the pinhole.

Pinhole projector using a box



DATE:	OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: Systems for looking into Space	• State the main purpose of the telescope and how it works • Identify the main components of the telescope.	
SUBTOPIC: How Telescopes work		
Terminology	Astronomers, astronomy and telescope	
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY	
	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	TEACHING & LEARNING ACTIVITIES		Resources
• Telescopes • telescopes are used to look into space and gather information • South Africa has built and uses some of the largest • How telescopes work	Teacher demonstrate /shows the learners how telescope works in class. Activity worksheet 1. Learners observed and do practical in class 2. Activity worksheet: Solve a secret code The teacher explains as he/she reads with the learner's the difficult terminology. The PPT is used and pictures are shown and explained to learners. Learners look at the PPT with curiosity, and are allowed to ask questions that will be open for discussions. Give learners Activity worksheet and Learners work on Activity worksheet.		Worksheets Chalkboard Internet Websites such as "Mieliestronk" for Afrikaans handlenses, The scope of a microscope, clickers (Or

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
		small sound devices) Siyavula book grade 6 B and Text book used by school
ASSESSMENT	Suggestion: Let learners observe how telescope works	
TEACHER REFLECTION		

How Do Telescopes Work?

Telescopes have two main parts: the first lens and the second lens. The first lens is called the objective lens and the second lens is called the eyepiece. Telescopes that use only lenses are called refracting telescopes, or refractors. Some telescopes use a mirror, called the primary mirror, in place of the first lens. These are called reflecting telescopes, or reflectors. Most professional telescopes are reflectors.

The objective lens (or primary mirror in reflectors) collects light from a distant object and brings it to a point or focus. The image is bent, or focused, on a small surface called the focal plane. The eyepiece is a magnifying glass. It focuses the light from the image at the focal plane so the observer sees a larger, magnified image.

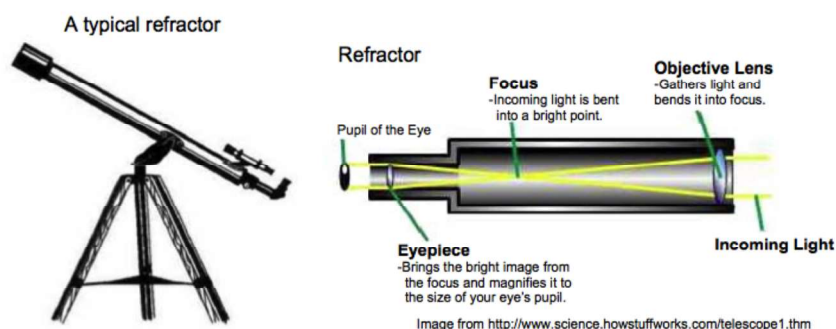
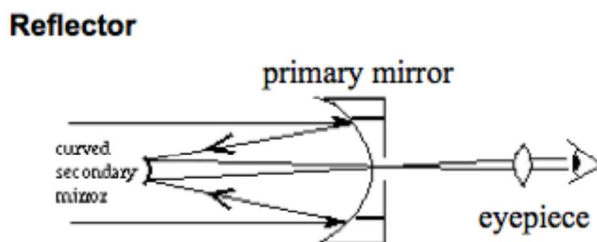


Image from <http://www.uio.ucl.ac.uk/public/telescope-guide/>

Most professional telescopes are reflectors. The main advantage of reflectors is that they can be made very large because the back of the mirror can be supported. Another advantage of reflectors is that there is no chromatic aberration, a feature of refractors where the different wavelengths of light pass through the lens at different speeds and produce a rainbow-like halo around the image. A third advantage of reflectors is that only one side of the objective (the reflecting side of the primary mirror) needs to be the right shape and smoothness to reflect the light. Because light passes through a lens, however, it needs to be perfectly shaped on both sides.

