Interesting Science fact #9

Birds sitting on power lines don't get electrocuted, because they sit on only one power line. If the bird touches any part of its body to another line, it creates a circuit, causing electrocution.

NATURAL SCIENCES & TECHNOLOGY

LESSON PLAN
GRADE 5 TERM 3

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 & Technology learning programme! This CAPS compliant programme consists of:

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

Lesson Plan Structure

1. The Term 3 lesson plan is structured to run for 9 weeks.
2. Each week, there are three lessons, of the following notional time:

   1 x 1 hour 30 minutes

   2 x 1 hour

   This time allocation of 3.5 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 and technological 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 natural sciences & technology****.* 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 AND DESIGN SKILLS that will be covered, and whether they are lower 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 poster or reference pages 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 Resource 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 Science and Technology.

   - 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 Science and Technology 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 Science and Technology 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 two questions to check their understanding.
4. **Conceptual Development:** complete an activity to apply new knowledge or skills.
5. **Checkpoint 2:** ask learners 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 week to track your progress.

PROGRAMME ORIENTATION

A vehicle to implement CAPS

Teaching Natural Sciences & Technology 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 & Technology, 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 Technology 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, we took into consideration the realities of teachers and to this end, we made some simple adjustments, 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***

In most terms, there are Technology knowledge strands that complement the Natural Sciences strands. There are three Technology strands, they are:

- ***Structures***
- ***Systems and Control***
- ***Processing***

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

Grade 5							
Term 1		Term 2		Term 3		Term 4	
Strands NS & Tech		Strands NS & Tech		Strands NS & Tech		Strands NS & Tech	
Life and Living	**Structures**	**Matter and Materials**	**Processing**	**Energy and Change**	**Systems and Control**	**Planet Earth and Beyond**	**Systems and Control**
Plants and animals on Earth Animal Skeletons Food Chains Life cycles	Skeletons and structures	Metals and non-metals Uses of metals	Processing materials Processed materials	Stored energy in fuels Energy and electricity Energy and movement	Systems for moving things	Planet Earth Surface of the Earth Sedimentary Rocks Fossils	-
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

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).

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

Remember that one week equates to 3,5 hours or three lessons: two lessons of 1 hour each; and one lesson of 1½ hours.

	GRADE 4		GRADE 5		GRADE 6	
TERM	**Topic**	**Time in weeks**	**Topic**	**Time in weeks**	**Topic**	**Time in weeks**
Term 1: Life and Living	• Living and non-living things • Structures of plants and animals • What plants need to grow • Habitats of animals • Structures for animal shelters	2 2½ 1 1 2½ (10 wks)	• Plants and animals on Earth • Animal Skeletons • Food Chains • Life cycles • Skeletons and Structures	2½ 1½ 2½ 1½ 2 (10 wks)	• Photosynthesis • Nutrients in Food • Nutrition • Food Processing • Eco Systems and food webs	2½ 1½ 1½ 2½ 2 (10 wks)
Term 2: Matter and Materials	• Materials around us • Solid materials • Strengthening materials • Strong frame structures	3½ 2 2 2½ (10 wks)	• Metals and non-metals • Uses of metals • Processing materials • Processed materials	2 2½ 3½ 2 (10 wks)	• Solids, liquids and gases • Mixtures • Solutions as special mixtures • Dissolving • Mixtures and water resources • Processes to purify water	½ 1 2½ 1 2½ 2½ (10 wks)

Term 3: Energy and Change	• Energy and Energy transfer • Energy around us • Movement energy in a system • Energy and sound	2½ 2½ 2½ 2½ (10 wks)	• Stored energy in fuels • Energy and electricity • Energy and movement • Systems for moving things	3 3 1 3 (10 wks)	• Electric circuits • Electrical conductors and insulators • Systems to solve problems • Mains electricity	2½ 2 2½ 3 (10 wks)
Term 4: Planet Earth and Beyond	• Planet Earth • The Sun • The Earth & the Sun • The Moon • Rocket Systems	2 1 1 2 2 (8 wks)	• Planet Earth • Surface of the Earth • Sedimentary Rocks • Fossils	1 2½ 2 2½ (8 wks)	• The solar system • Movements of the earth and planets • The movement of the Moon • Systems looking into space • Systems to explore the Moon and Mars	2½ 1 1 1 2½ (8 wks)
TOTALS	38 weeks		38 weeks		38 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 the question written on the board?		
6.	Was the 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?		

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:
Stored energy in fuels
Term 3, Weeks 1A – 3C

A. TOPIC OVERVIEW

TERM 3, WEEKS 1A – 3C

- This topic runs for 3 weeks.
- It is presented over 9 lessons.
- This topic counts for 18% in the end-of-year exam.
- 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 4	GRADE 5	GRADE 6&7
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Energy for life: we use energy for everything we do • Energy around us: energy stored in wood, coal, oil products, natural gas	• Fuels: energy stored in fuels; the use of fuels as sources of energy; everyday fuels such as coal, wood, petrol, paraffin, gas, candle wax; output energy such as heat and light • Burning fuels: fuels need heat and air to burn • Safety regarding fire: threat to communities	• Fossil fuels and electricity: formed millions of years ago; coal, oil and gas; coal used for power stations; non-renewable resources • Renewable and non-renewable sources of energy • Heat transfer: conduction, convection, radiation • Insulation and energy saving

