"I don't want to believe. I want to know."

-Carl Sagan

NATURAL SCIENCES

LESSON PLAN
GRADE 7 TERM 4

A MESSAGE FROM THE NECT

NATIONAL EDUCATION COLLABORATION TRUST (NECT)

Dear Teachers,

This learning programme and training is provided by the National Education Collaboration Trust (NECT) on behalf of the Department of Basic Education (DBE)! We hope that this programme provides you with additional skills, methodologies and content knowledge that you can use to teach your learners more effectively.

What is NECT?

In 2012 our government launched the National Development Plan (NDP) as a way to eliminate poverty and reduce inequality by the year 2030. Improving education is an important goal in the NDP which states that 90% of learners will pass Maths, Science and languages with at least 50% by 2030. This is a very ambitious goal for the DBE to achieve on its own, so the NECT was established in 2015 to assist in improving education and to help the DBE reach the NDP goals.

The NECT has successfully brought together groups of relevant people so that we can work collaboratively to improve education. These groups include the teacher unions, businesses, religious groups, trusts, foundations and NGOs.

What are the Learning programmes?

One of the programmes that the NECT implements on behalf of the DBE is the 'District Development Programme'. This programme works directly with district officials, principals, teachers, parents and learners; you are all part of this programme!

The programme began in 2015 with a small group of schools called the Fresh Start Schools (FSS). Curriculum learning programmes were developed for Maths, Science and Language teachers in FSS who received training and support on their implementation. The FSS teachers remain part of the programme, and we encourage them to mentor and share their experience with other teachers.

The FSS helped the DBE trial the NECT learning programmes so that they could be improved and used by many more teachers. NECT has already begun this embedding process.

Everyone using the learning programmes comes from one of these groups; but you are now brought together in the spirit of collaboration that defines the manner in which the NECT works. Teachers with more experience using the learning programmes will deepen their knowledge and understanding, while some teachers will be experiencing the learning programmes for the first time.

Let's work together constructively in the spirit of collaboration so that we can help South Africa eliminate poverty and improve education!

www.nect.org.za

CONTENTS

PROGRAMME ORIENTATION

Welcome to the NECT Natural Sciences learning programme! This CAPS compliant programme consists of:

- A full set of lesson plans for the term (3 hour lessons per week)
- A resource pack with images to support the lesson plans
- A full colour poster
- An outline of the assessment requirements for the term
- A tracker to help you monitor your progress

Lesson Plan Structure

1. Term 4 lesson plans are structured to run for 8 weeks.
2. Each week, there are three lessons, of the following notional time:

   3 x 1 hour

   This time allocation of 3 hours per week is CAPS aligned.

Lesson Plan Contents

1. The lesson plan starts with a **CONTENTS PAGE** that lists all the topics for the term, together with a breakdown of the lessons for that topic. You will notice that lessons are named by the week and lesson number, for example, Week 8 Lesson 8C.

2. Every topic begins with a 2 - 4 page **TOPIC OVERVIEW**. The topic overview pages are grey, making them easy to identify. The topic overview can be used to introduce the topic to learners. The topic overview includes:

   a. A ***general introduction*** to the topic that states how long the topic runs for, the value of the topic in the final exam and the number of lessons in the topic.

   b. A table showing the ***position of the topic*** in the term.

   c. A ***sequential table*** that shows the prior knowledge required for this topic, the current knowledge and skills that will be covered, and how this topic will be built on in future years. Use this table to give learners an informal quiz to test their prior knowledge. If learners are clearly lacking in the knowledge and skills required, you may need to take a lesson to cover some of the essential content and skills. It is also useful to see what you are preparing learners for next, by closely examining the 'looking forward' column.

   d. A glossary of ***scientific vocabulary***, together with an explanation of each word or phrase. It is a good idea to display these words and their definitions somewhere in the classroom, for the duration of the topic. It is also a good idea to allow learners some time to copy down these words into their personal dictionaries or science exercise books. You must explicitly teach the words and their meanings as and when you encounter these words in the topic. A good way to teach learners new vocabulary is to use 'PATS':

- POINT – if the word is a noun, point at the object or at a picture of the object as you say the word.
- ACT – if the word is a verb, try to act out or gesture to explain the meaning of the word, as you say it.
- TELL – if the word has a more abstract meaning, then tell the learners the meaning of the word. You may need to code switch at this point, but also try to provide a simple English explanation.
- SAY – say the word in a sentence to reinforce the meaning.

e. ***Understanding the uses / value of science****.* It is very important to give learners a sense of how science applies to their daily lives, and of the value that science adds to their lives. Hold a brief discussion on this point when introducing the topic, and invite learners to elaborate on the uses and value that this topic will have to their lives.

f. ***Personal reflection****.* At the end of every topic, come back to the topic overview, and complete this table. In particular, it is important to note your challenges and ideas for future improvement, so that you can improve your teaching the next year.

3. After the topic overview, you will find the **INDIVIDUAL LESSONS.** Every lesson is structured in exactly the same way. This helps you and the learners to anticipate what is coming next, so that you can focus on the content and skills. Together with the title, each lesson plan includes the following:

a. ***Policy and Outcomes****.* This provides you with the CAPS reference, and an overview of the skills that will be covered in the lesson. You can immediately see the science process skills that will be covered, and whether they are lower middle or higher order skills.

b. ***Possible Resources****.* Here, you will see the resources that you should ideally have for the lesson. If you need to use the poster or pages from the resource pack, this will be listed here. There is also a space for improvised resources, and you are invited to add your own ideas here.

c. ***Classroom Management****.* Every lesson starts in the same way. Before the lesson, you must write a question that relates to the previous lesson on the chalkboard. Train your learners to come in to the classroom, to take out their exercise books, and to immediately try to answer this question. This links your lesson to the previous lesson, and it effectively settles your learners.

Once learners have had a few minutes to answer, read the question and discuss the answer. You may want to offer a small reward to the learner who answers first, or best. Get your learners used to this routine.

Next, make sure that you are ready to begin your lesson, have all your resources ready, have notes written up on the chalkboard, and be fully prepared to start. Remember, learners will get restless and misbehave if you do not keep them busy and focussed.

d. ***Accessing Information****.* This section contains the key content that you need to share with learners. Generally, it involves sharing some new information that is written on the chalkboard, explaining this information, and allowing learners some time to copy the information into their exercise books. Train learners to do this quickly and efficiently. Learners must anticipate this part of the lesson, and must have their books, pens, pencils and rulers ready.

Explain to learners that this is an important resource for them, because these are the notes they will revise when preparing for tests and exams.

Checkpoint 1*.* Straight after 'Accessing Information', you will find two checkpoint questions. These questions help you to check that learners understand the new content thus far.

e. Conceptual Development*.* At this point, learners will have to complete an activity to think about and apply their new knowledge, or to learn a new skill. This is the most challenging part of the lesson. Make sure that you fully understand what is required, and give learners clear instructions.

Checkpoint 2*.* Straight after 'Conceptual Development, you will find two checkpoint questions. These questions help you to check that learners understand the new concepts and skills that they have engaged with.

f. Reference Points for Further Development*.* This is a useful table that lists the relevant sections in each approved textbook. You may choose to do a textbook activity with learners in addition to the lesson plan activity, or even in place of the lesson plan activity. You may also want to give learners an additional activity to do for homework.

g. Additional Activities / Reading*.* This is the final section of the lesson plan. This section provides you with web links related to the topic. Try to get into the habit of visiting these links as part of your lesson preparation. As a teacher, it is always a good idea to be more informed than your learners.

4. At the end of the week, make sure that you turn to the **TRACKER,** and make note of your progress. This helps you to monitor your pacing and curriculum coverage. If you fall behind, make a plan to catch up.

5. **POSTER AND RESOURCE PACK.** You will have seen that the *Possible Resource* section in the lesson plan will let you know which resources you will need to use in a lesson.

   Please note that you will only be given these resources once. It is important for you to manage and store these resources properly. Do this by:

   - Writing your name on all resources
   - Sticking Resources onto cardboard or paper
   - Laminating all resources, or covering them in contact paper
   - Filing the resource papers in plastic sleeves once you have completed a topic

   Have a dedicated wall or notice board in your classroom for Natural Sciences.

   - Use this space to display the resources for the topic
   - Display the vocabulary words and meaning here, as well as the resources
   - Try to make this an attractive and interesting space
   - Display learners' work on this wall – this gives learners a sense of ownership and pride

6. **ASSESSMENT.** At the end of the lesson plans, you will find the CAPS assessment requirements for the term. You should refer to your prescribed textbooks and departmental resources for examples of the relevant assessments.

Lesson Plan Routine

Train your learners to know and anticipate the routine of Natural Sciences lessons. You will soon see that a good knowledge of this routine will improve time-on-task and general classroom discipline and that you will manage to work at a quicker pace.

Remember, every Natural Sciences lesson follows this routine:

1. **Classroom Management**: settle learners by having two questions written on the chalkboard. Learners take out their exercise books and pens, and immediately answer the questions. Discuss the answers to the questions, and reward the successful learner.
2. **Accessing Information:** have key information written on the chalkboard. Explain this to learners. Allow learners to copy this information into their books.
3. **Checkpoint 1:** ask learners at least two questions to check their understanding.
4. **Conceptual Development:** complete an activity to apply new knowledge or skills.
5. **Checkpoint 2:** ask learners at least two questions to check their understanding.
6. **Reference Points for Further Development:** links to textbook activities – you may choose to use these activities as additional classwork activities, or as homework activities.
7. **Tracker:** fill in your tracker at the end of the lessons to track your progress.

A vehicle to implement CAPS

Teaching Natural Sciences can be exciting and rewarding. These lesson plans have been designed to guide you to implement the CAPS policy in a way that makes the teaching and learning experience rewarding for both the teacher and the learners.

To support the policy's fundamentals of teaching Natural Sciences, these lesson plans use the CAPS content as a basis and:

- provide a variety of teaching techniques and approaches
- promote enjoyment and curiosity
- highlight the relationship between Natural Science and other subjects
- where appropriate, draw on and emphasise cultural contexts and indigenous knowledge systems
- show the relationship between science, learners, their societies and their environments
- aim to prepare learners for economic activity and self-expression

Content and Time Allocation

These lessons plans have been developed to comply with CAPS in respect of both content and time allocation. In developing these lesson plans, consideration of the realities of teachers was taken and to this end, some simple adjustments were made, without deviating from policy, to make the teaching of these lesson plans more achievable. The kinds of adjustments made include using some of the practical tasks in the lesson plans for assessment purposes; and building in time for revision and exams during terms 2 and 4.

CAPS assigns one knowledge strand to form the basis of content in each term. These strands are as follows:

- Term 1: ***Life and Living***
- Term 2: ***Matter and Materials***
- Term 3: ***Energy and Change***
- Term 4: ***Planet Earth and Beyond***

The distribution of these strands across the year is summarised in the table below:

Grade 7			
Term 1	**Term 2**	**Term 3**	**Term 4**
NS Strand	**NS Strand**	**NS Strand**	**NS Strand**
Life and Living	**Matter and Materials**	**Energy and Change**	**Planet Earth and Beyond**
The biosphere Biodiversity Sexual Reproduction Variation	Properties of materials Separating mixtures Acids, bases and neutrals Introduction to the periodic table of the elements	Sources of energy Potential and Kinetic energy Heat transfer Insulation and energy saving Energy transfer to surroundings The national electricity supply system	Relationship of the Sun and the Earth Relationship of the Moon and the Earth Historical development of astronomy
These lesson plans have been designed against the stipulated CAPS requirements with topics being allocated for the time prescribed by CAPS. (Remember that some slight changes have been incorporated to accommodate time for revision, tests and examinations).			

PROGRAMME ORIENTATION

The time allocation by topic is summarised in the table below.

Remember that one week equates to 3 hours or three lessons of 1 hour each.

	GRADE 7		GRADE 8		GRADE 9	
TERM	**Topic**	**Time in weeks**	**Topic**	**Time in weeks**	**Topic**	**Time in weeks**
Term 1: Life and Living	• The biosphere	1	• Photosynthesis and respiration	2	• Cells as the basic units of life	2
	• Biodiversity	3½	• Interactions and interdependence within the environment	5	• Systems in the human body	2
	• Sexual Reproduction	3½			• Human Reproduction	2
	• Variation	1	• Micro-organism	2	• Circulatory and respiratory systems	1½
					• Digestive system	1½
		(9 wks)		(9 wks)		(9 wks)
Term 2: Matter and Materials	• Properties of materials	2	• Atoms	2	• Compounds	1
	• Separating mixtures	2	• Particle model of matter	5	• Chemical reactions	1
	• Acids, bases and neutrals	2	• Chemical reactions	1	• Reactions of metals with oxygen	1½
	• Introduction to the periodic table of the elements	2			• Reactions of non-metals with oxygen	1
					• Acids, bases and pH value	1
					• Reactions of acids with bases (I)	½
					• Reactions of acids with bases (II)	1
					• Reactions of acids with bases (III)	½
					• Reactions of acids with metals	1
		(8 wks)		(8 wks)		(8 wks)

Term 3: Energy and Change	• Sources of energy • Potential and Kinetic energy • Heat transfer • Insulation and energy saving • Energy transfer to surroundings • The national electricity supply system	1 2 2 2 1 1	• Static electricity • Energy transfer in electrical systems • Series and parallel circuits • Visible light	1 3 2 3	• Forces • Electric cells as energy systems • Resistance • Series and parallel circuits • Safety with electricity • Energy and the national electricity grid • Cost of electrical power	2 ½ 1 2 ½ 1 2
		(9 wks)		(9wks)		(9 wks)
Term 4: Planet Earth and Beyond	• Relationship of the Sun and the Earth • Relationship of the Moon and the Earth • Historical development of astronomy	4 2 2	• The Solar System • Beyond the Solar System • Looking into space	3 3 2	• The Earth as a system • The Lithosphere • Mining of mineral resources • Atmosphere • Birth, life and death of stars	1 2 2 2 1
		(8 wks)		(8 wks)		(8 wks)
TOTALS	34 weeks		34 weeks		34 weeks	

REFLECTING ON THE LESSONS THAT YOU TEACH

It is important to reflect on your teaching. Through reflection, we become aware of what is working and what is not, what we need to change and what we do not. Reflecting on your use of these lesson plans will also help you use them more effectively and efficiently.

These lesson plans have been designed to help you deliver the content and skills associated with CAPS. For this reason, it is very important that you stick to the format and flow of the lessons. CAPS requires a lot of content and skills to be covered – this makes preparation and following the lesson structure very important.

Use the tool below to help you reflect on the lessons that you teach. You do not need to use this for every lesson that you each – but it is a good idea to use it a few times when you start to use these lessons. This way, you can make sure that you are on track and that you and your learners are getting the most out of the lessons.

LESSON REFLECTION TOOL			
Preparation			
1.	What preparation was done?		
2.	Was preparation sufficient?		
3.	What could have been done better?		
4.	Were all of the necessary resources available?		
Classroom Management			
		Yes	**No**
5.	Was there a question written on the board?		
6.	Was there an answer written on the board?		
7.	Was the answer discussed with the learners in a meaningful way?		
8.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		

Accessing Information			
		Yes	**No**
9.	Was the text and/ or diagrams written on the chalkboard before the lesson started?		
10.	Was the work on the board neat and easy for the learners to read?		
11.	Was the explanation on the content easy to follow?		
12.	Was the information on the board used effectively to help with the explanations?		
13.	Was any new vocabulary taught effectively? (in context and using strategies like PATS)		
14.	Were the learners actively engaged? (asked questions, asked for their opinions and to give ideas or suggestions)		
15.	Were the checklist questions used effectively?		
16.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		

PROGRAMME ORIENTATION

Conceptual Development			
		Yes	**No**
17.	Was the information taught in the 'Accessing Information' part of the lesson used to foreground the activity?		
18.	Were clear instructions given for the conceptual development activity?		
19.	Were the outcomes/answers to the activities explained to the learners?		
20.	Could the learners ask questions and were explanations given?		
21.	Was a model answer supplied to the learners? (written or drawn on the board)		
21.	Were the checklist questions used effectively?		
22.	At the end of the lesson, were the learners asked if they had questions or if they needed any explanations?		
23.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		

TOPIC OVERVIEW:
Relationship of the Sun to the Earth
Term 4, Weeks 1A – 4C

A. TOPIC OVERVIEW

Term 4, Weeks 1a – 4c

- This topic runs for 4 weeks.
- It is presented over 12 lessons.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C

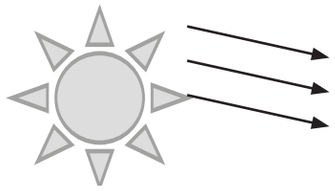
LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C

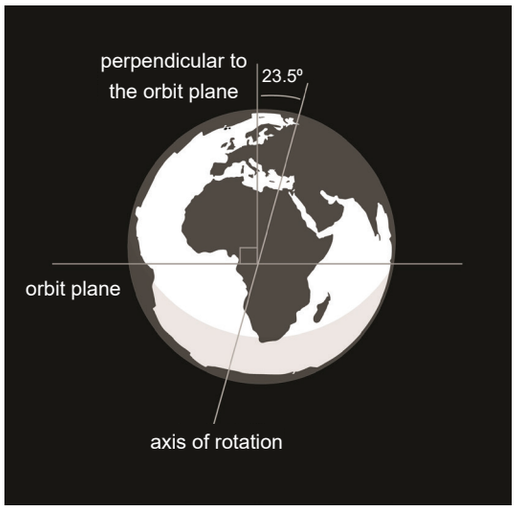
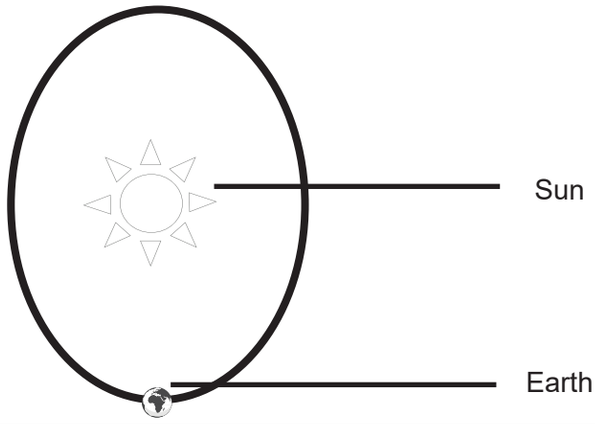
B. SEQUENTIAL TABLE

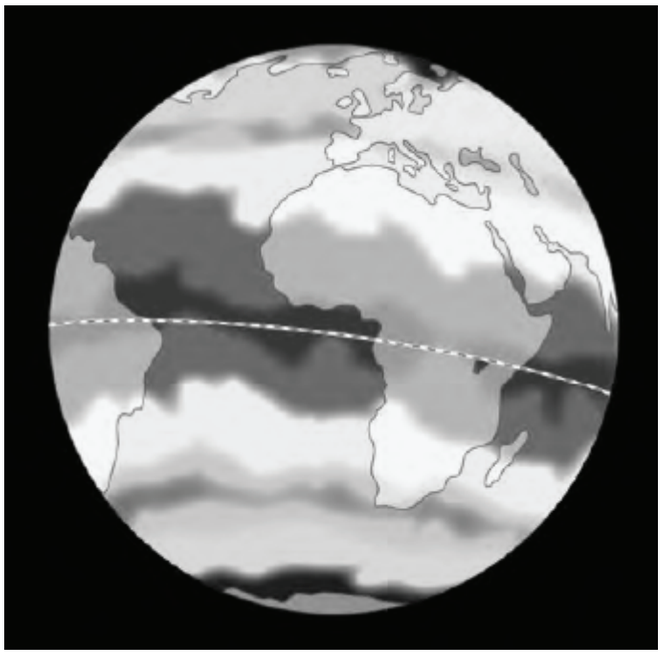
GRADE 6	GRADE 7	GRADE 8
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Time taken to revolve around the Sun • Rotation - each planet spins on its own axis	• Relationship of the Sun to the Earth • Solar energy and the Earth's seasons • Solar energy and life on Earth	• The Solar System • The Sun • Objects around the Sun • Earth's position in the solar system

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	radiate	The process of giving off energy in the form of waves or particles. 

2.	axis	An imaginary line that passes through the centre of the Earth from the north to the south pole. 
3.	rotate	To turn about a central point, in this case the Earth on its own axis. It looks like a top that is spinning.
4.	orbit	Path of one object in space, around another. 
5.	solar energy	Energy from the Sun. We can use solar energy by using a solar panel.
6.	solstice	The date on which the Sun's rays falls perpendicularly onto the Earth's surface at their furthest distance north or south of the equator. In the Southern hemisphere: a. 21 December is the summer solstice: the longest day and the shortest night. b. 21 June is the winter solstice: shortest day and the longest night.
7.	equinox	Dates on which day and night are of equal length. In the southern hemisphere, the dates are: a. 21 March is the Autumn equinox: day and night are equal in length. 12 hours each. b. 23 September is the Spring solstice: day and night are equal length.

8.	equator	An imaginary line that divides the Earth into two equal halves or hemispheres – the northern and the southern hemisphere. 
9.	photosynthesis	Process by which plants make their own food using carbon dioxide, water and the energy from the Sun. Oxygen is released into the atmosphere.
10.	carbohydrate	This is a type of food that plants manufacture. Examples are starch, glucose and cellulose. Carbohydrates contain a lot of energy so when we eat it, it gives us energy.
11.	producer	This is an organism that uses Sunlight, water and carbon dioxide to manufacture its own food. It is the only organism that can manufacture its own food. Examples are grass, trees and algae.
12.	food chain	A food chain is a simple linkage of organisms. An example of a food chain is an insect that eats a plant. The insect is then eaten by a small bird which will be eaten by a snake.
13.	herbivore	A herbivore is an animal that feeds only on producers (or plants). An example would be a cow or a giraffe. A cow feeds on grass only and giraffes feed on the leaves of trees. They do not eat any other animals or insects.
14.	carnivore	A carnivore is an animal that only eats other animals. For example, lions and leopards are carnivores. These animals only eat other animals.
15.	omnivore	An omnivore is an animal that eats both plants and animals. For example, a pig. Pigs will eat worms and plants and insects.
16.	fossil fuel	Fossil fuels are sources of energy that are formed from the accumulated remains of living organisms that were buried millions of years ago. Pressure, heat and time allow the organic matter to transform into one of the three major types of fossil fuels, which are coal, oil and natural gas.

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

This topic helps learners work out which year will be a leap year. They will be able to understand about seasons and that when it is summer in South Africa and is winter in a country in the northern hemisphere. Learners gain an understanding of how long it takes fossil fuels to form and that we should therefore conserve it.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

1 A

Term 4, Week 1, Lesson A

Lesson Title: The movement of light from the Sun outward onto Earth

Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and the Earth's seasons
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- identify features of the Sun that make it the major source of energy for Earth
- draw a diagram to illustrate how the Sun radiates light and heat energy

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions	✓	12. Recording Information	
3. Comparing		8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Ice cubes	Drawing of ice cubes on chalkboard - Resource 4

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

> Give one reason why the Sun is important to us.

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

> *It provides us with warmth and light. It is important for plants to make food (photosynthesis).*

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

> THE Sun
>
> 1. The Sun is a star found at the centre of our solar system and is essential for life on Earth.
> 2. The Sun generates huge amounts of energy.
> 3. The Sun **radiates** heat and light in all directions.
> 4. The Earth receives energy from the Sun in the form of heat and light (**solar energy**).
> 5. The Sun rises in the east and sets in the west.
> 6. At 12pm (middle of the day) the Sun is at its highest point

2. Tell one learner to read through the information on the board.
3. Explain to the learners that the Sun is extremely important for life on Earth because it provides light, heat and energy and without the Sun life would not exist.
4. Show the learners Resource 4 to explain this.
5. a. Tell the learners that there should be no talking for the next few minutes just listening to the teacher. Tell the learners that when you ask a question they must keep their eyes closed and not answer out loud, but just keep the answer in their minds.

   b. Ask the learners to close their eyes and imagine that the Sun was “switched off” for a day. Now ask the learners the following questions, giving them time to think about each question:

   - “What do you see?”

- "What do you hear?"
- "What do you smell?"
- "How do you feel?"

c. Ask the learners to now open their eyes and turn to a partner. Tell them to share their answers for each question with each other.

4. Choose a few learners to share their answers with the class.
5. Ask the learners if they realize how important the Sun is to life on Earth? They should say yes.
6. Give learners some time to copy the information written on the chalkboard into their workbooks.

Answers will vary but some examples could be:

- What do you see? *Darkness, nothing, fire (because things may catch fire)*
- What do you hear? *Chaos, screaming, crying, silence*
- What do you smell? *Burning, petrol, gas*
- How do you feel? *Cold, afraid*

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

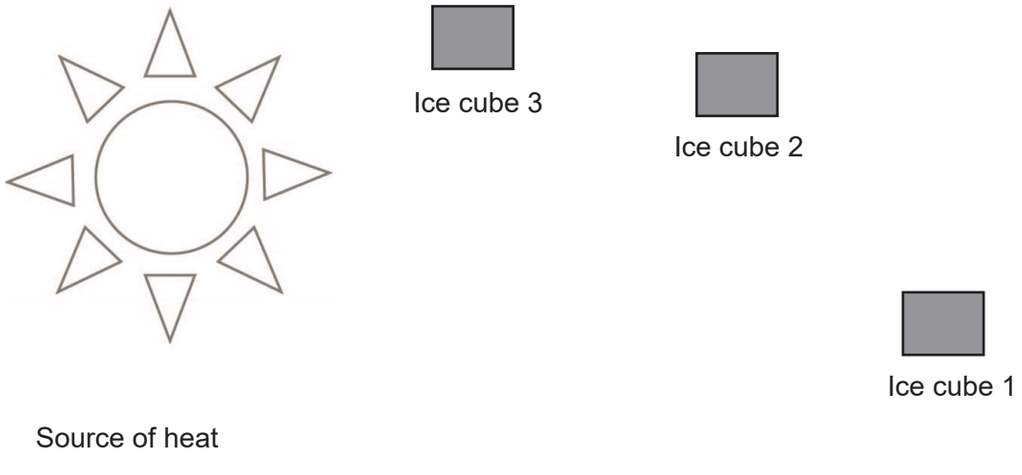
a. What is planet Earth's main source of energy?
b. What do we call this energy?

Answers to the checkpoint questions are as follows:

a. The Sun.
b. Solar energy.