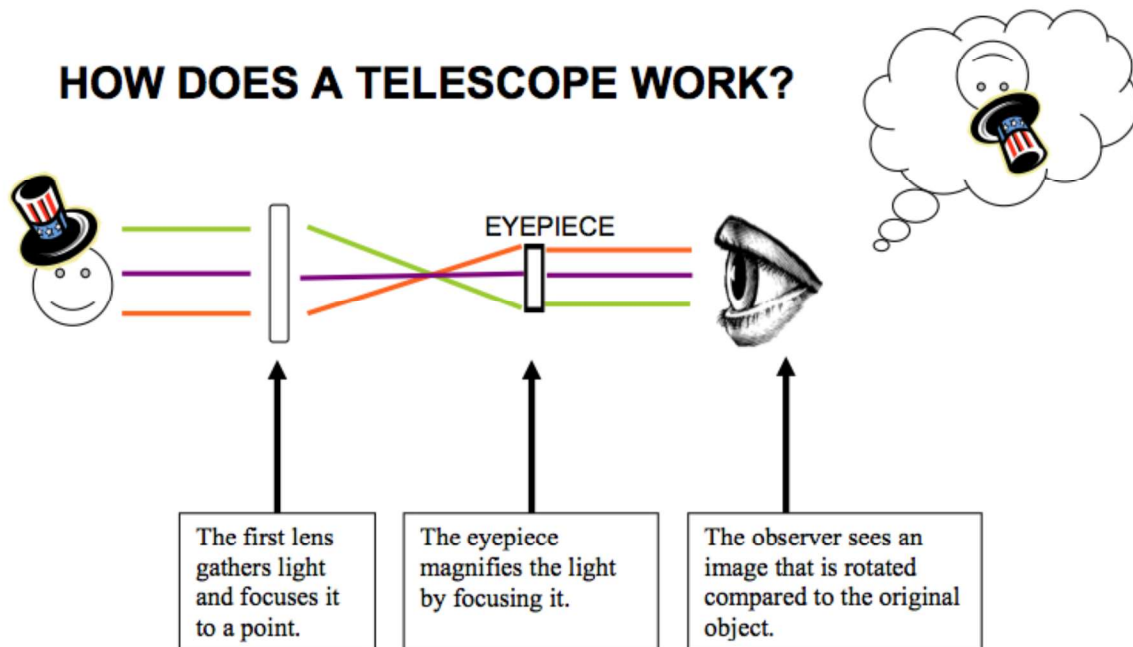


How Does a Magnifying Glass Work?

Magnifying glasses work by focusing light to create a virtual image in a location other than it would appear if the light were not focused. Just like you can see a “virtual you” who appears to stand back in the depths of a mirror, an observer sees a larger, virtual image cast by the light bent through a magnifying glass. The real image is cast on the observer’s retina, not out beyond the focal plane. To the observer, however, the image appears to be some distance beyond the surface of the magnifying glass. Magicians often take advantage of virtual images to make objects seem to appear in a seemingly empty box, or to look like they are hovering in mid air.

Professional Telescopes

Astronomers use telescopes (mostly reflectors) that observe across all wavelengths of light, from low-energy radio and microwave light to high-energy gamma rays and x-rays. The image below is of the complete light spectrum. See the lesson pdf for two images, as well as background information on professional telescopes, the Chandra X-ray observatory and the planned James Webb Space Telescope (JWST). The Chandra X-ray observatory observes x-ray light and the James Webb Space Telescope will observe primarily in infrared light.



Solve the mystery messages with the alphabet key that was recovered from a cosmic spy!