	• We are aware of energy around us, including movement, heat, light, sound	

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	sources	A thing from which something comes from, from where it originates
2.	released (release)	When something flows or moves freely; allow to escape; to set free
3.	rate	One quantity measured against another; speed is a rate as it measures distance against time.
4.	input energy	Input energy is the amount of energy going into a system.
5.	output energy	Output energy is the amount of energy going out of a system.
6.	combustion	Burning, or a chemical change that produces heat and light
7.	deprived	Removed or withheld from

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

We use fuel in some form every day, so it is important to understand the uses and the safety precautions needed when using fuels in any form. Fuels are non-renewable, so it is important to learn ways in which to conserve this energy. Fires are a big threat to communities, so learning what to do in the event of a fire could save lives.

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 3, Week 1, Lesson A
Lesson Title: Energy is stored in fuels
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Fuels
CAPS Page Number	39

Lesson Objectives

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

- describe different types of fuels
- describe what stored energy is.

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

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying	✓	11. Doing Investigations		17. Communicating	✓
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 1: Food is fuel for your body	
Resource 2: Stored energy	
Resource 3: Energy from the Sun is stored	

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 do we get our energy from?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

We get our energy from the food we eat.

D ACCESSING INFORMATION

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

FUELS

1. We use fuels every day.
2. We cook food, heat water to wash and we use light at night-time.
3. Fuels are substances that store energy.
4. Fuels are burned to make light or heat.
5. Coal, wood, paraffin, gas, candle wax, oil and petrol are types of fuels.
6. Food is also a fuel.
7. We eat food which is broken down by our bodies.
8. This process gives us energy.

2. Explain this to the learners as follows:
   a. Remind the learners that in Grade 4 they learnt that there are many types of energy.
   b. All our energy on Earth comes from the Sun.
   c. Energy is then stored in many types of fuels.
   d. Show learners Resource 2: ‘Stored energy’.
   e. Explain that coal and wood are both types of fuel.
   f. They have stored energy which is waiting to be used.
   g. Food stores energy for us.

h. We use this energy to move and work.
i. Show learners Resource 1: 'Food is fuel for your body'.
j. Explain that all the food we eat gives us energy to move and work.

3. Give learners some time to copy the above 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 a fuel?
b. Can you name three different fuels?

Answers to the checkpoint questions are as follows:

a. Fuels are substances that can be burned to make heat and light.
b. Any three of the following: coal, wood, paraffin, gas, candle wax, oil and petrol.

E CONCEPTUAL DEVELOPMENT

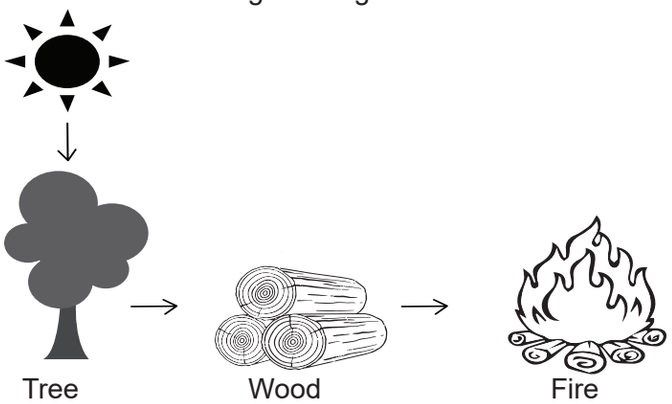
1. Explain the following to the learners:

FOSSIL FUELS

1. Plants use energy from the Sun, carbon dioxide and water to grow.
2. Plants store this energy in their leaves, roots and stems.
3. Wood also contains energy.
4. Burning wood changes this energy into light and heat.

2. Explain this to the learners as follows:
   a. Show learners Resource 3: 'Energy from the Sun is stored'.
   b. Point out that energy from the Sun is stored in the wood of the tree.
   c. When this wood is burned, the energy that is stored in the wood is changed to light and heat.
   d. All fuels store energy.
3. Task 1: A Flow Diagram of Energy Changes

Draw a flow diagram from the following drawing:



Energy from the sun is stored in the tree's wood which is released as light and heat when we burn wood.

Explain this to the learners as follows:

a. Draw a flow diagram of the drawing from the chalkboard.
b. Use arrows to show the direction in which the energy flows.
c. Discuss the answer with the class.

4. Model answer: Task 1

TASK 1 - FLOW DIAGRAM OF ENERGY FLOW

5. Task 2: Fuels are solids, liquids or gases.

TASK 2 - FUELS ARE SOLIDS, LIQUIDS OR GASES

Copy and complete the table below in your workbooks:

FUEL	**SOLID, LIQUID OR GAS?**
coal	
wood	
candle wax	
petrol	
gas (methane)	

6. Explain this to the learners as follows:

a. Learners must copy the table into their workbooks.
b. Learners must complete the table.
c. Discuss the answers with the class.