E CONCEPTUAL DEVELOPMENT

1. Write the instruction and draw the following onto the chalkboard:



2. Do the following activity with the learners:

a. Ask the learners which ice cube (1, 2 or 3) will melt the fastest?
b. Learners must not answer out loud but all must put up either 1, 2 or 3 fingers. Every learner must have a finger/s up before you ask one person to call out the answer.
c. The learners should have 3 fingers up to show that ice cube 3 melts the fastest.
d. Tell the learners that the correct answer is 3.
e. Ask the learners which ice cube (1, 2 or 3) will melt the slowest?
f. Learners must not answer out loud but all must put up either 1, 2 or 3 fingers. Every learner must have a finger/s up before you ask one person to call out the answer. The learners should have 1 finger up to show that ice cube 1 melts the slowest.
g. Tell the learners that the correct answer is 1.
h. (This method allows EVERY learner to be fully engaged in the lesson and helps you see who understands a concept and who does not)
i. Ask the learners why the ice cube melts when it is close to a source of heat.
j. Give the learners about a minute to think for a while, after which they need to discuss their answer with the person sitting next to them.
k. Ask one learner to tell the class why the ice cube melts when it is close to a source of heat.
l. Tell the learners the correct answer is that when the ice, a solid, receives energy from the Sun, this energy allows the molecules in the ice to move faster and the spaces between the molecules in the ice get bigger and the solid turns into a liquid.

3. Give the learners some time to copy the diagram on the chalkboard into their workbooks.
4. Instruct learners to complete the following activity:

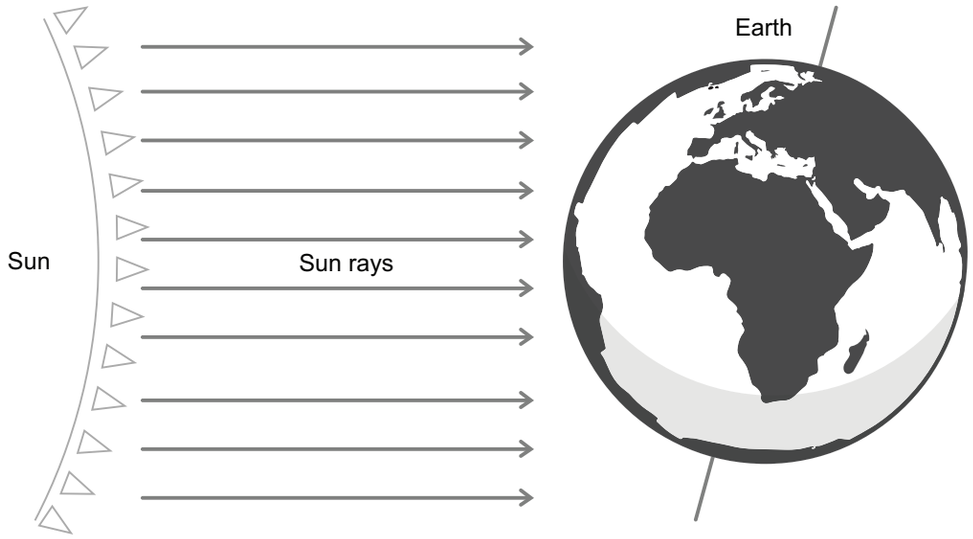
Activity 1

1. Write the AIM of the 'ice experiment' that was just discussed.
2. Write a CONCLUSION for the 'ice experiment' that was just discussed.
3. Draw a diagram with arrows to show how light moves from the Sun outward onto Earth. Divide the Earth into 2 halves and show which half is NIGHT and which half is DAY.
   Use the following labels on your diagram: **Sun, Earth, light rays, night, day**

5. Write the model answers onto the chalkboard:

1. AIM OF EXPERIMENT: To investigate whether a block of ice will melt faster/slower when placed close to/ further away from a source of heat.
2. CONCLUSION OF EXPERIMENT: The block of ice will melt faster when it is closer to the source of heat/ The block of ice will melt slower when it is further away from the source of heat.

3.



5. Ask the learners if they have any questions and provide answers and explanations.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What does radiate mean?
b. Why do you think the ice melts when it is left in the Sun for a while?

Answers to the checkpoint questions are as follows:

a. The process of giving off energy in the form of waves or particles.
b. The energy/heat from the Sun is added to the ice, the water molecules begin to get excited and move around. As more and more heat is added, the molecules move faster and faster, causing the structure of the molecules to loosen. The ice cube changes from a solid to a liquid.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	140-141
Via Afrika	Relationship of Sun to the Earth	148-149
Platinum	Relationship of Sun to the Earth	194-195
Spot On	Relationship of Sun to the Earth	141-142
Sasol Inzalo Bk B	Relationship of the Sun to the Earth	146-147
Step-by-Step Natural Sciences	Relationship of the Sun to the Earth	166
Pelican Natural Sciences	Relationship of the Sun to the Earth	247-250
Solutions for All Natural Sciences	Relationship of the Sun to the Earth	291-298
Shuters Top Class Natural Sciences	Relationship of the Sun to the Earth	159-160
Sasol Inzalo Bk B	Relationship of Sun to the Earth	146-147

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://starchild.gsfc.nasa.gov/docs/StarChild/questions/question31.html [Day and night]
2. https://www.universetoday.com/60174/does-the-Sun-move/ [Movement of planets around the Sun]

1 B

Term 4, Week 1, Lesson B
Lesson Title: Movement of the Earth on its axis
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Movement of the Earth on its axis
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- explain how the Sun emits light and heat energy
- describe the structure of the Sun
- relate the types of reactions that occur in the Sun

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions	✓	12. Recording Information	
3. Comparing		8. Predicting		13. Interpreting Information	✓
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the Sun	A round object like a ball
Model of the Earth	Resource 2, 3, 5 and 6

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Why do we have night and day?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

*It takes 24 hours for the Earth to complete one **rotation** on its own axis. The Earth rotates on its own **axis** and causes day and night. When one half is in darkness the other half is lit up by the Sun.*

D ACCESSING INFORMATION

1. Write the following question onto the chalkboard before the lesson starts:

THE EARTH

1. The Earth's **axis** is an imaginary line.
2. The Earth's axis passes through the north and south pole.
3. The Earth's axis is not straight; it is tilted at 23.5 degrees. (Refer to image in vocabulary list at the start of the topic).
4. The tilt of the Earth's axis does not change as the Earth orbits around the Sun.
5. The Sun does not move but the Earth does.
6. It takes 24 hours for the Earth to complete a **rotation.**

2. Tell one learner to read through the information written on the board.
3. Use the round object that was brought to class to demonstrate the following:
   a. The Earth has a north and south pole. Point to the top of the object and tell the learners that this is the north pole. Point to the bottom of the object and tell the learners that this is the south pole.
   b. The Earth is divided into the northern and southern hemispheres. Point to the top half of the object and tell the learners that this is the northern hemisphere, and then to the bottom half of the object and tell them that it is the southern hemisphere.

c. Show the learners Resources 5 and 6 to explain this.

4. Place your finger on the top of the object and your thumb on the bottom of the object. Then move your thumb a little to your left. Tell the learners that there is an imaginary line called the axis that runs through the object from your finger to your thumb.
5. Show the learners Resource 3 to explain this.
6. Give learners some time to copy the information written on the chalkboard into their workbooks.
7. Do the following activity with the learners:

Demonstrate the movement of the Earth by doing the following:

a. Ask two learners to come to the front of the class.
   - Tell one learner to hold the round object up high while standing on a chair.
   - Tell the class that this object in the learner's hand represents the Sun.
   - Ask the other learner to stand up and face the Sun.
   - Tell the learners that this learner standing on the floor, facing the Sun, represents the Earth.
   - Ask the learner, who is representing the Earth to turn slowly on the spot in an anti-clockwise direction. S/he can do 2 or 3 rotations.

b. Tell the learners that the movement of Earth turning on its own axis is called rotation. Write this word on the chalkboard.

c. Now tell the learner to keep rotating on his/her own axis whilst moving in a circle around the "Sun" in an anti-clockwise direction. Tell them this movement around the Sun is called a **revolution**. Write this word on the chalkboard.

d. Tell the learners to break into groups of two.

e. Tell them they need to work in pairs to repeat the activity they have just seen demonstrated, so that they can understand how the Earth rotates and revolves for themselves.

f. Give the learners 2 minutes to do this activity.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What is the name of the imaginary line that passes through the Earth?

b. Is the Earth straight or tilted on its axis?

Answers to the checkpoint questions are as follows:

a. The Earth's axis.

b. Tilted.

E CONCEPTUAL DEVELOPMENT

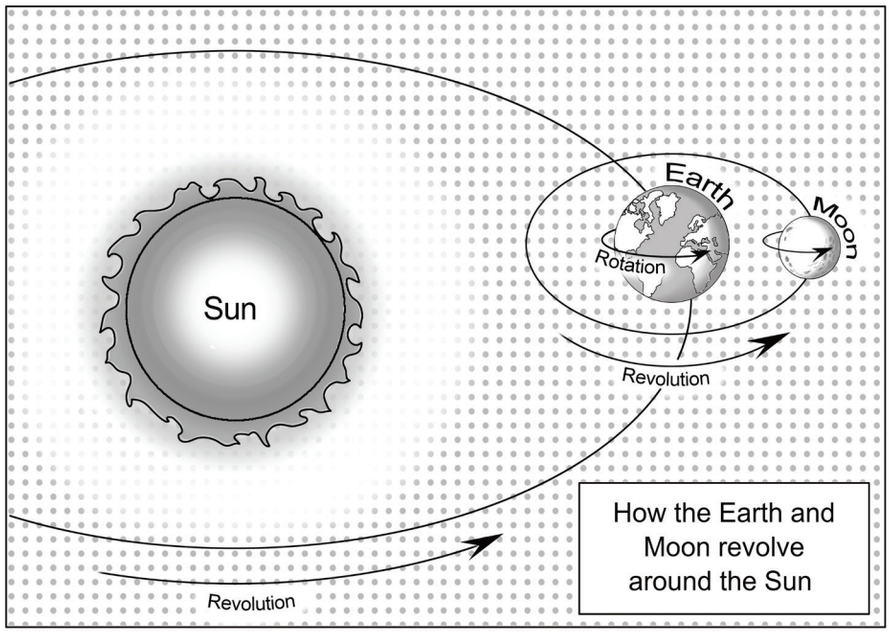
1. Instruct the learners to complete the following activity:

Activity

1. Draw a diagram to show the meaning of rotation and revolution. Your diagram should show the Earth moving around the Sun.
   - Your diagram should have the following labels: Earth, Sun, rotation, revolution
   - Use arrows to show direction of movement.
2. Write the meaning of the following:
   - Rotation
   - Revolution

2. Tell the learners to complete the above activity in their workbooks.
3. Write the model answer on the chalkboard:

1.



2. *Rotation: To turn on its own axis.*
3. *Revolution: To travel around an object following a path.*
4. *Show the learners Resource 2 to help explain this.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What is the Earth's axis?
b. Why do you think there are 24hrs in a day?

Answers to the checkpoint questions are as follows:

a. The Earth's axis is an imaginary line that passes through the north and south pole.
b. This is how long it takes for the Earth to complete one rotation on its own axis.

4. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of the Sun to the Earth	140-141
Via Afrika	Relationship of the Sun to the Earth	148-149
Platinum	Relationship of the Sun to the Earth	194-195
Spot On	Relationship of the Sun to the Earth	141-142
Step-by-Step Natural Sciences	Relationship of the Sun to the Earth	166
Pelican Natural Sciences	Relationship of the Sun to the Earth	251-253
Solutions for All Natural Sciences	Relationship of the Sun to the Earth	286
Shuters Top Class Natural Sciences	Relationship of the Sun to the Earth	160-161
Sasol Inzalo Bk B	Relationship of Sun to the Earth	150-154

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www.youtube.com/watch?v=9n04SEzuvXo (2.56 mins) [Movement of Earth on its axis]
2. https://www.space.com/16080-solar-system-planets.html [The solar system showing planets]
3. https://www.universetoday.com/60174/does-the-Sun-move/ [Movement of planets around the Sun]

1 C

Term 4, Week 1, Lesson C
Lesson Title: Movement of the Earth around the Sun
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Movement of the Earth around the Sun
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- explain why the tilt of the Earth's axis does not change as the Earth orbits around the Sun
- recall that the Earth takes 365 ¼ days to complete 1 revolution around the Sun

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions		12. Recording Information	
3. Comparing		8. Predicting		13. Interpreting Information	✓
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the Earth and Sun	1 round object for example a ball, a tomato, an onion, a blown-up balloon
	A4 blank paper
	Poster of the solar system
	Resource 1

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

How long does it take the Earth to complete one rotation on its own axis?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

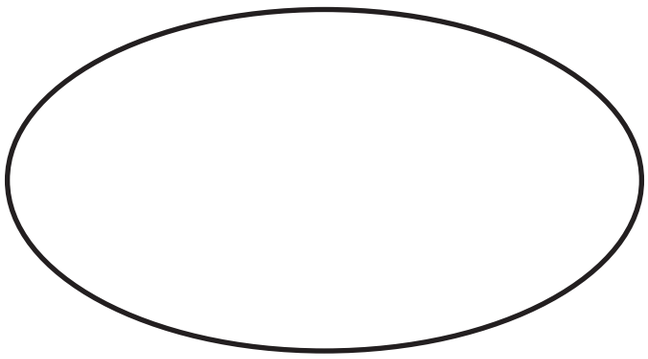
It takes 24 hours for the Earth to complete one rotation on its own axis.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

EARTH'S REVOLUTION

1. The Earth revolves around the Sun in an elliptical path, completing one revolution (orbit) around the Sun per year (or 365 1/4 days to be precise).
2. An elliptical shape is almost like the shape of an egg:



3. As the Earth revolves around the Sun it also rotates (spins) on its axis at the same time.

2. Explain this information to the learners as follows:
    a. In the previous lesson you saw that the Earth spins on its own axis at an angle.
    b. This rotation takes 24 hours, so the Earth is facing towards the Sun for 12 hours of daylight and facing away from the Sun for 12 hours of darkness.
    c. As the Earth spins on its own axis it also moves or rotates around the Sun.
    d. This rotation takes 365 ¼ days which is the same as 1 year.
3. Ask learners the learners if they know why we have a leap year.
4. Tell the learners turn to their partner and discuss this question and find the answer.
5. Ask one learner for the answer. They should say that each year has ¼ day extra and after 4 years, these four ¼ days will add up to another full day. Therefore, every fourth year has an extra day. We call this a leap year.
6. Show the learners Resource 2 and 3 to help explain this.
7. Give learners some time to copy the information written on the chalkboard into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. How long does it take for the Earth to move once around the Sun?
b. What day and month does a leap year occur?

Answers to the checkpoint questions are as follows:

a. It takes 365 ¼ days (1 year).
b. 29 February.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

Activity 1

1. In your own words explain what is meant by the Earth's rotation.
2. In your own words explain what is meant by the Earth revolving.

2. Ask the learners to answer the above two questions in their workbooks.
3. Write the model answers on the chalkboard.

1. *The Earth's rotation is the movement of the Earth on its axis which takes 24 hours.*
2. *The Earth revolves or moves around the Sun which takes 265 ¼ days which is one year.*

4. Read over the model answers with the learners.
5. Do the following activity with the learners:

a. Take the learners outside and ask:
   - For nine volunteers
   - For one of these volunteers to be the Sun
   - The other eight volunteers to be one of the eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune
   - The learner who is the Sun to stand in the centre of the circle and ask each learner who is a planet to stand where they think they should stand depending on how far they think they should be from the Sun

b. Give one learner who is not a planet or the Sun Resource1, and ask that the learner moves the planets (other learners) into the correct places around the Sun.

c. Ask the learners to come back into the class.

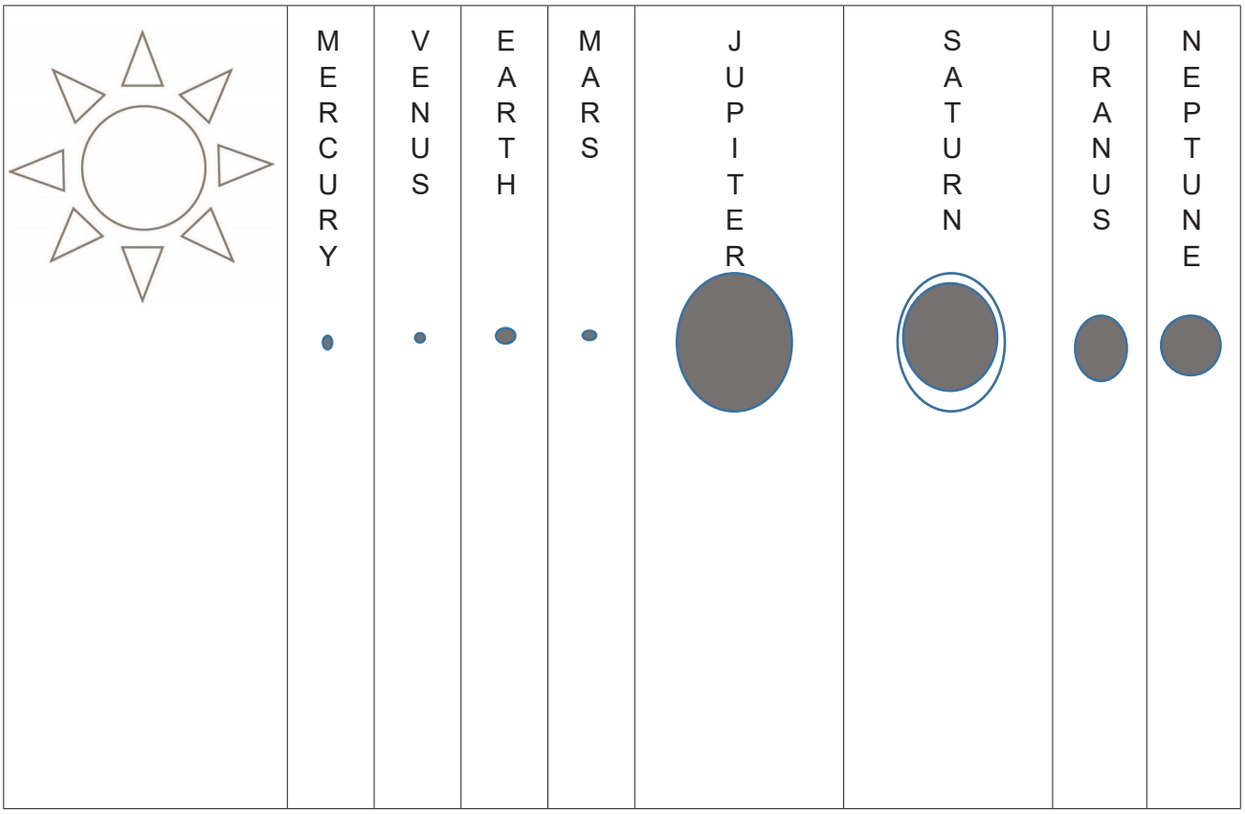
d. Hand out one A4 sheet of unlined paper to each learner.

e. Each learner must now sketch the Sun and 8 planets according to where they would be found in relation to the Sun.

f. The learners may use the poster and Resource 1 to help them.

g. Once the learners have drawn the solar system they would need to check a partner's work and compare their drawing and the information on the poster and Resource Page 1.

6. Below is a model answer for question g in the activity above:



7. Write the following onto the chalkboard (always try to do this before the lesson starts):

Activity 2

1. Name the 8 planets starting with the one closest to the Sun.
2. Which planet is the furthest away from the Sun?
3. Which planet is closest to the Sun.
4. Which planet would be the hottest?
5. Which planet would be the coldest?
6. Explain your answers in 4 and 5.

7. Give learners some time to answer the questions written on the chalkboard into their workbooks.
8. Write the model answers on the chalkboard:

1. *Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.*
2. *Neptune.*
3. *Mercury.*
4. *Mercury.*
5. *Neptune.*
6. *Mercury is very hot because it is very close to the Sun and Neptune will be very cold because it is very far away from the Sun.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What do we call the path the planets take around the Sun?
b. Which planet in our solar system is the only one suitable for humans to live on?

Answers to the checkpoint questions are as follows:

a. Orbit.
b. Earth.

9. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	140-143
Via Afrika	Relationship of Sun to the Earth	146-149
Platinum	Relationship of Sun to the Earth	194-197
Spot On	Relationship of Sun to the Earth	141-142
Step-by-Step Natural Sciences	Relationship of the Sun to the Earth	166-169
Pelican Natural Sciences	Relationship of the Sun to the Earth	254-259
Solutions for All Natural Sciences	Relationship of the Sun to the Earth	285-298
Shuters Top Class Natural Sciences	Relationship of the Sun to the Earth	161-164
Sasol Inzalo Bk B	Relationship of Sun to the Earth	150-154

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://www.polaris.iastate.edu/NorthStar/Unit5/unit5 intro.htm [Movement of the Earth around the Earth]

2 A

Term 4, Week 2, Lesson A
Lesson Title: Making a model of the Sun, Earth and Moon Part 1
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Movement of the Earth around the Sun
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- make a model of the Sun, Earth and Moon using paper mache
- define the different terminology related to the Earth

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions		12. Recording Information	✓
3. Comparing		8. Predicting		13. Interpreting Information	✓
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the Earth and Sun	
Textbook	
All-purpose cake flour	
Scrap paper	
Water	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

a. What does the Moon look like?

b. What does the Sun look like?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

a. The Moon is white with bits of grey. It has an uneven surface.

b. The Sun is bright yellow.

D ACCESSING INFORMATION

1. Do the following activity with the learners:

Ask learners to do the following:

a. Get into groups of 3 or 4 and sit together.

b. One learner from each group must come to the front of the class and take a bowl, a bottle or jug of water, scrap paper and some all-purpose cake flour.

c. Once the learners have settled down demonstrate what they would need to do, to make a paper mache model of the Sun, Moon and Earth

d. Explain each step to the learners as you do it:

- Roll some paper up into a ball large enough for the model that is being made. Remember that the Sun is very large; the Earth is smaller than the Sun but larger than the Moon.
- To make the paper mache glue add a cup of flour into a container.
- Now add small amounts of water and mix until it becomes a thin paste. It must not be too runny.
- Tear scraps of paper (either newspaper or writing paper) into strips.
- Take each strip of paper and dip it into the paper mache glue.
- Then stick the wet strip of paper onto the ball of paper. Continue to stick these wet strips onto the ball until the entire ball is covered.
- Do this a few times so that you have a few layers of paper mache on your ball.

e. Explain the following to the learners:

- They will need to make 3 of these paper mache balls.
- One ball will represent the Sun, one the Earth and one the Moon.

f. Remind the learners to look at their notes and to think about pictures that they have seen of these objects in the past.

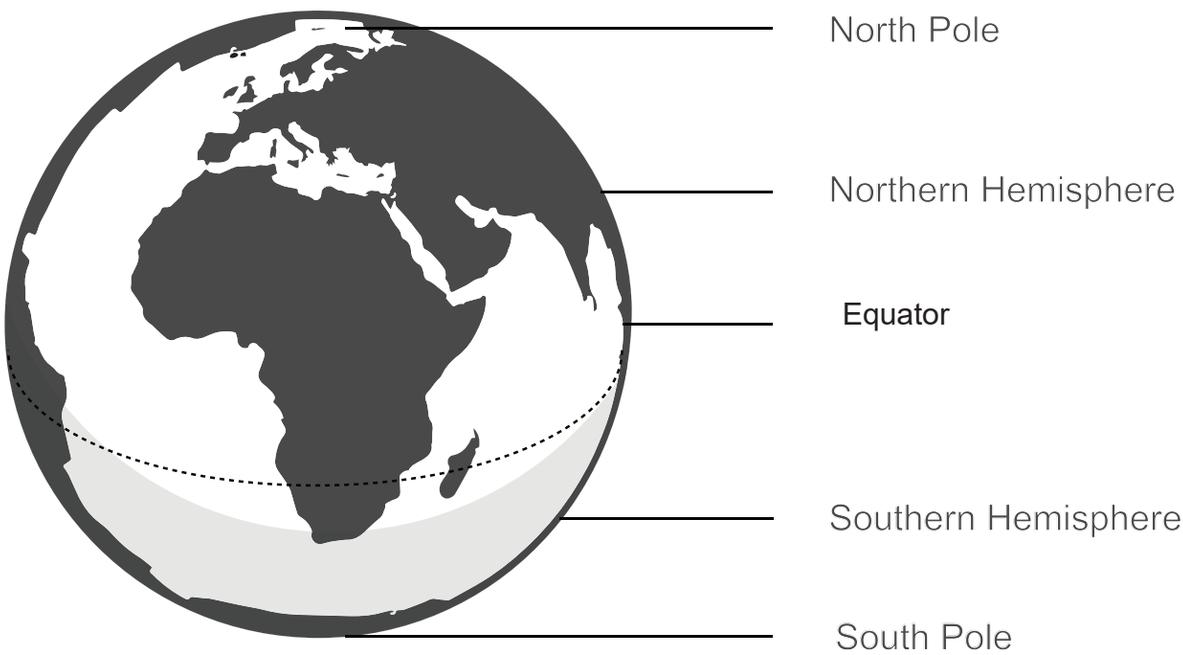
g. Tell the learners that once they are done making each of the objects they will need to leave these balls outside in the Sun to dry for the next lesson.

2. Ask learners if they have any questions and answer the questions.
3. Tell the learners that they may begin.
4. Walk around the class checking and assisting the learners.
5. Help the learners to figure out the sizes and shapes of the Sun, Earth and Moon if they are struggling to do this.
6. Once each group is done making their models, ask the groups to put the planets outside in a place where they will be safe from the rain and children running around.
7. Tell them that they must be able to recognize their planets for the next lesson.
8. Instruct learners to clean up their stations as dried flour is extremely difficult to clean.
9. Write the following onto the chalkboard (always try to do this before the lesson starts):

Activity 1

Draw and label the Earth. Use the labels: North pole, South Pole, Northern Hemisphere, Southern Hemisphere, Equator

10. Draw and label the model answer on the chalkboard:



11. Give learners some time to draw this diagram in their workbooks.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What is most of the Earth covered in?
b. How many hemispheres is the earth divided into? Name these hemispheres.

Answers to the checkpoint questions are as follows:

a. Water.
b. Two. Northern and Southern Hemispheres.

12. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

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Via Afrika	Relationship of Sun to the Earth	146-149
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Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	161-164
Sasol Inzalo Bk B	Relationship of Sun to the Earth	150-154

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://www.wikihow.com/Make-a-Model-of-the-Earth [Make a model of the Earth]

2 B

Term 4, Week 2, Lesson B

Lesson Title: Making a model of the Sun, Earth and Moon: Part 2

Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Movement of the Earth around the Sun
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- make a model of the Sun, Earth and Moon using paper mache
- define the different terminology related to the Earth

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing	✓	7. Raising Questions		12. Recording Information	
3. Comparing	✓	8. Predicting	✓	13. Interpreting Information	
4. Measuring	✓	9. Hypothesizing	✓	14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations	✓	15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the Earth and Sun	
Textbook	
Koki/paint/crayons/pastels/colouring in pencils	
Sticks	
Candle	
Matches	
White paper	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

> Explain how day and night occurs?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

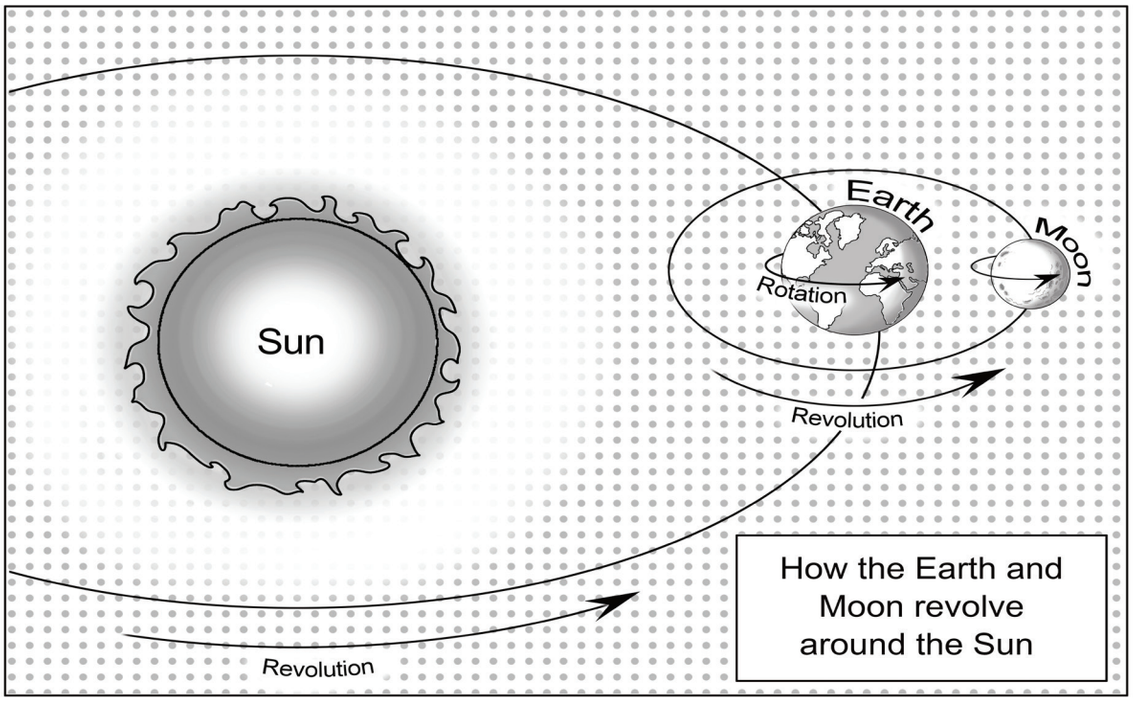
> *The Earth revolves around the Sun. The Earth also rotates on its own axis. While rotating on its own axis, the part of the Earth that faces the Sun experiences day, while the part of the Earth that faces away from the Sun experiences night.*

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

MOVEMENT OF THE EARTH AND Moon AROUND THE Sun

1. The Sun stands still and the Earth rotates on its own axis at angle of 23.50.
2. As the Earth rotates on its axis it also revolves (moves around) the Sun. This takes 365 ¼ days so it moves really slowly.
3. The Moon revolves around the Earth. This takes 27 ½ days.



2. Give learners some time to copy the information from the chalkboard into their workbooks.

E CONCEPTUAL DEVELOPMENT

1. Do the following activity with the learners:

   a. Tell the learners do the following:
   b. Bring in the balls that they made in the previous lesson into the class.
   c. Use the information in their workbooks to decorate the planets using Koki / paint / crayons / pastels /colour pencils.
   d. Pierce a hole and put a stick through the Sun, Moon and Earth.
   e. Remember that the Earth's axis is not vertical (straight), it is tilted from the vertical by an angle of 23,50.
   f. Arrange the Sun, Earth and Moon according to how they are found in our solar system.

2. Each group must come to the front of the class and using their model, tell the class the following:
   a. Which ball is the Sun?
   b. Which ball is the Earth?
   c. Which ball is the Moon?
   d. Why the object is decorated in the way that it is. For example, the Sun is yellow because it looks like a ball of light.
3. Each group must demonstrate how the Sun keeps still and the Earth and Moon move.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What did you find difficult about making the model?
b. Why was this difficult and how did you overcome this problem?

Answers to the checkpoint questions are as follows:

a. Answers will vary.
b. Answers will vary.

4. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	140-143
Via Afrika	Relationship of Sun to the Earth	146-149
Platinum	Relationship of Sun to the Earth	194-197
Spot On	Relationship of the Sun o the Earth	143
Sasol Inzalo Bk B	Relationship of Sun to the Earth	150-154
Step-by-Step Natural Sciences	Relationship of the Sun to the Earth	166-174
Pelican Natural Sciences	Relationship of the Sun to the Earth	254-259
Solutions for All Natural Sciences	Relationship of the Sun to the Earth	285-298
Shuters Top Class Natural Sciences	Relationship of the Sun to the Earth	166-174

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www.universetoday.com/75803/how-does-the-Sun-produce-energy [How the Sun produces energy]

2 C

Term 4, Week 2, Lesson C
Lesson Title: Investigation to see the effect of direct and indirect light on the Earth
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and the Earth's seasons
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- design an experiment to see if indirect or direct light will affect the temperature of the Earth
- draw a table of results

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information		6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing		7. Raising Questions		12. Recording Information	
3. Comparing		8. Predicting	✓	13. Interpreting Information	
4. Measuring	✓	9. Hypothesizing	✓	14. Communicating	
5. Sorting & Classifying		10. Planning Investigations	✓	15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the Earth and Sun	Model of Earth made by learners
Textbook	Flashlight on cellphone
Torch	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What is solar energy?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

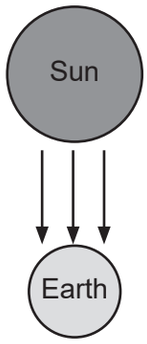
The light and heat given off by the Sun.

D ACCESSING INFORMATION

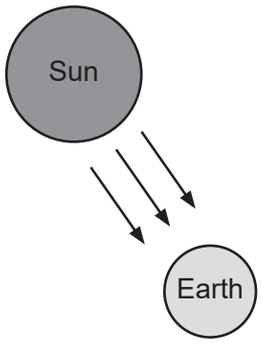
1. Write the following onto the chalkboard (always try to do this before the lesson starts):

DIRECT AND INDIRECT LIGHT AFFECTS THE TEMPERATURE OF THE EARTH

1. When light from the Sun hits the Earth directly, the light is more intense (concentrated) than when light hits the Earth indirectly.
2. This intense light increases the temperature of the Earth.
3. Areas of the Earth that are hit by direct Sunlight are therefore warmer than areas that are hit by indirect Sunlight.
4. In the summer, the Sun is high in the sky and we receive direct Sunlight.
5. In winter when the Sun is lower in the sky, we receive more indirect Sunlight. This explains why summer is warmer than winter.



Direct light



Indirect light

2. Explain the following information to the learners:
    a. When the Sun shines directly onto the Earth it hits a smaller surface. All the energy is focused on a small part of the Earth. This means that this part of the Earth is extremely hot.
    b. When the Sun shines on the Earth at an angle (slanted), it shines on a larger area so the heat is not as intense or concentrated. That means that the area that has Sunshine is not as hot.
3. Give learners some time to copy the information into their workbook

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. Is the Earth hotter when the Sun shines directly on it or at an angle?
b. Does the Sun hit a smaller or larger part of the Earth when it shines directly on the Earth?

Answers to the checkpoint questions are as follows:

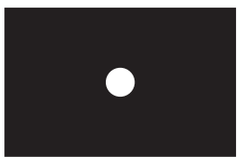
a. The Earth is hotter when the Sun shines directly on it.
b. The Sun hits a smaller part of the Earth when it shines directly on the Earth?

E CONCEPTUAL DEVELOPMENT

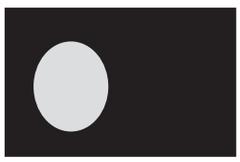
1. Do the following activity with the learners:

Activity

1. Tell the learners that they will work in pairs for this activity.
2. Ask the learners to collect a torch and a black card from the front of the class.
3. The learners must now do the following:
    a. Place the card flat on a desktop or table.
    b. One person should hold the torch about 25 cm above the card pointing straight down onto the card and shine the light onto the card. This is direct light.
    c. Look at the beam shining on the black card and note its size.
    d. The person in the pair not holding the torch should draw around the edge of the beam with a pen or pencil.
    e. Swap places and point the torch towards the card at an angle of 450, keeping it at the same distance (25cm) from the card as before.
    f. Shine the light onto the card. This is indirect light.
    g. Look at the beam shining on to the card, draw around the edge of the beam with a pen or pencil.



Direct light



Indirect light

2. Write the following onto the chalkboard (always try to do this before the lesson starts):

Activity 1

1. In which case is the light more concentrated? (direct or indirect)
2. In which case is the light more spread out? (direct or indirect)
3. In which case did the light look brighter? Why is this?
4. List 2 variables that you kept constant in this investigation.
5. Write a conclusion for this investigation.
6. What does this mean for the Sun and the Earth?

3. Give learners some time to answer the questions written on the chalkboard into their workbooks.
4. Write the model answers on the chalkboard:

1. *Direct*
2. *Indirect*
3. *Direct light. When light from the torch hits the paper directly, the energy is spread over a smaller surface area and is more intense (concentrated) than when light hits the paper indirectly.*
4. *Distance from the paper was the same and used the same torch.*
5. *The energy is spread out over a larger surface area when the light is shone at a slanting angle compared to when it is shone directly onto the card.*
6. *When light from the Sun hits the Earth directly, the solar energy is spread over a smaller surface area and is more intense (concentrated) than when light hits the Earth indirectly.*

5. Explain the following to the learners:
   - The energy from the torch is spread out over a larger surface area when the light is shone at a slanting angle relative to the card than when it is shone directly onto the card.
   - Similarly, when light from the Sun hits the Earth directly, the solar energy is spread over a smaller surface area and is more intense (concentrated) than when light hits the Earth indirectly.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. In the activity what did the torch represent?
b. In the activity, what did the paper represent?

Answers to the checkpoint questions are as follows:

a. The Sun.
b. The Earth.

6. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	147-149
Via Afrika	Relationship of Sun to the Earth	150-151
Platinum	Relationship of Sun to the Earth	198-201
Spot On	Relationship of the Sun o the Earth	145
Step-by-Step Natural Sciences	Relationship of the Sun to the Earth	166-174
Pelican Natural Sciences	Relationship of the Sun to the Earth	254-259
Solutions for All Natural Sciences	Relationship of the Sun to the Earth	285-298
Shuters Top Class Natural Sciences	Relationship of the Sun to the Earth	161-164
Sasol Inzalo	Relationship of the Sun to the Earth	160-162

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www-spof.gsfc.nasa.gov/stargaze/Sun1lite.htm [Sun rays on Earth]
2. http://www.learnnc.org/lp/editions/earth-Sun/6572 [Suns rays]

3 A

Term 4, Week 3, Lesson A
Lesson Title: The four seasons
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and the Earth's seasons
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- demonstrate how the position of the Earth in relation to the Sun changes as it orbits the Sun during the year
- identify places on a globe that receive solar energy
- explain why some places receive more light and heat at specific times of the year as the Earth revolves around the Sun
- compare the Earth at different times of the year

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing		7. Raising Questions		12. Recording Information	✓
3. Comparing	✓	8. Predicting	✓	13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Resource 7
Model of Earth and Sun made by learners	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What does intensity of solar energy mean?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

The amount of solar energy that reaches the surface of an object.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

THE FOUR SEASONS

1. The amount of energy emitted by the Sun is the same all year round.
2. The energy from the Sun is spread out over a larger surface area of the Earth, when the light is shone at a slanting angle.
3. The energy from the Sun is spread out over a smaller surface area of the Earth, when the light is shone directly onto the Earth.
4. The Earth's axis is tilted over by an angle of 23.5 degrees (23.5°) from the vertical at the same rate all year.
5. As the Earth travels around the Sun its North and South Poles constantly point in the same direction into space.
6. There are four seasons in a year:
   a. Spring
   b. Summer
   c. Autumn
   d. Winter
7. When it is summer in South Africa, the Southern Hemisphere is tilted towards the Sun and when it is winter in South Africa, the Southern Hemisphere is tilted away from the Sun.

8. When it is summer in South Africa, which is in the Southern Hemisphere, it is winter in America, which is in the Northern Hemisphere.
9. It takes one complete year (and four seasons) for the Earth to revolve around the Sun

3. Explain the four seasons to the learners as follows:
   a. South Africa is in the southern hemisphere.
   b. The earth is always tilted at the same angle.
   c. It is summer in South Africa when the Earth is positioned such a way that the Southern Hemisphere is tilted toward the Sun.
   d. It is winter in South Africa when the Earth is positioned in such a way that the Southern Hemisphere is tilted away from the Sun.
4. The Earth revolves around the Sun and this will take a year or 365 ¼ days.
5. Show the learners Resource 7 to explain this.
6. Give the learners time to copy the information from the chalkboard into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. How long does it take for Earth to rotate around the Sun once?
b. Does the angle the Earth is tilted at ever change?

Answers to the checkpoint questions are as follows:

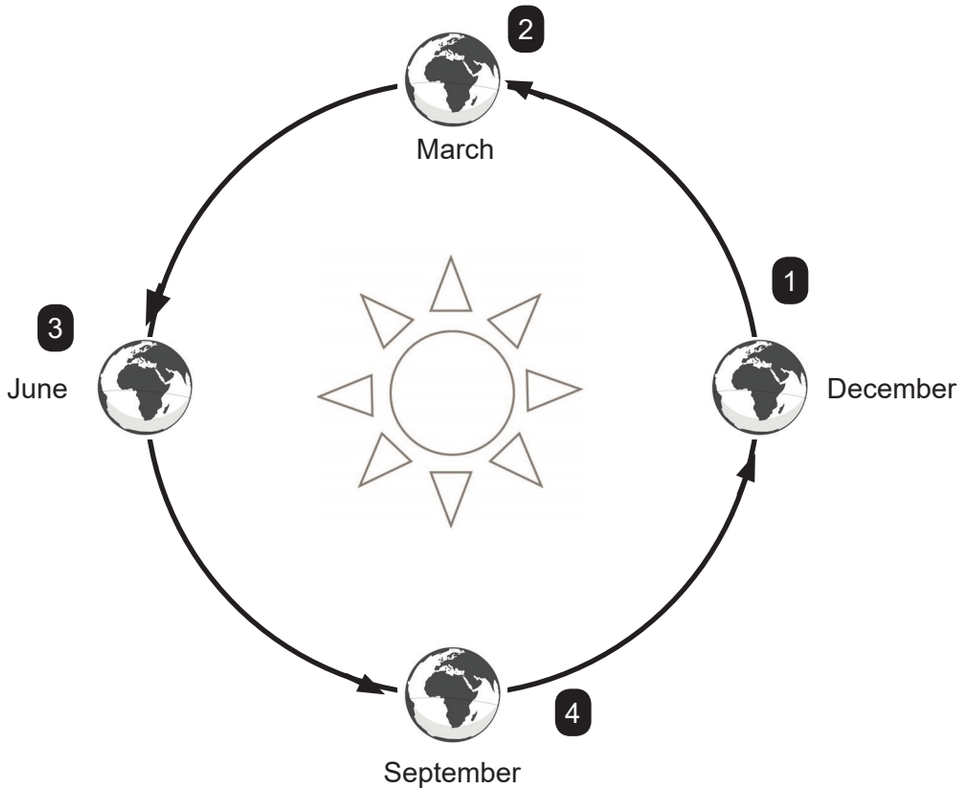
a. 1 year.
b. No. It is constantly tilted at 23.5

E CONCEPTUAL DEVELOPMENT

1. Draw and label the following diagram on the chalkboard. Write down the questions that follow. (Try to do this before the start of the lesson):

Activity

1. Look at the diagram below and answer the questions that follow:



1.1 Look at position 1 in the diagram:

a. What season is it in South Africa?

b. What season is it in the Northern hemisphere?

1.2 Look at position 2 in the diagram:

a. What season is it in South Africa?

b. What season is it in the Northern hemisphere?

1.3 Look at position 3 in the diagram:

a. What season is it in South Africa?

b. What season is it in the Northern hemisphere?

1.4 Look at position 4 in the diagram:

a. What season is it in South Africa?

b. What season is it in the Northern hemisphere?

2. Write “true” or “false” in column B

A	B
We experience winter because the Sun emits less energy in winter.	
We experience summer because we are closer to the Sun during summer.	
If it is winter in the Northern Hemisphere it is winter in the Southern Hemisphere too.	
Daytime is longer in the summer because the Earth spins more slowly in the summer months.	

2. Tell the learner to draw the diagram in their workbook and answer the questions.
3. Once learners have completed the activity, ask learners to contribute their answers.
4. Write the model answers on the chalkboard:

1.1

a. Summer.

b. Winter

1.2

a. Autumn.

b. Spring

1.3

a. Winter

b. Summer

1.4

a. Spring

b. Autumn

2.

A	*B*
We experience winter because the Sun emits less energy in winter.	*False*
We experience summer because we are closer to the Sun during summer.	*False*
If it is winter in the Northern Hemisphere it is winter in the Southern Hemisphere too.	*False*
Daytime is longer in the summer because the Earth spins more slowly in the summer months.	*False*

5. Explain the reasoning to the answers in question number 2 to the learners:
   a. All the statements in the "What causes the seasons?" activity are false.
   b. The amount of energy emitted by the Sun is the same all year round.
   c. The Earth spins on its own axis at the same rate all year.
   d. When it is winter in the Northern Hemisphere, it is summer in the Southern Hemisphere. The seasons are reversed in the Northern and Southern Hemispheres.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. List the four seasons.
b. What season is it in Australia when it is summer in South Africa?

Answers to the checkpoint questions are as follows:

a. Spring, summer, autumn, winter.
b. Summer.

6. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	143-151
Via Afrika	Relationship of Sun to the Earth	151-152
Platinum	Relationship of Sun to the Earth	196-200
Spot On	Relationship of Sun to the Earth	144-146
Step-by-Step Natural Sciences	Relationship of Sun to the Earth	168-169
Pelican Natural Sciences	Relationship of Sun to the Earth	255-258
Solutions for All Natural Sciences	Relationship of Sun to the Earth	287-291
Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	161-164
Sasol Inzalo Bk B	Relationship of Sun to the Earth	155-166

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. www.primaryhomeworkhelp.co.uk/time/seasons.htm [The 4 seasons]

3 B

Term 4, Week 3, Lesson B
Lesson Title: Solstice
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and the Earth's seasons
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- explain that the Earth's axis is an imaginary line
- explain that amount of daylight in a day depends upon the season. In summer there are more daylight hours than in winter
- recall information about the seasons

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues	✓	11. Doing Investigations	
2. Observing		7. Raising Questions		12. Recording Information	
3. Comparing	✓	8. Predicting	✓	13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	
Model of Earth	
Model of Sun	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Why do we have summer?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

When the southern hemisphere is tilted towards the Sun it will experience summer.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):
2. Use the drawing from the previous lesson.

SEASONS AND THE SOLSTICE

1. During the Earth's orbit around the Sun, one hemisphere is tilted away from the Sun (winter) and the other hemisphere will therefore be tilted towards the Sun (summer).
2. In the Southern Hemisphere:
   a. 21 December is the summer solstice: the longest day and the shortest night.
   b. 20 March is the autumn equinox: day and night are equal in length: 12 hours each.
   c. 21 June is the winter solstice: shortest day and the longest night.
   d. 23 September is the spring solstice: day and night are equal length.

3. Explain the following information to the learners:
   a. The Earth is orbiting around the Sun.
   b. The Earth's axis always points in the same direction in space. Because of this, sometimes the Southern Hemisphere is tilted towards the Sun and sometimes it is tilted away from the Sun.
4. Refer to the drawing on the board that was drawn the previous day.

5. Ask the learners to follow the path of the Earth around the Sun as it completes one revolution from points 1 to 4.
    a. Place your finger at position 1. Tell the learners that the Southern Hemisphere is experiencing summer. The day of the summer solstice is the longest day in the year. In the Southern Hemisphere, this is usually around 21 December.
    b. At position 3, the Southern Hemisphere is experiencing winter whilst the Northern Hemisphere is having summer. In the Southern Hemisphere, on the 21 June, the shortest day of the year is experienced. This is called the winter solstice.
    c. At position 2 and 4, the equator receives direct Sunlight. This is called an equinox. An equinox occurs twice a year, around 20 March (when our autumn equinox occurs at position 2) and 22 September (when our spring equinox occurs at position 4).

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What does the word equinox mean?
b. On what date do we (South Africa in the Southern hemisphere) experience the spring equinox?

Answers to the checkpoint questions are as follows:

a. It is the day where the Earth is neither tilted towards or ways from the Sun and we experience equal day and night: 12 hours each.
b. 23 September.

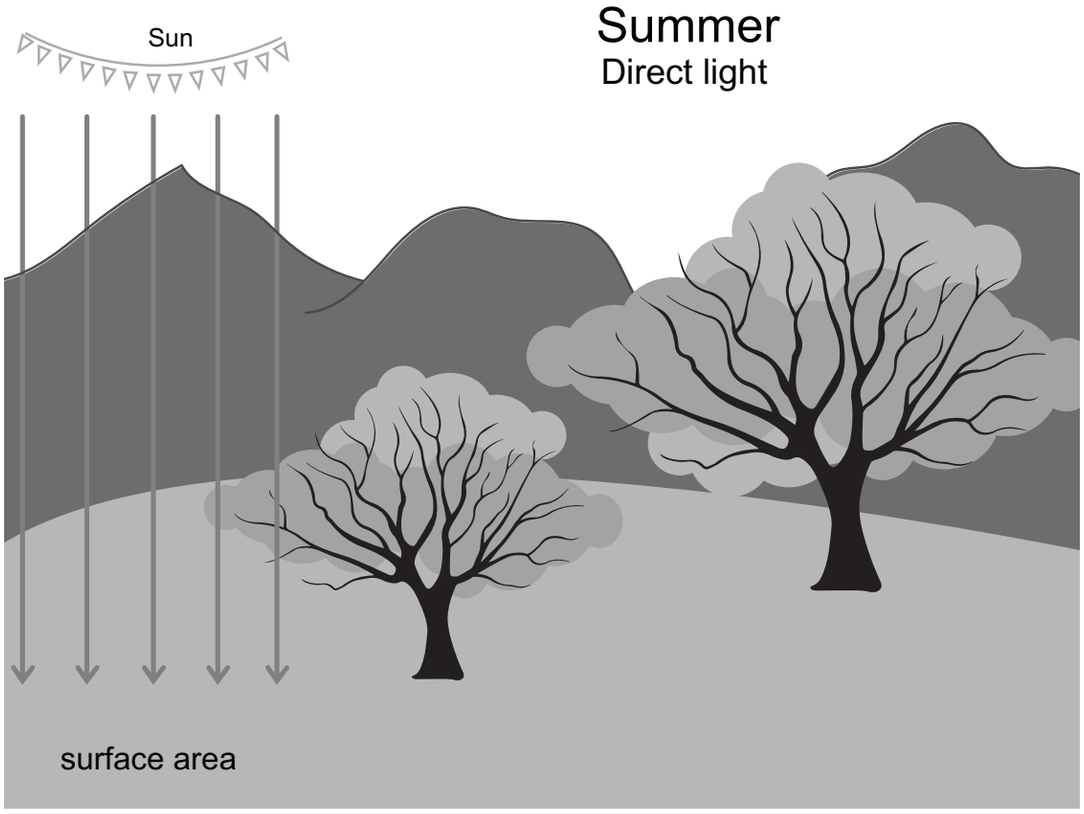
E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

Activity 1

1. The drawing below shows how the Sunlight hits the Earth in summer. The light is direct and the surface area is small.

   Draw a diagram with labels, to show how the Sun's light will hit the Earth in winter.



2. Answer the following questions by referring to the diagram showing the relative positions of the Earth and Sun during a year:

   2.1 At position 1, the Southern Hemisphere is tilted towards the Sun and experiences summer. This is called the summer _____ in the Southern Hemisphere and occurs around the date, _____ . The Northern Hemisphere is tilted _____ from the Sun and experiences winter. This is called the winter _____ in the Northern Hemisphere.

   2.2 At position 2, _____ months later, neither hemisphere is tilted more toward the Sun. Direct Sunlight only hits the Earth near the _____ and indirect Sunlight hits nearly everywhere else. This is called an _____. This causes mild temperatures in the north and south away from the equator.

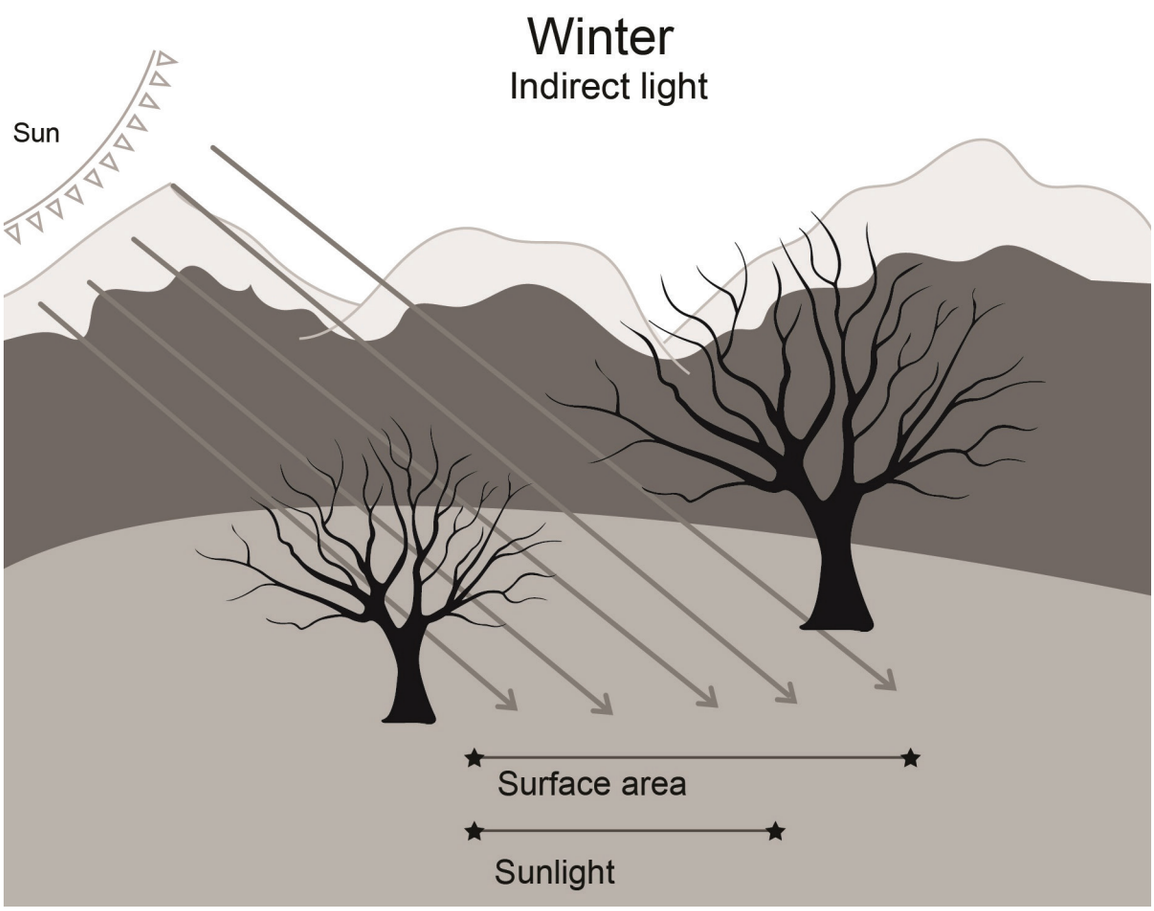
2.3 Six months later, the Southern Hemisphere is tilted _____ from the Sun and experiences_____ . This is called the winter _____ in the Southern Hemisphere and occurs around the date, _____ . The Northern Hemisphere is tilted _____the Sun and experiences _____. This is called the summer _____ in the Northern Hemisphere.