0 2 1 2 11 20 1 7 2 11 23 1 2 4 23 22 2 9 1 0 2 0 2 11 1 2 5 11 2 11

3 2 5 11 2 11 23 11 20 1 11 0 2 2 1 1 2 2 0 20 2 23 4 11

3 23 11 2 2 1 2 5 11 2 11 2 11 2 20 20 2 2 11 11 4 23 2 2 11

Letter	Symbol
a	Ⓐ
b	Ⓑ
c	Ⓒ
d	Ⓓ
e	Ⓔ
f	Ⓕ
g	Ⓖ
h	Ⓗ
i	①
j	②
k	③
l	④
m	⑤

Letter	Symbol
n	⑥
o	⑦
p	⑧
q	⑨
r	⑩
s	⑪
t	⑫
u	⑬
v	⑭
w	⑮
x	⑯
y	⑰
z	⑱



Memo of secret words

telescopes are made with two lenses

lenses focus the light beams

large lenses give better images

Memo of secret words

t e l e s c o p e s a r e m a d e w i t h t w o l e n s e s

l e n s e s f o c u s t h e l i g h t b e a m s

l a r g e l e n s e s g i v e b e t t e r i m a g e s



DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:	
TOPIC: System to explore the moon and mars		- Know about astronaut and their travel to the Moon - Know about Moon Rovers	
Content & Concepts/Subtopic			
-Vehicles used on Mars and Moon			
Terminology	Spacecraft, Space, Engineers, Scientists, Astronaut		
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY		
	2. UNDERSTANDING AND CONNECTING IDEAS		
	3. SCIENCE, TECHNOLOGY AND SOCIETY		
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	Making/Constructing
	Evaluating & Improving	Designing	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Vehicles used on the moon  a few people have visited the surface of the moon and explored it using a vehicle called a moon Rover	Teacher Activities: Introduces the topic: "Vehicles used on the Moon" Teacher settles the learners down to create learning atmosphere and then capture learners attention by asking learners to explain about any landing that has happened on the moon. Learners are asked on how astronauts travel to Moon. Body Teacher explain that astronauts make use of a vehicle called Moon rover to explore the surface of the moon and also talk about Apollo 11 which was the spacecraft used for the first Moon landing. Teacher uses a projector screen to show learners the pictures of Moon rovers, and Apollo 11. During this lesson learners learn that Moon rovers weighs 210kg, the frame is 3,1m long with a wheel base of 2.3m and that the vehicle is low with a height of		-projector -pictures of moon rover -videos of moon rover -any NS/Tech Grade 6 CAPS aligned textbook -Internet

	only 1,4m and it is therefore only 36cm off the ground.	
	Consolidation: The lesson is ended with information that Moon Rover has a steering device which is like that of an aircraft, it is therefore discussed that when the Moon Rover is in space, it unfolds large wing-shaped structures that show panels to the Sun to power the equipment on the Moon Rover. Learner Activities: -Listen, look carefully at pictures shown -Answer and ask questions, active participation in class. -Write notes about the Moon Rover information	
ASSESSMENT	Informal task- learners go home with a task of researching more about Moon Rovers	
TEACHER REFLECTION		

Grade 6 Worksheet Name & Surname _____ Date: _____

Introduction to Moon Rovers

10 Marks

Answer the questions below:

1.1 What is a Moon Rover? _____
_____ (2)

1.2 What was the first Moon landing spacecraft? _____ (1)

1.3 Choose the correct answer by shading the correct one:

(a) Moon Rovers weighs how many kilograms (kg)? (1)

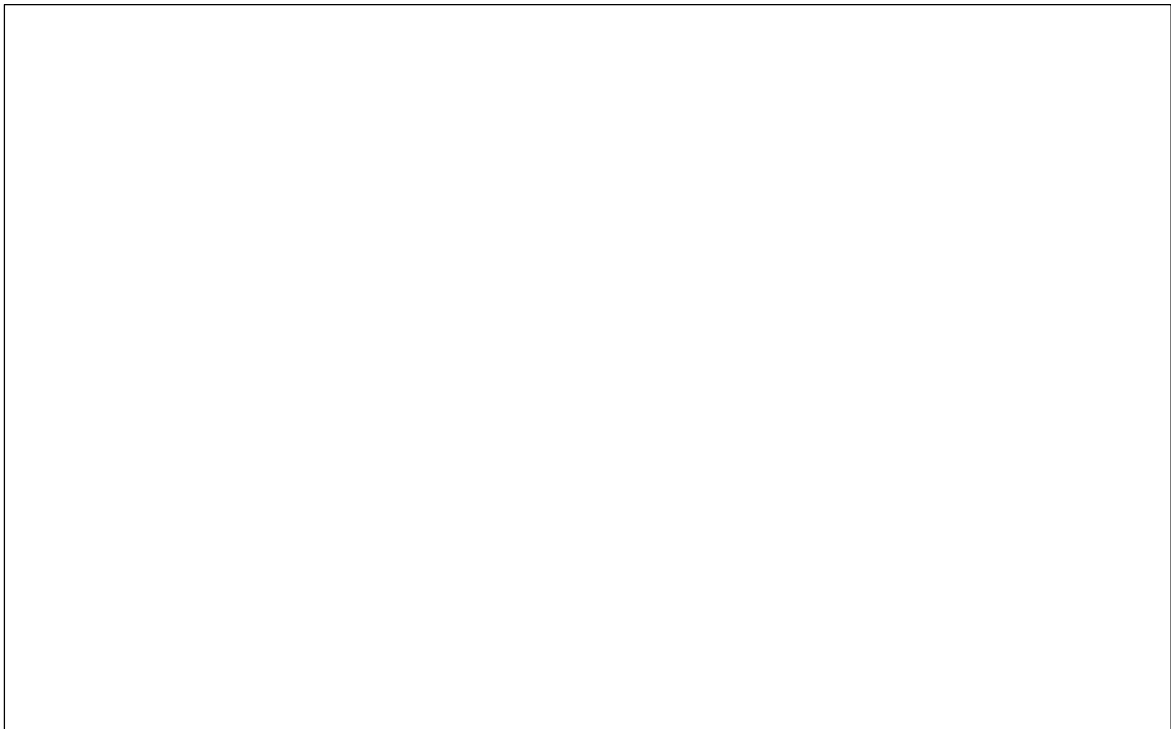
310 kg	210 kg	201 kg	305 kg
--------	--------	--------	--------