7. Model answer: Task 2

MODEL ANSWER FUELS ARE SOLIDS, LIQUIDS OR GASES

FUEL	**SOLID, LIQUID OR GAS?**
coal	solid
wood	solid
candle wax	solid
petrol	liquid
gas (methane)	gas

Checkpoint 2

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

a. Where does all the energy on Earth start?
b. Is candle wax a solid, liquid or gas?

Answers to the checkpoint questions are as follows:

a. It starts with the Sun.
b. Candle wax is a solid.

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
Study & Master	Stored energy in fuels	108-109
Viva	Stored energy in fuels	114-115
Platinum	Stored energy in fuels	111-112
Solutions for All	Stored energy in fuels	129-131
Day-by-Day	Stored energy in fuels	103
Oxford	Stored energy in fuels	80-81
Spot On	Stored energy in fuels	47-48
Top Class	Stored energy in fuels	75-76
Sasol Inzalo Bk B	Stored energy in fuels	4-10

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.bbc.co.uk/bitesize/ks3/science/energy_electricity_forces/energy_transfer_storage/revision/6 [Energy transfer and storage]
2. https://goo.gl/k51yz7 (4min 18sec) [What is energy?]

1 B

Term 3, Week 1, Lesson B
Lesson Title: Fuels as sources of energy
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Fuels
CAPS Page Number	39

Lesson Objectives

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

- describe how energy from fuels keeps us warm and cooks our food
- describe how energy from fuels gives us light.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions	✓	13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying	✓	11. Doing Investigations		17. Communicating	✓
6. Identifying problems & issues	✓	12. Recording Information			

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 4: Petrol and paraffin are fuels	
Resource 5: Gas is a fuel	
Resource 6: Candle wax is a fuel	

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 gives us our energy?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

The food we eat gives us our energy.

D ACCESSING INFORMATION

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

SOURCES OF USEFUL ENERGY

1. Fuels are **sources** of useful energy.
2. Petrol or diesel are used in cars and trucks so that they can move.
3. The stored energy is changed into movement energy.
4. Coal is burned in power stations to make electricity.
5. We use electricity to do many things.
6. Electricity is used to run appliances, for cooking and for lighting.
7. Candle wax is a fuel.
8. When the wick is lit, the wax burns.
9. This gives us light and heat.
10. Paraffin and gas are fuels used for lighting, heating and cooking.

2. Explain fuels and petrol to the learners as follows:
   a. Fuels are used every day.
   b. We use the energy stored in them to do useful things.
   c. Petrol and diesel give vehicles energy to move
   d. Show learners Resource 4: ‘Petrol and paraffin are fuels’.
   e. Petrol is a fuel made from oil that is drilled from deep down in the Earth.
   f. It is put into vehicles to make them move.

3. Explain coal and candle wax as fuels to the learners as follows:
   a. Coal is burned to turn the turbines in power stations.
   b. This gives us electricity.
   c. We use electricity to cook, provide light, for traffic lights and to run appliances.
   d. Candle wax is burned to give light and heat.
   e. Show learners Resource 6: 'Candle wax is a fuel'.
   f. Candles are an inexpensive way to provide light.
4. Explain paraffin and gas as fuels to the learners as follows:
   a. Paraffin and gas are both used for lighting, cooking and heating.
   b. Show learners Resource 5: 'Gas is a fuel'.
   c. Gas is used for cooking, as well as heating.
   d. Show learners Resource 4: 'Petrol and paraffin as fuels'.
   e. Paraffin is an inexpensive fuel used for heating, lighting and cooking.
5. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. Which two fuels do cars and trucks use?
b. What fuel do power stations use to make electricity?

Answers to the checkpoint questions are as follows:

a. Cars and trucks use diesel and petrol.
b. Power stations use coal.

E CONCEPTUAL DEVELOPMENT

1. TASK: FUELS AS SOURCES OF USEFUL ENERGY

   Write the following on the chalkboard (always try to do this before the lesson starts):

FUELS AS SOURCES OF USEFUL ENERGY

Copy and complete the following table:

EXAMPLES OF FUELS	WHAT IT IS USED FOR
petrol/diesel	
gas	
candle wax	
coal	
gas (methane)	

2. Explain to the learners as follows:
    a. Copy the table into their workbooks.
    b. Fill in as many uses for the fuel as the learners can think of.
    c. When the learners have completed their table, get them to share their answers with a partner. They can change and adapt their own answers, if necessary.
    d. Get some learners to share their answers with the class. Discuss these answers.
3. Model answer: Fuels as sources of useful energy

FUELS AS SOURCES OF USEFUL ENERGY

1. Copy and complete the following table:

EXAMPLES OF FUELS	**WHAT IT IS USED FOR**
petrol/diesel	to run cars and trucks
gas	heating and cooking
candle wax	lighting
coal	making electricity in power stations, heating and cooking
gas (methane)	heating and cooking

Checkpoint 2

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

a. What is petrol used for?
b. What is coal used for?

Answers to the checkpoint questions are as follows:

a. Petrol is a fuel that is used in cars and trucks to make them move.
b. Coal is used to make electricity in power stations and for heating and cooking.