2.4 Nine months later, neither hemisphere is tilted more toward the Sun. Direct light only hits the Earth near the _____ and indirect light hits nearly everywhere else. This causes mild temperatures in the north and south away from the equator.

2.5 The Earth is now back to its starting point again, having completed one revolution of the Sun in _____ months.

2. Give learners some time to answer these questions in their workbooks.
3. Tell the learners that they need to answer all the questions quietly.
4. Once learners are complete with the exercise, read each of the questions out loud and then ask learners to contribute their answers.
5. Write the model answers on the chalkboard as you do this:

1.



2.1 At position 1, the Southern Hemisphere is tilted towards the Sun and experiences summer. This is called the summer solstice in the Southern Hemisphere and occurs around the date, 21 December. The Northern Hemisphere is tilted away from the Sun and experiences winter. This is called the winter solstice in the Northern Hemisphere.

2.2 At position 2, 3 months later, neither hemisphere is tilted more toward the Sun. Direct Sunlight only hits the Earth near the equator and indirect Sunlight hits nearly everywhere else. This is called an equinox. This causes mild temperatures in the north and south away from the equator.

2.3 Six months later, the Southern Hemisphere is tilted away from the Sun and experiences winte. This is called the winter solstice in the Southern Hemisphere and occurs around the date, 21 June. The Northern Hemisphere is tilted towards the Sun and experiences summer. This is called the summer solstice in the Northern Hemisphere.

2.4 Nine months later, neither hemisphere is tilted more toward the Sun. Direct light only hits the Earth near the equator and indirect light hits nearly everywhere else. This causes mild temperatures in the north and south away from the equator.

2.5 The Earth is now back to its starting point again, having completed one revolution of the Sun in 12 months.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Where would one find the equator?
b. Why is the temperature in winter so much lower?

Answers to the checkpoint questions are as follows:

a. The Earth's equator is an imaginary line that passes around the middle dividing the Erath into the Northern and Southern hemispheres.
b. The temperature is lower because the Sun's energy is hitting the Earth at an angle and is covering a larger surface area and is therefore less intense.

6. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	152
Via Afrika	Relationship of Sun to the Earth	151
Platinum	Relationship of Sun to the Earth	200-201
Spot On	Relationship of Sun to the Earth	145
Step-by-Step Natural Sciences	Relationship of Sun to the Earth	166-174
Pelican Natural Sciences	Relationship of Sun to the Earth	254-259
Solutions for All Natural Sciences	Relationship of Sun to the Earth	287-298
Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	161-164
Sasol Inzalo Bk B	Relationship of Sun to the Earth	163-165

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www.youtube.com/watch?v=9n04SEzuvXo (2.56 mins) [Solstice]
2. http://www.helpteaching.com/lessons/249/solstices-and-equinoxes [Solstice]

3 C

Term 4, Week 3, Lesson C
Lesson Title: The Sun and photosynthesis
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and life on Earth
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- explain how plants use the light energy from the Sun to make food and oxygen
- draw and label a diagram of the process of photosynthesis

Specific Aims	1. DOING SCIENCE	
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing		7. Raising Questions	✓	12. Recording Information	✓
3. Comparing		8. Predicting	✓	13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Where does all energy originate from?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

All energy comes from the Sun.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

THE Sun AND PHOTOSYNTHESIS

1. The Sun releases a large amount of energy into the Earth's atmosphere.
2. The Sun's energy does 3 things to help make the Earth sustain life:
   - The heat energy warms up the Earth so that the temperature is suitable for us to live.
   - It provides plants with light energy so that they are able to produce their own food and therefore humans and animals will have food.
   - It's heat causes evaporation which later causes rain.
3. Photosynthesis is a process where a plant will manufacture food (glucose) using the Sun's energy, water and carbon dioxide. Oxygen is released in this process.

2. Explain the information to the learners as follows:
   a. Plants are the only living organisms that can manufacture their own food.
   b. Plants use energy from the Sun, water from the soil and carbon dioxide from the atmosphere to produce food or glucose. Oxygen gas is released into the atmosphere.
   c. During photosynthesis, the energy from the Sun is used to change carbon dioxide and water into carbohydrates (for example cellulose, starch or glucose).
   d. The carbohydrates are stored in fruits, leaves, wood or bark. When we eat these parts of the plants, we take in this energy and use it to do things like run, talk and write.
   e. In the same way animals, for example cows, use the Sun's energy when they eat the grass.

3. Give learners some time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What gas is needed for photosynthesis to occur?
b. Where does the plant get the water from?

Answers to the checkpoint questions are as follows:

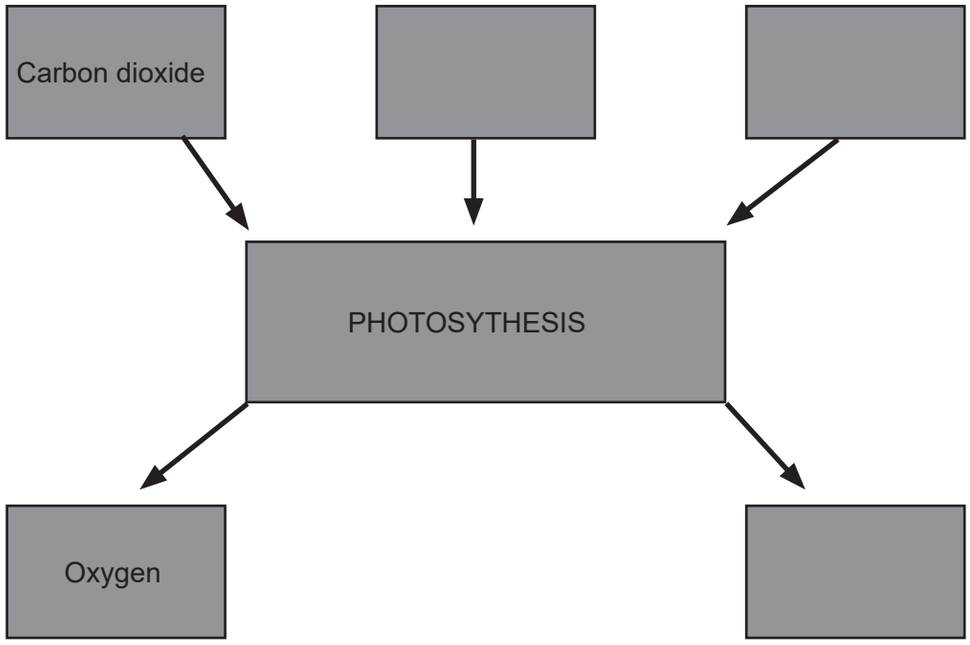
a. Carbon dioxide.
b. The soil.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

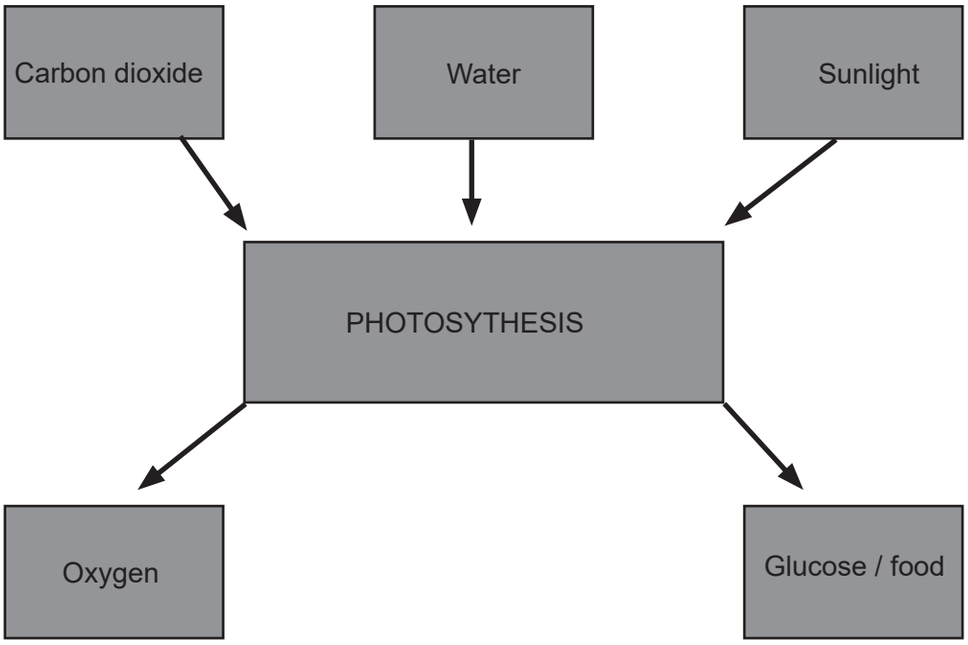
Activity

1. Copy the flow diagram below into your book. Use the information in your workbook to fill in the empty blocks to show the resources required for photosynthesis and the products formed.



2. Where does the plant get the following:
   a. Water?
   b. Carbon dioxide?
   c. Energy?
3. The process of photosynthesis is said to be the most important process on Earth. Explain why this statement is true.

2. Explain this task to the learners as follows:
   a. Redraw the flowchart and fill in the missing words.
   a. Answer the questions carefully.
3. Give learners some time to complete this task in their workbooks.
4. Once learners are done tell them to discuss their answers with a partner.
5. Write the model answer on the chalkboard:



2. *a. The plant gets water from the soil.*
   b. The plant gets carbon dioxide from the atmosphere.
   c. The plant gets energy from the Sun.
3. *Photosynthesis uses the energy from the Sun to change carbon dioxide and water into carbohydrates (for example cellulose, starch or glucose). The carbohydrates are stored in fruits, leaves, wood or bark. When we eat the plant, for example an apple, our bodies can release the energy stored in carbohydrates. In the same way animals, for example cows, use the Sun's energy when they eat the grass. If photosynthesis did not occur, all organisms would die as there would not be any food. Oxygen is released during photosynthesis and oxygen is required for all organisms to live as we need to breathe oxygen in.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Give 1 example of a carbohydrate.
b. Which organism is able to produce its own food?

Answers to the checkpoint questions are as follows:

a. Glucose, starch, cellulose.
b. Plants.

6. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	154-155
Via Afrika	Relationship of Sun to the Earth	152-153
Platinum	Relationship of Sun to the Earth	202-203
Spot On	Relationship of Sun to the Earth	147
Step-by-Step Natural Sciences	Relationship of Sun to the Earth	172-174
Pelican Natural Sciences	Relationship of Sun to the Earth	259-261
Solutions for All Natural Sciences	Relationship of Sun to the Earth	299-300
Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	165-167
Sasol Inzalo Bk B	Relationship of Sun to the Earth	170-171

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www2.estrellamountain.edu/faculty/farabee/BIOBK/BioBookPS.html [Photosynthesis]
2. https://www.khanacademy.org/science/biology/photosynthesis-in-plants [Photosynthesis]

4 A

Term 4, Week 4, Lesson A
Lesson Title: Energy flow in a food chain
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and life on Earth
CAPS Page Number	31

Lesson Objectives

By the end of the lesson, learners will be able to:

- draw a simple food chain
- explain how energy flows through the food chain
- describe how humans, animals and plants are dependent on each other and interacts in an ecosystem

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues	✓	11. Doing Investigations	
2. Observing	✓	7. Raising Questions		12. Recording Information	✓
3. Comparing		8. Predicting	✓	13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Resource 8

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Why are humans dependant on the Sun?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

All energy comes from the Sun. The Sun provides us with heat and makes our environment warm. Plants converts that energy into food for us.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

FOOD CHAINS

1. Plants and animals depend on the Sun for energy.
2. Plants need the Sun's energy to manufacture food and this food is eaten by animals.
3. These animals are then eaten by other animals. This is called a food chain.
4. A **food chain** is a simple linkage of organisms.
5. It begins with a producer (an organism that can manufacture its own food) which is eaten by a **herbivore** (an animal that eats only plants) or an omnivore (an animal that eats both other animals and plants, which would be eaten by a **carnivore** (an animal that eats only other animals). For example, when a bird eats an insect, and a snake eats the bird, these organisms are all linked in a food chain.
6. Plants also need water to photosynthesize. Water is not made on Earth but is recycled. The heat from the Sun causes the water to evaporate. This water then cools to form tiny droplets of water, which eventually forms clouds. Rain then falls from the clouds onto the Earth.

2. Explain the information to the learners as follows:
    a. Plants use the Sun's energy to manufacture food through a process called photosynthesis. We say the plants are the "producers".
    b. Plant eating animals, called herbivores, eat these plants as do omnivores, which are animals that eat both plants and animals.
    c. Herbivores and omnivores are then eaten by carnivores, which are animals that only eat other animals.
    d. An animal eats a plant, and that animal is then eaten by another animal. This is called a food chain.
3. Show the learners Resource 8 to help help explain this.
4. Give learners some time to copy the information from the chalkboard into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. Which organism is always the first in a food chain?
b. Water is not made in nature but is recycled. How does the Sun help with this?

Answers to the checkpoint questions are as follows:

a. A producer. (plant/tree/shrub)
b. The Sun's energy causes the water in rivers, dams, oceans, and lakes to evaporate. This water forms clouds and eventually falls as rain.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard:

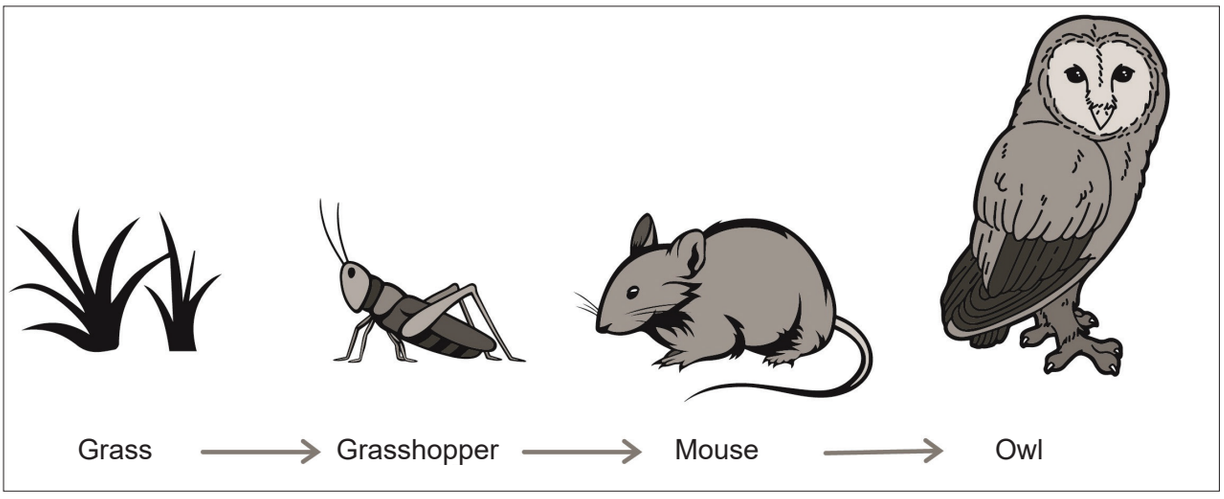
Activity

The following organisms are in an environment:

Frog, Grasshopper, Plant, Snake

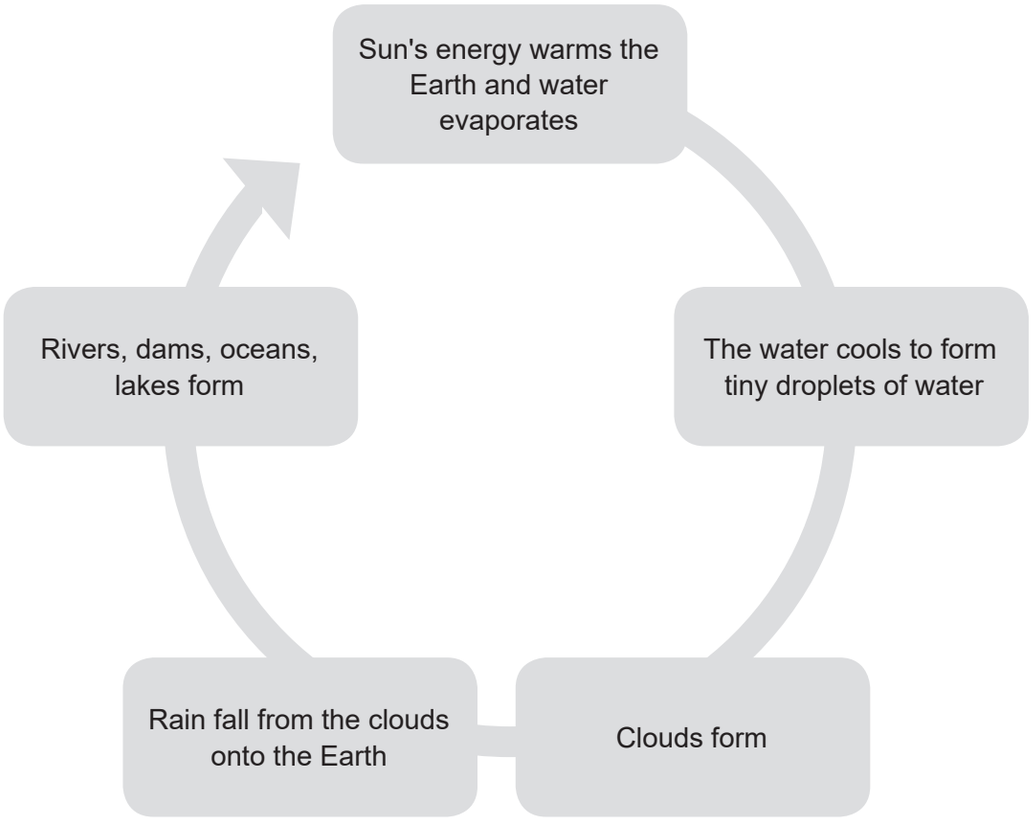
1. Draw a food chain to show the energy flow from one organism to the next.
2. Label the following: producer, herbivore, omnivore, carnivore.
3. What would happen if the Earth did not receive any Sunshine?
4. What would happen if all the frogs were removed from this area?
5. Draw a diagram to show how water is recycled. You may use just words or you can draw pictures and use words to describe what is happening.

2. Read and discuss question 1 and 2 with the learners:
   a. For question 1, explain that when drawing the food chain they can use words only, like 'lion' and that they do not have to draw a lion. They should draw arrows to show the flow of energy. Draw this example on the board to show the learners an example:



   b. For question 2, ask the learners to read through the definition of the words herbivore, carnivore and omnivore before labeling their food chain.
3. Give the learners some time to complete this task in their workbooks.
4. Write the model answers onto the chalkboard and discuss these with the learners.

1. *Plant → Grasshopper → Frog → Snake*
2. *Plant → Grasshopper → Frog → Snake*
   (producer) (herbivore) (omnivore) (carnivore)
3. *If the Earth did not receive Sunlight the Earth would freeze. Plants would not be able to produce food. The water cycle would not occur, so no rainfall.*
4. *Frogs feed on grasshoppers. The population of the grasshoppers could increase to huge numbers and may destroy the plants or eat too many of the plants. The snakes feed on frogs and they would have very little food and would die out. This ecosystem will ultimately be destroyed if all the frogs were removed.*



Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Give one example of a herbivore that you know of.
b. What is a carnivore?

Answers to the checkpoint questions are as follows:

a. Answers will vary but some examples are giraffe, elephant, grasshopper
b. An animal that only eats other animals.

5. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	155-156
Via Afrika	Relationship of Sun to the Earth	152-153
Platinum	Relationship of Sun to the Earth	204-205
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Solutions for All Natural Sciences	Relationship of Sun to the Earth	301-305
Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	167
Sasol Inzalo Bk B	Relationship of Sun to the Earth	170-171

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www.khanacademy.org/science/biology/photosynthesis-in-plants [Photosynthesis]
2. https://sciencebob.com/what-is-the-difference-between-food-chain-and-a-food-web/ [Food chains and food webs]

4 B

Term 4, Week 4, Lesson B
Lesson Title: Fossil fuels
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and life on Earth
CAPS Page Number	32

Lesson Objectives

By the end of the lesson, learners will be able to:

- explain how the Sun emits light and heat energy
- describe the structure of the Sun
- relate the types of reactions that occur in the Sun

Specific Aims	1. DOING SCIENCE	
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing		7. Raising Questions	✓	12. Recording Information	✓
3. Comparing	✓	8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Resource 9

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

> Name the gas that is released during photosynthesis.

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

> *Oxygen.*

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

FOSSIL FUELS

Fossil fuels are sources of energy that formed from the accumulated remains of living organisms that were buried millions of years ago. Coal, crude oil and natural gas are examples of fossil fuels.

1. Formation of coal
   a. Millions of years ago the Earth was covered with fern-like plants. The Earth changed and the land was covered by water, forming swamps.
   b. Over time the plants died, forming a thick layer of dead vegetation at the bottom of the swamps.
   c. As more water covered the land, sand and silt (fine sand or clay) were washed in and covered the dead vegetation, helping more and more plants to grow.
   d. This process repeated itself for millions of years building up massive layers of dead plant material, called peat.
   e. The peat layers eventually became buried and compressed even more.
   f. Pressure and heat, caused peat to turn into lignite, a porous type of coal.
   g. After more pressure and heating, more moisture was squeezed out of the lignite until it became soft, bituminous coal and eventually anthracite, the hardest type of coal.

2. Formation of crude oil and natural gas
   a. Oil, also known as crude oil, and natural gas were also formed millions of years ago by processes similar to those leading to the formation of coal.
   b. Sea animals and plants died in the oceans and were deposited on the ocean floor.
   c. Over millions of years, layer upon layer of marine deposits formed and were covered by sand and silt.
   d. Temperature and pressure, caused the deposits to change into crude oil and natural gas.
   e. Today, oil and gas are trapped under layers of rocks and sediment and have to be drilled and pumped out of the Earth. South Africa has some gas fields off the coast of Mossel Bay, but we do not have any oil reserves.
   f. Crude oil is refined to make many different products such as motor oil, petrol, diesel and tar, Vaseline and other waxes.

2. Ask two learners to slowly read out loud, the information on the formation of coal and the formation of oil and gas.
3. Explain the formation of coal to the learners as follows:
   a. Coal takes millions of years to be produced.
   b. Coal is formed when plants die, decay or rot and are then covered by water, sand and soil. This process happens again and again so layers of this material form.
   c. This plant material is then called peat.
   d. The layers of peat were then put under high pressure and heat, which caused the peat to turn into lignite, a porous (lots of holes filled with air) type of coal.
   e. After more pressure and heating, more moisture was squeezed out of the lignite until it became soft, bituminous coal and eventually anthracite, the hardest type of coal available.
   f. This coal is then used as a fuel to make, for example, fire.
4. Explain the formation of gas and crude oil to the learners as follows:
   a. Gas and crude oil also takes millions of years to form.
   b. Sea animals and plants died in the oceans and dropped on the ocean floor.
   c. Over millions of years, layer upon layer of marine (sea) deposits formed and were covered by sand and silt.
   d. Heat and high pressure, caused the deposits to change into crude oil and natural gas.
   e. Today, oil and gas are trapped under layers of rocks and sediment and must be drilled and pumped out of the Earth.
   f. Crude oil is refined to make many products such as motor oil, petrol, diesel and tar, Vaseline and other waxes.
   g. Gas is burnt to provide heat for cooking and other activities.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. Which fossil fuel is made from deposits of dead plant materials?
b. Which fossil fuel is made from deposits of dead plant and animal materials?

Answers to the checkpoint questions are as follows:

a. Coal.
b. Oil and gas.

E CONCEPTUAL DEVELOPMENT

1. Have the learners do the following activity:

Ask the learners to do the following:

a. Form groups of 4 or 5.
b. Each group much choose either coal, gas or oil formation.
c. There may be more than one group that has the same fossil fuel.
d. Each group will need to draw a flowchart on a large piece of chart paper that explains how each fossil fuel is made.
e. Each group will only deal with one fossil fuel.
f. When the flowcharts are complete, the charts must be stuck around the class.

2. Each group must walk around and look at each of the flowcharts that are stuck up and gather information about the formation of the fossil fuels.
3. Check the information on the charts against the model answer and make corrections where necessary.
4. Once learners have seen all the corrected flowcharts they must draw their own flowcharts in their workbooks that shows the formation of the 3 fossil fuels.
5. Show the learners Resource 9 to help help explain where coal is made.
6. Write the model answers on the chalkboard:

Coal formation

Plants in swamps die, covered by sand and silt

Many layers form repeatedly and peat is formed

After time, pressure and heat, lignite formed

After time pressure and heating, moisture was squeezed out of the lignite until it became soft, bituminous coal and eventually anthracite, the hardest type of coal available.