1.4 State whether the following is True or False.

(a) The frame of a Moon Rover is 3,1m long with a wheel base of 2.3m. _____ (1)

(b) The vehicle is low with a height of only 1,8m and it is therefore only 38cm off the ground
(1)

1.5 Neatly draw and colour a simple sketch of a Moon Rover. (4)



Total= 10 Marks

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: SYSTEMS TO EXPLORE THE MOON AND MARS		• Learners should read, write, draw and do practical tasks • Describe objects in our Solar System (planets, moons, the Sun, Asteroids) • Researching the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications				
Content & Concepts/Subtopic: Vehicles used on the Moon and Mars						
Terminology	Spacecraft, Space, Engineers, Scientists, Astronaut, Planet, Asteroid, Solar System, Rover, Wheel, Axle					
SPECIFIC AIMS		1. DOING SCIENCE AND TECHNOLOGY				
		2. UNDERSTANDING AND CONNECTING IDEAS				
		3. SCIENCE, TECHNOLOGY AND SOCIETY				
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		Making/Constructing	
	Evaluating & Improving		Designing			

CONTENT		TEACHING & LEARNING ACTIVITIES		Resources
Vehicles used on the Moon (Education, n.d.) ✓ A few people have visited the surface of the Moon and explored it using a vehicle called a Moon Rover Vehicles used on Mars (Education, n.d.) ✓ robots called Mars Rovers have been used to visit and explore the surface of Mars (people have not yet visited Mars) ✓ Researching the key features and	Teacher Activities Intro Instruct learners to conduct research about vehicles on the moon. They may answer some questions about what they have found out (Barnard, et al., 2013, p. 199), (Adatia, et al., 2013, pp. 211-212), (Bezuidenhout, et al., 2013, pp. 312-313, 316). They may answer in their workbooks or worksheets.	Learner Activities Learners take out their homework and show it to the teacher. They swap books as instructed and get ready to do corrections. They may watch a short video clip showing features of different planets.	References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i>. Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology</i> Grade 6. Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al.,	

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications	Body Learners must be instructed to research key features and purposes of the Mars and/or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications (Education, n.d.), (Barnard, et al., 2013, p. 199), (Adatia, et al., 2013, p. 212), (Bezuidenhout, et al., 2013, p. 316). <i>You can also show a short video clip depending on time</i> (YouTube, 2015), (NASA, n.d.).	Body Learners observe pictures or video clip. They complete the research activity by going through the prescribed text (Barnard, et al., 2013, pp. 195-199), (Adatia, et al., 2013, pp. 208-212), (Bezuidenhout, et al., 2013, pp. 311-316). They may ask questions.	2013. <i>Solutions For All Natural Sciences and Technology</i>. Northlands: Macmillan South Africa (pty) Ltd. Education, D. o. B., n.d. <i>Curriculum And Assessment Policy Statment</i>. Pretoria: Department of Basic Education. ✓ Pictures of the Moon Rovers & Mars Rovers
	Consolidation Learners are instructed to conduct more research at home, the library, media centre or computer centre. The teacher must give them a reasonable timeframe to complete this research activity. Instruct learners to bring recyclable materials to use for practicing how to make wheels and axles for the next lesson. Answer any questions relating to the project.	Consolidation Learners listen to final instructions and ask questions relating to the lesson and the worksheet.	
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Name and Surname:

Class: Gr 6/____

INSTRUCTIONS

1. All work must be handed in on the due date set by the teacher
2. Failure to submit on the due date will result in a minus 10% for each day that the work is due
3. Copying will result in an immediate 0
4. If you are absent for a formal assessment, you must bring a doctor's letter.

ASSESSMENT ACTIVITY

Investigate , Design, make and evaluate a model of a Moon/Mars rover. Your vehicle needs to have wheels and axels. The South African Space Agency wants to send a robotic rover to the moon. It needs to be small and light weight but strong. The rover will need to take photographs and gather soil samples.

Remember that the Technological process has certain steps that must be followed.

1. Design Brief
2. Investigation - Research
3. Design
4. Make
5. Evaluation
6. Communication

You will do certain activities individually and others you will do in pairs.

Activity 1: Investigate and Design Brief:

Research variety of cars that can go to the Mars and Moon and paste them on a Poster

Your Design brief

A Design brief for a Technology project is a short statement of what you are going to make, why you are going to make it and what you are going to make it for.