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
Study & Master	Stored energy in fuels	109
Viva	Stored energy in fuels	114-115
Platinum	Stored energy in fuels	113
Solutions for All	Stored energy in fuels	131-133
Day-by-Day	Stored energy in fuels	104
Oxford	Stored energy in fuels	80
Spot On	Stored energy in fuels	48
Top Class	Stored energy in fuels	75-78
Sasol Inzalo Bk B	Stored energy in fuels	12-15

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://goo.gl/Z3R9KV [Stored energy in fuels]
2. http://www.kids.esdb.bg/basic.html [What is energy]
3. https://goo.gl/Z3R9KV (4min 38sec) [What is energy]

1 C

Term 3, Week 1, Lesson C
Lesson Title: Everyday fuels
Time for lesson: 1½ hours

A POLICY AND OUTCOMES

Sub-Topic	Fuels
CAPS Page Number	39

Lesson Objectives

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

- name examples of everyday fuels
- identify things that use fuel
- identify fuels as solid, liquid or gas.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing	✓	8. Predicting		14. Designing	
3. Comparing	✓	9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	✓
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 6: Candle wax is a fuel	

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 type of fuel do power stations use to make electricity?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Power stations use coal to make electricity.

D ACCESSING INFORMATION

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

EVERYDAY FUELS

1. Fuels are useful in our daily lives.
2. Many people use wood, gas, oil, candle wax, coal and paraffin for heating, cooking or lighting.
3. Paraffin is a liquid fuel and must be carefully handled.
4. Methane gas is a gas and must also be carefully handled.
5. All fuels have stored energy.
6. This energy is released when it is burned.
7. The energy that is used to make the fuel burn is known as input energy.
8. Input energy can be from a match or lighter that is lit.
9. Different fuels need different amounts of input energy.
10. A paraffin lamp or gas catches alight very easily when a lit match is put to the fuel.
11. A wood fire needs more input energy than a paraffin lamp to make it burn.

2. Explain this to the learners as follows:
   a. Many types of fuels are useful to us in our everyday lives.
   b. We use these fuels for heating and cooking.
   c. Coal is burned to give us electricity.
   d. We use electricity for many things every day.
   e. We use it for cooking, heating and lighting.
   f. Fuels need an input energy to light them.

g. A match or lighter can be used as input energy.
h. Show learners Resource 6: 'Candle wax is a fuel'.
i. The match lights the wick of the candle.
j. The match is an input energy.

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

Checkpoint 1

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

a. Can you name two fuels that are used in everyday lives?
b. What can be used as input energy to light fuels?

Answers to the checkpoint questions are as follows:

a. Any two of the following: wood, oil, coal, paraffin
b. Either of the following answers: a match, a lighter

E CONCEPTUAL DEVELOPMENT

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

EVERYDAY FUELS

Copy and complete the following sentences. Choose a word from the list below. Underline the chosen word.

petrol, stored, lighter, liquid, match, wood

1. A car needs fuel to make it move. Its fuel is ____.
2. This type of fuel is a ____.
3. An example of a solid fuel is ____.
4. All fuels have ___ energy.
5. Fuels need an input energy like a ____ or a ____ to get them to burn.

2. Explain this to the learners as follows:
   a. Copy and complete the sentences by choosing the correct word from the list.
   b. Rewrite the sentences and underline the chosen word.
3. Give learners time to complete this task.
4. Model answer:

EVERYDAY FUELS

1. *A car needs fuel to make it move. Its fuel is petrol.*
2. *This type of fuel is a liquid.*
3. *An example of a solid fuel is wood.*
4. *All fuels have stored energy.*
5. *Fuels need an input energy like a match or a lighter to get them to burn.*

5. Task: An energy diary

TASK: AN ENERGY DIARY

1. Copy the table below into your workbook.
2. Fill in yesterday's date, what time of the day you used a product that used fuel, what it was you used, what did it do, and what fuel did it use.

Date	**Time of day**	**What thing did you use that uses fuel?**	**What did it do?**	**Type of fuel**
17th September	(morning, midday or evening) morning	kettle	boiled water	coal (to make electricity)

6. Explain this to the learners as follows: Copy and fill in the table using yesterday's date.
   a. The first example has been filled in.
   b. Learners must remember all the things they used that use fuel.
   c. Remember that in South Africa electricity is made by burning coal.
   d. When learners have completed the table, discuss the different products that use fuel.
   e. Note: answers will vary.
7. Give learners time to complete this task.

Checkpoint 2

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

a. Can you give an example of a fuel that is a liquid?
b. What type of energy do all fuels have?

Answers to the checkpoint questions are as follows:

a. Petrol/ diesel is a liquid fuel.
b. All fuels have stored energy.

