ACTIVITY SHEET BOOKLET RELATING TO THE LASEC EDUCATION NATURAL SCIENCES & TECHNOLOGY KIT FOR INTERMEDIATE PHASE & GRADE 7

GRADE 4	TERM 1	LIFE AND LIVING	LIVING AND NON-LIVING THINGS
ACTIVITY: To investigate what happens when dry yeast is added to a warm sugar solution.			

YOU NEED TO KNOW:

- Yeast is a single cell organism. It is a fungus.

YOU NEED:

- Active dry yeast
- Sugar
- Beaker or petri dish
- Warm water

WHAT TO DO:

1. Add a little lukewarm water to a beaker or Petri dish to cover the bottom.
2. Add a 1/4 teaspoon of sugar and stir until it dissolves.
3. Drop a few grains of dry active yeast into the water near side of the dish.
4. Place the beaker or dish in a place where it can stand for a day without being disturbed.
5. Look to see what happens to the yeast over the next day or two.

ASSESSMENT:

1. Describe what happened to the yeast when it was added to the sugar water solution?
2. Does dry yeast contain living or dead cells? Give a reason for your answer.
3. What is the purpose of putting the dry yeast in water and sugar in this experiment?
4. How is yeast used in the baking of bread?

GRADE 4	TERM 1	LIFE AND LIVING	WHAT PLANTS NEED TO GROW
ACTIVITY: To investigate whether new plants can grow from seeds or cuttings			

YOU NEED TO KNOW:

- You need to do this activity as a PROJECT over a few weeks or a month or two.
- You must hand in your findings in the form of a written report.

YOU NEED:

- Bean seeds or radish seeds
- Cuttings from strawberry, impatients, geranium or any other suitable plant
- Seed tray, flower pot or a half cold drink bottle with small holes in bottom
- Suitable soil
- Ruler or measuring tape

WHAT TO DO:

1. Plan what soil you are going to use for this investigation.
2. Plant your seeds and/or cuttings in your container filled with soil.
3. Where will you put your container? (What conditions are needed for plants to grow?)
4. How often will you water your plants?
5. Draw up a table with columns for Days, Height, Number of leaves.
6. Look at the plants in your container every few days.
7. Measure the height of the plants each time. Count how many leaves are formed. Write down your measurements in your table.
8. Write down what you saw happening to your plant each week.
9. Make a drawing of your plant every week.

ASSESSMENT:

Write up what you saw and measured in the form of a report.
You will be assessed on:

- writing down what soil you chose and why you chose it
- writing down what conditions are needed for plants to grow
- your table that shows the growth in length and the number of new leaves that formed over the period of time
- your drawings to show the changes in growth over this period
- writing down any other things you saw during this investigation that had an effect on the plant growth.

GRADE 4	TERM 2	MATTER & MATERIALS	MATERIALS AROUND US
ACTIVITY: To investigate what happens when some substances are heated or cooled			

YOU NEED TO KNOW:

- When a substance changes from a solid to a liquid or from a liquid to a gas we call this a **change of state**.

YOU NEED:

- Test tube
- Test tube holder (clothes peg)
- Ice
- Beaker filled with cold water
- Spirit burner
- Plastic cup

WHAT TO DO:

1. Place a little crushed ice in a test tube. (Use a test tube holder to hold the test tube.)
2. Heat the test tube with ice over a spirit burner. Notice what happens.
3. Continue to heat the water in the test tube until it starts to boil.
4. Hold a beaker, filled with cold water, near the mouth of the test tube when the water boils. **(Be careful not to put your hand near the mouth of the test tube).**
5. What do you see happening on the side of the beaker?
6. Let the water in the test tube cool again.
7. If there is a fridge at the school pour the water into a plastic cup and place in the freezer for a few hours.
8. What happens to the water in the cup?

ASSESSMENT:

1. Describe what you saw happening at each stage of this investigation.
   Use the words: heated, melted, evaporated, condensed, cooled, solidified, froze to describe what you saw.
2. What changes of state took place during this investigation?
3. Can other substances, besides water, also go through a change of state? If so give an example.

GRADE 4	TERM 2	MATTER & MATERIALS	MATERIALS AROUND US
ACTIVITY: To investigate melting and solidifying using different substances			

YOU NEED:

- Test tube/watch glass/evaporating dish
- Spirit burner
- Heating stand/test tube holder
- Wax
- Butter/margarine
- Chocolate
- Ice cream

WHAT TO DO:

1. Place about 1/4 teaspoon of one of the above solid substances in an evaporating basin or a test tube (or a watch glass).
2. Warm the substance over the burner. Watch what happens.
3. Allow the substance to cool again. Watch what happens.
4. Clean the container.
5. Repeat with each of the other solid substances.

ASSESSMENT:

1. What is meant by:
   A. melting
   B. solidifying
2.

SUBSTANCE	RESULT OF HEATING	RESULT OF COOLING
Butter/margarine		
Chocolate		
Ice cream		
Wax		

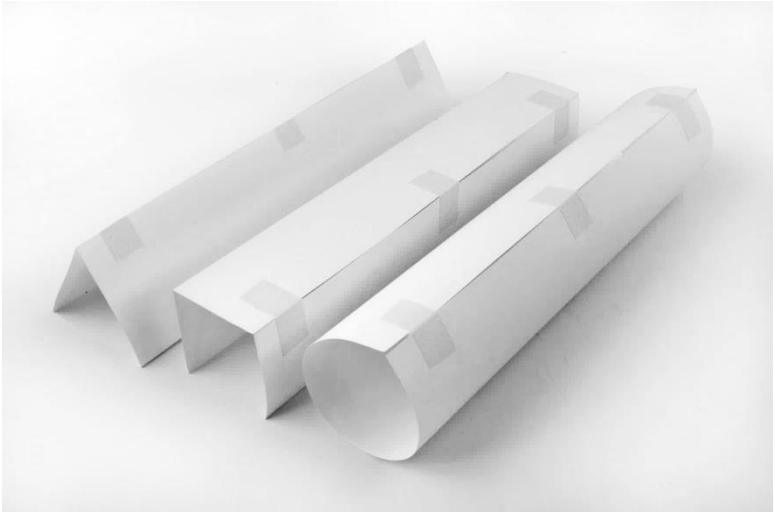
   Complete the table above and say what you saw happening.
3. Does each substance return to the same substance when it cools?
4. Does the ice cream solidify on cooling? If not explain why not?
5. How can we get a piece of iron to melt and solidify again?
6. What is the difference between melting and dissolving?

GRADE 4	TERM 2	STRUCTURES	STRENGTHENING MATERIALS
ACTIVITY: To investigate which shape of pillar is the strongest (can support the biggest load)			

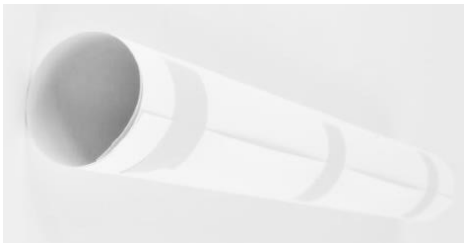
YOU NEED:

- Sellotape
- Sheets of A4 paper
- Test masses (e.g. pieces of modeling clay or small books of the same mass)
- Square piece of cardboard about 10cm x 10cm

WHAT TO DO:



1. Mark out and fold a sheet of A4 paper along its length to form a square pillar (as shown above).
2. Put pieces of sellotape where the two open ends join to keep the shape.
3. Do the same with a second sheet of A4 paper and make triangular pillar (as shown above).
4. Do the same with a third sheet of A4 paper and make circular pillar (as shown above).
5. Stand the pillars upright. Lie the cardboard square on top of each pillar. Now place test masses on top of each pillar. Keep adding more masses until the pillar buckles.
6. Roll a sheet of A4 paper to make a narrow tube. See drawing below. Test how strong the tube structure is.



ASSESSMENT:

1. Which pillar structure is the strongest?
2. Is the tubed structure (rolled paper) stronger than the single-walled pillars?
3. Where, in the things we use in our daily lives, do we find structures that make use of folding for giving them strength?
4. Look at the walls of a corrugated cardboard box. How does folding give the cardboard strength?

GRADE 4	TERM 2	STRUCTURES	STRONG FRAME STRUCTURES
ACTIVITY: A water tower case study in the form of a project.			

Read the following CASE STUDY:

Funda is primary school in a village. The water for the village is from a pipeline that was built many years ago. Many more people have moved into the village since then and, as more people installed taps, the water pressure got less. At Funda School water now comes out of the taps very slowly.
The people from the village asked the nearby town council to put in a larger pipe-line, but the council said that they do not have funds at present and can only consider this in a few years time. You have a suggestion that you can increase the water pressure if you put water in a tank and raise it high above the ground. The tank can be supported by a structure to create a **water tower** to store the water. **Water is quite heavy so it will need to be a strong structure to support the water tank.**

- You want to make a model of a water tower for the school committee to show that this idea will work.
- You must use an empty jam or canned fruit tin (large size) for the water tank.
- Your model tower that supports the tank must be at least 25 cm high excluding the tank.
- The tower must be made from paper struts that you rolled from sheets of paper.
- **Use triangulation** in your design to strengthen the structure.
- **The tower must be strong enough to support the tin when it is filled with water.**

YOU NEED:

- An empty jam tin or canned fruit tin
- Sheets of paper or pages from an old magazine or newspaper for the struts
- Sellotape or masking tape to join the struts

WHAT TO DO:

Design.
Each learner in the group:
- Make your own 2-D sketch of a possible tower that the group can make.
- List the materials that you will use to make your tower.
- Show your design to the rest of the group.
- In your group discuss which design, or combination of designs, is the best.

Make your model water tower
Evaluate your product
- Does it meet the specifications?
- Did you follow you plan (design)?
- Can it support the load? Fill the can with water without wetting the structure.
- Is it neat and well-finished?

GRADE 4	TERM 3	ENERGY AND CHANGE	MOVEMENT & ENERGY IN A SYSTEM
ACTIVITY: A project to make an instrument that produces sound energy.			

Read the following CASE STUDY:

The town's philharmonic society wants to encourage young children to enjoy music.
They are having a competition.
Children must design and make a musical instrument .
The instrument must be able to produce different notes.
It must be made out of basic or recycled materials.
Entries will be judged on originality, quality of sound and appearance.

WHAT TO DO:

Research:

- Find the meaning of the word philharmonic
- Use books, the library, friends and family and the internet to find out about different kinds of musical instruments and how they work. Look at classical as well as indigenous musical instruments

Design:

- Draw a few possible musical instruments you could make.
- Will it work by plucking, blowing, beating or shaking?
- Choose the one you think is best.
- How are you going to make the instrument?
- What tools do you require?
- What materials do you require?

Make:

- Make your musical instrument

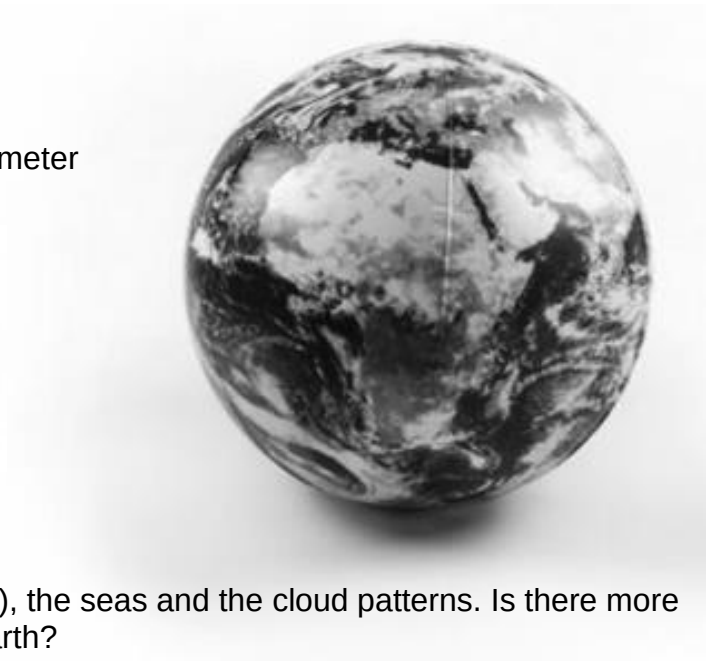
Evaluate your product:

- Is it made from mainly recycled materials?
- Does it produce different musical notes?
- Are the musical sounds clear?
- Is it neatly finished?

GRADE 4	TERM 4	PLANET EARTH & BEYOND	PLANET EARTH
ACTIVITY: To investigate some of the features of the earth			

YOU NEED:

Earthball (or a globe of the Earth)
Polystyrene sphere or a ball about 100mm in diameter
Torch or lamp



WHAT TO DO:

1. Inflate the Earthball
2. Look at the large land masses (continents), the seas and the cloud patterns. Is there more sea **or** land covering the surface of the Earth?
3. Find the North and South poles so that you can hold the globe the right way. The Earth spins (rotates) on its own axis along the North-South pole line.
4. Place your left forefinger on the North pole and your right forefinger on the South pole. You can now rotate the Earth on these two points.
5. Place a thin sheet of tissue paper on any part of the Earthball. This shows **the thickness** of the layer of air that surrounds the Earth.
6. Get another learner to hold the torch or lamp a few meters away to provide rays of sunlight lighting the Earth. The part of the Earth that is lit up is in daylight and the part of the Earth in shadow is in night.
7. Use the ball or polystyrene sphere to represent the Moon. One learner, holding the ball, can walk around the Earthball to show the path of the Moon.
8. How long does it take for the Moon to revolve once around the Earth?
9. The Earth also revolves around (orbits) the Sun.
10. Try showing this by walking in a circle around the torch.

ASSESSMENT:

1. In your groups, discuss what you have learnt about the Earth, Moon and Sun.
2. Is most of the surface of the Earth covered with water or with land?
3. Is the layer of air that surrounds the Earth thin or thick compared to the size of the Earth?
4. Is the Earth bigger or smaller than the Moon?

GRADE 4	TERM 4	PLANET EARTH & BEYOND	PHASES OF THE MOON
ACTIVITY: To investigate the changing shape of light on the moon			

YOU NEED TO KNOW:

- The moon has no light of its own.
- We can only see that part of the moon which sunlight shines on.