Question:

Write your Design Brief using the following phrases:

- "I am going to design and make a"
- "that will help scientists to ..."
- ".... the Moon/Mars"

Design specification: List of materials, size and shape

Constraints:

Designing/ your final structure



DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: SYSTEMS TO EXPLORE THE MOON AND MARS		• Learners should read, write, draw and do practical tasks • Researching the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications • Make and evaluate a model vehicle featuring wheels and axles • Designing, making and evaluating a model of one of these vehicles which can move by means of wheels and axles (refer to Section 2.7)				
Terminology	Spacecraft, Space, Engineers, Scientists, Astronaut					
SPECIFIC AIMS		1. DOING SCIENCE AND TECHNOLOGY				✓
		2. UNDERSTANDING AND CONNECTING IDEAS				✓
		3. SCIENCE, TECHNOLOGY AND SOCIETY				✓
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		Making/Constructing	
	Evaluating & Improving		Designing			

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Vehicles used on the Moon (Education, n.d.) ✓ A few people have visited the surface of the Moon and explored it using a vehicle called a Moon Rover Vehicles used on Mars (Education, n.d.) ✓ robots called Mars Rovers have been used to visit and explore the surface of Mars (people have not	Teacher Activities Intro Introduce learners to wheels and axles. Show learners a short video clip or pictures showing different methods of making wheels and axles (Adatia, et al., 2013, pp. 213-214), (Barnard, et al., 2013, pp. 199-200), (Bezuidenhout, et al., 2013, pp. 322-324).	Learner Activities Learners take out their homework and show it to the teacher. They swap books as instructed and get ready to do corrections. They may watch a short video clip showing features of different planets.	References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology</i> Grade 6. Cape Town: Maskew Miller Longman

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
✓ yet visited Mars) ✓ Researching the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications ✓ designing, making and evaluating a model of one of these vehicles which can move by means of wheels and axles (refer to Section 2.7) ✓ measuring how far the different vehicles can run down a ramp and draw bar graphs [This can be used as a possible project]	Body Instruct learners to take out the recycled materials they brought to class and prepare to make some wheels and axles using the prescribed text and/or video as a guideline. Learners activity: Learners investigate about wheels Give each learner or team a chance to display and evaluate their wheels, communicating flaws and possible solutions.	Body Learners take out their recycled materials and make wheels and axles using the different methods learnt. Consolidation Learners present their wheels and axles and discuss ways to improve them.	(pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i>. Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d. <i>Curriculum And Assessment Policy Statment</i>. Pretoria: Department of Basic Education. ✓ Pictures of the Moon ✓ Rovers and Mars ✓ Rovers ✓ Apparatus including bottle tops, round ✓ tins or cardboard ✓ circles for the wheels, ✓ sosatie sticks or dowels and ✓ straws for the axles ✓ Measuring tapes or ✓ meter sticks
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

(INDIVIDUAL WORK)

Do research to find out more about the type of rover you have chosen. Use the information on pages 208 and 209 as well as the library and the internet. Then write a report with the **following headings**:

- **Historical facts**

[illegible]

- **What the rover is designed to do.**

Drawings/pictures of rovers: Use pictures, drawings with labels as well as writing.

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: SYSTEMS TO EXPLORE THE MOON AND MARS		• Learners should read, write, draw and do practical tasks • Researching the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications • recall the terms design brief, specifications as well as constraints.			
Content & Concepts/Subtopic: Vehicles used on the Moon and Mars					
Terminology	Spacecraft, Space, Engineers, Scientists, Astronaut, Planet, Asteroid, Solar System, Rover				
SPECIFIC AIMS		1. DOING SCIENCE AND TECHNOLOGY		✓	
		2. UNDERSTANDING AND CONNECTING IDEAS		✓	
		3. SCIENCE, TECHNOLOGY AND SOCIETY		✓	
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		Making/Constructing
	Evaluating & Improving		Designing		
CONTENT		TEACHING & LEARNING ACTIVITIES			
Vehicles used on the Moon		Teacher Activities		Learner Activities	
✓ A few people have visited the surface of the Moon and explored it using a vehicle called a Moon Rover		Intro Introduce learners to the practical project (design, make and evaluate a Moon/Mars Rover). Learners may start with a short activity to prepare them for the practical project (Bezuidenhout, et al., 2013, pp. 316-317). Hand out worksheets and go through the different sections, but focus more on “researching the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy		Learners complete a short activity. They listen to further instructions about the project. hey may watch a short video clip showing features of different planets.	
Vehicles used on Mars					
✓ robots called Mars Rovers have been used to visit and explore the surface of Mars (people have not yet visited Mars)					
✓ Researching the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and					
				References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and</i>	