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
Study & Master	Stored energy in fuels	110
Viva	Stored energy in fuels	117-118
Platinum	Stored energy in fuels	113-114
Solutions for All	Stored energy in fuels	131-133
Day-by-Day	Stored energy in fuels	104-105
Oxford	Stored energy in fuels	81-82
Spot On	Stored energy in fuels	48
Top Class	Stored energy in fuels	77
Sasol Inzalo Bk B	Stored energy in fuels	10-11

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://goo.gl/gqSD92 [Fuels used in our daily life]
2. https://goo.gl/4Msyvw [Fossil fuel facts]

2 A

Term 3, Week 2, Lesson A
Lesson Title: Fuels give useful output energy
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Fuels
CAPS Page Number	39

Lesson Objectives

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

- identify the output energy of certain fuels
- describe the output energy from a fuel
- describe the usefulness of the output energy.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues		12. Recording Information			

TOPIC: Stored energy in fuels

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Matches, candle, saucer	

C CLASSROOM MANAGEMENT

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

Can you give an example of a fuel that is a solid?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Either of the following answers: coal, wood

D ACCESSING INFORMATION

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

USEFUL OUTPUT ENERGIES FROM FUELS

1. When fuels start burning, their stored energy is released and changed to other forms of energy.
2. We call this output energy.
3. Output energy can be heat, light and movement.
4. Fuels are used to get many useful forms of output energy.
5. Fuels have stored energy.
6. An input energy is used to light the fuel.
7. A match stick ia a source of an input energy.
8. A match has a small amount of energy.
9. When a fuel is lit, the stored energy is changed to an output energy.

2. Explain this to the learners as follows:
   a. All fuels have stored energy.
   b. They need a small input energy to light them.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. Give two examples of output energy from a particular fuel?
b. What must happen to a fuel to change the stored energy of the fuel to an output energy?

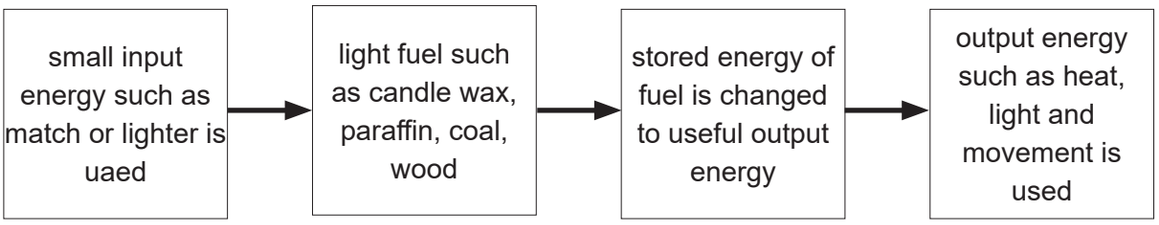
Answers to the checkpoint questions are as follows:

a. Any of the following answers: heat, light, movement
b. The fuel must be lit.

E CONCEPTUAL DEVELOPMENT

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

CHANGING STORED ENERGY TO OUTPUT ENERGY



2. Explain this to the learners as follows:
   a. The burning of fuel is a process.
   b. This can be shown in a flow diagram.
   c. Point out that the input energy used is small compared to the stored energy of the fuel.
   d. The matchstick will burn out quickly.
   e. The candle it has lit will stay alight for a long time.
   f. This is because it has stored energy.
   g. The stored energy of the fuel changed into useful output energy.
3. Give learners time to write this information in their workbooks.

4. Do the following as a teacher-led demonstration:
5. Explain this to the learners as follows:

ENERGY STORED IN A FUEL

You will need:

some matches

a short, small candle

a saucer.

METHOD

1. Light a match.
2. Leave the match in the saucer to burn.
3. Count how many seconds this takes.
4. Use a second match to light a candle.
5. Drip some wax into the saucer and place the candle upright on this wax.
6. Leave the candle to burn.
7. Time how long it takes for the candle to burn out.

6. Explain this to the learners as follows:
   a. The match has a small amount of stored energy.
   b. It did not take long to burn out.
   c. A match is used to light the candle.
   d. The candle takes a long time to burn out.
   e. The difference between the energy you put in and the energy the candle gave out is how much energy was stored in the candle.
   f. The output energy from the fuel is bigger than the input energy needed to make the fuel burn.

Checkpoint 2

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

a. Does a match have a little or a lot of input energy when it is lit?
b. What is the output energy of a candle once it is lit?

Answers to the checkpoint questions are as follows:

a. A match has little input energy when it is lit.
b. A candle will have light energy (and a bit of heat energy) once it is lit.

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
Study & Master	Stored energy in fuels	-
Viva	Stored energy in fuels	116-117
Platinum	Stored energy in fuels	115
Solutions for All	Stored energy in fuels	133-135
Day-by-Day	Stored energy in fuels	105-106
Oxford	Stored energy in fuels	83-85
Spot On	Stored energy in fuels	49
Top Class	Stored energy in fuels	78-79
Sasol Inzalo Bk B	Stored energy in fuels	12-15

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.tomnewbyschool.co.za/wp-content/uploads/2016/07/Grd-5-NS-Tech-T3-2016-approved.pdf [Stored energy in fuels]
2. https://goo.gl/fCdM1D [Fuels - Teachers for Technology and Science]

2 B

Term 3, Week 2, Lesson B
Lesson Title: Burning fuels
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Fuels
CAPS Page Number	39

Lesson Objectives

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

- investigate various fuels by burning them
- describe the input energy needed to burn them
- describe the output energy obtained from the fuel.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing	✓	9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Any three of the following fuels: a small piece of wood, a small piece of coal, a candle, a piece of string soaked in paraffin, a peanut, matches or a lighter, a pair of tongs	

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 output energy of coal once it is lit?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

The output energy of coal is heat and a little light.