YOU NEED:

- Torch (or a lamp)
- Moon and Earth model (or polystyrene ball to represent the moon and an Earth globe)

WHAT TO DO:

1. **If you can do this investigation in a darkened room it works better.**
2. Shine the torch or lamp to light up the Moon model or polystyrene sphere.
3. View the light on the “Moon” from different sides.
4. When the light falls on the Moon straight on, you see the whole surface, facing you, lit up.
5. When the light falls on the Moon from the side you only see part of the Moon lit up.
6. When the light falls on the Moon from behind, you don’t see any light on the Moon.

Now, using what you have seen:

1. Try to find the Moon in the sky each day over a period of a month.
2. Look for the Moon during the day and at night.
3. **If you go to look for the Moon at night make sure that you have an adult with you at all times.**
4. Write down:
   1.) The date
   2.) Describe the shape (in words) and
   3.) Draw pictures of what the Moon looks like each day.

ASSESSMENT:

1. Hand in your record of drawings and descriptions of the shape of the Moon for the month.
2. What do we mean when we talk about the “Phases of the Moon”?
3. Why do we only see part of the Moon during certain times of the month?
4. How long does it take for the pattern of the Moon to repeat itself?

GRADE 4	TERM 4	SYSTEMS & CONTROL	ROCKET SYSTEMS
ACTIVITY: To design, make and evaluate a rocket model using balloons			

YOU NEED:

- Balloons of different sizes
- Fishing line
- Sellotape
- Drinking straws
- Tape measure

WHAT TO DO:

Investigate different balloon rockets and measure how far each one will travel along a stretched fishing line.

Design:

- Plan how you are going to do your investigation.
- How will you attach your fishing line?
- How will the balloon rocket move along the fishing line?
- How many different rockets will you try?
- How will you measure and record the distance travelled?

Make:

- Set up your investigation and test your different balloon rockets.

Evaluate:

1. Record the distance travelled by your different rockets in the form of a bar graph.
2. Evaluate each rocket and say why some rockets travelled further than others.
3. How could you improve this investigation to make the balloon travel further?

GRADE 5	TERM 1	LIFE & LIVING & STRUCTURES	SKELETONS AS STRUCTURES
ACTIVITY: To make a model of a vertebrate skeleton			

YOU NEED TO KNOW:

- A vertebrate skeleton is a frame structure.
- The joints between bones allow for movement.

YOU NEED:

- Paper (A4 sheets /newspaper /magazine pages)
- Sellotape
- Wooden dowels
- Paper clips/thin wire
- Drinking straws
- Paper fasteners
- String/thread

WHAT TO DO:

Design:

- Plan what vertebrate skeleton you are going to make.
- You can use rolled paper to make struts that represent the bones (or you could use straws or sticks/dowels for this purpose).
- Plan how you are going to join the bones.
- Plan how you are going to support the whole skeleton.
- Make a sketch of your design.

Make:

- Make your skeleton.

Evaluate:

- Did you complete the task?
- Can the limbs move at the joints?
- Is your skeleton neatly finished?
- Can you name the different parts on your skeleton?

GRADE 5	TERM 2	MATTER & MATERIALS	METALS & NON-METALS
ACTIVITY: To investigate some properties of metals and non-metals			

YOU NEED TO KNOW:

- Malleable means the substance can be hammered, bent or shaped.
- Brittle means the substance breaks or shatters if it is hammered.

YOU NEED:

- Piece of copper wire
- Piece of chalk
- Piece of coal or charcoal
- Some coins
- Piece of rock
- Tin can

WHAT TO DO:

Test each substance according to the property and complete the table.

ASSESSMENT:

1. Complete the table.

Substance	Property			Metal or non-metal
	Shiny or dull	Malleable or brittle	Hard or soft	
Copper				
Coal				
Rock				
Chalk				
Coin				
Tin can				

2. Name three other metals and three non-metals.
3. Do most metals melt easily?
4. Some metals sometimes get a dull surface after a while. How can we clean the surface to make them shiny again?

GRADE 5	TERM 2	MATTER & MATERIALS	OTHER PROPERTIES OF METALS
ACTIVITY: To test different metals and to find out if they are attracted by a magnet			

YOU NEED TO KNOW:

Drawing pins, paper clips and tin cans are made of iron with a coating of another metal on the surface.

YOU NEED:

- Magnet
- Metal objects, like nails, screws, copper wire, paper clips, drawing pins, coins, brass screws, iron filings, aluminium object and any other metallic objects you might find. *Sandpaper has been included in the kit to remove any pollutants/rust found on the nail.

WHAT TO DO:

1. Draw up a table with two columns, one labelled Magnetic Metals and the other non-magnetic Metals.
2. Test each object with the magnet to see if it is attracted.
3. Fill in the substance in the correct column after you have tested it.

ASSESSMENT:

1. Complete the table that you drew up.
2. Are non-metals magnetic? (You could test a few non-metals to see.)

GRADE 5	TERM 2	MATTER & MATERIALS & PROCESSING	PROCESSING MATERIALS
ACTIVITY: To investigate what happens when we mix different substances and compare their properties before and after mixing.			

YOU NEED TO KNOW:

When processing certain substances by mixing them you need to combine them in a definite proportion to get the result you want.

YOU NEED:

- For mixing and setting: Plaster of Paris (or Polyfilla) and water
- For mixing and setting: Sand, gravel, cement and water
- For mixing and setting: Flour and water
- For mixing and cooling: Jelly powder (or gelatine) and hot water
- For mixing and cooking: Ingredients to make a pancake (flour, egg, milk, oil)
- Suitable container to do mixing (e.g. plastic bowl or bottom cut-off from plastic cold drink bottle)
- Small pan for pancake

WHAT TO DO:

1. The teacher should help you to divide up the different types of mixtures between the groups in the class so that each group is making one of the different types of mixtures.
2. Plan how you are going to make your mixture. (Find out about what proportions of each component to use.) Write down your method.
3. Bring the necessary ingredients to class to make your mixture.
4. Notice the properties of each component before you mix them.
5. Make your mixture (and leave to set, dry, cool, cook or dry).
6. Examine the properties of your product. Are these the same as the ingredients?

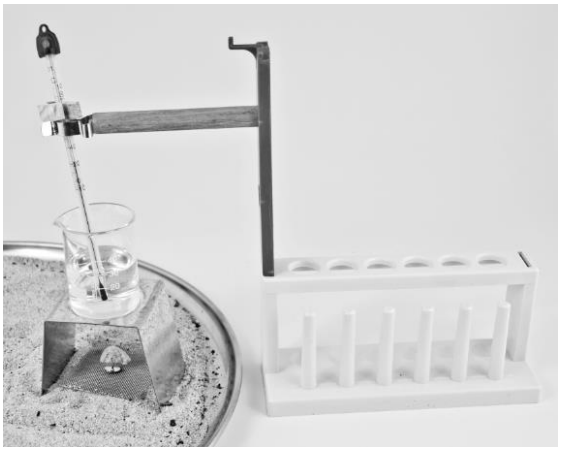
ASSESSMENT:

Hand in your findings in the form of a report. Use the following headings to help you.

- Components of my mixture.
- Properties of each component.
- Proportions for my mixture.
- How I made my mixture.
- What I saw happening.
- Properties of the final product.
- Uses of the product I made.
- Conclusion.

GRADE 5	TERM 3	ENERGY & CHANGE	STORED ENERGY IN FUELS
ACTIVITY: To investigate what energy is released when we burn different fuels and what input energy is needed to make them burn			

YOU NEED:



- Various common fuels: e.g. wood, coal, paraffin, candle wax.
- Unusual fuels: e.g. Peanut, cashew nut or a piece of biscuit.
- Large metal lid, or tray lined with a layer of sand (area below fuel to protect surfaces)
- Matches and wood splints to light the fuels
- Learner Chemistry Kit
- Metal drawing pin/ needle in cork

WHAT TO DO:

1. What precautions must you take when working with fire and smoke?
2. Choose three fuels from the above list to test, trim them to approximately 1cm^3 each.
3. Write down which fuels you predict will generate the most or least heat.
4. Lay out a metal or tinfoil lined tray where you intend to do the test and line with approximately 1cm thick layer of sand to protect the surface from the burning fuel.
5. Lay the steel gauze from the Kit on the sand, place the drawing pin with fuel pinned on the end on the gauze so that the fuel is held above the surface.
6. Place bipod stand and beaker with 30ml water above the fuel.
7. Set up thermometer in stand so that it can be held in water without touching the bottom of the beaker – this is so that the water temperature is measured rather than the temperature of the beaker base.
8. Record the temperature of the water at room temperature with unlit fuel.
9. Light the fuel with a match or wooden splint and measure the temperature that is reached when the fuel is almost burnt up. Replace water or allow to cool back to room temperature.
10. Record the increase in temperature for each of the fuels. Remember to do this by measuring start temperature and end temperature each time.
11. These fuels generate smoke so all equipment should be cleaned well before packing away.

ASSESSMENT:

1. Write down the precautions you took during your investigation.
2. Draw a table indicating your results. e.g.

Fuel	Input Energy	Start temperature	End temperature	Temperature increase

3. Were you correct in you predictions about most heat and least heat given off? What were the results?
4. Use your findings to explain what is meant by:
   (a) input energy to make fuel burn
   (b) output energy from fuel.
5. Why can we say that a biscuit is also a fuel?
6. Where do our bodies get the energy from to go about our work and play each day?

GRADE 5	TERM 3	ENERGY & CHANGE	BURNING FUELS
ACTIVITY: To investigate how long a candle will burn when it is covered with a glass container.			

YOU NEED TO KNOW:

Fuels need oxygen from the air to burn.
It is easier to light a candle and place the container over it than to light a candle inside a container.

YOU NEED:

- Short pieces of candle
- 3 Glass containers of different sizes (mouth should fit easily over candle)
- Matches or lighter to light candles
- Saucer or dinner plate with thin layer of water
- Stop watch

WHAT TO DO:

1. **Make a hypothesis** about how long a candle will burn in a closed container.
2. Stand the candle in the middle of the plate (this can be done by lighting it, dropping some hot wax onto the plate and standing candle in the wax so that it stays up) and pour in a thin layer of water around it, light the candle and then place one of the containers over it timing how long it continues to burn.
3. Repeat this with the other containers comparing how long they burn.

ASSESSMENT:

1. Write down your hypothesis.
2. Make a labelled drawing how you will carry out the investigation.
3. Write down the steps of what you will do.
4. Write down what you saw happen in your investigations.
5. Were you correct in your hypothesis? Give a reason for your answer.
6. Explain burning of fuels in terms of air and the oxygen in it in your investigation.
7. What happened to the water on the plate?
8. What is used up in this investigation? Remember that fire needs fuel, heat and oxygen to burn.
9. Related to your findings, explain how some fire extinguishers work.

GRADE 5	TERM 3	ENERGY & CHANGE & SYSTEMS & CONTROL	ENERGY & ELECTRICITY
ACTIVITY: To investigate how to set up a simple electrical circuit.			

YOU NEED:

- Cell (penlight AA)
- Light bulb
- Connecting wires
- Cell holder
- Bulb holder.

WHAT TO DO:

1. Connect the electrical components to make a simple electrical circuit as shown below.
2. See what happens to the light bulb when the circuit is complete.
3. Try reversing the connections from the cell to the light bulb. Does the bulb still light up?

ASSESSMENT:

1. We call this an electrical system, what happens when any part of this system is disconnected?
2. What does the + symbol on the cell indicate?
3. Where does the energy come from to make the light bulb light up?
4. What energy changes (transfers) take place in this circuit?
5. How long will the light bulb burn if it is not switched off?
6. Describe two ways that you can make the light bulb turn off when you want it to.

GRADE 5	TERM 3	ENERGY & CHANGE & SYSTEMS & CONTROL	ENERGY & MOVEMENT
ACTIVITY: To investigate how things work that use stretched elastic bands and compressed springs			

YOU NEED TO KNOW:

When we stretch or twist elastic or compress or stretch a spring we store energy in it.

YOU NEED:

- Elastic bands Catapult (teacher demonstration only)
- Coiled spring
- Toys that use springs or elastic to work

Materials to make your own toy

- Elastic bands
- Cardboard
- Two bottle caps
- Stick/dowel about 20cm long
- Reamer / drill
- Washer
- Tape

WHAT TO DO:

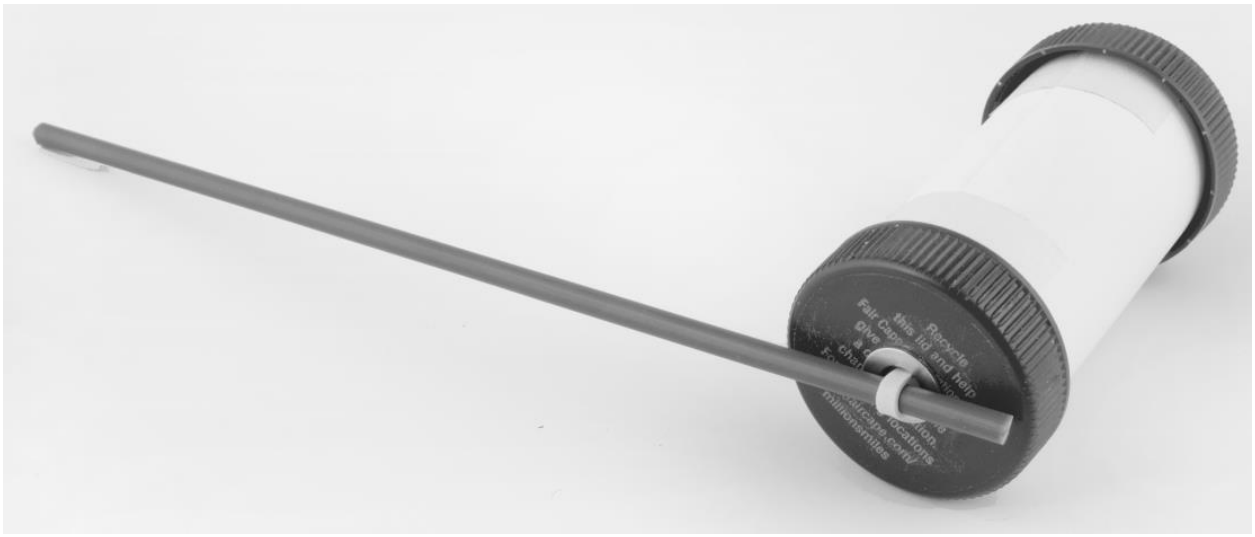
1. Examine any toys that learners or the teacher can bring to class that work using springs or elastic. Find out how they work.
2. Your teacher will also demonstrate how a catapult can propel a soft object like a piece of bread or a marshmallow.