Oil formation

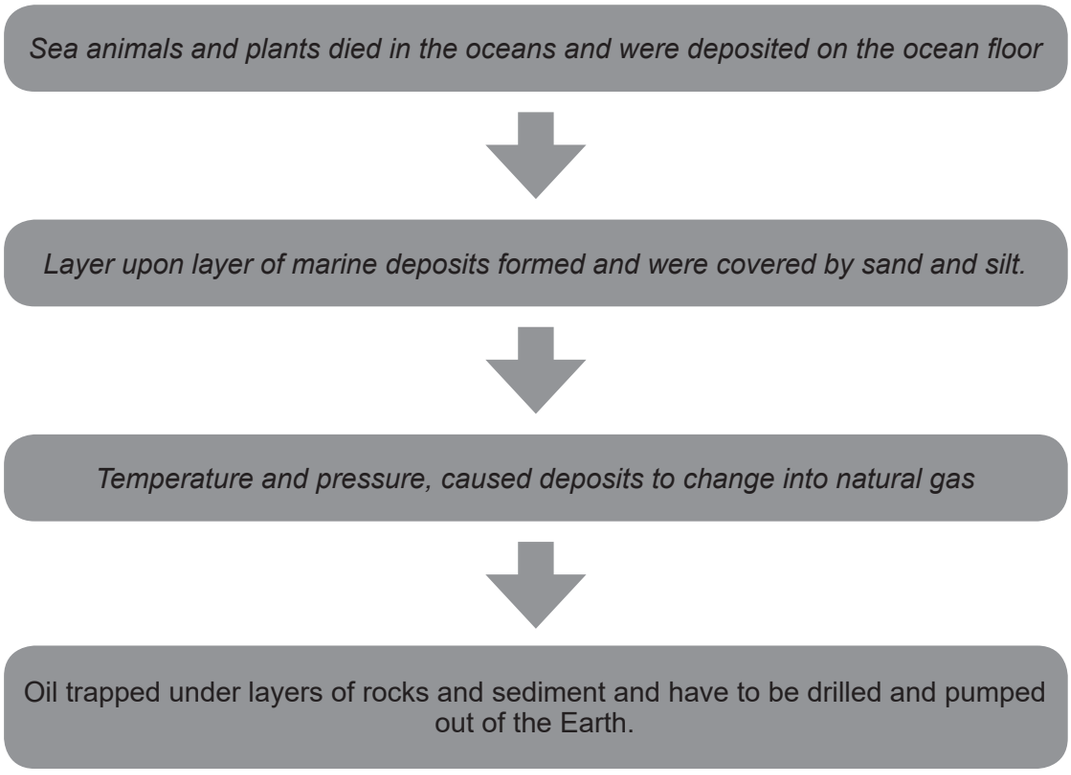
Sea animals and plants died in the oceans and were deposited on the ocean floor

Layer upon layer of marine deposits formed and were covered by sand and silt.

Temperature and pressure, caused deposits to change into crude oil

Oil trapped under layers of rocks and sediment and have to be drilled and pumped out of the Earth.

Gas formation



6. Write the following onto the chalkboard (try to do this before the lesson starts):

Activity

1. What are fossil fuels?
2. What conditions are needed for fossil fuels to form?
3. Why are fossil fuels important?
4. Why can't we make fossil fuels today?

7. Give learners some time to answer these questions in their workbooks.
8. Tell the learners that they need to answer all the questions quietly.
9. Once learners are completed the activity, read each of the questions out loud and then ask learners to contribute their answers.
10. Write the model answers on the chalkboard as you do this:

1. *Fossil fuels are sources of energy that formed from the accumulated remains of living organisms that were buried millions of years ago.*
2. *Pressure, heat and time.*
3. *Burning fossil fuels releases energy. Crude oil is refined to make many different products such as motor oil, petrol, diesel and tar, Vaseline and other waxes. Gas and coal can be burnt to release energy for many activities like cooking, heating and light.*
4. *They take millions of years to form naturally.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Name two products that can be made from refined crude oil.
b. How did lignite become anthracite?

Answers to the checkpoint questions are as follows:

a. Motor oil, petrol, diesel and tar, Vaseline and other waxes.
b. After more pressure and heating, more moisture was squeezed out of the lignite until it became soft, bituminous coal and eventually anthracite, the hardest type of coal available.

11. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Sun to the Earth	155-156
Via Afrika	Relationship of Sun to the Earth	152-153
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Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	168
Sasol Inzalo Bk B	Relationship of Sun to the Earth	170-171

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www.meritnation.com/ask-answer/question/draw-a-flowchart-for-the-formation-of-coal/coal-and-petroleum/9952355 [How coal is formed]
2. 757&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi7-tT7g9DVAhVqL8AKHQacDp8Q [How oil is formed]
3. http://study.com/academy/lesson/what-are-fossil-fuels-definition-advantages-disadvantages.html [What are fossil fuels?]

4 C

Term 4, Week 4, Lesson C
Lesson Title: Advantages and disadvantages of fossil fuels
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Solar energy and life on Earth
CAPS Page Number	32

Lesson Objectives

By the end of the lesson, learners will be able to:

- list advantages of using fossil fuels
- list disadvantages of using fossil fuels

Specific Aims	1. DOING SCIENCE	
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing		7. Raising Questions	✓	12. Recording Information	
3. Comparing	✓	8. Predicting		13. Interpreting Information	✓
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Name the 3 fossil fuels.

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Coal, Crude oil and gas.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

ADVANTAGES AND DISADVANTAGES OF USING FOSSIL FUELS	
Advantages	**Disadvantages**
1. Cheapest source of energy.	1. Destroys the environment because when they burn, carbon dioxide is released into the environment and this causes global warming which means the Earth's temperature increases.
2. Safe to transport.	2. Causes pollution which leads to people getting diseases such as lung cancer or asthma.
3. Economic benefits: countries that produce oil and gas are richer than those that don't. Creates jobs.	3. Once its finished we can't make more. It is non-renewable.
4. Very stable and easy to store	4. Health of coal mine workers is deteriorating.
5. A little amount produces a lot of energy.	5. If there is an oil spill in the oceans sea animals die and land animals that rely on these animals for food also die.

1. Tell the learners the following:
   a. Fossil fuels are sources of energy that formed from the accumulated remains of living organisms that were buried millions of years ago.
   b. Coal, crude oil and natural gas are examples of fossil fuels.
2. Explain the followingto the learners.

   Point 1: Cheapest source of energy. Although the process of removing and cleaning up fossil fuels is expensive it is still cheaper than installing wind and solar technologies.

   Point 3: Fossil fuels are stable which means when it is stored it does not change into other substances.
3. Ask learners to discuss the advantages and disadvantages of using fossil fuels with a partner.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. Is it easy to store fossil fuels?
b. Are fossil fuels renewable?

Answers to the checkpoint questions are as follows:

a. Yes.
b. No.

E CONCEPTUAL DEVELOPMENT

1. Write the following instruction on the chalkboard. (Try to do this before the start of the lesson):

FOSSIL FUELS FOR ENERGY

Do you think that we should continue to use fossil fuels to produce energy?

- Discuss your opinion and give reasons for your answer.
- Your answer must be + 100 words.

2. Tell the learners that they will need to:
   a. Discuss whether they think we should continue to use fossil fuels to produce energy or not.
   b. Give full reasons for your answer.
   c. Use the information (advantages and disadvantages) that is written on the chalkboard to help them.
3. Tell them that their answer should not be more than 100 words.

If learners say that we should continue to use fossil fuels they could include the following in their writing:

a. *It is the cheapest source of energy. Although the process of removing and cleaning up fossil fuels is expensive it is still cheaper than installing wind and solar technologies. Poor people can afford this type of fuel and need it for cooking etc.*
b. *Because fossil fuels are safe and stable, they can be transported easily and efficiently over long distances. They can be transported on large trucks or pumped through large pipes below and above the ground. It is also safe to store.*
c. *It brings in money for the country, which creates jobs for people.*
d. *A little fuel produces lots of energy so people do not need too much.*

If learners say that we should not continue to use fossil fuels they could include the following in their writing:

a. *Destroys the environment because when they burn, carbon dioxide is released into the environment and this causes global warming which means the Earth's temperature increases.*
b. *Causes pollution which leads to people getting diseases such as lung cancer.*
c. *Once its finished we can't make more. It is non-renewable.*
d. *Health of coal mine workers is deteriorating. They are getting sick because of the conditions in the mines.*
e. *If there is an oil spill in the oceans sea animals die and land animals that rely on these animals for food also die. This affects the food chain.*
f. *We could use solar and wind energy that does not destroy the environment.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Name one disease that is caused by burning fossil fuels.
b. What will happen to animals if there is an oil spill in the ocean?

Answers to the checkpoint questions are as follows:

a. Lung cancer or asthma.
b. Sea animals die and land animals that rely on these animals for food also die.

4. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

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Spot On	Relationship of Sun to the Earth	148-149
Step-by-Step Natural Sciences	Relationship of Sun to the Earth	173-174
Pelican Natural Sciences	Relationship of Sun to the Earth	261-264
Solutions for All Natural Sciences	Relationship of Sun to the Earth	301-305
Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	168-169
Sasol Inzalo Bk B	Relationship of Sun to the Earth	170-171

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://study.com/academy/lesson/what-are-fossil-fuels-definition-advantages-disadvantages.html [What are fossil fuels?]
2. http://www.conserve-energy-future.com/pros-and-cons-of-fossil-fuels.php [Pros and cons of fossil fuels]

TOPIC OVERVIEW:
Relationship of the Moon to the Earth
Term 4, Weeks 5A – 6C

A. TOPIC OVERVIEW

Term 4, Weeks 5a – 6c

- This topic runs for 2 weeks.
- It is presented over 6 x 1 hour lessons.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C

LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C

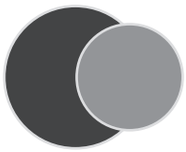
B. SEQUENTIAL TABLE

GRADE 6	GRADE 7	GRADE 8
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• The Movement of the Moon	• Relationship of the Moon to the Earth • Gravity	• Objects around the Sun

C. SCIENTIFIC VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	gravity	The force that attracts a body towards any other physical body having mass. The heavier an object is, the faster it will fall to the ground.
2.	gravitational pull	The gravitational pull is the force with which one object pulls on another object. A heavy object will fall to the ground faster as it has a stronger gravitational pull to the Earth's centre.
3.	spring tide	Tides that occur at full Moon or new Moon and are higher and lower than normal.
4.	neap tide	Tides that occur at first and last quarter of the Moon when the change between low and high tides is the smallest.

5.	ecosystem	A community of living organisms and their interaction with the environment.
6.	eclipse	Total or partial covering of one celestial body by the shadow of another. A lunar eclipse is when the Earth passes directly between the Sun and the Moon. A solar eclipse happens when the Moon passes directly in front of the Sun and blocks the Sun's light from shining on the Earth. 
7.	craters	The Moon has many craters, which look like big holes on its surface. These were formed when meteors hit its surface. 
8.	mass	The mass of an object is the amount of matter in the object. Mass is measured in kilograms (kg) and is independent of where you measure it. A wooden block with a mass of 10 kg on Earth also has a mass of 10 kg on the Moon.
9.	weight	Weight is a force acting on an object downwards.Weight is measured in Newtons (N). For example, the Earth exerts a gravitational force of about 10 Newtons for every kilogram of mass on its surface. So, a person with a mass of 50 kg has a weight of 500N on the surface of the Earth.

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Learners will understand about gravity and how we are able to stand up straight no matter where we are on Earth. Learners understanding about the Moon and tides will help when visiting the beach or for fisherman to know when would be a good time to go out to sea.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

TOPIC: Relationship of the Moon and the Earth

5 A

Term 4, Week 5, Lesson A
Lesson Title: The Moon
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Relative positions
CAPS Page Number	32

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe the rotation of the Moon and the revolution around the Earth
- model the rotation and revolution of Moon and the Earth

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information		6. Identifying problems & issues		11. Doing Investigations	
2. Observing	✓	7. Raising Questions		12. Recording Information	✓
3. Comparing		8. Predicting		13. Interpreting Information	
4. Measuring	✓	9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Resource 12
Model of Moon, Sun and Earth that learners made	Resource 13

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Does the Earth orbit the Moon or does the Moon orbit the Earth?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

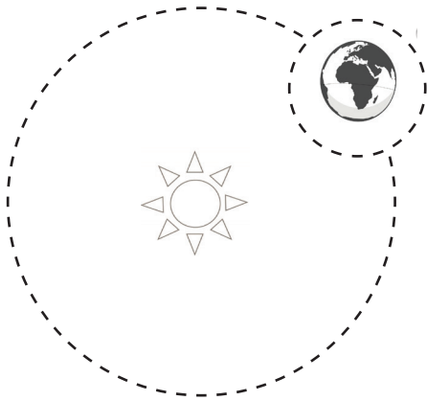
The Moon orbits the Earth.

D ACCESSING INFORMATION

1. Write and draw the following onto the chalkboard (always try to do this before the lesson starts):

THE Sun, EARTH AND Moon

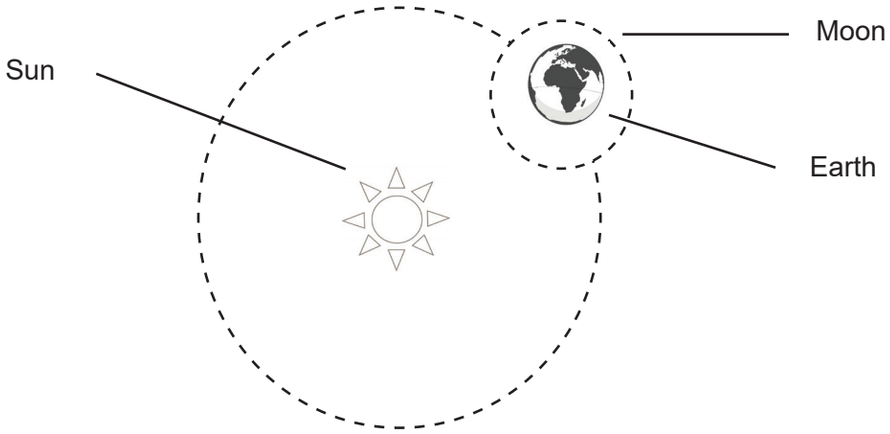
1. The Moon spins on its own axis every 27 and a half days.
2. The Moon revolves around the Earth. It revolves around the Earth at the same amount of time that it takes to rotate on its axis.
3. This explains why we only see one side of the Moon.
4. The Moon accompanies the Earth on its year-long orbit around the Sun.



The Sun, Earth and Moon

5. The average distance between the Moon and the Earth is 385 000 km.
6. The Earth's average distance from the Sun is 149 597 871 km.

2. Explain the information to the learners as follows:
    a. The Moon is the most obvious feature in our night sky and has captivated people for thousands of years.
    b. Ancient cultures recorded the apparent motion of the Moon through the sky and made calendars which used the phases of the Moon to mark the months. In fact, some religious calendars (Muslims) still use a lunar (Moon) based calendar rather than the official solar (Sun) based calendar used in South Africa, and most of the Western world, today.
    c. The Earth, just like all the other planets in the solar system, travels around the Sun, completing one revolution every year. As the Earth travels around the Sun, the Moon orbits the Earth.
    d. The Moon orbits around the Earth completing one revolution every 27.3 days.
    e. Our Moon rotates on its own axis and experiences daytime and dark nighttime just like the Earth does. However, the Moon spins much more slowly than the Earth does and completes one rotation on its axis every 27.3 days.
    f. Viewed from above, the Moon moves in an anti-clockwise direction around the Earth. The Moon's orbit is not a perfect circle, it is elliptical, so its distance from Earth changes as it revolves around the Earth. The average distance is about 385 000 km, which is about 60 times the radius of the Earth itself.
    g. For comparison, the Earth's average distance from the Sun is 149 597 871 km, or about 23 481 times the radius of the Earth.
3. Tell the learners to copy the information written on the chalkboard into their workbooks.
4. Give the learners time to copy the information into their workbook.
5. Ask 3 learners to come to the front of the class.
    a. Get 1 learner to be the Sun, one learner to be the Earth and one learner to be the Moon.
    b. The learner who is the Sun must not move.
    c. The learner who is Earth should orbit the Sun. It takes 1 year for the Earth to complete 1 orbit around the Sun. Ask the Learner who is the Earth, to spin (on own axis), as well as orbit the Sun.
    d. The learner who is the Moon will then spin on its own axis and rotate the Earth.
    e. The Moon completes one orbit around the Earth in approximately 27 and a half days.
6. Ask the 3 learners to return to their seats.
7. Ask the learners to provide labels for the drawing on the chalkboard.



The Sun, Earth and Moon

8. Have the learners add these labels to the drawing in their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. Is the Moon or Sun closer to the Earth?
b. How long does it take for the Moon to complete one revolution around the Earth?

Answers to the checkpoint questions are as follows:

a. The Moon is closer to the Earth than to the Sun.
b. The Moon spins much more slowly than the Earth does and completes one revolution every 27.3 days.

E CONCEPTUAL DEVELOPMENT

1. Draw the following table onto the chalkboard (try to do this before the start of the lesson):

Activity Complete the following table by using words from the word bank:	
Earth	**Moon**
Surface consists of _____	Surface consists of
Is _____ than the Moon	Is _____ than the Earth.
Is visible because it _____ light from the Sun hitting it.	Is visible because it _____ light from the Sun hitting it.
Is in orbit around the _____	Is in orbit around the _____.
Spins on its axis once every _____ hours.	Spins on its axis once every _____ days.
Has _____ atmosphere.	Has _____ atmosphere.

Word bank:	
• rock, soil and water • rock and lunar soil • reflects • absorbs • Sun • Earth	• an • no • larger • smaller • 24 • 27.3

2. Ask the learners to draw the table in their workbooks and ask them to fill in the blanks.
3. When the task is complete tell the learners to compare answers with the person next to them.
4. Read out a sentence:
   a. Ask a learner for the correct word that fits in the space.
   b. Write the correct word in the blank space.
   c. Continue to do this until all the blanks have been filled.

5. Write the model answer on the chalkboard:

Earth	***Moon***
Surface consists of rock, soil and water.	*Surface consists of rock and lunar soil.*
Is larger than the Moon	*Is smaller than the Earth.*
Is visible because it absorbs light from the Sun hitting it.	*Is visible because it reflects light from the Sun hitting it.*
Is in orbit around the Sun.	*Is in orbit around the Moon.*
Spins on its axis once every 24 hours.	*Spins on its axis once every 27.3 days.*
Has an atmosphere.	*Has no atmosphere.*

6. Hand out Resources 12 and 13 2 and send it around the class so that each learner looks at it.
7. Tell the learners the following about the surface of the Moon:
    a. The Moon is littered with craters, which are formed when meteors hit its surface.
    b. Some areas on the surface of the Moon look dark and others look lighter.
    c. The dark areas are called maria (singular mare) meaning seas, as astronomers initially thought that these areas were seas on the surface.
    d. The bright areas are called highlands as they are higher than the maria.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What are craters and how are they formed?
b. Does the Moon really have seas?

Answers to the checkpoint questions are as follows:

a. The Moon is littered with craters, which are formed when meteors hit its surface.
b. No. The dark areas are low lying areas in shadow.

8. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Moon to the Earth	155-156
Via Afrika	Relationship of Moon to the Earth	152-153
Platinum	Relationship of Moon to the Earth	204-205
Spot On	Relationship of Moon to the Earth	151-152
Sasol Inzalo Bk B	Relationship of Moon to the Earth	170-171
Step-by-Step Natural Sciences	Relationship of Moon to the Earth	175
Pelican Natural Sciences	Relationship of Moon to the Earth	270-273
Solutions for All Natural Sciences	Relationship of Moon to the Earth	309
Shuters Top Class Natural Sciences	Relationship of Moon to the Earth	171

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www.nasa.gov/feature/goddard/2016/preparing-for-the-august-2017-total-solar-eclipse [Solar eclipse]
2. http://science.howstuffworks.com/Moon1.htm [The Moon's surface]

TOPIC: Relationship of the Moon and the Earth

5 B

Term 4, Week 5, Lesson B
Lesson Title: Solar and Lunar eclipse
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Relative positions
CAPS Page Number	32

Lesson Objectives

By the end of the lesson, learners will be able to:

- compare solar and lunar eclipses
- model how solar and lunar eclipses occur
- draw a diagram of how a solar and lunar eclipse occur

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing	✓	7. Raising Questions		12. Recording Information	✓
3. Comparing		8. Predicting		13. Interpreting Information	✓
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbooks	Resource 10
Models of the Sun, Earth and Moon made by learners	Resource 10

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

How far from the Sun is the Earth?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

The Earth's average distance from the Sun is 149 597 871 km.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

THE SOLAR AND LUNAR ECLIPSE

1. The reflection of the Sun's light onto the Moon causes the phases of the Moon.
2. A lunar eclipse is when the Earth passes directly between the Sun and the Moon.
3. This can only occur when the Sun, Earth, and Moon are aligned exactly, or very closely, with the Earth in the middle.
4. A solar eclipse is when the Moon passes directly between the Sun and the Earth.
5. This can occur only when the Sun, Moon, and Earth are aligned exactly, or very closely, with the Moon in the middle.

2. Read over the information on the chalkboard with the learners.
3. Give the learners some time to copy the information from the chalkboard into their workbooks.
4. Tell the learners that you will explain a solar eclipse to them.
5. Tell the learners that they need to listen carefully because they will need to draw a diagram to show what a solar eclipse looks like.

6. Explain a solar eclipse to the learners:
    a. When you look at the size of the Moon in the sky compared with the size of the Sun in the sky you see that they are very similar.
    b. A solar eclipse happens when the Moon passes directly in front of the Sun and blocks the Sun's light.
    c. The bright light from the Sun is blocked, allowing us to see the very faint outer edge of the Sun's atmosphere.
    d. We normally cannot see this outline as it is swamped by the bright light from the Sun.
7. Protective glasses must be worn when viewing the Sun during a solar eclipse to protect the eyes.
8. Tell the learners that you will explain a lunar eclipse to them.
9. Tell the learners that they need to listen carefully because they will need to draw a diagram to show what a lunar eclipse looks like.
10. Explain a lunar eclipse to the learners:
    a. When you look at the size of the Moon in the sky compared with the size of the Sun in the sky it looks as though they are very similar.
    b. A lunar eclipse is when the Earth passes directly between the Sun and the Moon.
    c. In this case, the Earth blocks the Sunlight from reaching the Moon's surface, making the Moon appear dark in the night sky.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What is a solar eclipse?
b. What is a lunar eclipse?

Answers to the checkpoint questions are as follows:

a. A solar eclipse is when the Moon passes directly between the Sun and the Earth.
b. A lunar eclipse is when the Earth passes directly between the Sun and the Moon.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (try to do this before the start of the lesson):

Draw diagrams in your workbook of the following:

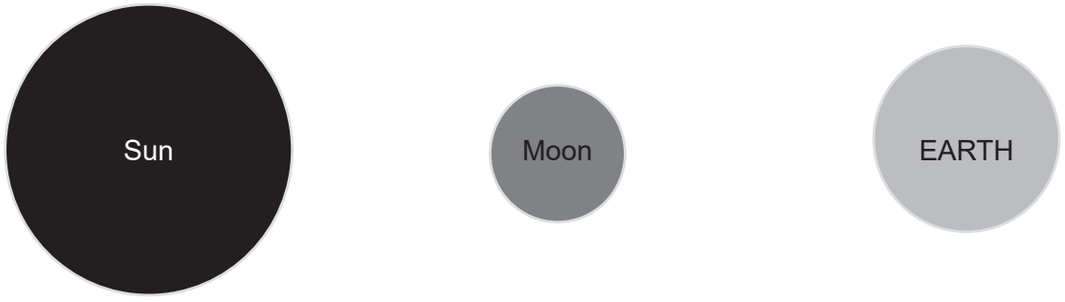
1. A solar eclipse
2. A lunar eclipse

Show what the eclipse looks like when viewed from Earth.

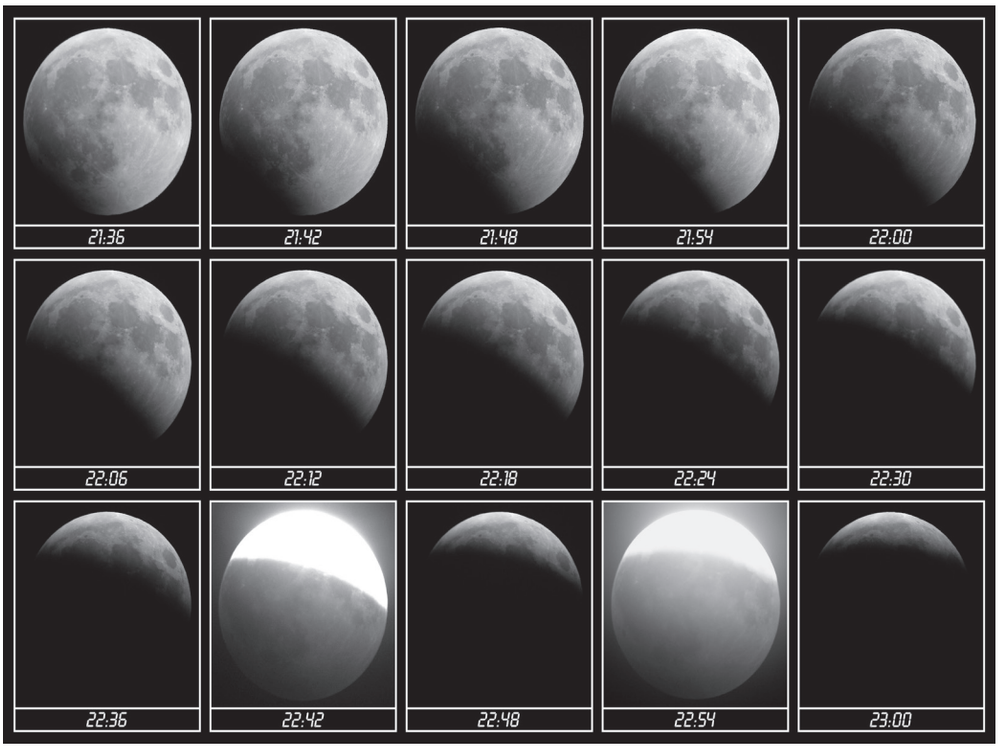
Secondly, draw the positions of the Earth, Sun and Moon during the eclipse. Remember to label your diagrams.

2. Tell the learners to complete the task in their workbooks.
3. Draw and label the model answers on the chalkboard:They may use the poster and Resource 10 and 11 to help them.

1. Solar eclipse



2. Lunar eclipse



Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What precaution should you take when viewing the solar eclipse?
b. Why does the Sun and Moon look as though they are the same size even though we know that the Sun is much bigger than the Moon?

Answers to the checkpoint questions are as follows:

a. Use protective glasses or your eyes will be damaged.
b. This is because the Moon is much closer than the Sun. It looks bigger because it is closer.

4. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Moon to the Earth	160-161
Via Afrika	Relationship of Moon to the Earth	146-149
Platinum	Relationship of Moon to the Earth	156-157
Spot on	Relationship of Moon to the Earth	152
Sasol Inzalo Bk B	Relationship of Moon to the Earth	189-194
Step-by-Step Natural Sciences	Relationship of Moon to the Earth	175-176
Pelican Natural Sciences	Relationship of Moon to the Earth	271-273
Solutions for All Natural Sciences	Relationship of Moon to the Earth	-
Shuters Top Class Natural Sciences	Relationship of Moon to the Earth	-

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://www.planetarium.co.za/skystuff/Eclipse2017.shtml [Information about solar and lunar eclipse]

5 C

Term 4, Week 5, Lesson C
Lesson Title: Gravity
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Gravity
CAPS Page Number	32

Lesson Objectives

By the end of the lesson, learners will be able to:

- define the meaning of gravity
- demonstrate how gravity works
- explain the effect of the Earth's gravity on the Moon
- explain that the Moon also exerts gravitational force on the Earth

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing	✓	7. Raising Questions		12. Recording Information	
3. Comparing		8. Predicting	✓	13. Interpreting Information	
4. Measuring		9. Hypothesizing	✓	14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Ball bearings of different weights	Small stone
	Feather
	Small rock/brick
	Ball in a packet with thick string/ rope tied to it

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

If you dropped a feather and a stone which would land first?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

The stone would land first.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

GRAVITY

1. **Gravity** is the force of attraction between two forces.
2. There are 2 main factors that affect gravity: mass and size.
3. The bigger the object the more gravity it has on another object.
4. The heavier the object the more gravity it has on another object.
5. A heavy object will fall to the ground the fastest as it has a stronger gravitational pull to the Earth's centre.
6. The **mass** of an object is the amount of matter in the object. Mass is measured in kilograms (kg) and is the same no matter where you measure it.
7. An object's **weight** can change, as it depends on the mass of the object and also the strength of gravity acting on it. Weight is measured in Newtons (N).

2. Explain the information to the learners as follows:
   a. The word **gravity** is used to describe the **gravitational pull (force)** an object experiences on or near the surface of a planet or Moon.

b. The gravitational force is a force that attracts objects with mass towards each other.

c. Any object with mass exerts a gravitational force on other objects with mass. So, the Earth exerts a gravitational pull on the desks, chairs and learners in the classroom, holding everything on the surface and stopping it from drifting off into space.

d. The Earth's gravity pulls everything down towards the centre of the Earth and so if a book is dropped it falls to the ground.

3. Tell the learners to copy the information from the chalkboard into their workbooks.
4. Give learners some time to copy this information into their workbooks.
5. Do the following activity with the learners:

1. Take the learners outside.
2. Tell the learners that they will be observing whether a heavy or light object will reach the ground first when dropped from the same height.
3. Tell 3 volunteers to do the following:
   a. Stand on a chair.
   b. One learner will hold a feather, the other a small stone and the last a rock/brick.
4. Ask the learners which object is the heaviest? (They should say the rock/brick)
5. Ask the learners which object is the lightest? (They should say the feather)
6. Continue the demonstration by asking the learners to do the following:
   a. Hold the object in their open hand so that all the objects are at the same height.
   b. Tell the learners that when they hear the word “drop” they must turn their hand over and let the object fall from their hand.
   c. Tell the rest of the learners that they must observe which object reached the ground first.
   d. Shout “drop!”
7. Ask the learners which object reached the ground:
   a. First? (They should say the rock)
   b. Last? (They should say the feather)
8. Ask the learners to go back into the class.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What are the two main factors that affect gravity?

b. Why does a heavy object fall faster than a light object?

Answers to the checkpoint questions are as follows:

a. Mass and size.

b. A heavy object will fall to the ground the fastest as it had a stronger gravitational pull to the Earth’s centre.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (try to do this before the start of the lesson):

Activity 1

1. What was the aim of the experiment that was performed outside?
2. Draw a table to show the results of the experiment. Remember to give your table a heading.

Object	**Fast / faster / fastest**

3. What was the conclusion to the experiment?

2. Give learners some time to complete this task in their workbooks.
3. Once learners are done they must discuss their answers with a partner.
4. Write the model answers on the chalkboard:

1. *To see whether a light or heavy object would reach the ground the fastest.*
2. *Table showing which object reaches the ground the fastest.*

Object	***Fast / faster / fastest***
feather	*fast*
stone	*faster*
rock	*fastest*

3. *A heavy object will fall to the ground the fastest as it had a stronger gravitational pull to the Earth's centre.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Why is it that when we drop an object that it falls to the ground and not stay floating in the air?
b. Which is larger, the Moon or the Sun?

Answers to the checkpoint questions are as follows:

a. The Earth's gravitational force pulls all objects to the ground.
b. Sun.

5. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Via Afrika	Relationship of Moon to the Earth	152-153
Platinum	Relationship of Moon to the Earth	204-205
Spot On	Relationship of Moon to the Earth	153-154
Sasol Inzalo Bk B	Relationship of Sun to the Earth	170-171
Step-by-Step Natural Sciences	Relationship of Moon to the Earth	177
Pelican Natural Sciences	Relationship of Moon to the Earth	275-277
Solutions for All Natural Sciences	Relationship of Moon to the Earth	309-312
Shuters Top Class Natural Sciences	Relationship of Sun to the Earth	172-175

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://study.com/academy/lesson/gravitational-pull-of-the-earth-definition-lesson-quiz.html [Gravitational pull of the Earth]

6 A

Term 4, Week 6, Lesson A
Lesson Title: Gravitational pull
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Gravity
CAPS Page Number	32

Lesson Objectives

By the end of the lesson, learners will be able to:

- define the meaning of gravity
- demonstrate how gravity works
- explain the effect of the Earth's gravity on the Moon
- explain that the Moon also exerts gravitational force on the Earth

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions	✓	12. Recording Information	
3. Comparing		8. Predicting	✓	13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Ball with string attached	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

> Which is bigger, the Earth or the Moon?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

> *The Earth is bigger.*

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

> GRAVITY
>
> 1. All the components in our universe are held together by gravity.
> 2. The greater the mass of the object, the stronger the gravitational pull between them.
> 3. The **mass** of an object is the amount of matter in the object. Mass is measured in kilograms (kg) and is the same no matter where you measure it.
> 4. An object's **weight** can change as it depends on the mass of the object and the strength of gravity acting on it. Weight is measured in Newtons (N).
> 5. Mass changes depending on which planet we are on.
> 6. The Moon also has its own gravity. The strength of gravity on the surface of the Moon is one-sixth that of the Earth, and so you would weigh one-sixth of what you do on Earth on the Moon.

2. Explain the information to the learners as follows:
   a. All the components in our universe are held together by gravity.
   b. The greater the mass of the objects, the stronger the gravitational pull between them. Today we will focus on how the Sun releases energy into our solar system.

c. There is a difference between mass and weight.
   - The mass of an object is the amount of matter in the object. Mass is measured in kilograms (kg) and is the same no matter where you measure it.
   - An object's weight can change as it depends on the mass of the object and the strength of gravity acting on it. Weight is measured in Newtons (N). For example, the Earth exerts a gravitational force of about 10 Newtons for every kilogram of mass on its surface.
   - So, if something has a mass of 20Kg, its weight will be 200N.

d. The Moon also has its own gravity. The strength of gravity on the surface of the Moon is one-sixth that of the Earth, and so you would weigh one-sixth of what you do on Earth on the Moon.

3. Give the learners time to copy the information from the chalkboard into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What force allows the Moon to orbit the Earth?
b. What are the units of measurement of mass and weight?

Answers to the checkpoint questions are as follows:

a. Gravitational force.
b. Mass: Kg and Weight: Newtons

E CONCEPTUAL DEVELOPMENT

1. To do this activity, you will need the following:
    - 6 empty 500ml plastic bottles (this is for 6 groups)
    - water to fill the bottles
    - 18m String
    - an outside area
    - scissors
2. Ensure you have these materials prepared before the lesson starts.
3. Tell the learners that they are going to be doing an investigation.
4. Write the following onto the chalkboard (always try to do this before the lesson starts):

PRACTICAL TASK

1. This practical task will be done in groups.
2. We will be exploring the affects of gravitational pull.
3. Each person in the class must participate in the investigation and complete the answers to the written activities in their workbooks.
4. We will need the following materials and equipment to do the investigation:
    - 6 empty 500ml plastic bottles (this is for 6 groups)
    - water to fill the bottles
    - 18m String
    - an outside area
    - scissors
5. You will need to listen and observe.

5. Read through the practical task with the learners.
6. Remind the learners that the Earth rotates on its axis.
7. Tell the learners that today they are going to be investigating what affects gravitational pull.

Practical set-up (Do this before the lesson)

1. Make sure the plastic bottles are clean and empty.
2. Cut the string into 6 pieces of 2.5m each.
3. Make sure you have water available to fill the bottles.

8. Divide the learners into 6 groups.
9. Ask a member of each group to collect their materials for the investigation.
10. Explain the following to the learners:
    - They must tie the 2.5m piece of string to the empty bottle.
    - Hold the string so that the bottle hangs at 1m length.
    - They must take turns to hold their arm out and to swing round with the empty bottle.
    - The bottle must lift perpendicular to the body.
    - They must note how this feels.
    - They must then fill the bottle with water and carry out the same action.
    - Tell them to let the string go and to note what happens to the bottle.
    - Tell the learners to note the difference between an empty bottle and a full bottle.
    - They must then hang the string at 2m and repeat the process with an empty bottle and then a full bottle.
11. Ask the learners to identify what they represent.
    (They represent Earth).
12. Ask the learners to identify what the bottle represents.
    (The bottle represents the moon).
13. Ask them if they have any questions.
14. Write the following onto the chalkboard (always try to do this before the lesson starts):

TASK: (20 marks)

1. Write down a heading for the investigation. (1)
2. In the practical what do you represent? (1)
3. In the practical what does the bottle represent? (1)
4. Explain what gravity is. (2)
5. Describe the difference in the feeling of an empty bottle and a full bottle with 1m of string.(2)
6. What happens to the bottle when you let it go? (2)
7. What does this represent in terms of the Earth and the moon? (2)
8. Describe the difference in the feeling of an empty bottle and a full bottle with 2m of string.(2)
9. Which was easier to swing, a full bottle with 1m of string or a full bottle with 2m of string? (1)
10. What can we conclude about this investigation. (6)

15. Read through the questions with the learners.
16. Discuss the results with the learners.
17. Ask the learners to copy the questions into their books.
18. Tell the learners they have 15 minutes to answer these questions in their workbooks.
19. Supervise the learners whilst they complete the task and answer any questions they may have.
20. Collect books for assessment.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Moon to the Earth	162-164
Via Afrika	Relationship of Moon to the Earth	157-159
Platinum	Relationship of Moon to the Earth	202-203
Spot On	Relationship of Moon to the Earth	153-155
Sasol Inzalo Bk B	Relationship of Moon to the Earth	195-198
Step-by-Step Natural Sciences	Relationship of Moon to the Earth	178-179
Pelican Natural Sciences	Relationship of Moon to the Earth	277-279
Solutions for All Natural Sciences	Relationship of Moon to the Earth	313-318
Shuters Top Class Natural Sciences	Relationship of Moon to the Earth	176-179

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://study.com/academy/lesson/gravitational-pull-of-the-earth-definition-lesson-quiz.html [Gravitational pull of the Earth]

6 B

Term 4, Week 6, Lesson B
Lesson Title: How the Moon affects the tides
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Tides
CAPS Page Number	33

Lesson Objectives

By the end of the lesson, learners will be able to:

- explain how the Sun emits light and heat energy
- describe the structure of the Sun
- relate the types of reactions that occur in the Sun

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues	✓	11. Doing Investigations	
2. Observing		7. Raising Questions		12. Recording Information	
3. Comparing	✓	8. Predicting	✓	13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Resource 14
Scarves or cloth of at least a meter long.	Resource 15

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Why does the Earth stays orbiting the Sun and not float off into space?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

The Sun is a large object that exerts a gravitational pull on the Earth that keeps it in its orbit.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

TIDES

1. More than 70% of the Earth's surface is covered by water.
2. The rise and fall of sea levels is called tides.
3. This is caused by the Moon' gravitational pull on the Earth.
4. The tides are predictable and we have 2 low tides and 2 high tides every day.
5. Spring tides occur when the Moon is in line with the Sun so the Sun's gravity adds to the Moon's gravity. This causes higher than usual high tides and extra-low low tides.

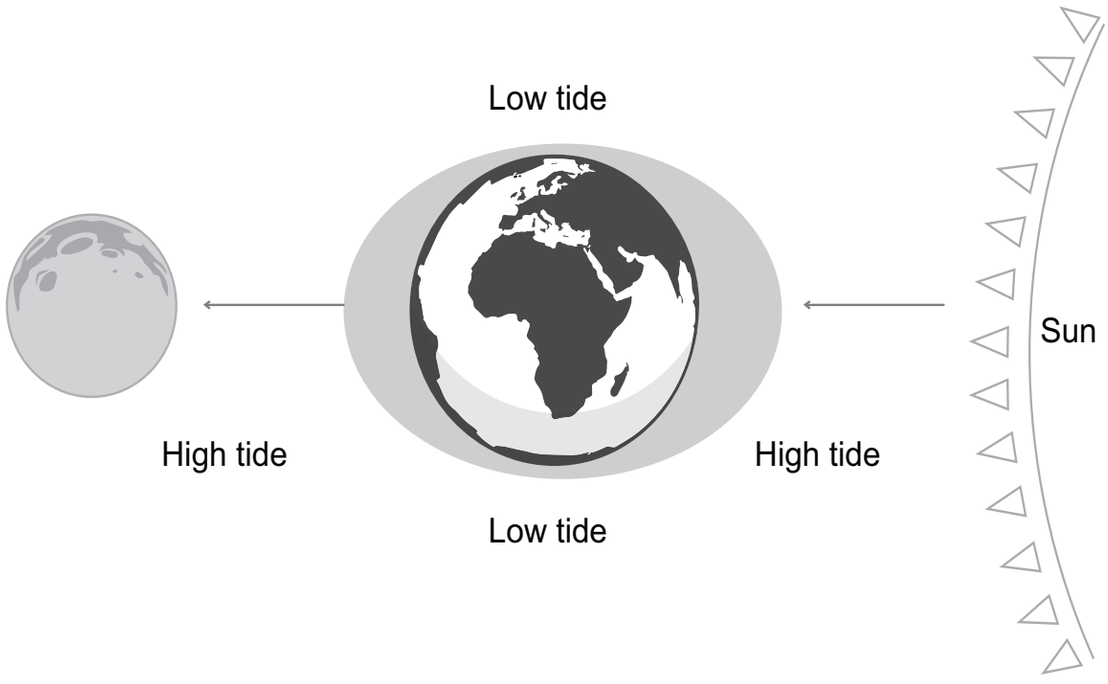


Diagram showing spring tide

6. Neap tides occur when the Moon and the Sun are perpendicular to each other.
   Perpendicular looks like this:

7. A neap tide is an extra low high tide and an extra high low tide.
8. The Moon is closer than the Sun to the Earth so it has a greater effect on the tides.

2. Explain the following information to the learners:
   a. The Earth's surface is made up of 70% water.
   b. The Moon has a gravitational pull that causes the levels of this water to rise and fall and this is called tides.
   c. There are two types of tides, spring and neap tides.
   d. When the Sun, Earth and Moon are all in a line we have spring tides.
   e. When there is a spring tide there are very high, high tides and very low, low tides as shown in the diagram on the board. (Point to the drawing and show the high and low tides).
   f. Neap tides are formed when the Moon and the Sun are perpendicular to each other.
   g. When this happens, the amount of water surrounding the Earth is almost the same all round, as the high tides are low and the low tides are high.
3. Show the learners Resource 14 and 15 which show high and low tides.
4. Tell the learners to copy the information from the chalkboard into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. How much of the Earth is covered in water?
b. What are tides?

Answers to the checkpoint questions are as follows:

a. More than 70%
b. The rise and fall of sea levels is called tides.

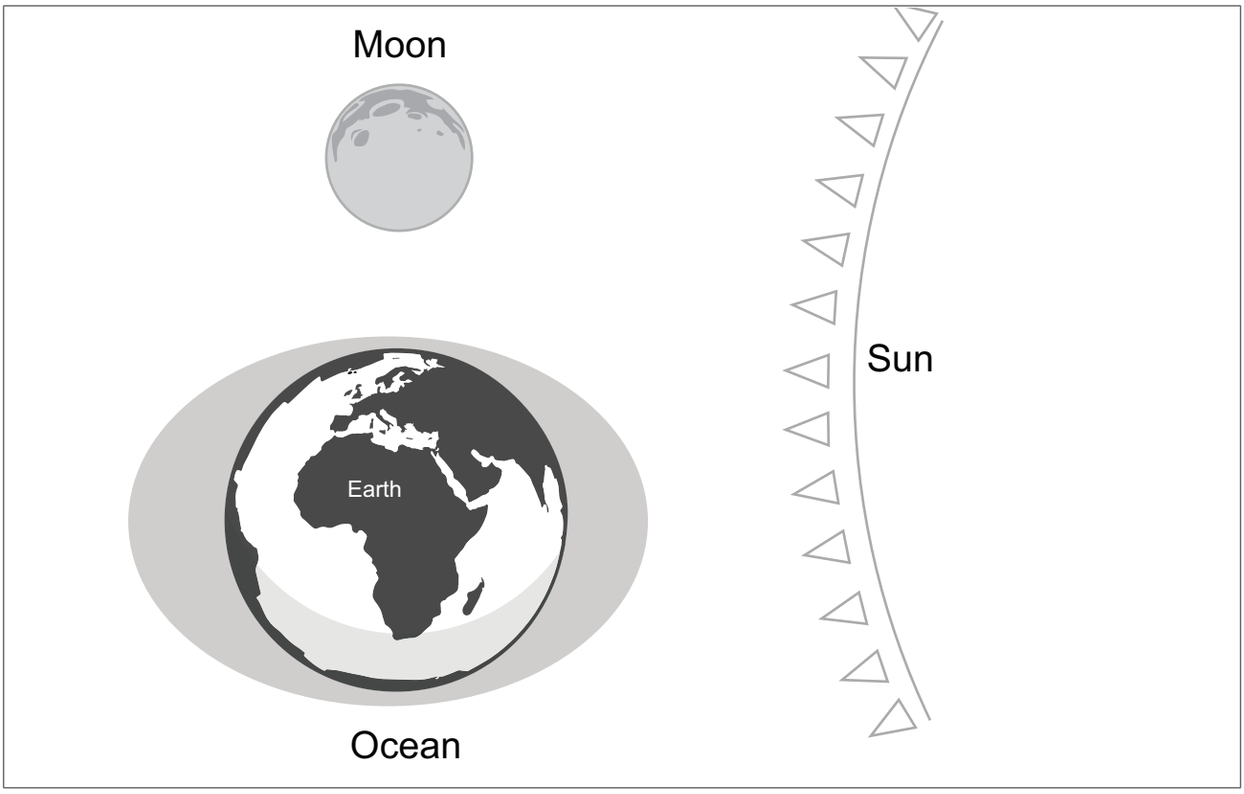
E CONCEPTUAL DEVELOPMENT

1. Take the learners outside for the following activity.

    1. Tell the learners to get into groups of 6 and follow your instructions:
        a. One learner represents the Earth, four learners represent the Earth's oceans and one learner represents the Moon.
        b. Tell the learner representing the Earth to stand in an open space.
        c. The four learners representing the oceans must take one blue scarf each and stand in.
        d. a circle around the learner representing Earth. (One behind, one in front
        e. and one on either side).
        f. The four learners representing the oceans: link scarves with each other.
    2. Tell the learners that the oceans are around the Earth.
    3. Tell the learner representing the “Moon” to stand outside the circle of the "ocean" about 5 steps away from the "Earth" directly in front of any one of the learners representing the ocean.
    4. Tell the learner representing the “Sun” to stand outside the circle of the "ocean" about 10 steps away from the "Earth" on the opposite side of the Moon. So now the Moon, Earth and Sun are all in a straight line.
    5. The “Moon” and “Sun” must pull on the scarf.
    6. Tell the learners that this is what a spring tide looks like.
    7. Ask the “Moon” to move perpendicular (or at a right angle) to the “Sun” and pull gently on the scarf. The scarves are now surrounding the Earth, almost equally around the Earth.
    8. Tell the learners that this is what a neap tide looks like.

2. Ask the learners to go back to class.
3. Write the following question on the chalkboard. (Always try to do this before the lesson starts):

Draw and label a diagram to show what a neap tide will look like.



Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Name the two types of tides that the Earth experiences?
b. How many high tides does the earth experience per day?

Answers to the checkpoint questions are as follows:

a. Neap and spring tides.
b. Two.

6. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Moon to the Earth	162-164
Via Afrika	Relationship of Moon to the Earth	157-159
Platinum	Relationship of Moon to the Earth	202-203
Spot On	Relationship of Moon to the Earth	153-155
Sasol Inzalo Bk B	Relationship of Moon to the Earth	195-198
Step-by-Step Natural Sciences	Relationship of Moon to the Earth	178-179
Pelican Natural Sciences	Relationship of Moon to the Earth	278-279
Solutions for All Natural Sciences	Relationship of Moon to the Earth	315
Shuters Top Class Natural Sciences	Relationship of Moon to the Earth	178

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://study.com/academy/lesson/gravitational-pull-of-the-earth-definition-lesson-quiz.html [Gravitational pull of the Earth]

6 C

Term 4, Week 6, Lesson C
Lesson Title: Shoreline ecosystems
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Tides and the effects it has on shoreline ecosystems
CAPS Page Number	33

Lesson Objectives

By the end of the lesson, learners will be able to:

- differentiate between the different zones in a tidal pool
- identify the different organisms in a tidal pool

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions		12. Recording Information	✓
3. Comparing		8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Resource 16

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Tides that form when the Moon and Sun are perpendicular to each other are called _____ tides.

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Tides that form when the Moon and Sun are perpendicular to each other are called neap tides.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

TIDES AND ECOSYSTEMS

1. An ecosystem is a community of living organisms and their interaction with the environment.
2. There are two kinds of shoreline ecosystems:
   a. Rocky shore ecosystem: which is on the upper part of the rocky shore and is dry a lot of the time. Only very tough organisms like snails and some seaweed live here.
   b. Sandy shore ecosystem: the dry, sandy area where land animals like crabs live.
3. The region of the beach between high tide and low tide levels is called the intertidal zone.
4. The intertidal zone is a harsh environment for marine animals to live.
5. During storms, the surf can be very rough and plants and animals must be able to withstand the battering from big waves and not get washed away.
6. Animals and plants that live here are underwater at high tide but are exposed to the air during low tide.
7. Some organisms may stay underwater if they are in small rock pools which do not empty out when the tide goes out.
8. Those that are exposed to air at low tide, face hot temperatures in summer and cold temperatures in winter so they must be able to adapt to different temperatures.
9. Humans throw trash on the beaches and this washes into the water and when the tide comes in it brings this trash back into the environment. This harms the animals living in these ecosystems.

2. Explain the following to the learners:
    a. Animals and plants live in a region between the beach and the sea. This area is called the intertidal zone.
    b. Sometimes these animals are covered in water and sometimes they are exposed to the Sun so they must be well adapted so that they don't dry out. Examples of animals that can survive here are snails and crabs with their hard shells. A plant example is seaweed which has a thick waxy coating that stops it from drying out.
    c. There are two types of shoreline ecosystems: rocky (on the rocks) and sandy (on the sand) shore ecosystems.
    d. When the tide comes in it brings food that washes onto the shore for little animals to eat.
    e. The incoming tide also brings in plastics and bottles that destroy the environment and harm the animals.
3. Ask the learners to work in groups of 3 or 4 to answer the following questions. (Answers are in italics):

Discuss the adaptations that a plant and animal will need to survive living in this ecosystem. *(Plants will need to have a tough waxy covering to prevent it from dying out. They will need to have strong roots to keep from getting washed away when the tide comes in. Animals will have to be able to either hide under the sand or have a thick outer shell to protect it from drying out.)*

4. Tell the learners to copy the information written on the chalkboard into their workbooks:

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What is a shoreline ecosystem?
b. How is seaweed adapted to survive in the shoreline?

Answers to the checkpoint questions are as follows:

a. A shoreline ecosystem is a group of organisms that are adapted to live on the shoreline.
b. Its leaves have a waxy coating so that it does not rot or dry out.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

Activity

1. Draw a sketch of what you think a shoreline ecosystem will look like.
2. List two kinds of shoreline ecosystems.
3. Describe some of the challenges faced by living creatures that live in shoreline ecosystems and explain how they overcome these challenges.
4. How do incoming tides help living creatures in the shoreline ecosystem?
5. List the things people could do to help clean up this ecosystem

2. Read through the questions with the learners.
3. Show the learners Resource 16 which shows what rocky shoreline looks like.
4. Give the learners some time to answer the questions in their workbooks.
5. Write the model answers on the chalkboard:

1. *Rocky and sandy shoreline ecosystems.*

2. *When the tide goes out they are exposed to the harsh Sun so the plants need to have a waxy layer to protect them from drying out. The animals are exposed to the harsh Sun as well so they have a shell for protection or they bury themselves under the sand.*
3. *They bring in plants and tiny animals for birds and bigger animals to eat.*
4. *Do not throw trash on the ground, rather use bins.*
5. *Provide more bins for the area.*

   Take a group of people and work together to pick up the trash every weekend.

   Make signs to remind people of the harm that they are causing to these ecosystems.

   (Answers will vary here)

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. List the 2 types of shoreline ecosystems?

b. List one way that people are causing harm to this ecosystem.

Answers to the checkpoint questions are as follows:

a. Rocky and sandy

b. We throw trash on the ground, this washes into th

6. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Relationship of Moon to the Earth	162-164
Via Afrika	Relationship of Moon to the Earth	157-159
Platinum	Relationship of Moon to the Earth	202-203
Spot On	Relationship of Moon to the Earth	153-155
Sasol Inzalo Bk B	Relationship of Moon to the Earth	195-198
Step-by-Step Natural Sciences	Relationship of Moon to the Earth	180-181
Pelican Natural Sciences	Relationship of Moon to the Earth	279-280
Solutions for All Natural Sciences	Relationship of Moon to the Earth	316
Shuters Top Class Natural Sciences	Relationship of Moon to the Earth	179-180

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://sciencing.com/ecosystem-shoreline-9237.html. [Shoreline ecosystem]

TOPIC OVERVIEW:
Historical development of astronomy
Term 4, Weeks 7A – 8C

A. TOPIC OVERVIEW

Term 4, Weeks 7a – 8c

- This topic runs for 2 weeks.
- It is presented over 6 x 1 hour lessons.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C

LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C

B. SEQUENTIAL TABLE

GRADE 6	GRADE 7	GRADE 8
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Systems for looking into Space	• Early indigenous knowledge • Modern development	• Early viewing of space • Telescopes

C. SCIENTIFIC VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	constellation	A constellation is any group of stars, as seen from Earth, that seems to form a pattern or picture in the sky. Different nations, cultures and people have given different names to the different star patterns and have interpreted them in different ways.
2.	astronomy	It is the study of stars, the Moon, Sun and planets.
3.	rotate	To turn about a central point, in this case on its axis. It looks like a top that is spinning.
4.	orbit	The regularly, repeated path of a celestial object around a star or planet.