systems for using solar energy and communications	and communications (Education, n.d.), (Adatia, et al., 2013, p. 212), (Barnard, et al., 2013, p. 199)", (Bezuidenhout, et al., 2013, p. 316). Body Focus on the design brief, specifications and constraints. Explain what a Rover is and also its function on the surfaces of the moon and Mars. Give learners examples of known Rovers such as the Moon Rover, Spirit Rover (Mars), and Curiosity Rover (Mars) (Adatia, et al., 2013, p. 208). Learners must identify a problem, create a design brief and come up with some specifications and constraints. Give them a guideline to bring a rough sketch of the research to class so that they may complete the research section in class. Answer any questions relating to the project.	Body Learners listen to instructions and take notes where necessary. They must be able to recall the terms design brief, specifications as well as constraints. observe pictures or video clip. They may ask questions. Consolidation Learners the design brief, specifications and constraints. They listen to final instructions and ask questions relating to the lesson and the worksheet.	<i>Technology. Northlands: Macmillan South africa (pty) Ltd.</i> <i>Education, D. o. B., n.d. Curriculum And Assement Policy Statment. Pretoria: Department of Basic Education.</i> <i>YouTube, 2014. Google. [Online]</i> <i>Available at: https://www.google.co.za/url?=&source=web&tc=t&iurl=https://m.youtube.com/watch%3Fv%3D5aDSYTMqyQw&ved=OahUK_EwidhK3fgZnaAhWkIMAK_Hd5uA8sQo7QBCCswBA&usg=AOvVawIXdkbl-aMVXYIbXlJgxtbk</i> <i>[Accessed 30 March 2018].</i> <i>YouTube, 2015. Google. [Online]</i> <i>Available at: https://www.google.co.za/url?=&source=web&tc=t&iurl=https://m.youtube.co 2018</i> ✓ Pictures - the Moon & Mars Rovers
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

Activity 3. DESIGN:

(GROUP WORK)

Now that you know a bit more about Moon / Mars rovers, you can start the design. This is the planning phase telling people how you are going to make your rover. The specification tells one what the rover must look like and what it must be able to do. The constraints are those things that can limit our ideas in terms of design.

3.1 Specifications

The rover must:

- move using wheels and axles
- be light and strong
- be able to roll down a ramp in a straight line
- have some special features for doing its work (like cameras, robotic arms and so on).

Your moon rover has the following constraints:

- It must be made of recycled materials.

3.2 Materials needed.

See below some examples you can use to make your rover.

Things to use as wheels: You can collect snuff boxes, shoe-polish tins, the lids of bottles. You can also cut out cardboard circles.

Things to use for axles: You can find sosatie sticks, plastic straws, wooden dowel sticks, aluminium rods. You can also use nails or wire to make axles.

3.3 Tools and materials you will need:

- Some long-nose pliers to cut and bend wire
- Hole-makers (small and big nails) and big scissors for cutting cardboard
- A small hammer to drive the nails
- Some glue
- To decorate your rover car you need crayons or paint.

Questions

1. What materials will you need to make your rover?

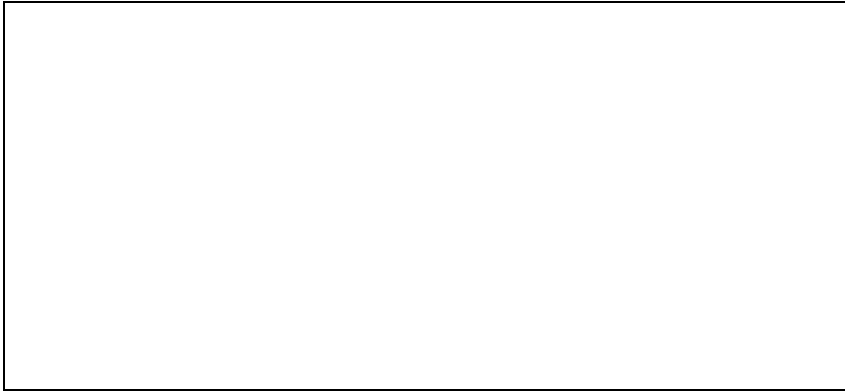
2. What tools will you need to make it? Such as pliers to cut the wire, scissors to cut cardboard.
Make a list and collect some of these items from home.

3. Design drawings: Now you need to draw some designs for your system. Label your drawing showing what materials you are going to use for the different parts. Draw your own design and then you can discuss your design with your partner. You both draw the design that you agreed upon.