MAKE A SIMPLE 'SPOOL RACER' TOY

1. Ream two holes in one bottle top, one hole in middle of other.
2. Cut a 7cm wide strip of cardboard and roll it up as a tube to fit between the two caps.
3. Thread one end of elastic through cap with two holes so secure.
4. Thread other end through tube and cap with one hole, then washer and over end of stick leaving about 1cm overlap for stick.
5. Additional elastic bands can be wrapped around caps for extra grip or to increase the circumference of a wheel in order to make it turn.
6. Decorate, wind it up and race.

ASSESSMENT:

1. What energy changes take place when an elastic band makes something move?
2. Where does the elastic band get its energy from?
3. Is your racer neat and creatively presented?
4. Does your racer work well? If not, what adjustments can you make to improve the design.



GRADE 5	TERM 3	ENERGY & CHANGE & SYSTEMS & CONTROL	SYSTEMS FOR MOVING THINGS
ACTIVITY: To investigate how wheels and axles help vehicles and some machines to move more easily			

YOU NEED:

- For wheels: Bottle lids, Cardboard circles, Round tins, etc.
  (You can also use the rubberized wheels that are in the Lasec Education Natural Sciences and Technology Kit)
- For axles: Skewer sticks, Wood dowels, Rigid plastic rods, Straws, etc.
- For body (chassis)of vehicle: cardboard box, plastic cold drink bottle, tin, folded cardboard, etc. (You can also use the Lasec Education plastic chassis in the Kit.)
- Tape
- Glue gun can be useful

WHAT TO DO:

Design and make a vehicle that uses wheels and axles for easy movement.

Plan:

- What are you going to use for wheels?
- How are you going to fix your wheels and axles to the body (chassis of the vehicle)?
- Decide on a fixed axle (wheels turn freely on axle) or a moving axle (wheels are fixed to the axle and axle turns together with the wheels).
- Make a 2-D drawing of your design.

Make:

- Make your vehicle.
- Test and evaluate your vehicle.
- Does it run freely down a slope or when it is pushed?
- Is it sturdy?
- Is it neatly and creatively finished?

ASSESSMENT:

1. Is the 2-D drawing neat and was the design followed?
2. Is the vehicle sturdy?
3. Is the vehicle neat and creatively presented?
4. Does the vehicle move freely down a slope or when pushed?
5. How would you add elastic or spring power to your vehicle to make it go?

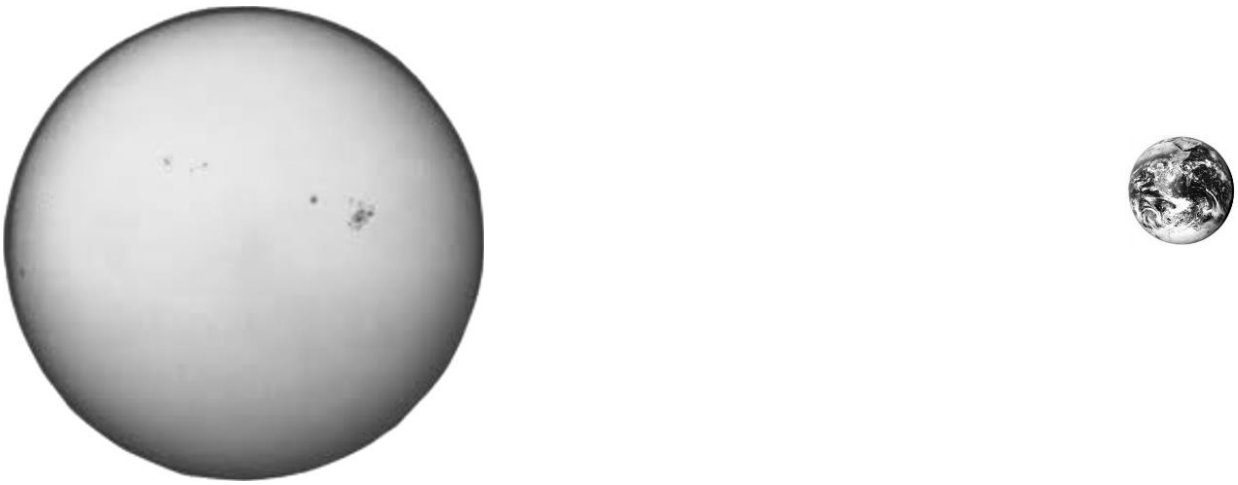
GRADE 5	TERM 4	EARTH & BEYOND	PLANET EARTH
ACTIVITY: To demonstrate the movement of the Earth in relation to the Sun			

YOU NEED TO KNOW:

- The Earth spins (rotates) on its own axis
- The Earth orbits around (travels around) the Sun

YOU NEED:

Items to help demonstrate the above two facts such as globe, lamp or ball.



Sun and Earth: Not to scale.
The Sun is actually about 109 times the size of the Earth

WHAT TO DO:

In your groups decide how you can demonstrate to the class that:

- the Earth spins (rotates) on its own axis
- the Earth orbits around the Sun
- these two movements are happening at the same time

ASSESSMENT:

1. Present you demonstration to the class and explain what is happening.
2. How long does it take for the Earth to rotate once on its own axis?
3. How long does it take for the Earth to orbit the Sun once?
4. What other objects orbit the Sun?

GRADE 5	TERM 4	EARTH & BEYOND	SURFACE OF THE EARTH – SOIL TYPES
ACTIVITY: To investigate different soil types and measure how much water each soil can hold			

YOU NEED:

- Sandy soil
- Loamy soil
- Clayey soil
- 4 Measuring cylinders
- Cotton wool
- 3 Filter funnels
- Hand lens
- Beaker of water
- Plastic Teaspoon

WHAT TO DO:

1. Examine each soil by looking at it through a hand lens, feeling it with your fingers and smelling it. Write down what you find in a table that you draw up with the headings:
   - Soil type
   - Colour
   - Texture
   - Size of grains
   - Smell
2. Take three measuring cylinders and place a filter funnel in the mouth of each cylinder.
   - Put a small pinch of cotton wool (about the size of your small finger nail) loosely in each funnel to stop soil falling down the spout.
   - Spoon in a little sandy soil in the first funnel (fill about half the funnel).
   - Spoon in a little clayey soil in the second funnel (fill to the same height as the first funnel).
   - Spoon in a little loamy soil in the third funnel (fill to the same height).
   - Use the fourth measuring cylinder to pour equal amounts of water into each of the three funnels.
   - Measure how much water seeps through each soil and how fast it seeps.
   - Record in table with headings: Water added (ml), Water seeped through (ml), Water retained (ml), Rate that water seeped (fast/slow)

ASSESSMENT:

1. Complete the table you were asked to do under point 1. of “WHAT TO DO”
2. Why must you put equal amounts of soil and the same volume of water into each funnel?
3. Record your measurements in a table indicating, how much water was added, how much water seeped through, how much water was retained by each soil and the rate that water seeped.
4. From your table draw up a bar graph to show the water retention of each soil.

GRADE 5	TERM 4	EARTH & BEYOND & LIFE & LIVING	SURFACE OF THE EARTH – SOIL TYPES
ACTIVITY: To investigate how well seedlings grow in different types of soil			

YOU NEED:

- 3 planting containers (seed trays or flower pots or plastic punnets or bottom half of plastic cold drink bottles (with small holes in the bottom)
- Sandy soil
- Clayey soil
- Loamy soil
- Bean seeds or radish seeds
- Ruler to measure growth

WHAT TO DO:

1. Plant a few seeds in each of three similar plant containers:
   - one filled with sandy soil
   - one filled with clayey soil
   - one filled with loamy soil
2. Water each container with an equal amount of water and place in a suitable spot for the seeds to germinate.
3. See how long it takes for the seedlings to appear above the ground in each container.
4. Measure the height of the seedlings in each tray, every third day, for a few weeks.
5. Write down your measurements in a table. Also compare and write down what you see about the growth in each container.
6. Water each tray with the same amount of water each time whenever one of the trays appears dry.

ASSESSMENT:

1. Why must you water each tray with the same amount of water each time?
2. Complete the table you were asked to draw up under point 5. of “WHAT TO DO”.
3. Write down and compare the growth of the seedlings in each soil type
4. Use your measurements to plot a bar graph of the growth in each soil type.
5. Write down your conclusion from what you have seen and measured.

GRADE 5	TERM 4	EARTH & BEYOND & LIFE & LIVING	FOSSILS
ACTIVITY: To make a model of a fossil embedded in sedimentary rock			

YOU NEED TO KNOW:

- Fossils are the remains of ancient plants and animals preserved in rock.

YOU NEED:

- Plaster of Paris
- Water
- Modelling clay
- Petroleum jelly (Vaseline)
- Paper or plastic cup or other container
- Stirring rod
- Small natural objects such as sea shells, parts of plants, bones
- Newspaper or paper towels

WHAT TO DO:

1. Combine the plaster of Paris with water in a 1:2 ratio (1 part water to 2 parts plaster of Paris) in the paper cup. Mix well with a stirring rod.
2. Choose a small natural object like a sea shell or any other object to make your fossil.
3. Knead the modelling clay until it is soft and pliable.
4. Coat the natural object your group chose with petroleum jelly. Press it firmly into the modelling clay to make an impression. The petroleum jelly prevents the shell from sticking to the clay.
5. Remove the sea shell carefully to create a mould in the shape of the shell.
6. Fill the impression in the clay left by the shell with plaster of Paris. Smooth the plaster to form a flat surface.
7. Place the clay and wet plaster on a newspaper or paper towel and allow it to harden, at least overnight, or preferably for two or three days.
8. Carefully peel the clay away from the hardened plaster to free the ‘fossil’.
9. You should be able to see the shape of the shell (fossil).

ASSESSMENT:

1. Explain what a fossil is and how it is formed.
2. What is the importance of fossils?
3. Can you name some of the fossils found in South Africa?

GRADE 6	TERM 1	LIFE & LIVING	PHOTOSYNTHESIS
ACTIVITY: To test some food from plants and animals for the presence of starch			

YOU NEED TO KNOW:

- We can test for starch by adding a little iodine solution which acts as an indicator.
- When iodine comes in contact with starch it turns from brown to a blue–black colour.

YOU NEED:

- Test tubes or flat containers like a saucer or watch glass or petri dish
- Iodine solution
- Mini propette or medicine dropper
- Maize starch (starch powder)
- Some foods to test: e.g. cooked rice, flour, potato, bread, boiled egg, cheese, etc

WHAT TO DO:

1. Put a teaspoon tip of starch powder into a test tube or in a petri dish.
2. Use a dropper to add one or two drops of iodine solution to the starch.
3. What happens? Note the colour.
4. Now test each foodstuff that you brought to see if it contains starch.
5. Draw up a table with headings:
   - Foodstuff
   - Starch present or not

ASSESSMENT:

1. What is a positive indication that starch is present?
2. What is a negative indication regarding the presence of starch?
3. Record your results of your food tests in the table you drew up.
4. Are the foods that tested positive for starch obtained from plants or from animals?
5. Are the foods that tested negative for starch obtained from plants or from animals?
6. What do you conclude from your findings?

GRADE 6	TERM 1	LIFE & LIVING	ECOSYSTEMS & FOOD WEBS
ACTIVITY: To investigate an ecosystem in our near your school and look at the relationships between the living and non-living things you find there			

YOU NEED TO KNOW:

An ecosystem is an area where living and non-living things depend on each other in many different ways.

YOU NEED:

- Thin string
- 4 nails or wooden sticks
- Hand lens
- Notebook, pen and pencil

WHAT TO DO:

1. Choose a natural area for your study where there are plants and small animals.
2. Use the nails (or sticks) and the string to mark off an area about 5m x 5m square. (5 large steps (strides) is about 5 meters.)
3. Find three of the most plentiful plants and three of the most plentiful animals found there.
4. Observe the different shape leaves and sizes of plants.
5. Do not harm any of the plants and animals in the area in any way.
6. Write about and make drawings of each of these plants and animals.
7. Include what food, water, sunlight and shelter is available to them.
8. Describe any food web (feeding pattern) that you can see in your ecosystem.
9. Identify any possible threats to this ecosystem.
10. Is there any way to overcome (or prevent) these threats?

ASSESSMENT:

- Hand in your findings in the form of a short written report.
- Include your drawings (and pictures if possible)

GRADE 6	TERM 1	PROCESSING	FOOD PROCESSING
ACTIVITY: To research and investigate the different ways that fresh food can be processed to make a product or make it last longer (preserve it)			

YOU NEED TO RESEARCH AND FIND OUT:

How foods can be processed or preserved by combining, cooking, freezing, pickling, drying, fermenting and salting.
Try to find out about indigenous ways of processing foods in different communities and cultures.

YOU NEED:

- Books, Encyclopaedias, Magazines, Internet
- Discussions with parents, family and peers
- Some food (or ingredients) of your choice that you can process in some way

WHAT TO DO:

1. Use any references to research and find out about processing of foods.
2. Include finding out about a few indigenous ways of processing food in your research.
3. Write up your report under suitable headings.
4. Record your sources (Bibliography) at the end of the report.
5. Include drawings and pictures in your report wherever possible.
6. Now choose a food (or a few ingredients) and process it. You can do this at home or in class if it is possible. Include a description of how you processed your food and a sample of the product you made with your report.

ASSESSMENT:

- You will be assessed according to your report and the product you made as described in “WHAT TO DO” above.

GRADE 6	TERM 2	MATTER & MATERIALS & PROCESSING	MIXTURES
ACTIVITY: To investigate making mixtures of (i) two solids (ii) a solid and a liquid and (iii) two liquids			

YOU NEED TO KNOW:

- A mixture consists of at least two substances mixed together

YOU NEED:

- Dried beans and sand
- Beaker or container
- Sugar and tea leaves
- Measuring cylinder
- Chalk and water
- Filter funnel and filter paper
- Sugar and water
- Hand lens
- Oil and water
- Tweezers or forceps
- Methylated spirits and water

WHAT TO DO:

1. Each group can make up one of the above mixtures (or any other mixture you would like to try).
2. Examine the mixture carefully. Can you still see the separate components (substances) making up the mixture?
3. Can these components be separated again easily? If so try and separate them.
4. Complete the table suggested in 'ASSESSMENT' below.