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Early beliefs and discoveries have led to modern inventions and we are now able to explore space better because of those that have come before us.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

7 A

Term 4, Week 7, Lesson A
Lesson Title: The beginning of the calendar
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Early indigenous knowledge
CAPS Page Number	33

Lesson Objectives

By the end of the lesson, learners will be able to:

- use information from the Sun and Moon to calculate days, months and years
- explain that various cultures and religions used the Moon and stars to know when to sow seeds and harvest

Specific Aims	1. DOING SCIENCE	
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	✓

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues	✓	11. Doing Investigations	
2. Observing	✓	7. Raising Questions		12. Recording Information	✓
3. Comparing	✓	8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

> What is the name of the star that provides us with energy?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

> *The Sun.*

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

> TIME AND THE Moon AND STARS
>
> 1. The Moon and Sun and stars seem to move in predictable patterns.
> 2. People in ancient times used these patterns to measure time and develop different calendars.
>   a. They created a year which was a time period that included 4 seasons.
>   b. A month which was a time period from one full Moon to the next full Moon.
>   c. A day which was a time period from one Sunrise to the next Sunrise.
> 3. Accurate timekeeping was very important for farming communities because people needed to know when to plant their seeds and when to harvest their crops. For example, farmers used The *Pleiades*, also called the *Seven Sisters*, a bright cluster of stars to help them plan their planting. Once the constellation was visible in the early morning in June they knew it was time to start planting their crops.

2. Ask the learners to work in pairs to answer the following questions. (Answers are in italics):
   1. How many hours are there in one day? *(24 hours)*
   2. How do you know when a day begins and the day ends? *(It starts at Sunrise and ends at Sunset)*
   3. How do you know when a month starts? *(It starts when there is a new Moon)*
   4. How many seasons are there in a year? *(4 Seasons)*

3. Explain the following information about ancient times to the learners:
    a. People did not have calendars and watches so they looked at the Sun and Moon and looked for patterns.
    b. They saw that the Sun rose at the beginning of the day and ended with the Sun setting.
    c. They saw that the Moon took a certain amount of time from a new Moon to the next new Moon and so they called this a month.
    d. The realized that there were 4-seasons in a cycle: spring, summer, autumn and winter and called this cycle, a year.
    e. This is how our calendar was formed.
4. Tell the learners that:
    a. Some religions, like Islam, follow the Moon accurately and therefore have their own calendar. Their month is not 30 or 31 days but 27 or 28 days which is the time taken for the Moon to go once around the Earth.
    b. Accurate timekeeping was very important for farming communities because people needed to know when to plant their seeds and when to harvest their crops. For example, farmers used The *Pleiades*, also called the *Seven Sisters*, a bright cluster of stars to help them plan their planting. Once the constellation was visible in the early morning in June, they knew it was time to start planting their crops.
5. Explain to the learners that:
    a. The Khoikhoi call the Pleiades Khuseti or Khunuseh meaning "rain stars".
    b. They are called Selemela in Sotho and Tswana, Shirimela in Tsonga, Tshilimela in Venda, and isiLimela in Xhosa and Zulu. In Xhosa the stars are called the "digging stars".
    c. In East Africa and Zanzibar the Pleiades are called Kilimia, which also means "ploughing stars" or "digging stars".
    d. Not only were the Pleiades used in Africa to mark planting season, they were also used by the ancient Mayans in Mexico and Central America to mark the start of their rainy season too.
6. Tell the learners to copy the information from the chalkboard into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What is another name for Seven Sisters?
b. How many hours are there in a day?

Answers to the checkpoint questions are as follows:

a. Pleiades.
a. 24 hours

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

Activity

Month	Modern Xhosa	Traditional Xhosa	Meaning of traditional name
January	uJanuwari	EyoMqungu	Month of the Tambuki Grass
February	uFebhuwari	EyoMdumba	Month of the swelling grain
March	uMatshi	EyoKwindla	Month of the first fruits
April	uApreli	UTshazimpuzi	Month of the withering pumpkins
May	uMeyi	UCanzibe	Month of Canopus (Canopus is a star)
June	uJuni	Isilimela	Month of the Pleiades
July	uJulayi	EyeKhala / EyeNtlaba	Month of the aloes
August	uAgasti	EyeThupha	Month of the buds
September	uSeptemba	EyoMsintsi	Month of the coast coral tree
October	uOktobh	EyeDwarha	Month of the lilypad
November	uNovemba	EyeNkanga	Month of the small yellow daisies
December	uDisemba	EyoMnga	Month of the mimosa thorn tree and Simba (the lion)

1. The traditional names for the months mostly come from the names of plants and flowers. Why do you think certain months are given specific plants or flower names?
2. Why do you think August is called EyeThupha, the month of the buds?
3. What time of year does Isilimela correspond to? What does this signal to traditional farmers?
4. What month are you born in? Write down the traditional Xhosa name in your workbook

2. Tell the learners the following:

   In the Xhosa language, there are two ways of naming months, the modern and the traditional way. The modern names of the months are used in urban areas.

   However, in rural areas, in poetry, and particularly in the Eastern Cape the old names are still used.

3. Read through the questions with the learners.
4. Give learners some time to copy the questions into their workbooks and answer them.
5. Write the model answers on the chalkboard:

1. *These are the months when these plants are very visible.*
2. *This is close to spring and this is when the buds start emerging (coming out).*
3. *June. At this time the Pleiades, also called the Seven Sisters, a bright cluster of stars is very visible. This helps farmers with their planting. Once the constellation was visible in the early morning in June they knew it was time to start planting their crops.*
4. *These answers will vary according to learner's birth month.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What is the modern Xhosa name for May?
b. What is the traditional name for April?

Answers to the checkpoint questions are as follows:

a. uMeyi.
b. UTshazimpuzi.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Historical development of astronomy	140-141
Via Afrika	Historical development of astronomy	148-149
Platinum	Historical development of astronomy	194-195
Sasol Inzalo Bk B	Historical development of astronomy	146-147
Step-by-Step Natural Sciences	Historical development of astronomy	182-183
Pelican Natural Sciences	Historical development of astronomy	291
Solutions for All Natural Sciences	Historical development of astronomy	326-327
Shuters Top Class Natural Sciences	Historical development of astronomy	183-184

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://starchild.gsfc.nasa.gov/docs/StarChild/questions/question31.html [Day and night]
2. https://www.universetoday.com/60174/does-the-Sun-move/ [Movement of planets around the Sun]

7 B

Term 4, Week 7, Lesson B
Lesson Title: Constellations
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Early indigenous knowledge
CAPS Page Number	34

Lesson Objectives

By the end of the lesson, learners will be able to:

- recall stories from the past
- draw up their own constellations

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing		7. Raising Questions		12. Recording Information	
3. Comparing	✓	8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

TOPIC: Historical development of astronomy

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Resources 17, 18, 19 and 20

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

How many days are there in a year?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

365 ¼ .

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

CONSTELLATIONS

1. A **constellation** is any group of stars, as seen from Earth, that seems to form a pattern or picture in the sky.
2. Different nations, cultures and people have given different names for the different star patterns and have interpreted these patterns in their own ways.
3. The Southern Cross, Crux, and the two bright Pointer stars were used by farmers to mark the beginning of the planting season.
4. According to Sotho, Tswana and Venda traditions, these stars were called Dithutlwa, meaning "The Giraffes". The bright stars of Crux are male giraffes, and the two Pointers are female giraffes.
5. Another example is the constellation Orion, which is named after a supernaturally, strong hunter in Greek stories.

1. Explain the following information about constellations to the learners. Show the learners Resource 18 and 19 to help with your explanations.
   a. Astronomy is one of the oldest sciences. Ancient civilizations around the world watched the night skies, noting the patterns they saw in the sky. These patterns are called the constellations.
   b. A constellation is any group of stars, as seen from Earth, that seems to form a pattern or picture in the sky.

c. Different nations, cultures and people have given different names for the different star patterns and how they interpreted the patterns.

d. Tell the learners that a well-known example is Orion. Show the learners Resource 17 to show them what Orion's belt looks like. It is named after Orion, a supernaturally, strong hunter in Greek mythology.

e. This is one of the most recognized constellations around the world and many cultures have identified with it, each forming their own myths, many around a strong man or hunter.

3. Tell the learners to copy the information from the chalkboard into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. Name 2 constellations that you know of.

b. What is the Venda word for giraffes?

Answers to the checkpoint questions are as follows:

a. Orion and The Southern Cross

b. Dithutlwa

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):
2. Tell the learners that they will be working in a group of 3 or 4 for this next activity.

Activity

Create your own legend

INSTRUCTIONS:

1. Make up your own pattern of stars and draw them on a piece of paper
2. Make up a story to go along with your new constellation.
3. Your story must have the following criteria:
   - Have an interesting title.
   - Describe the constellation.
   - Explain how it was formed.
   - Tell us how the Milky Way was formed.
   - Have lots of detail as you will be acting out the story in the next lesson.

3. Using Resource 20, read out the stories to the class.
4. Tell them to use these as an example to do their activity.

5. Explain the following steps to the learners:
    a. STEP 1: Draw some stars on a page.
    b. STEP 2: Make a pattern out of the stars for example it could make up a bull or a scorpion.
    c. STEP 3: Write a story about your constellation. It must be creative and be acted out.
    d. STEP 4: Each group will have 5-7 minutes to act out their story.
6. Write the model answers on the chalkboard:

The answers will vary here but Resource 6 has stories that can be used as an example.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. How many stars make up Orion's belt (Only the actual belt)?
b. What is another name for the Southern Cross?

Answers to the checkpoint questions are as follows:

a. Three.
b. Crux.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Historical development of astronomy	140-141
Via Afrika	Historical development of astronomy	148-149
Platinum	Historical development of astronomy	194-195
Sasol Inzalo Bk B	Historical development of astronomy	146-147
Step-by-Step Natural Sciences	Historical development of astronomy	183-185
Pelican Natural Sciences	Historical development of astronomy	286-290
Solutions for All Natural Sciences	Historical development of astronomy	324-327
Shuters Top Class Natural Sciences	Historical development of astronomy	-

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://en.wikipedia.org/wiki/Orion%27s_Belt [Orion's Belt]

7 C

Term 4, Week 7, Lesson C
Lesson Title: Making a Sundial
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Making a Sundial
CAPS Page Number	34

Lesson Objectives

By the end of the lesson, learners will be able to:

- see how ancient people used the movement of the Earth around the Sun to tell the time
- make a Sundial
- tell the time using a Sundial

Specific Aims	1. DOING SCIENCE	
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	✓

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information		6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions	✓	12. Recording Information	✓
3. Comparing		8. Predicting		13. Interpreting Information	
4. Measuring	✓	9. Hypothesizing		14. Communicating	
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	Wall clock
Watches	Resources 21 and 22
Crayons or colour pens	
Paper plate or a piece of blank A4 paper	
Sharpened pencil	
Plastic straw or stick	
Ruler	

TOPIC: Historical development of astronomy

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

> What unit of measurement do astronomers use to measure distances in space?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

> *Astronomers use units called light years to measure the distances between stars in the galaxies.*

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

> TIME OF DAY
>
> 1. The position of the Sun helped ancient people determine the time of year.
> 2. Remains such as the stones found in Stonehenge in England show how stones were carefully placed in a circle to mark where the Sun rises and sets during the year.
> 3. Early cultures used the changes they saw in the sky for timekeeping.
> 4. A day was marked by the time between one Sunrise and the next, just as it is today.
> 5. In 160 BC the mathematician and astronomer, Theodosius of Bithynia, is said to have invented a universal Sundial that could be used anywhere on Earth.
> 6. A Sundial is a device that tells the time of day by the position of the Sun in the sky.
> 7. It consists of a flat plate (the dial) and a gnomon (which can be a rod, wire or stick) which casts a shadow onto the dial.
> 8. As the Sun appears to move across the sky, the shadow lines up with different hour lines which are marked on the dial to indicate the time of day.

2. Read through the information written on the chalkboard with the learners.
3. Hold the wall clock up so that every learner can see it clearly.
4. Change the time on the clock to different times and ask learners to put up their hand when they know what time it is.
5. Use the following times:
   a. 3:30
   b. 12:15
   c. 6:00
   d. 4:45
   e. 9:20

6. Give learners some time to copy the information written on the chalkboard into their workbooks.
7. Explain to the learners that years ago, before the invention of clocks and watches, people used a Sundial to tell the time of day.
8. Show the learners Resource 7 which shows Stonehenge, which is a place in England. Tell them that the evidence such as these stones found in Stonehenge, in England, show how stones were carefully placed in a circle to mark where the Sun rises and sets during the year.
9. Tell the learners the following about Sundials:
    a. In 160 BC the mathematician and astronomer, Theodosius of Bithynia, is said to have invented a universal Sundial that could be used anywhere on Earth.
    b. A Sundial is a device that tells the time of day by the position of the Sun in the sky.
    c. It consists of a flat plate (the dial) and a gnomon (which can be a rod, wire or stick) which casts a shadow onto the dial.
    d. As the Sun appears to move across the sky, the shadow lines up with different hour lines which are marked on the dial to indicate the time of day.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What is a Sundial?
b. Why do we say that the Sun 'appears' to move?

Answers to the checkpoint questions are as follows:

a. A Sundial is a device that tells the time of day by the position of the Sun in the sky.
b. The Sun does not move, rather the Earth moves around the Sun.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard:

HOW TO MAKE A SunDIAL

1. Prepare an A4 page.
   - Start this project on a Sunny day.
   - Use the pencil to poke a hole through the very centre of the paper plate.
   - If you are using an A4 page draw a large circle on the page.
   - Write the number 12 on the edge of the plate or paper with a crayon.
   - Draw a straight line from 12 down to the bottom of the paper.
   - Using a ruler as a guide, draw a line from 12 to 6. Make sure that you go right through the centre where you made the hole.
   - The page is now divided into 2 halves.
   - Divide each half into 2 so that you now have 4 equal parts.
   - Write the numbers 3 and 9 on the edge of those parts.
   - Using a ruler as a guide, draw a line from 3 to 9. Make sure that you go right through the centre where you made the hole.
   - The page should start to look like the face of a clock.
   - Continue to divide each part so that you eventually have 12 equal pieces.
   - Take your colour pen or pencil and write the numbers 1 to 12 on the edges.
   - Try to be as accurate as possible.
   - Poke the straw through the hole.
   - Keep this A4 paper with you.
2. Take the plate with you. When it is 12 o'clock take the plate, and place it on the ground so that the shadow of the straw falls along the line to the number 12.
3. Fasten the plate to the ground. Predict where you think that the shadow of the straw will be pointing in one hour. (It should be at 1 at 1 o'clock)
4. Continue each hour predicting the position and then checking and marking the actual position and time on the edge of the plate.

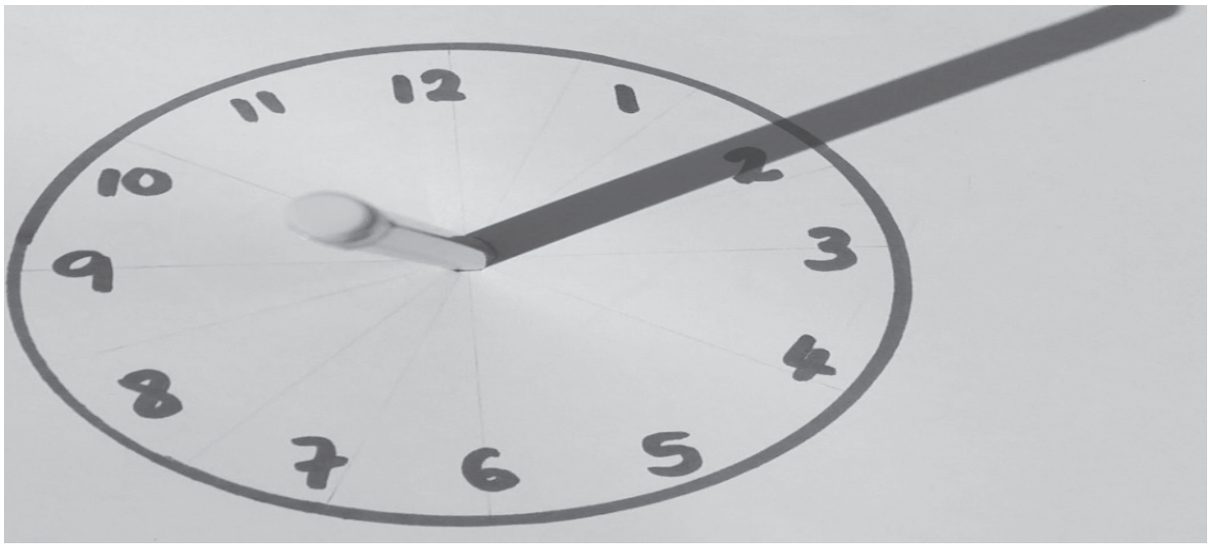
2. Explain this task to the learners as follows:
   a. Follow the instructions that are written on the chalkboard to make the Sundial.
   b. Be accurate.
3. Explain to the learners that they will have to do the following:
   a. When it is 12 o'clock take the plate, and place it on the ground so that the shadow of the straw falls along the line to the number 12.
   b. Fasten the plate to the ground.

c. Predict where they think that the shadow of the straw will be pointing in one hour. (It should be at 1 at 1 o'clock)

d. Continue each hour predicting the position and then checking and marking the actual position and time on the edge of the page.

4. Show the learners Resource 22 which shows them what their Sundial should look like.

5. The learners' Sundials should look like this:



6. Ask the learners the following questions: (The answers will be in italics)

a. How many parts was the Sundial divided into? *(12)*

b. Why was it divided into that number of parts? *(There are 12 hours in the day and 12 hours in the night)*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. How many hours are there in a day?

b. How many minutes in an hour?

Answers to the checkpoint questions are as follows:

a. 24 hours

b. 60 minutes

7. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Historical development of astronomy	170-171
Via Afrika	Historical development of astronomy	164-166
Platinum	Historical development of astronomy	227-229
Spot on	Historical development of astronomy	161-163
Sasol Inzalo Bk B	Historical development of astronomy	231-232
Step-by-Step Natural Sciences	Historical development of astronomy	183-185
Pelican Natural Sciences	Historical development of astronomy	286-290
Solutions for All Natural Sciences	Historical development of astronomy	323-327
Shuters Top Class Natural Sciences	Historical development of astronomy	182-185

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://www.nwf.org/kids/family-fun/crafts/Sundial.aspx [How to make a Sundial]

8 A

Term 4, Week 8, Lesson A
Lesson Title: Modern Developments
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Modern developments
CAPS Page Number	34

Lesson Objectives

By the end of the lesson, learners will be able to:

- explain how technology has changed beliefs
- list details of the Southern African Large Telescope (SALT)

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions	✓	12. Recording Information	
3. Comparing	✓	8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Telescope	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Where is the Sun located in our solar system?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

In the middle of the solar system.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

MODERN DEVELOPMENTS

1. The earliest astronomers had no observatories.
2. They studied the stars and planets using just their eyes. This is called naked eye observing.
3. Early astronomers such as the ancient Greeks believed the Earth was at the centre of the universe, with the stars and planets orbiting around the Earth.
4. The South American Mayans, ancient Egyptians and ancient Chinese built some of the first **observatories**. These are special buildings used for studying the stars.
5. Astronomers use computers to move the telescopes and operate the instruments.
6. As technology has progressed, we have been able to see a lot more and have learnt a lot more about the Universe.
7. The Southern African Large Telescope (SALT), is the largest telescope in the Southern Hemisphere, with a mirror measuring 11.1 by 9.8 metres.
8. The telescope is located at the South African Astronomical Observatory near Sutherland.
9. This is the perfect town for star gazing because Sutherland is a small, rural town in the Karoo, in the Northern Cape. There is not much pollution in the atmosphere.

2. Explain the following information about modern developments to the learners:
    a. The earliest astronomers had no sophisticated observatories. They studied the stars and planets using just their eyes. This is called naked eye observing.
    b. The South American Mayans, ancient Egyptians and ancient Chinese built some of the first observatories. These are special buildings used for studying the stars. These ancient observatories had no telescopes inside.
    c. Nowadays modern observatories contain large telescopes with extremely sensitive cameras and instruments mounted on the telescopes. Astronomers use computers to move the telescopes and operate the instruments. As technology has progressed, we have been able to see a lot more and have learnt a lot more about the universe.
3. Explain the following to the learners, about the Southern African Large Telescope:
    a. The Southern African Large Telescope (SALT), is the largest telescope in the Southern Hemisphere, with a mirror measuring 11.1 by 9.8 metres.
    b. The telescope is located at the South African Astronomical Observatory near Sutherland in the Karoo.
4. Ask the learners to work in pairs to answer the following question: (Answer is in italics)

SALT is built in Sutherland, a rural town in the Karoo which is a desert. Why do you think this town was chosen? *(This town is small with very few people, houses and industries. This means that it will have very little electrical light and air pollution. The skies will be clear to see the stars.)*

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What does SALT stand for?
b. How big is the mirror?

Answers to the checkpoint questions are as follows:

a. Southern African Large Telescope
b. 11.1 by 9.8 metres.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):.

Activity

Fill in the blanks.

1. The earliest astronomers had no observatories. They studied the stars and planets using just their ____. This is called _____observing.
2. Early astronomers such as the ancient Greeks believed the _____ was at the centre of the universe, not the ___ with the stars and planets orbiting around the Earth.
3. The South American Mayans, ancient Egyptians and ancient Chinese built some of the first _____. These are special buildings used for studying the stars.
4. _____ use computers to move the telescopes and operate the instruments.
5. As technology has progressed, we have been able to see a lot more and have learnt a lot more about the _____.
6. The _____, is the largest telescope in the Southern Hemisphere, with a mirror measuring _____ metres.
7. The telescope is located at the South African Astronomical Observatory near_____.
8. This is the perfect town for star gazing because _____ is a small, rural town in the desert called the _____, in the Northern Cape.
9. There is very little _____ and _____ pollution.

2. Tell the learners to do the following:
   a. Copy the questions into their workbooks.
   b. Work quietly to answer the questions by using the information written on the chalkboard at the beginning of the lesson.
3. Tell the learners that once they are done they should find a partner that is also done and compare answers.
4. Write the model answers on the chalkboard:

Model answers

1. *The earliest astronomers had no observatories. They studied the stars and planets using just their eye. This is called naked-eye observing.*
2. *Early astronomers such as the ancient Greeks believed the Earth was at the centre of the universe, not the Sun, with the stars and planets orbiting around the Earth.*
3. *The South American Mayans, ancient Egyptians and ancient Chinese built some of the first observatories. These are special buildings used for studying the stars.*
4. *Astronomers use computers to move the telescopes and operate the instruments.*
5. *As technology has progressed, we have been able to see a lot more and have learnt a lot more about the universe.*
6. *The Southern African Large Telescope (SALT), is the largest telescope in the Southern Hemisphere, with a mirror measuring 11.1 x 9.8 metres.*
7. *The telescope is located at the South African Astronomical Observatory near Sutherland.*
8. *This is the perfect town for star gazing because Sutherland is a small, rural town in the desert called the Karoo, in the Northern Cape.*
9. *There is very little electrical light and air pollution.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Who built the first observatories?
b. In which hemisphere is the SALT?

Answers to the checkpoint questions are as follows:

a. The South American Mayans, ancient Egyptians and ancient Chinese built some of the first observatories.
b. Southern Hemisphere.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Historical development of astronomy	236-237
Via Afrika	Historical development of astronomy	168-169
Platinum	Historical development of astronomy	194-195
Spot on	Historical development of astronomy	165
Sasol Inzalo Bk B	Historical development of astronomy	231-232
Step-by-Step Natural Sciences	Historical development of astronomy	186-190
Pelican Natural Sciences	Historical development of astronomy	290-298
Solutions for All Natural Sciences	Historical development of astronomy	328-332
Shuters Top Class Natural Sciences	Historical development of astronomy	186-188

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://en.wikipedia.org/wiki/Nicolaus_Copernicus [Copernicus]
2. https://www.salt.ac.za/ [SALT]

8 B

Term 4, Week 8, Lesson B
Lesson Title: Modern Developments: Making a poster
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Modern developments
CAPS Page Number	33

Lesson Objectives

By the end of the lesson, learners will be able to:

- write facts about famous astronomers like Galileo, Copernicus, Kepler and Newton
- explain what each of the astronomers contributed to science
- use gathered information from various sources to make a poster

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	✓
2. Observing	✓	7. Raising Questions	✓	12. Recording Information	
3. Comparing	✓	8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Books with information on famous astronomers	Resource 23
Chart paper	Resource 24
Colour pens, pencils	Resource 25 and 26

TOPIC: Historical development of astronomy

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What do we call a scientist that studies the stars?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

An astronomer.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

IMPORTANT DISCOVERIES IN ASTRONOMY

1. People have made and continue to make important discoveries in astronomy.
2. Ancient astronomers noticed that the stars never changed position in relation to one another.
3. Other than the Sun and the Moon, they could see five other objects moving in the sky and they called these “planets’, which in Greek means wanderers.
4. The planets were Mercury, Venus, Mars, Jupiter and Saturn.
5. The movements of the Sun and the Moon seemed predictable but the planets seemed to move irregularly.
6. Early astronomers found it difficult to explain the movement of the planets, because it was thought that the Earth was at the centre, standing still, and the Moon and Sun were rotating around it.
7. Four astronomers made important discoveries:
   - Copernicus suggested that the Sun is at the centre of the solar system (1514)
   - Kepler used mathematics to describe orbits accurately (1609)
   - Galilei made the first telescope to observe planets and their Moons (1610)
   - Newton showed that gravity held the solar system together (1687)

2. Explain the following information about modern developments and important discoveries to the learners:
   a. The earliest astronomers had no sophisticated observatories. They studied the stars and planets using just their eyes. This is called naked eye observing.
   b. People have made and continue to make important discoveries in astronomy.

3. Tell the learners that ancient astronomers noticed the following when they looked into the sky:
    a. The stars never changed position in relation to one another.
    b. Other than the Sun and the Moon, they could see five other objects moving in the sky and they called these “planets”, which in Greek means wanderers. They named these planets Mercury, Venus, Mars, Jupiter and Saturn
    c. The movements of the Sun and the Moon seemed predictable but the planets seemed to move irregularly.
4. Explain to the learners that early astronomers found it difficult to explain the movement of the planets, because they thought that the Earth was at the centre standing still, and the Moon and Sun were rotating around it.
5. Tell the learners that four astronomers made important discoveries:
    a. The first was Nicolaus Copernicus who suggested that the Sun is at the centre of the solar system (1514).
    b. The third was Johannes Kepler who used mathematics to describe orbits accurately (1609).
    c. The second was Galileo Galilei who made the first telescope to observe planets and their Moons (1610).
    d. The fourth was Isaac Newton who showed that gravity held the solar system together (1687).
6. Tell the learners that they will be doing some research on these astronomers in this lesson.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What did Galilei invent?
b. What were the 5 planets that they were aware of?