Own design drawings



Group design drawings



DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: SYSTEMS TO EXPLORE THE MOON AND MARS		- designing, making and evaluating a model of one of these vehicles which can move by means of wheels and axles (refer to Section 2.7) - recall the terms design brief, specifications as well as constraints.			
Content & Concepts/Subtopic: Vehicles used on the Moon - Testing and Evaluating a Moon/Mars Rover Model					
Terminology	Spacecraft, Space, Engineers, Scientists, Astronaut, Planet, Asteroid, Solar System, Rover, Design Brief, Specifications, Constraints				
SPECIFIC AIMS	1. DOING SCIENCE AND TECHNOLOGY				
	2. UNDERSTANDING AND CONNECTING IDEAS				
	3. SCIENCE, TECHNOLOGY AND SOCIETY				
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		Making/Constructing
✓	Evaluating & Improving		Designing		

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Vehicles used on Mars (Education, n.d.) ✓ designing, making and evaluating a model of one of these vehicles which can move by means of wheels and axles (refer to Section 2.7) ✓ measuring how far the different vehicles can run down a ramp and draw bar graphs [This can be used as a possible project]	Teacher Activities Intro Instruct learners to make their Rover Models, (Adatia, et al., 2013, pp. 2215-16) (Barnard, et al., 2013, p. 202), (Bezuidenhout, et al., 2013, p. 327). Body Instruct learners to write down any flaws and advantages their Models have, as well as any changes that may need to be made. They must write these down in their	Learner Activities Learners test and evaluate their Rover Models. Body Learners write down any flaws and advantages their Models have, as well as any changes that may need to be made. They must write these down in their	References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al., 2013. <i>Day-By-Day Natural Sciences and</i>

CONTENT		TEACHING & LEARNING ACTIVITIES		Resources
Check the learner’s knowledge and that they can: • make and evaluate a model vehicle featuring wheels and axles (Education, n.d.)	worksheets.	worksheets.	Consolidation to present their Rover Models to the class.	<i>Technology Grade 6.</i> Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology.</i> Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d. <i>Curriculum And Assement Policy Statment.</i> Pretoria: Department of Basic Education. Pictures (Moon & Mars Rovers) Apparatus including: bottle tops, round tins or cardboard circles for the wheels, sosatie sticks or dowels and straws for the axles Measuring tapes or meter sticks
	Learners activity			
	Learners will be making their Rover Models .			
ASSESSMENT		Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION		Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		

ASSESSMENT TASK 4. MAKE:

(GROUP WORK)

Now make your Moon/Mars rover!

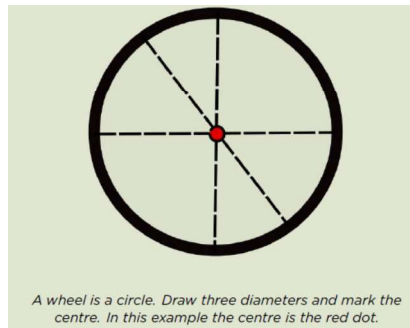
Below are some tips which will help you when making your rover. Remember that you may not have the perfect design from the start! So when making your rover, you need to go back and modify your design as you find things which work and do not work.

1. How to find the centre of a wheel - a wheel is a circle

- Some plastic lids have a small dimple or lump that shows you where the centre is.
- If your lids or discs do not have a dimple, you can use a ruler to draw diameter lines across the middle (a dimple is a small dent).
- A diameter line is the longest line you can draw across a circle. Where diameters cross, that is the centre.

2. How to make the right size hole in the centre

- If you want the wheel to **rotate** on the axle, then you must make a hole that is a little bit bigger than the diameter of the axle.
- If you want the wheel to be **tight** on the axle, then you must make a hole that is smaller than the diameter of the axle. When you push the wheel onto the axle, it will grip the axle.

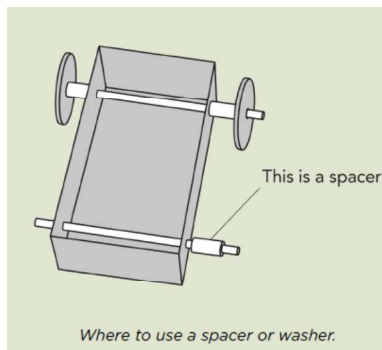


3. How to stop wheels wobbling on their axles

- If the axle goes through just one surface of the lid, this is what can happen: the wheel will wobble. You need to give the lid another surface. Glue two lids together.
- Or else, trace the shape of the lid on cardboard, mark a hole in the centre of the circle, and cut out the cardboard. Cut the cardboard so that the disc will be a tight fit in the lid. Then glue the cardboard into the lid.