ASSESSMENT:

1. Draw up a table with the following columns:
   - Components of mixture
   - State of each component
   - Separate components visible or not
   - Method of separation
1. Each group must tell you what to put in each column for the mixture they made.
2. What is the difference between a mixture and a solution?
3. What substances are mixed to make concrete?
4. Can it still be regarded as a mixture once the cement has set?

GRADE 6	TERM 2	MATTER & MATERIALS & PROCESSING	SOLUTIONS AS SPECIAL MIXTURES
ACTIVITY: To investigate different solids to see if they dissolve in water			

YOU NEED TO KNOW:

- A solution is also a mixture
- We can't see the individual components in a solution

YOU NEED:

- Test tubes or beaker or other containers
- River Sand
- Sugar
- Salt
- Rice grains
- Any other substances you want to test

WHAT TO DO:

1. Try dissolving a small amount of each of the above substances by shaking it (mixing it) with a little water in a test tube or other container.
2. Examine each mixture. Can you still see the separate components that make up the mixture?

ASSESSMENT:

1. From your findings complete the table below:

Soluble substances	Insoluble substances

2. Name two other substances that are soluble when mixed with water.
3. Name two other substances that are insoluble when mixed with water.

GRADE 6	TERM 2	MATTER & MATERIALS & PROCESSING	SOLUTIONS AS SPECIAL MIXTURES
ACTIVITY: To investigate whether we can recover the solute from a solution by different methods			

YOU NEED TO KNOW:

- The solid that dissolves in water is called the solute.
- The liquid in which the solid dissolves is called the solvent.

YOU NEED:

- Test tubes
- Salt
- Filter funnel and filter paper
- Water
- Evaporating dish or watch glass

WHAT TO DO:

1. Add a little salt to some water in a test tube and shake the mixture until all the salt dissolves.
2. Now try to recover the salt by using different ways of separation as suggested in the Assessment questions below.

ASSESSMENT:

1. Can the solute be recovered from the solution by settling and decanting (allowing the mixture to stand for a while and then pouring off the water?
2. Can the solute be recovered from the solution by filtration? (Try this using filter paper and a funnel.)
3. Can the solute be recovered from the solution by allowing the solvent to evaporate (crystallization)? (Try this by placing a little of the solution in a watch glass or evaporating basin and allowing it to stand for a day or two.)
4. Is there any other way that the salt can be recovered from the solution? If so, explain how.

GRADE 6	TERM 2	MATTER & MATERIALS	RATES OF DISSOLVING
ACTIVITY: To investigate some factors that affect the rate (time taken) of dissolving			

YOU NEED:

- Table salt (coarse and fine)
- Stop watch or timer of some sort
- Stirring stick
- Hot water
- 2 Beakers (or other containers)
- Cold water

WHAT TO DO:

- Plan a set of 3 investigations:
  - To investigate if temperature of the solvent (hot water or cold water) affects the rate (time taken) for fine table salt to dissolve in water.
  - To investigate if stirring (or shaking) of the mixture affects the rate (time taken) for fine table salt to dissolve in water.
  - To investigate if grain size (coarse or fine grains of salt) affects the rate (time taken) for table salt to dissolve in water.
- Remember to make sure that you do a fair test for each investigation.
- Do your investigations.

ASSESSMENT:

1. What is meant by a fair test?
2. Say how, in your planning, you made sure it was a fair test for each investigation.
3. Write down what you saw and what you found out during each investigation.
4. What would you expect about the rate of dissolving if you shook a mixture of fine table salt and hot water?

GRADE 6	TERM 2	MATTER & MATERIALS & PROCESSING	PROCESSES TO PURIFY WATER
ACTIVITY: To design, make and evaluate a simple system to clean dirty water			

YOU NEED TO KNOW:

- Water can be cleaned by processes such as sieving, filtering, settling, decanting, boiling and adding chemicals to kill germs.

YOU NEED:

- Two 2 litre plastic cold drink bottles
- Fine river sand
- Gravel or very small pebbles
- Coarse river sand
- Cotton wool

WHAT TO DO:

You want to obtain clean water from a muddy water mixture.

Design:

- Try to find out how sand filters work.
- Design a simple sand filter using the items in 'YOU NEED' above and using one of the 2 litre plastic cold drink bottles for your filter.
- Make a labelled drawing to show the layers in your filter.

Make:

- Make your sand filter according to your design.

Test and Evaluate:

- Half fill the other 2 litre plastic cold drink bottle with water and add half a cup of soil. Shake the bottle to make a muddy water mixture.
- Using settling, decanting and filtering, test your sand filter to see if you can get clean water from this muddy water mixture.
- Evaluate your filter: Does it work? Does it do what is meant to do?

ASSESSMENT:

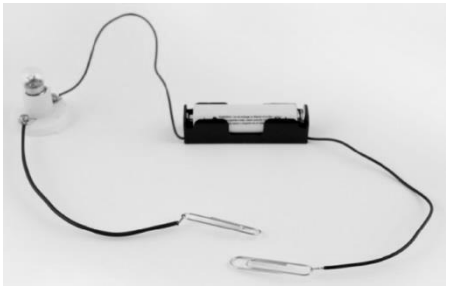
- Hand in your project in the form of a report explaining the designing , making, testing and evaluating steps you went through.
- Include any working drawings you have made.
- How could you kill any germs in the filtered water that might have got through your sand filter?

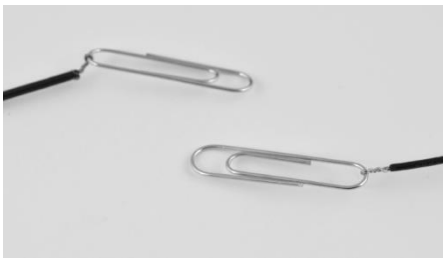
GRADE 6	TERM 3	ENERGY & CHANGE &SYSTEMS & CONTROL	ELECTRIC CIRCUITS
ACTIVITY: To investigate how to make a simple electric circuit and make a switch to control the circuit			

YOU NEED:

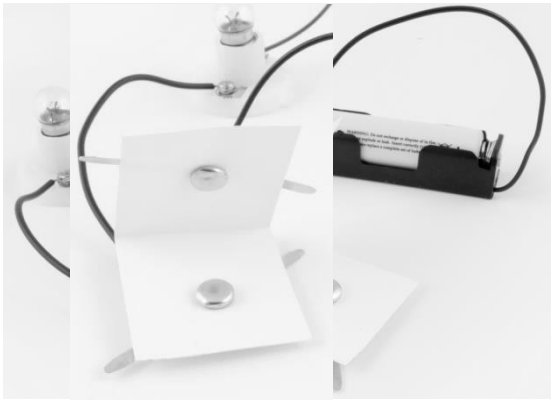
- Cell (penlight)
- Light bulb
- Connecting wires
- Cell holder
- Bulb holder
- Metal paper clips
- Paper fasteners
- Switch

WHAT TO DO:





1. Connect the electrical components to make a simple electrical circuit as shown on the right.
2. See what happens to the light bulb when the circuit is complete.
3. Now remove one of the wires. What happens to the light?
4. Try making a switch from two paper clips as shown in the picture. Connect this in place of one of the wires, connect the clips.
5. Try making a switch from two paper fasteners as shown in the pictures. Connect this in place of a wire and press the two parts of the card together for the fasteners to make contact.
6. Connect a proper switch in place of a wire and switch on.



ASSESSMENT:

1. What is the purpose of a switch in a circuit?
2. How could one make a switch using thin cardboard and some aluminium foil? After trying this draw your design.
3. Draw a circuit diagram of your circuit.

GRADE 6	TERM 3	ENERGY & CHANGE	ELECTRICAL CONDUCTORS AND INSULATORS
ACTIVITY: To test different materials in an electric circuit to see if they are conductors or insulators			

YOU NEED:

For circuit:

- Cell (penlight)
- Light bulb
- Connecting wires
- Cell holder
- Bulb holder

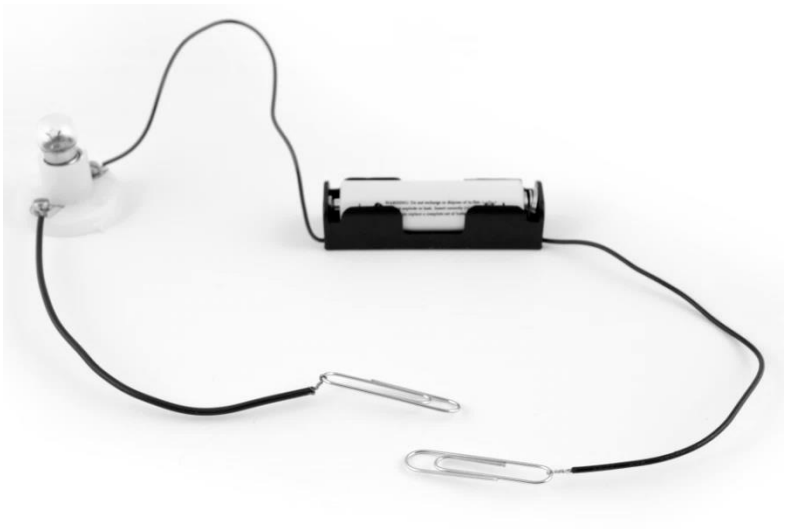
Materials to test: e.g.

- Metal paper clips
- Iron nail
- Plastic pen
- Coins
- Paper
- Piece of wood
- Glass
- Copper wire
- Chalk
- Aluminium foil
- Cardboard
- Any other materials you would like to test

*Sandpaper has been included in the kit to remove any pollutants/rust found on the nail.

WHAT TO DO:

1. Set up a circuit like the one that is shown on the right.
2. Connect the material to be tested between points A and B.
3. See if the light comes on and how bright it is.



ASSESSMENT:

1. Draw up a table with columns for conductors and insulators. Fill in the table as you test each substance.
2. What is meant by a conductor?
3. What is meant by an insulator?
4. Do the items in the conductor column have anything in common? If so, what?

GRADE 6	TERM 3	ENERGY & CHANGE & SYSTEMS & CONTROL	SYSTEMS TO SOLVE PROBLEMS
ACTIVITY: To design, make, evaluate and present a toy (system) that uses an electric circuit that produces light or sound when it works.			

SCENARIO:

 The school is holding a fun day to raise funds.

- Your group wants to make a “steady hand” game that people can play.
- People who play this game must move a wire with a small loop along a folded wire “course” without letting the loop touch the wire.
- If the loop touches the wire a buzzer must sound or a light must go on, or both.
- When the player reaches the end of the “course’ the loop must be able to rest on the wire without the alarm going off

YOU NEED:

- Cells (penlight)
- Light bulb and Bulb holder or buzzer (or both)
- Cell holders
- Connecting wires
- Galvanized wire or wire form an old metal coat hanger
- Wood base/sturdy plastic base
- Paper fastener to make switch or paper clip switch
- Any other materials you want to use

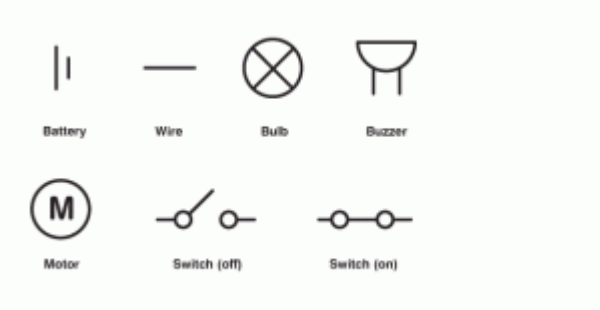
WHAT TO DO:

Design:

- First design your circuit. Use electrical symbols for the different components.
- Now design the layout for your game. Make drawings to help you.
- What materials do you need?

Make:

- Make your “steady hand” game.



Evaluate:

- Does your game work properly?
- Does it look neat?
- Is the wire “course” supported firmly?

Present:

- Present your game to the class. Tell them how you designed your circuit.
- Show the class your drawn circuit that clearly shows the components using the correct symbols.
- Let one or two learners try your game to see how it works.

GRADE 6	TERM 4	EARTH & BEYOND	THE SOLAR SYSTEM
ACTIVITY: To make models of our Solar System			

YOU NEED TO KNOW:

- If we scaled down the Sun (which has a diameter of about 1,39 million kilometres) to a diameter of 1 meter (1000mm) then, on this scale, the planets would have diameters of:

- Mercury 3 mm
- Venus 8 mm
- Earth 9 mm
- Mars 4 mm
- Jupiter 102 mm
- Saturn 83 mm
- Uranus 33 mm
- Neptune 32 mm

YOU NEED:

- Solar system model
- Modelling clay or Paper Mache or small objects (beads, marbles, seeds, polystyrene balls, sport balls, etc.) with diameters shown above to represent the planets
- Chalkboard compass

WHAT TO DO:

1. Draw a circle, with a radius of 50 cm, on the chalkboard or on the ground to represent the Sun.
2. Now make models of the planets using modelling clay or find objects to the sizes shown in "YOU NEED TO KNOW" above.
3. Even on this small scale the distances of the planets from the Sun are quite large:
    - Mercury, on this scale, would be about 41 m from the Sun
    - Venus, on this scale, would be about 77 m from the Sun
    - Earth, on this scale, would be about 107 m from the Sun
    - Mars, on this scale, would be about 163m from the Sun
    - Jupiter, on this scale, would be about 559 m from the Sun
    - Saturn, on this scale, would be about 1025 m from the Sun
    - Uranus, on this scale, would be about 2062 m from the Sun
    - Neptune to scale, would be about 3233 m from the Sun

    You won't be able to put your planets at these distance from your scale size Sun but it gives you an idea of the huge distances of planets from the Sun.
4. Hold each planet next to your drawing of the Sun to get an idea of the size of the Sun compared to the planets.

ASSESSMENT:

- Find out the actual diameters (in km) of the planets and their distances (in km) from the Sun.