Answers to the checkpoint questions are as follows:

a. A telescope.
b. Mercury, Venus, Mars, Jupiter and Saturn.

E CONCEPTUAL DEVELOPMENT

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

ACTIVITY

Design a poster that will include the following information:

1. Name of astronomer.
2. Country where he was born.
3. Short notes on the contributions that the astronomer made to astronomy – include important dates.

2. Tell the learners that they will work in a group of 3 or 4 learners to create an A4 poster.
3. In your resource pack are multiple pages of the same resource (Resources 23-26) because each group will need their own Resource.
4. Tell the learners the following:
   a. They will be given Resource 23,1 24,1 25,1 or 26,1 that has information on 4 astronomers.
   b. They must only choose ONE astronomer to work on.
   c. The poster must have the following information:
      - Name of astronomer.
      - Country that he was born.
      - Short notes on the contributions that the astronomer made to astronomy with dates.
5. Inform the learners that they will be showing these posters to their classmates in the next lesson.
6. Allow learners time to complete their posters

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. What did the early astronomers call the objects that were moving around in the sky?
b. Who showed that gravity held the solar system together?

Answers to the checkpoint questions are as follows:

a. They called these objects planets.
b. Isaac Newton.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Historical development of astronomy	236-237
Via Afrika	Historical development of astronomy	168-169
Platinum	Historical development of astronomy	194-195
Spot on	Historical development of astronomy	165
Sasol Inzalo Bk B	Historical development of astronomy	231-232
Step-by-Step Natural Sciences	Historical development of astronomy	186-190
Pelican Natural Sciences	Historical development of astronomy	290-298
Solutions for All Natural Sciences	Historical development of astronomy	328-332
Shuters Top Class Natural Sciences	Historical development of astronomy	186-188

G ADDITIONAL ACTIVITIES / READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. https://en.wikipedia.org/wiki/Nicolaus_Copernicus [Copernicus]
2. https://en.wikipedia.org/wiki/Galileo_Galilei [Galilei]
3. https://en.wikipedia.org/wiki/Johannes_Kepler [Kepler]
4. https://en.wikipedia.org/wiki/Isaac_Newton [Newton]

8 C

Term 4, Week 8, Lesson C
Lesson Title: Modern Developments: Information gathering
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Modern developments
CAPS Page Number	34

Lesson Objectives

By the end of the lesson, learners will be able to:

- recall facts about famous astronomers like Galileo, Copernicus, Kepler and Newton
- explain what each of the astronomers contributed to science
- gather information from various sources and complete a table

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	6. Identifying problems & issues	✓	11. Doing Investigations	
2. Observing	✓	7. Raising Questions		12. Recording Information	
3. Comparing	✓	8. Predicting		13. Interpreting Information	
4. Measuring		9. Hypothesizing		14. Communicating	✓
5. Sorting & Classifying		10. Planning Investigations		15. Scientific Process	

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Textbook	
A4 posters from previous lesson made by learners	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

> What did Galileo Galilei invent?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

> *The telescope.*

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

> IMPORTANT DISCOVERIES IN ASTRONOMY HISTORY
>
> Four astronomers made important discoveries:
>
> a. 1514: Copernicus suggested that the Sun was at the centre of the solar system.
> b. 1609: Kepler used mathematics to describe orbits accurately.
> c. 1610: Galilei made the first telescope to observe planets and their Moons.
> d. 1687: Newton showed that gravity held the solar system together.

2. Remind the learners of the following information about modern developments and important discoveries:
   a. The first was Nicolaus Copernicus who suggested that the Sun was at the center of the solar system (1514).
   b. The third was Johannes Kepler who used mathematics to describe orbits accurately (1609).
   c. The second was Galileo Galilei who made the first telescope to observe planets and their Moons (1610).
   d. The fourth was Isaac Newton who showed that gravity held the solar system together (1687).

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

a. What was Kepler famous for?
b. Who suggested that the Sun was at the centre of the solar system?

Answers to the checkpoint questions are as follows:

a. Kepler used mathematics to describe orbits.
b. Copernicus.

E CONCEPTUAL DEVELOPMENT

1. In the previous lesson the learners made an A4 poster of an astronomer of their choice.
2. Ask one person from each group to stick their A4 poster onto the wall.
3. Write the following onto the chalkboard (always try to do this before the lesson starts):

ACTIVITY

Draw a table to gather data about the discoveries made by the 4 astronomers.

Name of astronomer (Date)	Country of birth	Contribution to science

4. Tell the learners to copy the table into their workbooks. The table should fill one page in their workbooks.
5. Tell each group to stand next to their poster and take their workbooks with them.
6. Explain the gathering of data to the learners by telling them the following:
   a. Fill in the table by obtaining information from their own poster.
   b. Once they are done they need to move on to the next poster, where they will gather information about a different astronomer.
   c. They will repeat this process until they have information for all 4 astronomers.
4. Once learners are done, ask for a volunteer to fill in the table on the chalkboard.
5. Use the model answer as a guide.

TOPIC: Historical development of astronomy

Name of astronomer (Date)	Country of birth	Contribution to science
Nicolaus Copernicus (1514)	Poland	Discovered that: 1. Planets and the Moon do not revolve around a single point. 2. The Earth is not at the center of the solar system. 3. All planets revolve around the Sun, which is at the centre of the universe. 4. Stars do not move.
Johannes Kepler (1609)	Germany	Discovered that: 1. The orbit of every planet is an ellipse with the Sun at the centre. 2. The line joining a planet and the Sun sweeps out in equal areas during equal intervals of time.
Galileo Galilei (1610)	Italian	1. Galileo discovered the four largest Moons of Jupiter (which are now called the Galilean Moons). 2. He also found that Venus has phases just like the Moon (and just like all planets). 3. He discovered that the Moon has craters and that the Sun has dark spots which are called Sunspots.
Isaac Newton (1687)	England	Discovered: 1. Gravity 2. Realized that it was the force of gravity that was holding the Moon in its orbit around the Earth. 3. According to Newton, gravity is the reason that objects fall to the ground when dropped and why planets orbit the Sun and why Moons orbit planets.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

a. Where was Kepler born?

b. Who realized that it was the force of gravity that was holding the Moon in its orbit around the Earth?

Answers to the checkpoint questions are as follows:

a. Germany.

b. Isaac Newton.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
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Via Afrika	Historical development of astronomy	168-169
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G ADDITIONAL ACTIVITIES / READING

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2. https://en.wikipedia.org/wiki/Galileo_Galilei [Galilei]
3. https://en.wikipedia.org/wiki/Johannes_Kepler [Kepler]
4. https://en.wikipedia.org/wiki/Isaac_Newton [Newton]

NATURAL SCIENCES

ASSESSMENT
GRADE 7 TERM 4

GRADE 7 ASSESSMENT

- This section presents the CAPS assessment requirements for this grade for this term.
- See your prescribed textbooks for examples of the required assessments.

CAPS Assessment

Assessment is a continuous planned process that involves identifying, gathering, interpreting and diagnosing information about the performance of learners.

Assessment involves generating and collecting evidence of learner achievement and progress, and using this information to understand and provide assistance to the learner during the process of teaching and learning.

Assessment should be both *formal* and *informal*:

a. ***Informal Assessment*** involves regular checking of learners' class work and practical tasks; asking questions; discussions; informal classroom interactions; and giving constructive feedback. Informal assessment marks do not need to be recorded, but the teacher can make notes for future reference.

b. ***Formal Assessment*** provides teachers with a systematic way of evaluating how well learners are progressing. Formal Assessment consists of selected assessment tasks. These tasks are stipulated by CAPS and the marks need to be recorded. These tasks are done throughout the year, and include practical / investigations, project, tests and examinations.

   i. ***Tests and Examinations***

   The weighting of the marks should reflect the time allocated to each section in the curriculum content. Tests and exams should consist of a range of questions that cover different cognitive levels: recall; understanding; application; evaluation; analysis; and synthesis. CAPS aligned tests and examinations, with accompanying memoranda, are provided with these lesson plans.

   ii. ***Practical / investigation tasks***

   Practical / investigation tasks give learners the opportunity to demonstrate knowledge, skills and understanding. They form part of the activities included in these lesson plans. Each term, one practical / investigation task has been selected for assessment. A rubric is provided to conduct the assessment.

   iii. ***Poject***

   Projects give learners the opportunity to demonstrate knowledge, skills, understanding and application. The project can be given in any term but must be recorded for term 4 assessment.

A minimum mark allocation is prescribed in CAPS for, practical / investigation, projects, tests and examinations for each grade. These are summarised, by grade, in the table below:

GRADE 7 ASSESSMENT

Grade 7					
Programme of Formal Assessment					
Formal Assessments	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**TOTAL % FOR THE YEAR**
School-based assessments	Test 1 [30 marks] Practical task/ investigation 1 [20 marks]	Test 2 [30 marks] Practical task/ investigation 2 [20 marks]	Test 3 [30 marks] Practical task/ investigation 3 [20 marks]	Practical task/ investigation 4 [20 marks] Project [20 marks]	40%
Exams [60 minutes]		Exam 1 on work from terms 1 and 2 [60 marks]		Exam 2 on work from terms 3 and 4 [60 marks]	60%
Number of formal assessments	2	3	2	3	Total: 100%

Refer to CAPS on the processes for converting marks to percentages and to the 7-point scale.

In this section of the booklet, you will find your science assessments for this term.

There are two assessments included:

A Practical Activity

The activity completed is drawn from one of the lessons in the lesson plans. The rubric or memorandum attached in this pack will assist you with assessing the task completed by the learners.

An Exam

The exam included will need to be copied onto the chalkboard for learners to complete. There is also an exam memorandum included to assist you with marking the learners completed test scripts.

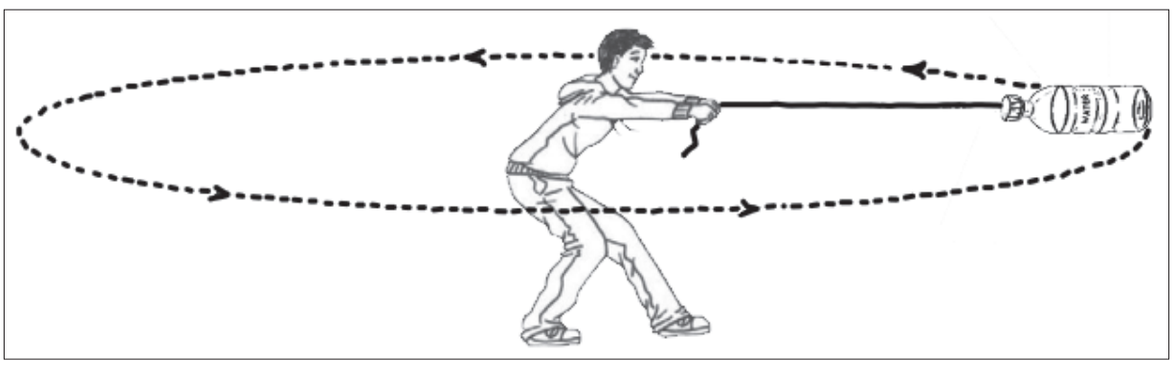
All of the assessments are aligned to CAPS requirements and the marks allocated for each assessment are as stipulated in CAPS.

Natural Sciences
Grade 7
Practical Task
Term 4

20 marks
Time allocation: 40 minutes (15 minutes preparation, 25 minutes task time)

NOTE TO THE TEACHER:

1. This practical activity will be completed as part of Section E of lesson 6A.
2. This practical will take place during the lesson after the teaching component in Section D, "Accessing Information".
3. The first 15 minutes will be used to teach section D and prepare learners for the practical task.
4. The next 25 minutes will be used to complete the practical activity as outlined in Section E.
5. The instructions and content of the practical task should be written on the chalkboard, before the lesson for the learners.
6. The memo for assessing the practical task is provided.
7. The learners will be working as a class and will need the following to complete the tasks:
    - 6 empty 500ml plastic bottles (This is for 6 groups)
    - water to fill the bottles
    - 18m String
    - an outside area
    - scissors
8. Ensure that all the materials have been collected before the practical lesson. This may take a few days. Allow enough time for this.
9. The learners should answer questions with some guidance. Use the memo to guide you.
10. Below is a diagram to show you the action.



Grade 7
Natural Sciences
Term 4

Practical Task
Memorandum

(see Section E of Lesson 6A for instructions and questions)

CAPS Topic	Question	Expected answer/outcome	Marks
Movements of the Earth and Moon	1	Investigation to see the difference weight and length of string have on the effects of gravity. ✓	1
Movements of the Earth and Moon	2	I represent the Earth. ✓	1
Movements of the Earth and Moon	3	The bottle represents the Moon. ✓	1
Movements of the Earth and Moon	4	Gravity is the force of attraction between two objects. ✓ ✓	2
Movements of the Earth and Moon	5	The full bottle was more difficult to swing around than the empty bottle. ✓ ✓	2
Movements of the Earth and Moon	6	The bottle continues moving and then falls. ✓ ✓	2
Movements of the Earth and Moon	7	The same way the bottle moves is the way the moon would move. ✓ ✓	2
Movements of the Earth and Moon	8	The full bottle was more difficult to swing than the empty bottle. ✓ ✓	2
Movements of the Earth and Moon	9	The full bottle with 1m of string was easier to swing. ✓	1
Movements of the Earth and Moon	10	This investigation proves that the more weight ✓ an object has the greater the gravitational pull ✓ and that the further away ✓ the object is the greater the gravitational pull is. ✓ Thus the distance between two objects and the mass of an object affects gravitational pull. ✓ ✓	6
			TOTAL 20

Grade 7
Natural Sciences
Term 4
Exam

60 Marks
90 Minutes

NOTE TO THE TEACHER:

If possible, photocopy this exam for each learner. If this is not possible, write the exam on the chalkboard.

INSTRUCTIONS TO THE LEARNERS

1. Answer all questions in blue or black ink.
2. Read each question carefully before answering it.
3. Pay attention to the mark allocations.
4. Plan your time carefully.
5. Write your answers in the spaces provided.
6. Write neatly.

PRACTICE QUESTION

Read the question and circle the letter that shows the correct answer.

1.1. Which planet in our solar system is closest to the sun?

a. Neptune

b. Mercury

c. Earth

d. Saturn.

You have answered correctly if you have circled (B)

GRADE 7 ASSESSMENT – EXAM TERM 4

SECTION A: Energy and Change

QUESTION 1: MULTIPLE CHOICE [5]

Read each question and circle the letter that shows the correct answer.

1.1. I grab a metal spoon standing in a pot of boiling water and it burns my hand. Why did the spoon burn my hand?

a. Due to a chemical reaction

b. Electrical charges

c. Heat conduction

d. Convection of heat

1.2. The two energy sources we use to dry our washing in the garden are?

a. Gravity and electricity

b. Solar winds and light

c. Wind and heat

d. Wind and light

1.3. I use a solar geyser to heat up my water, I am using …

a. Renewable resources

b. Electrical energy

c. Non-renewable resources

d. Fossil fuels

1.4. Thermal insulators are best described as:

a. Metals

b. A non-conducting substance

c. Any substance that does not conduct heat

d. Not able to conduct electricity

1.5. The energy we get from moving water is called …

a. Hydro-electricity

b. Hydrogen

c. Hydropower

d. Potential energy

GRADE 7 ASSESSMENT – EXAM TERM 4

QUESTION 2: TRUE OR FALSE [5]

Write true or false next to the following statements:

2.1. All living things need energy _____

2.2. Fossil fuels are a non-renewable source of energy _____

2.3. A stretched elastic band has gravitational potential energy _____

2.4. Variables are factors that repeat in an experiment. _____

2.5. A Styrofoam cup is a good insulating material. _____

QUESTION 3 [5]

Write one or two words that mean the same as the sentence:

3.1. Ability to do work.

_____

3.2. Transfer of heat energy between solid objects that are touching.

_____

3.3. Fuels or substances formed in the Earth from dead plant and animal remains.

_____

3.4. Energy produced by heat.

_____

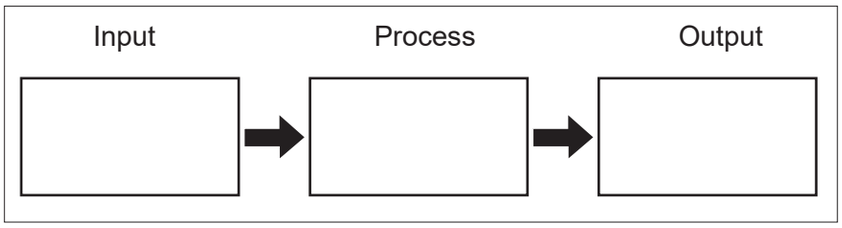
3.5. Transfer of heat by electromagnetic waves.

_____

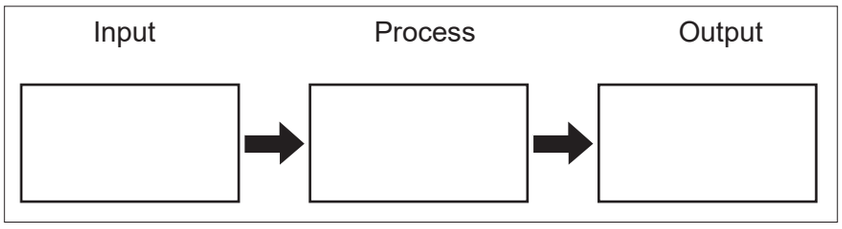
QUESTION 4 [6]

Show the energy transformations by completing the blocks:

4.1. A battery is connected to a buzzer.



4.1. An electric circuit connected to a fan motor and the blades of the fan rotate.



QUESTION 5 [9]

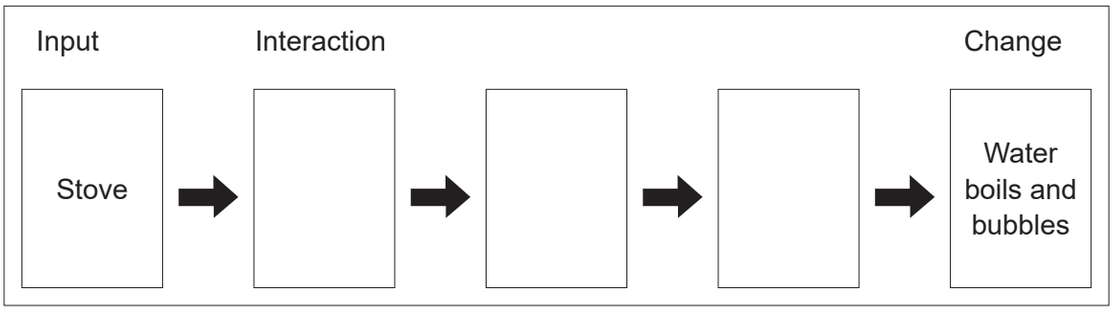
Answer the following questions:

5.1. Name two ways in which heat can be transferred. (2)

_____ _____

5.2. Complete the diagram below to show energy transfer in a thermal system by putting the following words in or above the correct boxes.(5)

kinetic energy/ stove heats pot/ potential energy/pot heats water/ stove heats up



5.3. What does the law of conservation state? (2)

_____

_____

GRADE 7 ASSESSMENT – EXAM TERM 4

SECTION B: Planet Earth and Beyond

QUESTION 1: MULTIPLE CHOICE [6]

Read each question and circle the letter that shows the correct answer.

1.1. In the experiment using ice heat and distance, which statement is true?

a. A block of ice will melt faster when placed further away from the heat source.

b. A block of ice will melt slower when placed further away from the heat source.

c. A block of ice will melt slower when placed closer to the heat source.

d. A block of ice will melt faster when placed somewhere by the heat source.

1.2. A spring tide is where the sea level rises higher than normal. Why?

a. Both the sun and the moon act together.

b. There is little gravity in the north.

c. The moon is full.

d. The sun and moon's gravities act on the sea.

1.3. Which one of these is not a requirement for photosynthesis to happen?

a. Oxygen

b. H_2O

c. CO_2

d. Mineral salts

1.4. A new moon would be:

a. Where the whole moon is completely invisible.

b. Where the whole moon is visible.

c. Where a small crescent of moon becomes visible.

d. Both A and C are correct.

1.5. In science we have learned that all matter exerts gravity on the objects around it. Choose the factors that will affect the strength of this gravity.

a. Tilt and axis

b. Mass and distance

c. Weight

d. Both mass and size

1.6. Earth's axis is tilted at …

a. 24.5°

b. 365°

c. 23.5°

d. 28°

QUESTION 2 [5]

Write one word that means the same as the sentence:

2.1. Days on which day and night are equal length.

_____

2.2. The process of giving off energy in the form of waves or particles.

_____

2.3. An imaginery line that divides the earth into two equal parts.

_____

2.4. The force that attracts a body towards any other physical body having mass.

_____

2.5. A community of living organisms and their interaction with the environment.

_____

QUESTION 3 [10]

Answer the questions below.

3.1. Here are five words that are used in explaining the formation of fossil fuels like coal and oil. On the lines below arrange these five words in the correct order that would explain the formation of such fuels: (4)

peat/ death/ sinks deeper/ bake/ pressure

a._____ b._____ c. pressure d._____ e._____

3.2. Complete the table below with facts to compare earth and the moon. (6)

Earth	**Moon**
Surface -	Surface –
Size -	Size –
Light -	Light –

QUESTION 4: MATCH THE COLUMNS [6]

Instructions:

- Match the sentences in COLUMN A with the words in COLUMN B.
- Draw a line to join the sentence in COLUMN A with the correct word in COLUMN B. Do this as shown in the example below.

COLUMN A	
example	An animal that only eats meat
4.1.	Summer solstice
4.2.	Moon passes directly between the sun and the earth
4.3.	Winter solstice
4.4.	Spring solstice
4.5.	Earth passes directly between the sun and the moon
4.6.	Autumn equinox

COLUMN B
A. 23 September
B. Solar eclipse
C. 21 December
D. Lunar eclipse
E. Carnivore
F. 20 March
G. 21 June

QUESTION 5 [3]

5.1. Give three reasons to explain why we should not continue to use fossil fuels.

_____

_____

_____

_____

TOTAL 60

Grade 7
Natural Sciences
Term 3

Exam
Memorandum

CAPS Topic	Questions	Expected answer(s)	Marks
PART A: Energy and Change			
	1		
Sources of energy	1.1	C ✓	1
Sources of energy	1.2	C ✓	1
Sources of energy	1.3	A ✓	1
Sources of energy	1.4	C ✓	1
Sources of energy	1.5	A ✓	1
	2		
Sources of energy	2.1	True ✓	1
Sources of energy	2.2	True ✓	1
Potential and Kinetic energy	2.3	False ✓	1
Heat transfer	2.4	False ✓	1
Insulation and energy saving	2.5	True ✓	1
	3		
Sources of energy	3.1	Energy ✓	1
Heat transfer	3.2	Conduction ✓	1
Sources of energy	3.3	Fossil fuels ✓	1
Heat transfer	3.4	Thermal energy ✓	1
Heat transfer	3.5	Radiation ✓	1
	4		
Energy transfer	4.1	Input - Chemical potential energy in the cell ✓ Process – Kinetic energy as the buzzer vibrates ✓ Output – Chemical potential energy in the cell is transferred to kinetic energy ✓	3
Energy transfer	4.2	Input – Chemical potential energy in the cell ✓ Process – Kinetic energy as the current flows ✓ Output – Rotation of the blades, kinetic energy ✓	3

<table>
<tr><td></td><td>5</td><td></td><td></td></tr>
<tr><td>Heat transfer</td><td>5.1</td><td>Any two - conduction, convection, radiation ✓ ✓</td><td>2</td></tr>
<tr><td>Energy transfer</td><td>5.2</td><td>Input - interaction - potential energy ✓ - kinetic energy - change ✓

Stove – stove heats up ✓ - stove heats pot ✓- pot heats water ✓ - water boils and bubbles</td><td>5</td></tr>
<tr><td>Potential and kinetic energy</td><td>5.3</td><td>Energy cannot be created or destroyed but it can be transferred from one form to another ✓ ✓</td><td>2</td></tr>
<tr><td colspan="4">PART B: Earth and Beyond</td></tr>
<tr><td></td><td>1</td><td></td><td></td></tr>
<tr><td>Relationship of the sun to earth</td><td>1.1</td><td>B ✓</td><td>1</td></tr>
<tr><td>Relationship of the moon and earth</td><td>1.2</td><td>D ✓</td><td>1</td></tr>
<tr><td>Relationship of the sun to earth</td><td>1.3</td><td>A ✓</td><td>1</td></tr>
<tr><td>Relationship of the moon and earth</td><td>1.4</td><td>C ✓</td><td>1</td></tr>
<tr><td>Relationship of the moon and earth</td><td>1.5</td><td>B ✓</td><td>1</td></tr>
<tr><td>Relationship of the moon and earth</td><td>1.6</td><td>C ✓</td><td>1</td></tr>
<tr><td></td><td>2</td><td></td><td></td></tr>
<tr><td>Relationship of the moon and earth</td><td>2.1</td><td>Equinox ✓</td><td>1</td></tr>
<tr><td>Relationship of the sun and earth</td><td>2.2</td><td>Radiate ✓</td><td>1</td></tr>
<tr><td>Relationship of the moon and earth</td><td>2.3</td><td>Equator ✓</td><td>1</td></tr>
<tr><td>Relationship of the moon and earth</td><td>2.4</td><td>Gravity ✓</td><td>1</td></tr>
<tr><td>Relationship of the sun and earth</td><td>2.5</td><td>Ecosystem ✓</td><td>1</td></tr>
<tr><td></td><td>3</td><td></td><td></td></tr>
<tr><td>Relationship of the sun and earth</td><td>3.1</td><td>a. death ✓
b. peat ✓
d. sinks deeper ✓
e. bake ✓</td><td>4</td></tr>
<tr><td>Relationship of the moon and earth</td><td>3.2</td><td><table><tr><th>Earth</th><th>Moon</th></tr><tr><td>rock, oil and water ✓</td><td>rock and lunar soil ✓</td></tr><tr><td>larger than the moon ✓</td><td>smaller than the earth ✓</td></tr><tr><td>absorbs light from the sun ✓</td><td>reflects light from the sun ✓</td></tr></table></td><td>6</td></tr>
</table>

	4		
Relationship of the moon and earth	4.1	C ✓	1
Relationship of the moon and earth	4.2	B ✓	1
Relationship of the moon and earth	4.3	G ✓	1
Relationship of the moon and earth	4.4	A ✓	1
Relationship of the moon and earth	4.5	D ✓	1
Relationship of the moon and earth	4.6	F ✓	1
	5		
Relationship of the sun and earth		Any 3 below ✓ ✓ ✓ • Destroys the environment – CO_2 is released into the air which causes global warming • Causes pollution which leads to people getting diseases • It is non-renewable • Health of coal miners deteriorates. • Oil spills lead to the death of animal and plant life • Use solar and wind energy	3
			TOTAL: 60