D ACCESSING INFORMATION

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

COMPARING DIFFERENT FUELS

1. When fuels start burning, the stored energy inside is released.
2. Some fuels burn more quickly than others.
3. Some fuels catch alight more easily than others.
4. Some fuels produce more waste than others.
5. When fuel is burned, it is changed into other forms of energy, like heat and light.

2. Explain this to the learners as follows:
   a. Fuels are burned to release the stored energy inside the fuel.
   b. Fuels burn at different rates.
   c. Some fuels, like paraffin and petrol, catch alight easily.
   d. Some fuels, like coal and wood, take more input energy to catch alight.
   e. Some fuels, after they have been burned, produce waste.
   f. Coal leaves ash behind, and petrol releases carbon dioxide into the air.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. Do all fuels burn at the same rate? Give examples to explain your answer.
b. What waste does coal leave behind once it has been burned?

Answers to the checkpoint questions are as follows:

a. No, fuels burn at different rates. Gas will burn quickly while coal will burn slowly.
b. Coal leaves ash behind as waste.

E CONCEPTUAL DEVELOPMENT

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

COMPARE DIFFERENT FUELS

Type of fuel	Input energy	Time needed to catch alight	Output energy
1.			
2.			
3.			

2. Explain this to the learners as follows:
   a. Learners must copy the table into their workbooks.
   b. Learners can fill in the type of fuel before the investigation.
   c. After each fuel is burned, they must complete the relevant section on the table.
3. Do the following investigation as a teacher-led demonstration:

INVESTIGATION: COMPARE DIFFERENT FUELS

You will need any three of the following fuels:

a small piece of wood
a small piece of coal
a candle
a piece of string soaked in paraffin
a peanut
matches or a lighter
a pair of tongs.

METHOD

1. Choose any three of the fuels above.
2. Use the tongs to hold one fuel at a time.
3. Light the fuel with matches or a lighter.
4. Learners must observe what happens by:
   a. timing how long each fuel takes to catch alight from when the input energy makes contacts with the fuel
   b. working out the output energy (light and/or heat).
5. Learners must record their observations in the table in their workbooks.

4. Explain this to the learners as follows:
   a. Each fuel will take different times to catch alight.
   b. Each fuel will have different levels of output energy (some will be hotter or give a brighter light than others).
   c. Discuss the different fuels that have been burned.
   d. Ask the learners which fuel they would choose to keep warm.
      Coal or wood
   e. Ask the learners which fuel they would use to give them light.
      Candle
5. Model answer: (Answers will vary depending on fuels chosen.)

COMPARE DIFFERENT FUELS

Type of fuel	Input energy	Time needed to catch alight	Output energy
1. coal	lighter	30 seconds	heat, little light
2. candle	lighter	3 seconds	light, little heat
3. paraffin	lighter	immediate	light and heat

Checkpoint 2

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

a. Name a fuel that would take more input energy to catch alight (take a longer time) than candle wax?
b. What useful output energy does paraffin give us?

Answers to the checkpoint questions are as follows:

a. Either of the following: coal, wood
b. Paraffin gives us heat and light energy.

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
Study & Master	Stored energy in fuels	110
Viva	Stored energy in fuels	117-118
Platinum	Stored energy in fuels	116-117
Solutions for All	Stored energy in fuels	132-133
Day-by-Day	Stored energy in fuels	105
Oxford	Stored energy in fuels	83-85
Spot On	Stored energy in fuels	49
Top Class	Stored energy in fuels	79-81
Sasol Inzalo Bk B	Stored energy in fuels	12-15

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.mycyberwall.co.za/get-smart/science/grade-5/stored-energy-fuels [Stored energy fuels]
2. https://goo.gl/2KYyku (2min 58sec) [Energy in a peanut experiment]
3. idrange.org/_literature_143086/Fires – Favourites - Demonstration [Lesson plan: fire favourites]

2 C

Term 3, Week 2, Lesson C
Lesson Title: Fuels need heat and air
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Burning fuels
CAPS Page Number	39

Lesson Objectives

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

- describe the three things needed for a fire to burn
- draw the fire triangle.

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

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing	✓	8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

TOPIC: Stored energy in fuels

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 7: The fire triangle	

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 useful energy does coal give us when it is burned?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Coal gives us heat and a little light when it is burned.

D ACCESSING INFORMATION

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

FUELS NEED HEAT AND AIR

1. Burning fuel provides us with energy that we can use.
2. Burning fuel needs some energy to start burning.
3. Heat energy is needed to make the fuel catch alight.
4. A match or lighter gives this input energy.
5. Once fuel is burning, it needs oxygen to keep burning.
6. Fuel gets oxygen from the air around it.

2. Explain this to the learners as follows:
   a. A fire needs fuel, heat and oxygen from the air to burn.
   b. A match or lighter provides the input energy as heat.
   c. This sets the fuel alight.
   d. The fire gets oxygen from the air to keep burning.
   e. Fuel will not burn if it does not have the heat to set it alight or the oxygen to keep it burning.
3. Give learners 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 three things does a fire need to burn?

b. Where is the oxygen that a fire needs to keep burning?