GRADE 6	TERM 4	EARTH & BEYOND	MOVEMENTS OF THE EARTH
ACTIVITY: To investigate the rotation of the Earth on its axis and how it revolves around the Sun			

YOU NEED TO KNOW:

- The diameter of the Sun is about 109X larger than the diameter of the Earth
- The Sun is about 150 million kilometres away from Earth

YOU NEED:

- Earthball or globe
- Torch or lamp to represent the Sun

WHAT TO DO:

1. Inflate the Earthball
    - Look at the large land masses (continents), the seas and the cloud patterns.
    - Is there more sea or land on the surface of the Earth?
    - Find the North and South poles to hold the globe the right way. The Earth spins (rotates) on its own axis along the North-South pole line.
    - Place your left forefinger on the North Pole and your right forefinger on the South Pole. You can now rotate the Earth on these two points.
2. Get another learner to hold the torch or lamp a few meters away to provide rays of sunlight lighting the Earth. The part of the Earth that is lit up is in daylight and the part of the Earth in shadow is in night.
    - Which way does the Earth spin? Hint: The Sun comes up earlier in Durban than it does in Cape Town.
3. Rotate the Earth on its axis.
    - How long does it take for the Earth to make one complete rotation on its axis?
    - The Earth also revolves around (orbits) the Sun.
    - Show this by walking in a circle around the torch.
    - How long does it take for the Earth to revolve once around the Sun?
4. Use the information given in “YOU NEED TO KNOW” to calculate:
    - How big would the Sun be, to scale, if the Earthball has a diameter of 38 cm?
    - On this scale the Sun would be about 4500 meters (4,5 kilometres) away from the Earthball!

ASSESSMENT:

1. Is there more sea or land on the surface of the Earth?
2. Which way does the Earth spin?
3. How long does it take for the Earth to make one complete rotation on its axis?
4. How long does it take for the Earth to revolve once around the Sun?
5. How big would the Sun be, to scale, if the Earthball has a diameter of 38cm?

GRADE 6	TERM 4	EARTH & BEYOND & SYSTEMS & CONTROL	SYSTEMS TO EXPLORE THE MOON AND MARS
ACTIVITY: To research, design, make and evaluate a model of a Moon or Mars rover.			

YOU NEED:

- For wheels: Bottle lids, Cardboard circles, Round tins, etc. (You can also use the rubberized wheels that are in the Lasec Education Natural Sciences and Technology Kit for IP)
- For axles: Skewer sticks, wood dowels, rigid plastic rods, straws, etc.
- For body (chassis) of vehicle: cardboard box, plastic cold drink bottle, tin, folded cardboard, etc. (You can also use the Lasec Education plastic chassis.)
- For mechanical arms and other items on the rover use any suitable materials.

WHAT TO DO:

Research:

- Find out about the features and purposes of the Mars and Moon Rovers and how they work.

Design:

- Each learner in the group must first design and draw their own ideas of a Moon or Mars Rover.
- Now, in your group, discuss and compare the different designs and decide on the best ideas.

Make:

- Make your Rover using the materials suggested in “YOU NEED” above and any other materials suggested by your group.

Evaluate:

- Is your product finished off neatly?
- Test your vehicle. Does it run smoothly?
- Have a competition. Each group must run their vehicle down a ramp. See which vehicle travels the furthest.

Communicate:

- Present your model to the class and tell them what special features you included in you model for your rover to ride around on the Moon or Mars.

GRADE 7	TERM 1	LIFE & LIVING	THE BIOSPHERE
ACTIVITY: To investigate the requirements for the growth of seedlings			

YOU NEED TO PREPARE IN ADVANCE:

- Plant a few radish seeds, beans or mielies in each of 4 small containers (flower pots, tin cans, cut off cold drink bottles, etc). Place in a warm spot and water regularly for the seeds to germinate.

WHAT TO DO:

1. Plan two separate investigations using your germinating seedlings:
   a. Investigate whether light is necessary for the growth of plants
   b. Investigate whether water is necessary for the growth of plants
2. Remember to:
   - Have one set of seedlings with the factor you are investigating and the other set without that factor to compare with.
   - Keep all other conditions the same except for the factor that you are investigating.
3. Show your planning to your teacher and when given the go ahead begin your investigation.
4. Record what you see each day, observe height, size of leaf, colour etc.

ASSESSMENT:

- Write up your findings in the form of a short report that states the effect of water and light on plant growth.
- Your report must refer directly to your research (show your research and observations that your statement is based on).
- Present this to class. Keep in mind that communication of research is important, use graphs rather than just stating figures. Give observed findings rather than speculations. Wrap up your findings with a short conclusion that gives understanding to those listening.

GRADE 7	TERM 1	LIFE & LIVING	SEXUAL REPRODUCTION
ACTIVITY: To investigate the growth of Angiosperms in order to observe the stages in the life cycle.			

YOU NEED TO KNOW:

- Seeds are produced in flowers, which are the sexual organs of Angiosperms.
- This investigation will take a few months for plants to grow from seeds to the flowering stage.

YOU NEED:

- Seeds of flowers (any plant where the structure of the male and female parts can be clearly seen)
- Soil
- Beans
- Containers in which to grow plants
- Ruler

WHAT TO DO:

1. In one container, plant a few beans
2. In a second container, plant a few seeds of any other flowering plant.
3. Observe the growth of each and observe your findings with regard to growth rate, height and life cycle.

ASSESSMENT:

1. Measure the height of the plant, as it grows. This can be done daily or weekly. Present results in a table.
2. Identify, draw and describe the components of a flower.
3. What are pollinators? How are these attracted to flowers?

GRADE 7	TERM 1	LIFE & LIVING	VARIATION
ACTIVITY: To investigate some variants amongst learners in your class			

YOU NEED TO KNOW:

- Some characteristics are passed from parents to their children.
- Variation occurs between individuals of the same species. Siblings from the same parents may look different.

YOU NEED:

- Tape measure
- Prestik or sticky tape
- 30cm ruler

WHAT TO DO:

1. Measure the height of each person in class and draw up a table.
   Your graph can show the number of learners that fit into each of these categories:
   - Less than149cm
   - 150-159cm
   - 160-169cm
   - 170-179cm
   - More than 180cm
     (this table should be adjusted toward average heights in class)

ASSESSMENT:

Height:

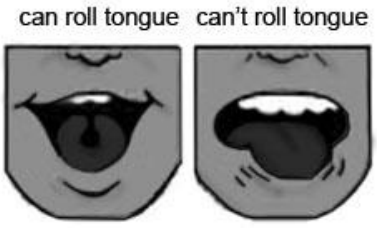
Once you have the data of all the different heights measured in class, you can:

1. Draw up a bar graph using the data (height = x-axis; number of learners = y-axis)
2. Calculate the average height of the boys and girls by adding up all the heights and dividing by the number of people.

Draw these averages on your graph by drawing a red line for the boys' average and a green line for the girls' averageMeasure the heights of the adults in your household and record this in the form of a table, you can then:

1. Draw a graph of the heights (same as number 1 above)
2. Compare the graphs of adults from the class.

Tongue rolling:



1. In a table, record how many learners in the class can roll their tongues.
2. Calculate the percentage of learners able to roll their tongues.
3. Record how many family members can roll their tongues, put it in a table and calculate the percentage that can roll their tongues.
4. Is tongue rolling an inherited characteristic? Explain why.

GRADE 7	TERM 2	MATTER & MATERIALS	PROPERTIES OF MATERIALS
ACTIVITY: To investigate and compare the strength and flexibility of selected materials.			

YOU NEED TO KNOW:

- Properties of materials determine their suitability for a particular use, such as strength, flexibility, boiling and melting points as well as electrical and heat conductivity.

YOU NEED:

- Plastic/paper cup
- String
- Weights (coins/marbles)
- Ruler

Suggested materials to be tested:
10cm strips of:

- newspaper
- Cling film
- Plastic wrap
- Thin cardboard
- Aluminium foil
- Plastic shopping bag
- Elastic band
- Thin copper wire
- Etc.

WHAT TO DO:

1. Attach three or four short lengths of string to the rim of the cup then knot the free ends together to make a holder for the weights.
2. Use an extra bit of string to attach the materials to be tested to the holder.
3. One learner holds up the strip of material being tested with the cup hanging on the end, the other learner adds weights (one by one).
4. Use the ruler to measure whether the material stretches.
5. Continue to add weights until the cup is full or the material breaks.
6. Now repeat with the other materials.
7. Record the number of weights you used before the material broke and the amount of stretch for each material.

ASSESSMENT:

1. Draw up a table with columns for:
   - Number of weights added
   - Amount of stretch
   - Did material break
   - Strong or weak material
   - Flexible or inflexible
2. Write down the similarities of the strong materials and the similarities of the weak materials.

GRADE 7	TERM 2	MATTER & MATERIALS	PROPERTIES OF MATERIALS
ACTIVITY: To investigate what happens when water is heated			

YOU NEED TO KNOW:

- The temperature at which a material changes state from a solid to a liquid is called its **melting point**.
- The temperature at which a material changes from a liquid to a gas is called its **boiling point**.

YOU NEED:

- Bipod stand & wire gauze
- Spirit burner
- Beaker
- Thermometer
- Water
- Peg to hold thermometer

WHAT TO DO:

1. Place sufficient water in a beaker to cover the bulb of a thermometer. Check that the thermometer bulb is not resting on the base of the beaker.
2. Light the spirit burner and place the beaker on the bipod stand over the burner.
3. Heat the water and take the temperature readings every three minutes. Record the time intervals and temperature readings in a table.
4. Continue heating until the water boils and for a further 3 minutes.

ASSESSMENT:

1. Use your table to draw a line graph of temperature vs. time.
2. What did you notice in the water:
   a. While you were heating it?
   b. When it started to boil?
3. Did the temperature continue to rise after the water started to boil? How can we explain this?

GRADE 7	TERM 2	MATTER & MATERIALS	SEPERATING MIXTURES
ACTIVITY: To investigate how we can separate and collect all the substances from a mixture of sand, iron filings, salt, ethanol and water.			

YOU NEED TO KNOW:

- If two liquids are mixed together completely, they are called **miscible liquids**.
- You can separate the two liquids by distillation if they have different boiling points.

YOU NEED:

- Sieves
- Filter funnel
- Filter paper
- Magnet
- Beakers and glass/plastic jars
- Spirit burner
- Test tube with delivery tube (or Liebig condenser)
- Mixture of sand, iron filings, salt, ethanol and water

WHAT TO DO:

1. In your groups plan how you would go about separating each substance from the mixture.
2. In which order would you separate each substance?
3. Write down your action plan and show it to your teacher.
4. Go ahead and separate the substances in your mixture.

ASSESSMENT:

1. In the form of a report, write a summary of your investigation that includes:
    - Your action plan
    - What you found when you separated each substance
    - What you would do differently if you had to perform the experiment again.
2. Explain how the process of distillation works.

GRADE 7	TERM 2	MATTER & MATERIALS	SEPERATING MIXTURES
ACTIVITY: To investigate how you can separate some of the components of ink by chromatography			

YOU NEED TO KNOW:

- Chromatography relies on the fact that different substances dissolve at different rates in a solvent.

YOU NEED:

- Strip of filter paper
- 50ml beaker
- Clothes peg
- Methylated spirits
- Black ink or black marker/koki

WHAT TO DO:

1. Cut a narrow strip of filter paper (about 2cm wide).
2. Draw a line across the strip about 2cm from the end with ink or a koki or black pen.
3. Put a little methylated spirits into the beaker (1cm deep is enough).
4. Clip the strip in a clothes peg and rest the peg across the mouth of the beaker so that the ink end of the strip dips into the methylated spirits but the ink line is about 1cm above the surface of the meths.
5. Take note of what happens.

ASSESSMENT:

1. Describe what you saw regarding:
   a. The methylated spirits and the paper
   b. The koki/ink line that you drew on the paper
2. Make a labelled drawing of the strip of filter paper at the end of the investigation.
3. What do you conclude about the composition (make-up) of the black ink?
4. Try to find out how people who analyse substances use chromatography to help them find out the substances in a mixture.

GRADE 7	TERM 2	MATTER & MATERIALS	ACIDS, BASES & NEUTRALS
ACTIVITY: To test some common beverages and substances found in the home to find out if they are acids, bases or neutrals			

YOU NEED TO KNOW:

- Red litmus turns blue in a basic (alkaline) medium
- Blue litmus turns red in an acid medium
- If both blue litmus and red litmus turn a purple shade the substance is neutral

YOU NEED:

- Red litmus paper
- Blue litmus paper
- Watch glass or glass containers

Substances to test:

- Beverages: tea, fizzy lemonade or cola drinks, coffee, milk, fruit juice etc.
- Other household substances: water, vinegar, solution of tartaric acid, solution of bicarbonate of soda, shampoo, salt water, sugar water, lemon juice, antacids etc.

WHAT TO DO:

1. On the class chalkboard draw up a table with 3 columns with headings:
   - Acids
   - Bases
   - Neutrals
2. Each group in the class can test a few of the above substances with red and blue litmus paper.
3. A learner from each group can then write in the substances they tested under the relevant column.
4. Each learner can then copy the completed table into their workbook.
5. Dip your finger in lemon juice and rub your finger on your tongue.
6. Dip your finger in a weak solution of bicarbonate of soda and rub your finger on your tongue.

ASSESSMENT:

1. What conclusions can you draw from your observation of the results for the substances in each column?
2. Describe the taste of an acid and that of a base (alkali) on the tongue from your tests in points 5 and 6 above and the position of these substances in the table.

GRADE 7	TERM 3	ENERGY & CHANGE	HEAT TRANSFER (BY CONDUCTION)
ACTIVITY: To investigate whether metals conduct heat and, if so, whether they conduct it at the same rate.			

YOU NEED TO KNOW:

- The heat conductivity apparatus (Ingenhausz apparatus) supplied with the kit has three rods made from iron, aluminium and brass.
- It is named after a Dutch scientist/physician (Ingenhausz) who made measurements on heat conduction in metals.

YOU NEED:

- Heat conductivity apparatus (Ingenhausz)
- Bipod stand
- Drawing pins/paper clips
- Vaseline
- Boiling water
- Timer (stopwatch)

WHAT TO DO:

1. Set up the conductivity apparatus on the bipod as shown on the right.
2. Attach a drawing pin/paper clip to the end of each metal rod with a little Vaseline.
3. Pour boiling water into the apparatus to nearly fill the can.
4. Start timing from the time you pour the water into the can.
5. Watch each rod and note the time that it takes for the drawing pin/paper clip to drop off each rod.

ASSESSMENT:

1. Draw a bar graph showing the time taken for the drawing pin/paper clip to drop off each rod.
2. Which of the three metals is the best conductor of heat?
3. Why are cooking pots made of metal and their handles made of wood, Bakelite or plastic?