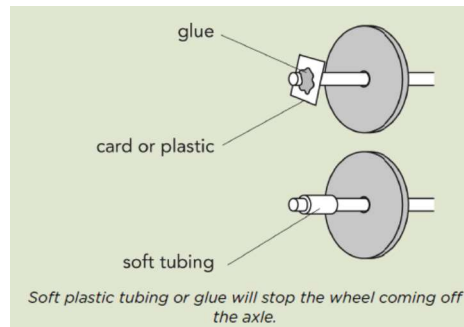
4. Does the wheel rub against the body of the rover?

- You need a spacer on the axle, to keep some space between the wheel and the body.
- You can use a bead with a large hole, or you can make plastic washers from slippery plastic. Milk bottles are good for making slippery washers.
- Use an office punch for making neat holes in a piece of milk-bottle plastic. Then cut around the holes to make washers.



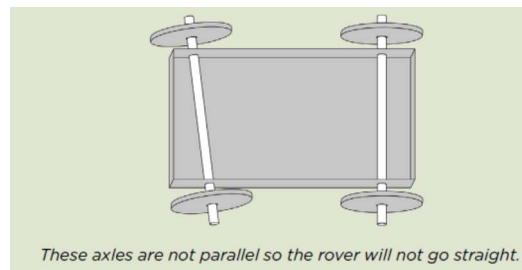
5. Does the wheel come off the axle?

- Push a piece of soft tubing onto the end of the axle as you see in the picture.
- Or push on a flat piece of cardboard and hold it on the axle with glue.



6. Does the rover not run in a straight line?

- The axles must be parallel in your rover.
- These axles in the picture are not parallel. If your axles go through the body, then the axle holes must be the same distance apart on the left and the right side.
- If you need to make a hole in a new place, then you can glue a small piece of card with a hole in it over the old hole.



Test your rover and make it run as well as you can. Go back and draw your improved design. **Draw the rover you have made and write labels to explain what all the parts do. For example, you can write "This piece of straw stops the wheel rubbing against the body."**

Test

Work in groups. Take turns to test your rovers to see how well they work.

DATE:		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: System to explore the Moon and Mars		• Learners should read, write, draw and do practical tasks • Researching the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications • designing, making and evaluating a model of one of these vehicles which can move by means of wheels and axles (refer to Section 2.7) • recall the terms design brief, specifications as well as constraints.				
Content & Concepts/Subtopic: Vehicles used on the Moon Research on Moon/Mars Rovers						
Terminology	Spacecraft, Space, Engineers, Scientists, Astronaut, Planet, Asteroid, Solar System, Rover				✓	
SPECIFIC AIMS			1. DOING SCIENCE AND TECHNOLOGY			
			2. UNDERSTANDING AND CONNECTING IDEAS			✓
			3. SCIENCE, TECHNOLOGY AND SOCIETY			✓
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		Making/Constructing	
	Evaluating & Improving		Designing			

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
Vehicles used on the Moon ✓ A few people have visited the surface of the Moon and explored it using a vehicle called a Moon Rovers Vehicles used on Mars ✓ Researching the key features and purposes of the Mars or Moon Rovers including wheels	Teacher Activities Instruct the learners to complete Evaluation worksheet. Body Instruct learners to answer research questions in their worksheets (Barnard, et al., 2013, p. 201), (Bezuidenhout, et al., 2013, pp. 320-321), (Adatia, et al.,	Learner Activities Learners study their research materials and highlight important statements and keywords as instructed.	References Adatia, R. et al., 2013. <i>Platinum Natural Sciences and Technology</i> . Cape Town: Pearson South Africa (pty) Ltd. Barnard, J. et al.,

CONTENT	TEACHING & LEARNING ACTIVITIES		Resources
and axles, cameras, mechanical arms, and systems for using solar energy and communications	2013, p. 212). Instruct them to make sure that they properly reference their sources. Also instruct them to make drawings of their research. Consolidation ; Learners activity Complete Evaluation worksheet.	Body Learners complete the research questions using the research materials they collected. They must also reference their sources as instructed. They may ask questions. Consolidation Learners take further instructions. They may take notes and ask questions.	2013. <i>Day-By-Day Natural Sciences and Technology Grade 6</i> . Cape Town: Maskew Miller Longman (pty) Ltd. Bezuidenhout, W. et al., 2013. <i>Solutions For All Natural Sciences and Technology</i> . Northlands: Macmillan South africa (pty) Ltd. Education, D. o. B., n.d. <i>Curriculum And Assessment Policy Statment</i> . Pretoria: Department of Basic Education. ✓ Pictures of Moon & Mars Rovers and Mars
ASSESSMENT	Worksheet/textbook activity (Informal Assessment)		
TEACHER REFLECTION	Reflect on the lesson. Identify what worked and what did not work. Suggest changes in future lessons.		