Answers to the checkpoint questions are as follows:

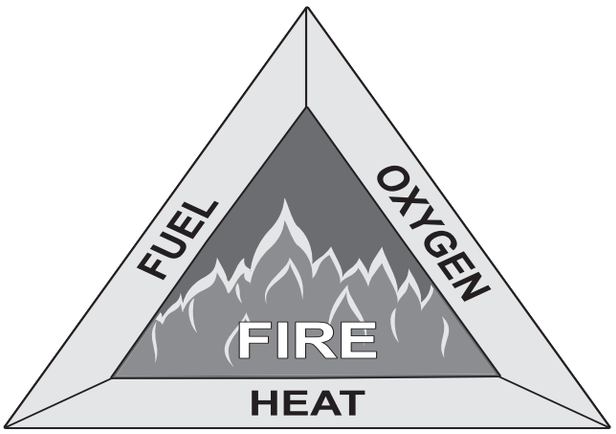
a. A fire needs fuel, heat and oxygen to burn.

b. Oxygen is in the air.

E CONCEPTUAL DEVELOPMENT

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

THE FIRE TRIANGLE



1. A fire needs fuel, heat and oxygen to burn.
2. If any of these three parts is missing, the fire will not burn.
3. Another word for burning is combustion.
4. When we take one of the three things away from a fire, we say we are depriving it.

2. Explain this to the learners as follows:

a. Without fuel, heat or oxygen, a fire will not burn.

b. If one of these three things is taken away from the fire, we say we **deprive** it.

c. Another important word is **combustion**.

d. Combustion is another word for burning.

Checkpoint 2

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

a. What does combustion mean?

b. What happens if fuel, heat or oxygen is taken away from a fire?

Answers to the checkpoint questions are as follows:

a. Combustion means burning.

b. The fire is deprived, and it will not burn.

3. 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
Study & Master	Stored energy in fuels	111-112
Viva	Stored energy in fuels	119-120
Platinum	Stored energy in fuels	118
Solutions for All	Stored energy in fuels	136
Day-by-Day	Stored energy in fuels	106
Oxford	Stored energy in fuels	86
Spot On	Stored energy in fuels	50
Top Class	Stored energy in fuels	81-82
Sasol Inzalo Bk B	Stored energy in fuels	15-16

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://k8schoollessons.com/burning-and-change/ [Combustion facts]
2. https://goo.gl/wTxFre (5min 35sec) [Epic Science - Fire Triangle Experiment]

3 A

Term 3, Week 3, Lesson A
Lesson Title: Burning fuels
Time for lesson: 1½ hours

A POLICY AND OUTCOMES

Sub-Topic	Investigate candles burning
CAPS Page Number	39

Lesson Objectives

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

- conduct an experiment to investigate candles being deprived of oxygen, and their burning times
- observe the results of the investigation
- record information in a table.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting	✓	14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring	✓	10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues		12. Recording Information			

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Four candles, four saucers, matches or a lighter, a watch or clock, four glass bottles or containers of different sizes (small, medium, large, extra-large), 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:

What three things does a fire need to burn?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

A fire needs fuel, heat and oxygen to burn.

D ACCESSING INFORMATION

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

COMBUSTION

1. For combustion to take place, a heat source, fuel and oxygen are needed.
2. To burn a candle, a heat source such as a match is needed to light it.
3. Candle wax is the fuel.
4. When the candle wax has burned down, the candle will go out.
5. The candle will also need oxygen to keep burning once it is alight.

2. Explain this to the learners as follows:
   a. Ask learners to look at the fire triangle they drew in their workbooks in the previous lesson.
   b. A fire needs fuel, heat and oxygen to burn.
   c. Heat is needed to set the candle alight.
   d. This heat can be a match or a lighter.
   e. The candle wax is the fuel.
   f. When the candle wax has burned down, the candle will go out.
3. Give learners 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 is the heat source used to light a candle?
b. What is the fuel used to keep a candle alight?

Answers to the checkpoint questions are as follows:

a. Either of the following answers: a match or a lighter.
b. Candle wax is the fuel used to keep a candle alight.

E CONCEPTUAL DEVELOPMENT

1. To do this activity, each group will need the following:
    - Three glass bottles or glasses of different sizes: small, medium and large
    - Four candles
    - Four saucers or bottle lids
    - Matches
    - A cellphone timer, clock or a watch
2. Ensure you have these materials prepared for each group before the lesson starts.
3. Tell the learners that they are going to be doing an investigation.
4. Divide the learners into groups so that each group will have access to the materials.
5. 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. Each group will be doing tasks to explore the relationship between combustion and the presence of oxygen.
3. Each person in the group must participate in the investigation and complete the answers to the written activities in their workbooks.
4. Each group will need the following materials and equipment to do the investigation:
    - Three glass bottles or glasses of different sizes: small, medium and large
    - Four candles
    - Four saucers or bottle lids
    - Matches
    - A cellphone timer, clock or a watch
5. You will be working with lit candles. BE CAREFUL AND BE RESPONSIBLE AT ALL TIMES.