GRADE 7	TERM 2	ENERGY & CHANGE	HEAT TRANSFER (BY CONVECTION)
ACTIVITY: To investigate convection currents in water			

YOU NEED TO KNOW:

- When water is heated, the water particles will rise (because heated liquids expand and become less dense). When the hot liquid reaches the surface, it gets pushed to the sides by more hot water rising up below it. The water particles at the surface cool down, have less kinetic energy and become dense. The cooled water sinks to the bottom where it gets heated again.

YOU NEED:

- Beaker
- Bipod stand
- Spirit burner
- Potassium permanganate (or food colouring)
- Drinking straw

WHAT TO DO:

1. Half fill a beaker with water and place it on a bipod stand.
2. Place a drinking straw in the beaker so that it touches the bottom on one side.
3. Carefully drop a small crystal of potassium permanganate down the straw so that it settles on the bottom of the beaker.
4. Put your finger over the top of the straw and slowly remove it from the water.
   (Try not to disturb the crystal or the water while you remove the straw)
5. Light the spirit burner and place it under the bipod so that the flame is directly below the potassium permanganate crystal.
6. Observe what happens as the burner heats the water around the crystal.

ASSESSMENT:

1. Draw a picture of the beaker and show the path of the colour as you heated the water. Use arrows to show the direction of movement.
2. Explain why the colour followed this path.
3. How could you show that convection also takes place in air?

GRADE 7	TERM 3	ENERGY & CHANGE	HEAT TRANSFER (BY RADIATION)
ACTIVITY: To investigate the amount of heat absorbed by dark coloured and shiny surfaces			

YOU NEED TO KNOW:

- Unlike conduction and convection, radiation does not need a material for the transfer of heat energy

YOU NEED:

- Silver surface aluminium plate
- Matt black surface aluminium plate
- Sellotape
- 2 thermometers

WHAT TO DO:

1. Use sellotape to attach the bulb of a thermometer to the back surface of a silver surfaced aluminium plate.
2. Do the same with a matt black surfaced aluminium plate.
3. Take the temperature readings on both thermometers.
4. Place both plates in bright sunlight (the back surfaces with thermometers must be away from the sun.)
5. Take the temperature readings on both thermometers every minute for over a period of 4 minutes.
6. Record your temperature readings in a table.

ASSESSMENT:

1. What do you conclude from your observations?
2. What clothes would be best to wear on a hot day in the sun – dark clothing or light coloured clothing? Explain your answer.

GRADE 7	TERM 3	ENERGY & CHANGE	HEAT TRANSFER (BY RADIATION)
ACTIVITY: To investigate different insulating materials and how well they keep a beaker of hot water hot			

YOU NEED TO KNOW:

- Insulators are poor conductors of heat and will not transfer heat energy well.

YOU NEED:

- Different insulating materials (Styrofoam, newspaper, cardboard, cotton cloth, woollen cloth, plastic, aluminium foil etc.)
- Beakers
- Boiling water
- Thermometers

WHAT TO DO:

1. Do this as a class investigation.
2. Each group can test a different material.
3. As a class, discuss and plan how you are going to insulate your beaker and measure the temperature loss of the hot water over time.
4. How will you ensure that each group uses the same procedures to ensure that it is a fair test?
5. Record your readings in the form of a table.

ASSESSMENT:

1. Each group must write up their results and findings for the material they tested and present this to the class.
2. After the groups have done their presentation list the materials that were tested from best insulating substance to least insulating substance.

GRADE 7	TERM 3	ENERGY & CHANGE	INSULATION & ENERGY SAVING
ACTIVITY: To design, make and test an insulated slow-cooking box.			

YOU NEED TO KNOW:

- Some materials are good conductors of heat, e.g. metals. This means they will easily heat up, but will also lose heat rapidly.
- Other materials are bad conductors of heat and will cause the heat to be retained for much longer, e.g. polystyrene cups and containers, wood, straw and plastic.

YOU NEED:

- A cardboard box or plastic container (must fit materials and metal pot)
- Newspaper, polystyrene chips, straw
- Towels
- Blankets/old duvet
- Suitable metal pot (that will easily fit in box with some room to spare)
- Rice/beans that you want to cook
- Boiling water

WHAT TO DO:

1. Place your cardboard box/plastic container on a sturdy surface where it can stay for a few hours.
2. Line the box with a blanket or towel.
3. In the metal pot, put your rice, add the boiling water and secure the lid.
4. Immediately transfer the pot to the box and wrap the pot in newspaper (or other insulating material) or more blankets. Close the box/container.

ASSESSMENT:

1. Before you secure the lid and close the box, take the temperature.
2. Every 30 minutes thereafter, take the temperature again (taking care not to let too much heat escape) until the rice is cooked.
3. In a table, record all of the temperature readings. Use these readings to draw a line graph.
4. Do the activity again but this time use a different insulating material.
5. Use your temperature readings to compare your results.
6. Comment on the efficiency of your slow-cooker box.

GRADE 7	TERM 4	EARTH & BEYOND	RELATIONSHIP OF THE SUN TO THE EARTH
ACTIVITY: To investigate how the tilt of the Earth's axis gives rise to the seasons in different parts of the world			

YOU NEED TO KNOW:

- The Earth's axis is not vertical. It is tilted at an angle of 23.5 ° from the vertical.
- The radiant energy reaching Earth from the Sun contains light and heat.

YOU NEED:

- Orbiter model
- Earthball
- Torch
- Sheet of A4 graph paper
- Protractor

WHAT TO DO:

Investigating the path of the Earth around the Sun:

- Use the Orbiter model to investigate how the Earth revolves around the Sun.
- Investigate how long it takes to revolve around the Sun and which planets orbit closer to the Sun.

Investigating light rays striking a surface at different angles

- Place the A4 sheet of graph paper on a flat surface
- Hold a torch about 30-50cm away.
- Change the angle but keep the torch the same distance away by moving it in an ark motion
- Observe how the size of the area changes as well as the brightness of light on the page.

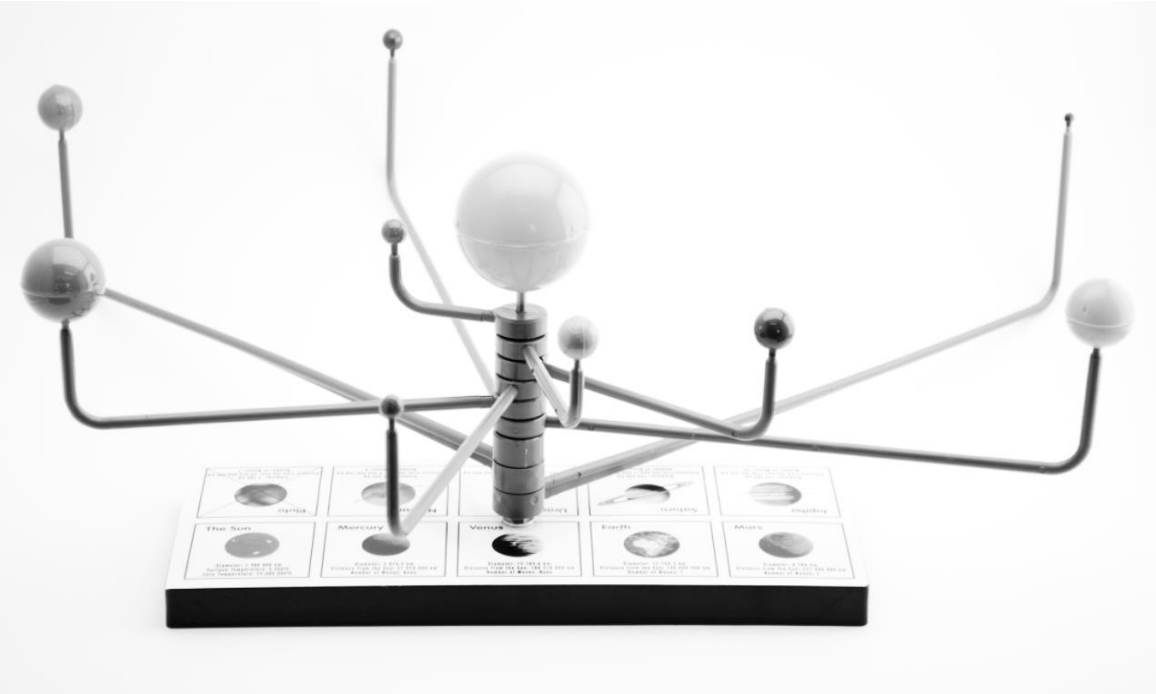
Investigating how the tilt of the Earth affects the seasons

- Inflate the Earthball. Put a finger of one hand on the North Pole and a finger from the other hand on the South Pole of the Earthball and hold it so that the axis that runs between the fingers is vertical.
- Now with the help of a protractor tilt the Earthball so that the axis is at approximately 23,5° from the vertical and towards the side the torch will shine from.
- Hold the torch horizontally about 1m away from the Earthball and shine the beam onto the ball.
- Does the light from the torch fall on one hemisphere more than the other of the Earthball, which hemisphere?
- Take the torch to the other side while keeping the Earthball stationary, which hemisphere now receives more light?
- Use what you have observed to explain why it is warmer in summer and cooler in winter in South Africa.
- Use this model to explain Spring and Autumn.
- Investigate why the South Pole gets approximately 180 days of sunlight in summer and 180 days of darkness in winter.

ASSESSMENT:

1. How many days does it take for the Earth to revolve around the Sun? Draw a diagram showing the Earth's revolution around the sun.

2. How does the area of light shone by a torch change in size and intensity when shone directly or at an angle to a page, while keeping the same distance from it.
3. Since the Earth is tilted at 23,5°, which hemisphere is in Summer when the North Pole is tilted towards the Sun, illustrate your answer.
4. Explain why it is warmer in Summer and cooler in Winter in South Africa.
5. Explain why we have Spring and Autumn, referring to the tilt of the Earth and its revolution around the Sun.
6. Explain why the South Pole receives almost 180 24-hour days of darkness in Winter and over 180 24-hour days of sunlight in Summer.



GRADE 7	TERM 4	EARTH & BEYOND	RELATIONSHIP OF THE MOON TO THE EARTH
ACTIVITY: To investigate how the Moon revolves around the Earth and how it is held in its orbit by the pull of the Earth's gravity			

YOU NEED TO KNOW:

- Every object attracts every other object with a force called gravitational pull.
- The greater the mass of the objects the stronger is the force of attraction.

YOU NEED:

- Moon and Earth model
- Plastic beach bucket with sand or small sand bag
- 2m of thin rope or thick string

WHAT TO DO:

Investigating the movement of the Moon around the Earth

- Place the Moon and Earth model on a table
- Move the moon to see what orbit it takes around the Earth
- Describe the motion
- Discuss how long it takes for the Moon to complete one revolution around the Earth.

Using a bucket/sand bag to demonstrate the Moons revolution

- Tie one end of the string to the handle of the bucket/sand bag.
- Wrap the other end of the string around your hand and swing it above your head so that it describes a circle around your head.
- The bucket/bag represents the Moon and the string represents the gravitational pull of the Earth on the Moon.

ASSESSMENT:

1. How long does it take for the Moon to complete one revolution around the Earth?
2. What shape is the revolution that the moon makes around the Earth? Illustrate this with a labelled pencil sketch.
3. Explain why the bucket/bag follows a circular path and does not fly off in a straight line.
4. Explain how the Earth's gravitational force keeps the Moon in its circular orbit around the Earth.

ACTIVITY SHEETS RELATING TO TECHNOLOGY GRADE 7

GRADE 7	TERM 1	MECHANICAL SYSTEMS & CONTROL	SIMPLE MECHANISMS - LEVERS
ACTIVITY: To investigate levers and linkages as mechanical systems			

YOU NEED TO KNOW:

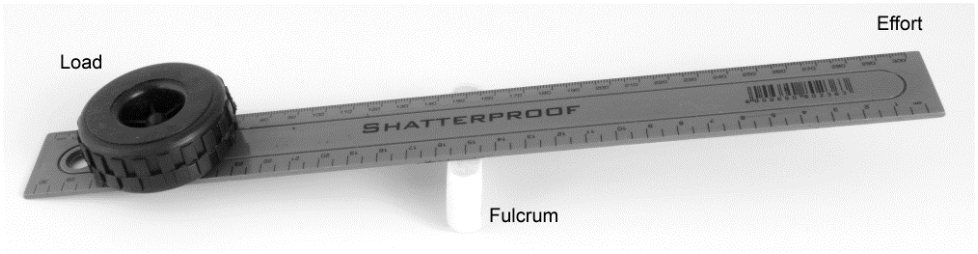
- First class levers have the fulcrum (F) placed between the effort (E) (force applied) and the load (L)
- Second class levers have the load (L) placed between the effort (E) and the fulcrum (F)
- Third class levers have the effort (E) applied between the load (L) and the fulcrum (F)

YOU NEED:

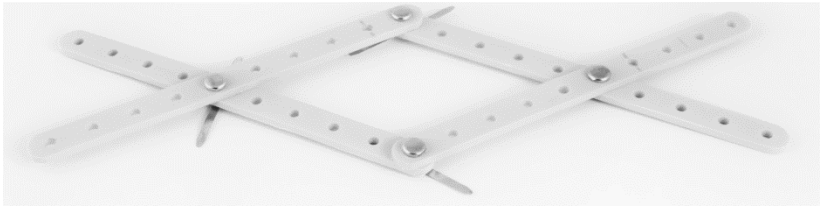
Ruler or piece of wood strip (for a lever)
Eraser (for a fulcrum)
Flat stone (for a load)
Link strip
Paper fasteners
From home: Pair of scissors, stapler, tweezers, claw hammer, nutcracker

WHAT TO DO:

1. Using the eraser as a fulcrum, the ruler or wood strip as a lever and the stone as a load set up the three classes of levers.



2. Move the load to different parts of the lever relative to the fulcrum and see how this affects the effort needed to lift the stone. See which positions of E, L and F give the best mechanical advantage.
3. Connect 4 pieces of link strip using paper fasteners as fulcrum points (as shown in the picture below) to create a linkage system. Move points A and B closer together then further apart and see what happens to the system.



ASSESSMENT:

1. Make labelled drawings of each of the 3 classes of levers that you set up.
2. What is mechanical advantage?
3. Which class of lever always gives mechanical advantage?
4. Which class of lever never gives mechanical advantage?
5. What did you notice about the distance the load moved compared to the distance over which the effort was applied in a second-class lever?
6. Examine the Pair of scissors, stapler, tweezers, claw hammer and nutcracker you brought from home and say what class of lever each one represents.
7. Where are linkage systems used in the things we see around us?

GRADE 7	TERM 1	MECHANICAL SYSTEMS & CONTROL	PNEUMATICS & HYDRAULICS
ACTIVITY: To investigate the principles of pneumatics and hydraulics using syringes			

YOU NEED TO KNOW:

- In pneumatic systems the fluid that transfers the force is air.
- In hydraulic systems the fluid that transfers the force is a liquid (usually an oil, but we will use water).

YOU NEED:

1x 2,5ml syringe
Clear plastic tubing
2x 10ml syringes
Jar or bowl of water

WHAT TO DO:

Investigating Pneumatics

1. Take two 10ml plastic syringes. Push the plunger of one syringe down and leave the plunger of the other syringe up.
2. Join the two syringes with a piece of plastic tubing as shown below.
3. Push in the plunger of the one syringe and note how far the plunger of the other syringe moves.

4. Now remove one of the syringes and replace it with a 2,5ml syringe. (Draw out the plunger of the 2,5ml syringe before connecting it to the 10ml syringe with plunger down.)
5. Push in the plunger of the 2,5ml syringe and note how far the plunger of the 10ml syringe moves.
6. Push in the plunger of the 10ml syringe and note how far the plunger of the 2,5ml syringe moves.

Setting up the syringes to investigate Hydraulics

- Connect the piece of plastic tubing to the nozzle of a 10ml syringe.
- Put the free end of the tubing into the jar of water and pump the plunger of the syringe up and down repeatedly to expel all the air from the syringe and the tubing.
- Draw out the plunger one more time so that the syringe and tubing fills with water.
- Connect the free end of the tubing to a second 10 ml syringe with plunger pushed in.

7. You can now repeat steps 1 – 6 as above, but this time using water as the hydraulic fluid.

ASSESSMENT:

1. In the case of two 10ml syringes connected by the tubing, if you push the plunger of one syringe in half-way, how far does the plunger of the other syringe move?
2. In the case of the 10ml syringe connected to the 2,5ml syringe by the tubing:
   a. If you push the plunger of the 2,5ml syringe in by 2cm, how far does the plunger of the 10 ml syringe move?
   b. Which requires the least effort to push in, the plunger of the 2,5ml syringe or the plunger of the 10ml syringe?
   c. To which syringe should you apply the force to gain mechanical advantage out of the system?

GRADE 7	TERM 1	MECHANICAL SYSTEMS & CONTROL	LEVERS, LINKAGES, HYDRAULICS, PNEUMATICS
Mini – PAT: Jaws of Life Rescue System			

YOU NEED TO KNOW: The 'Jaws of Life' rescue device is used to help rescuers get to people who are trapped in the wreckage of car accidents. The device makes use of hydraulics and levers to cut or force open the metal of the wreckage.

YOU NEED:

- Items brought from home to help you construct your model
- From the Lasec Education Technology Kit:
    - Syringes
    - Plastic tubing
    - Syringe adaptors
    - Link strip and gussets
    - Nuts and bolts
    - Wood strip
    - Plastic rods
    - Wooden dowel

WHAT TO DO:

1. Research 'Jaws of life' rescue systems using textbook as well as library or online resources.
2. You will make a model of one using the basic materials provided as well as materials from home. You will need to apply what you have learnt in levers, linkages and in hydraulics to build it. The jaws of your device should open or close by pushing the syringe connected to the system. Your device must display a gain in mechanical advantage. Your model can be mounted on cardboard or wood to assist in keeping the structure together.
3. Write your design brief, specifications and constraints for your model.
4. Draw a 3D drawing of your idea in oblique projection using dark and feint lines.
5. Draw a working drawing in 2D showing one view with dimensions to scale.
6. Construct your model.

ASSESSMENT:

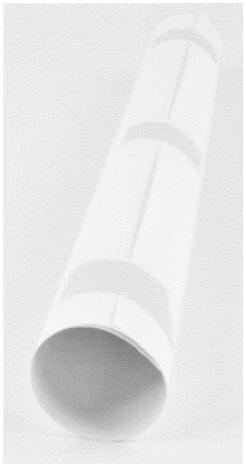
1. Does your model work?
2. Does it do what it is intended to do: show mechanical advantage, prying or cutting movement?
3. Is it neatly made and finished?
4. Does it match your working drawing?

GRADE 7	TERM 2	STRUCTURES	FRAME STRUCTURES
ACTIVITY: To investigate stiffening materials for use in structures			

YOU NEED:

A4 sheets of Project board (160 g) or thin cardboard
2 thick books
Link strip
Nuts and bolts
Sellotape or Masking tape
Small stones or weights

WHAT TO DO:



Stiffening a structural material by tubing

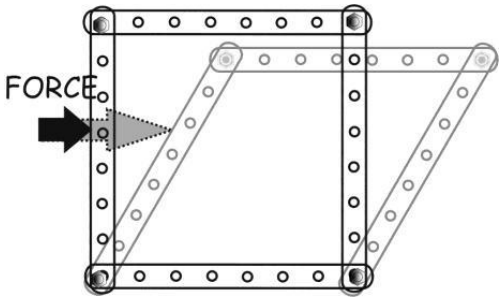
1. See how flimsy a sheet of A4 project board is as a flat sheet.
2. Now roll the sheet to form a tube about 2 cm in diameter. (Stop it from unrolling by securing the free end with a piece of sellotape or masking tape.)
3. It now becomes a strong material that can be used to make frame structures.

Stiffening a structural material by folding

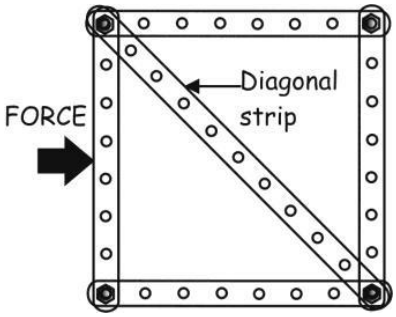
1. Support a sheet of A4 project board placed flat on two books placed about 15 cm apart. Try supporting two or three small stones on the board between the two books. Does the board hold them?
2. Now fold the board at every 2 cm along its length to make a corrugated board (See diagram).
3. Support the corrugated (folded) board on the two books. How many stones can the board support now before it gives way?

Stiffening a frame structure by triangulation

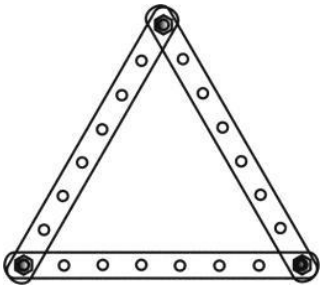
1. Join four lengths of link strip (each about 12 cm long) to form a square, as shown on the right.
   Use the bolts and nuts to join the strips.
2. Apply a force to any one of the sides of the square.
3. The square gives way - a rectangular frame is not a very rigid or strong structure.



4. Now add a diagonal piece of link strip.
5. This makes the frame rigid to compressive forces.
6. The strip divides the frame into triangles which have rigid structures.
7. This is called triangulation.

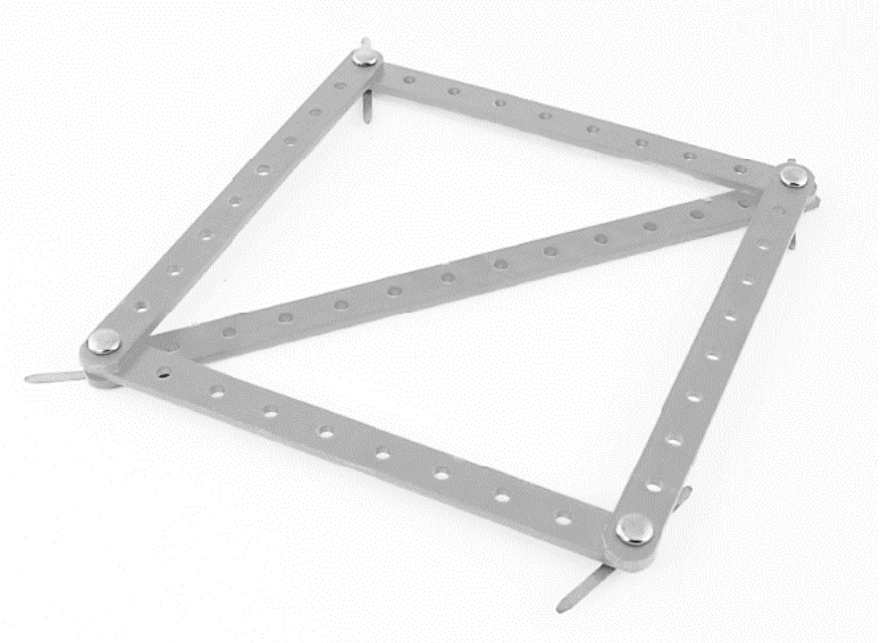


8. Remove one of the sides of the square frame and join the frame to make a triangle.
9. Apply a force on any side of the triangle.
10. Triangular frames are rigid shapes.



ASSESSMENT:

1. Where is tubing used in things around us to make strong structures?
2. Where is folding used in things around us to make strong structures?
3. Triangulation:
   a. How did adding the diagonal strip to the square frame structure increase the strength of the structure?
   b. Where is triangulation used in things around us to make strong structures?



GRADE 7	TERM 2	STRUCTURES	FRAME STRUCTURES
Mini – PAT: Cell Phone Tower			

YOU NEED:

- Items brought from home to help you construct your model
- The Lasec Education Technology Kit contains a few items that might prove helpful such as:
  - wood strip,
  - wooden dowel,
  - plastic rods,
  - sellotape,
  - masking tape,
  - drinking straws.

WHAT TO DO:

1. Your teacher will discuss with you the scenario given in your textbook for the construction of a model cell phone tower.
2. Write your design brief and list the specifications for your tower.
3. Sketch your 2 initial design ideas using free-hand 3D sketches:
   - Draw one idea using oblique projection
   - Draw a different idea using single vanishing point perspective.
   - Show your designs to the other learners in your group and after evaluation and feedback, you can modify your design if necessary.
   - Work out what materials and tools you need to build your model tower.
   - Make a working drawing of your tower showing one face in 2D.
4. Each learner now shows their final working drawing to their group. The group discusses all the designs and decides which best ideas they can use to make their final design.
5. Each group now builds their model with learners in each group being given certain tasks to do.
6. The class develops a rubric together that can be used to evaluate the groups.
7. Each group presents their model and plans to the class and is evaluated by the other groups. Your teacher will supervise the presentations and explain how you need to go about this.

GRADE 7	TERM 3	ELECTRICAL SYSTEMS & CONTROL	MAGNETISM
ACTIVITY: To investigate different kinds of permanent magnets and the magnetic field around magnets			

YOU NEED:

- 2 Bar magnets
- Sheet of A4 paper
- Pins
- Horseshoe magnet
- Iron filings

WHAT TO DO:

1. Notice the N and S markings on a bar magnet indicating the North pole and South pole of the magnet.
2. Bring a bar magnet close to a few pins and notice what happens.
3. Do the same with a horseshoe magnet.
4. Bring the N end one bar magnet close to the S end of a second bar magnet. Notice what happens.
5. Bring the N end of the bar magnet close to the N end of the second bar magnet. Notice what happens.
6. Bring the N end of a bar magnet close to one limb of a horseshoe magnet and then to the other limb of the horseshoe magnet. Notice what happens in each case.
7. Place the bar magnet on a flat surface and cover it with a sheet of A4 paper.
8. Sprinkle a few iron filings evenly over the paper and tap the paper lightly with you finger a few times. Notice what happens.
9. Repeat steps 7 and 8, but this time put the horseshoe magnet under the paper. Notice what happens.

ASSESSMENT:

1. Write down what you noticed and what you concluded for each investigation you did in steps 2, 3, 4, 5 and 6 above.
2. How can you find out which is the N pole of the horseshoe magnet?
3. Make a sketch showing the pattern the iron filings formed in step 8. What caused this pattern?
4. Make a sketch showing the pattern the iron filings formed in step 9. What caused this pattern?

GRADE 7	TERM 3	ELECTRICAL SYSTEMS & CONTROL	MAGNETISM
ACTIVITY: To investigate which substances stick to a magnet and which do not			

YOU NEED:

- Bar magnet
- Pins
- Match sticks
- Nails
- Sand
- Aluminium foil
- Paper
- Piece of copper
- Old nickel coin
- Tin can
- Stone
- Piece of plastic
- Any other substances

*Sandpaper has been included in the kit to remove any pollutants/rust found on the nail.

WHAT TO DO:

1. Place the object or substance you are testing on the desk and bring the bar magnet up close and touch the substance with the magnet.

2. Does it stick to the magnet?
3. Do the same with each object or substance you have brought to test.

ASSESSMENT:

1. Draw up a table with columns for substances that stick to the magnet and those that do not.
2. What do you conclude from your experiments?

GRADE 7	TERM 3	ELECTRICAL SYSTEMS & CONTROL	MAGNETISM
ACTIVITY: To investigate which metals stick to a magnet and which do not			

YOU NEED:

- Metal items and objects such as:
  - Aluminium foil; Copper granules; Iron nails; Steel wool; Household pins; Empty tin can; Lead sinker; Brass object;
  - Any other metal objects
- Bar magnet

WHAT TO DO:

1. Place the object or substance you are testing on the desk and bring the bar magnet up close and touch the substance with the magnet.
2. Does it stick to the magnet?
3. Do the same with each object or substance you have brought to test.

ASSESSMENT:

1. Draw up a table with two columns: Metals that stick to a magnet and Metals that do not stick to a magnet. Record the substances under the appropriate column as you test them.
2. What do the objects/substances that stick to the magnet have in common?

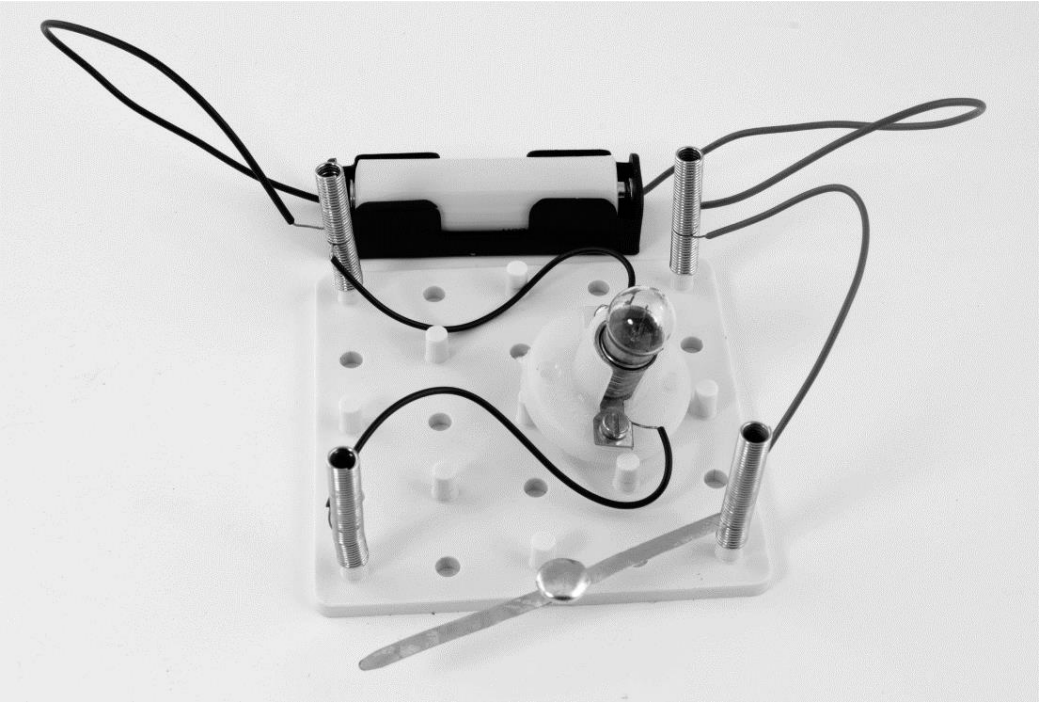
GRADE 7	TERM 3	ELECTRICAL SYSTEMS & CONTROL	SIMPLE ELECTRIC CIRCUITS
ACTIVITY: To investigate how to make a simple electric circuit			

YOU NEED:

Simple circuit board
Light bulb in holder
Cell holder and torch cell
Buzzer with leads
Connecting leads
Metal paper fastener (or paper clip)

WHAT TO DO:

1. Use components from the list above to make a simple electric circuit like the one that is shown below.



2. Unfold the legs of the paper fastener and connect it to one of the springs. This acts as a switch - use it to close the circuit when you want to turn the light bulb on.
3. Remove the light bulb from the circuit and replace it with the buzzer. Reverse the terminals of the buzzer in the circuit if it does not sound when the switch is closed.

ASSESSMENT:

1. Draw a circuit diagram, using the correct symbols, for the circuit you made containing the light bulb.
2. Why does the bulb only light up when the switch is closed?
3. Why does the buzzer only sound when it is connected the right way in the circuit?
4. What constitutes the *input*, the *process* and the *output* in the circuit?

GRADE 7	TERM 3	ELECTRICAL SYSTEMS & CONTROL	SIMPLE ELECTRIC CIRCUITS
ACTIVITY: To investigate how to make a simple electric magnet			

YOU NEED TO KNOW:

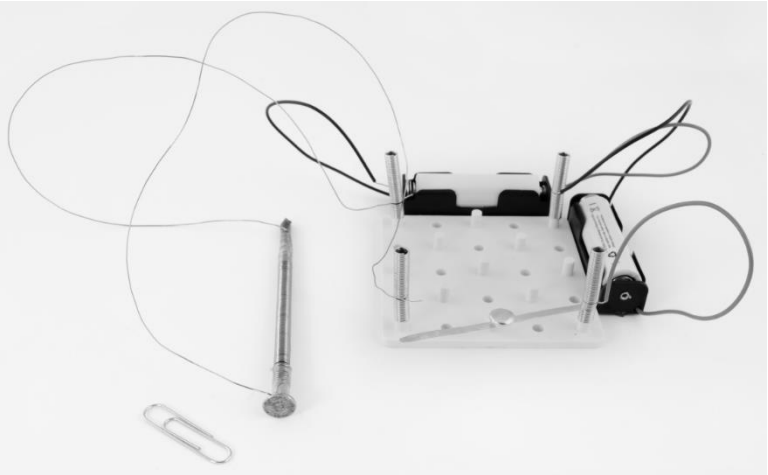
- When an electric current flows in a conductor a magnetic field is produced around the conductor.

YOU NEED:

Iron nail
About 3 m of varnish-coated transformer wire
2 cell holders and torch cells
Pins
Sellotape
Simple circuit board
Paper fastener
*Sandpaper has been included in the kit to remove any pollutants/rust found on the nail.

WHAT TO DO:

1. Wind the transformer wire around the iron nail to form a coil along the length of the nail. (Use sellotape to secure the end of the coil and stop it from springing off the end of the nail.)
2. Leave a short length of the wire free on either end to connect to the power source.
3. Use a sharp knife to scrape the varnish off the tips of these ends to make good electrical contact with the battery.



4. Connect 2 cells in series. Connect the lead from one terminal of this battery to one of the free wires of the electromagnet.
5. Connect the lead from the other terminal to a switch which then connects with the other free wire from the electromagnet.

INVESTIGATION AND ASSESSMENT:

Write down your answers to the questions as you perform each step below:

1. Place a few pins on a flat surface. Why must they be pins containing iron?
2. With the circuit still open, hold one end of the electromagnet just above the pins. Are the pins attracted to the nail? Give a reason for your answer.
3. Close the circuit by touching the free lead from the battery to the end of the free lead from the electromagnet. Are the pins attracted now? Why?
4. Open the circuit again. What happens to the pins? Give a reason for your answer. Do they all fall off the electromagnet immediately? Give a reason for your answer.
   Don't leave the electromagnet switched on as it uses a lot of energy from the battery.

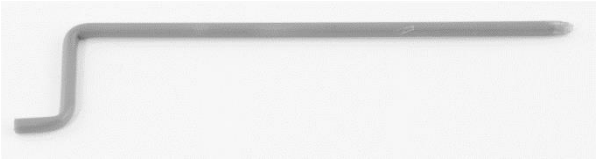
GRADE 7	TERM 3	MECHANICAL SYSTEMS & CONTROL	CRANKS & PULLEYS
ACTIVITY: To investigate how cranks and pulleys work			

YOU NEED:

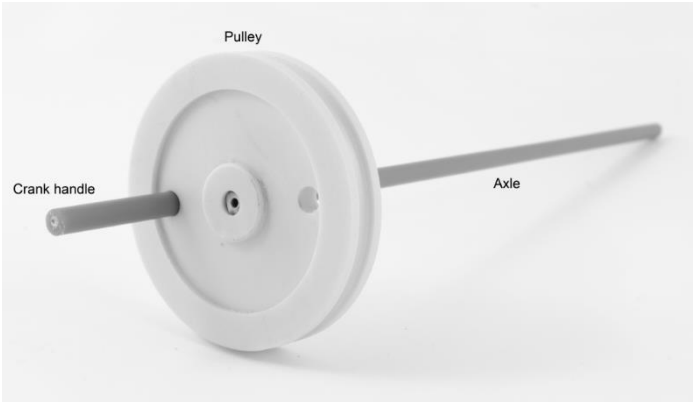
- Rigid plastic rod
- Pulleys
- Small spirit burner (from Learner Chemistry Kit)
- Link strip
- Nuts and bolts (4 mm)

WHAT TO DO:

1. Make a crank
   a. Gently heat a small section of a 15 cm length of rigid plastic rod (about 2 cm from the end of the rod) above the flame of a spirit burner.
   b. Rotate the rod above the flame to ensure even heating all around the rod at this point.
   c. The plastic becomes soft in this region and you can bend it easily.
   d. Bend it to make a right angle and allow it to cool so that the bend becomes rigid.
   e. Heat the rod evenly a further 2 cm from the first bend and bend the rod at right angles at this point to make a crank. (See picture of crank below.)

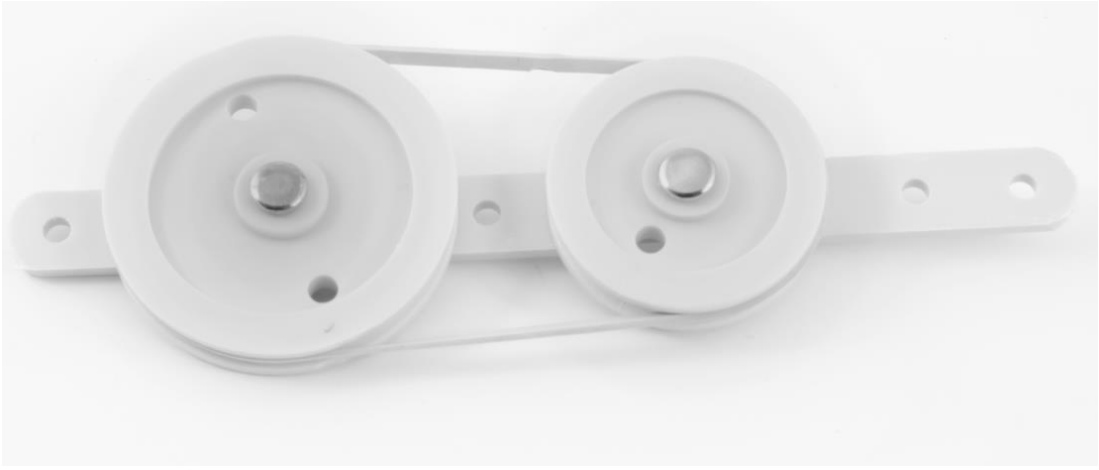


   f. You can also make a crank using a fixed axle pushed through the centre hole of a pulley and a crank handle pushed into the off-centre hole. (See picture below)



2. Investigating Pulleys
   a. Use a bolt and nut to attach a pulley to the end hole of a piece of link strip. (The pulley must turn freely on its axis.)
   - Fix one end of a piece of string to a small object. Hold the pulley on the strip above the object then loop the string over the pulley.
   - Pull downwards on the free end of the string and notice what happens to the object.
   b. Remove the string and mass object.
   c. Attach a second pulley to a hole on the link strip, 4-5 holes away from the first pulley.
   - Use a rubber band to act as a pulley belt and link the two pulleys.

- Use your finger to rotate one pulley and notice what happens to the other pulley.
- Use pulleys of different sizes to see and feel what happens when you rotate first one of the pulleys and then the other.



ASSESSMENT:

1. Where do we use cranks in our daily lives?
2. Where do we use pulleys in our daily lives?
3. What do we call plastics that soften when they are heated then set again when they cool without undergoing any change? (Find the answer on the internet or in a reference book.)
4. How would you use two pulleys to give you a mechanical advantage?
5. How could you get two pulleys (linked by a belt) to rotate in opposite directions when you turn one of them?

GRADE 7	TERM 3	ELECTRICAL SYSTEMS & CONTROL / STRUCTURES / MECHANISMS	STRUCTURES AND ELECTRICITY / CRANKS AND PULLEYS
Mini – PAT: Recycling and Impact			

YOU NEED:

- Items brought from home to help you construct your model
- From the Lasec Education technology Kit:
  - Pulleys
  - Iron nails
  - Cell holders and cells
  - Link strip and gussets
  - Nuts and bolts
  - Wood strip
  - Plastic rods
  - Wooden dowel
  - Paper clips
  - Light bulbs and holders
  - Connecting leads
  - Coated transformer wire (for electromagnet)

WHAT TO DO:

1. Your teacher will discuss with you the scenario given in your textbook on sorting magnetic and non-magnetic materials and outline the working model you need to make.
2. Your teacher will also explain how you must present your project to the class and what role each learner played in the designing and making of the model.
3. Write a design brief with specifications and constraints for a crane with electromagnet.
4. Sketch two possible designs for a suitable crane using single VP perspective.
5. Draw a circuit diagram for the electromagnet (with a light to show when it is on).
6. Now choose one of the crane designs and use the oblique technique to draw the crane.
7. Work out a flow chart detailing the sequence of manufacture of the crane and electromagnet.
8. Form groups to make your model.
9. Design a poster using an artist's impression to show your crane and electromagnet in use.
10. Develop a rubric to evaluate the models made by the other groups.
11. Using your rubric, evaluate the other groups when they present and demonstrate their models to the class. (They will also evaluate your group when you present.)

GRADE 7	TERM 4	PROCESSING	PROCESSING FOOD FOR A MEAL
ACTIVITY: To investigate how to prepare an item for a meal that is tasty and nutritious and that can be prepared under conditions found in a refugee camp			

YOU NEED:

Foodstuffs and kitchen utensils brought from home

WHAT TO DO:

1. Work in groups to do this activity
2. Follow the guides and tips given in your Technology textbook to prepare the food that you have chosen.

ASSESSMENT:

1. Allow learners from the other groups to assess the item of food you have prepared in your group, using the following criteria:

a) Is it nutritious?
b) Is it tasty?
c) Does it have a pleasant texture?
d) Is it easy to prepare in a situation like a refugee camp with limited resources?
e) Is it cost effective?

GRADE 7	TERM 4	PROCESSING / BIAS IN AND IMPACT OF TECHNOLOGY	PROPERTIES OF MATERIALS
Mini-PAT : Shelters for refugees			

YOU NEED:

- Items brought from home to make your model shelter
- The technology equipment found in the kit that might prove helpful such as:
  - wood strip
  - wooden dowel
  - plastic rods
  - sellotape
  - masking tape
  - drinking straws

WHAT TO DO:

1. Your teacher will discuss with you the scenario given in your textbook regarding the need for emergency shelters in the case of a disaster and outline the working model you need to make.
2. Your teacher will also explain how you must go about investigating, designing and planning for this project.
3. Write a design brief with specifications for producing a textile suitable for use in making an emergency shelter.
4. Sketch design ideas for an emergency shelter that can be transported to and erected at a site where people have become homeless.
5. Make your model of an emergency shelter made of the material you have waterproofed.

ASSESSMENT:

1. Is your shelter practical and easy to manufacture?
2. Is it easy to transport to the place where it is required?
3. Is it easy to assemble?
4. Is it easy to pack away after use?
5. Is the material that covers the shelter waterproof?
6. Is it neatly finished off and does it look presentable?