6. Read through the practical task with the learners.
7. Remind the learners that combustion is a scientific word for burning of fuel.
8. Tell the learners that today they are going to be investigating the relationship between fire and oxygen.
9. Have each group collect the equipment they will need for the task.
10. Tell the learners that they will have 5 minutes to set up the experiment and then they will be given the tasks to complete.
11. The following will need to be written onto the chalkboard. (Try to do this before the lesson starts):

EXPERIMENT SET-UP

1. Light one of the candles.
2. Drip a little bit of wax on each lid or saucer.
3. Stand one candle on each of the four saucers or plates in the melted wax.
4. The four candles should now be standing firmly on each plate.
5. Blow out the burning candle.

12. Read through the experiment set-up with the learners.
13. Ask them if they have any questions.
14. Tell the learners they have 5 minutes to set up the experiment.
15. Supervise the learners whilst they complete the task and answer any questions they may have.
16. After 5 minutes call the learners back to attention.
17. Tell the learners that they are now going to complete task 1.
18. The following will need to be written on the chalkboard:

Task 1: (3 marks)

- The aim of this experiment is to see what happens when we burn a candle inside a glass jar compared to a candle that is burning outside of a glass jar.

1.1. What do you predict the difference will be between the candle burning outside of the jar and the candle burning inside the glass jar?

1.2. Was is the heat source in this experiment?

1.3. What is the fuel source in this experiment?

19. Read through task 1 with the learners.
20. Ask them if they have any questions.
21. Tell the learners they have 3 minutes to answer these questions in their workbooks.
22. Supervise the learners whilst they complete the task and answer any questions they may have.
23. After 3 minutes call the learners back to attention.
24. Tell the learners that they are now going to complete Task 2.
25. The following will need to be written on the chalkboard:

Task 2: (12 marks)

2.1. Draw the following table into your workbooks:

JAR	ESTIMATED TIME	ACTUAL TIME
Small		
Medium		
Large		

- Carefully light one candle.
- Place the medium sized glass jar over the burning candle.
- Watch the candle flame.

2.2. What do you observe happens to the flame after a few minutes?

2.3. Why do you think this has happened?

2.4. What three things are necessary for a fire to burn?

- Now complete the ESTIMATED TIME on the table.
- Estimate how long you think the candle will burn under the small jar.
- Estimate how long you think the candle will burn under the medium jar.
- Estimate how long do you think the candle will burn under the large jar.
- Record your answers.

2.5. Which candle do you think will stop burning first? Give a reason for your answer.

- Now light all four candles.
- Place one jar over three of the candles.
- Using a cellphone timer, a clock or a watch, measure the amount of time it takes for each candle to stop burning.
- Record the ACTUAL TIMES on the table.
- Looking at the data you collected and recorded on the table, answer the following questions:

2.6. Which candle stopped burning first?

2.7. Why do you think this candle stopped burning first?

2.8. Which covered candle stopped burning last?

2.9. Why do you think this candle burnt for longer than the candle under the small jar?

2.10. Which candle is still burning?

2.11. Why is this candle still burning?

26. Read through task 2 with the learners.

27. Ask them if they have any questions.

28. Tell the learners they have 15 minutes to complete task 2.

29. Tell learners that each person in the group must record their individual answers in their workbooks for assessment.

30. Supervise the learners whilst they complete the task and answer any questions they may have.

31. After 15 minutes call the learners back to attention.

32. Tell the learners to return all equipment and to tidy their work areas.

33. 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
Study & Master	Stored energy in fuels	111-112
Viva	Stored energy in fuels	121-124
Platinum	Stored energy in fuels	119-121
Solutions for All	Stored energy in fuels	137-139
Day-by-Day	Stored energy in fuels	107
Oxford	Stored energy in fuels	86-87
Spot On	Stored energy in fuels	51
Top Class	Stored energy in fuels	81-82
Sasol Inzalo Bk B	Stored energy in fuels	17-19

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.education.com/activity/article/candle-snuffing-contest/ [Candle Burning Experiment]
2. https://goo.gl/OgGQ6w (1min 51sec) [Underwater Candle - Science Experiment]
3. https://goo.gl/ZLpzAB [Candle in a bottle experiment]

3 B

Term 3, Week 3, Lesson B
Lesson Title: Safety with Fire
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Fires can be a threat
CAPS Page Number	39

Lesson Objectives

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

- name some of the causes of fires
- conduct a fire drill both at home and at school
- critically evaluate the fire drill practice.

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

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	✓
6. Identifying problems & issues		12. Recording Information			

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 9: Five fire safety tips	

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 gas does a fire need to keep burning?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

A fire needs oxygen to keep burning.

D ACCESSING INFORMATION

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

CAUSES OF FIRES

1. Controlled fires are useful as they provide heat to keep us warm and enable us to cook our food.
2. When not controlled, fires can be very harmful.
3. Cooking and heating are the most common causes of uncontrolled fires in homes.
4. Uncontrolled fires can harm plants, animals and people.
5. It is important to prevent fires.
6. Be careful when using fuel, especially candles and paraffin lamps.
7. Both fall over easily.

2. Explain this to the learners as follows:
   a. Fires are a big threat to some communities.
   b. In areas where houses are built close together, a fire can jump from house to house.
   c. It is important to be careful when fuel is being lit for heating or lighting.
3. Give learners 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 are the two most common causes of fire accidents in the home?
b. Why is it dangerous to leave a candle unattended?

Answers to the checkpoint questions are as follows:

a. Unsupervised heating and cooking are the two most common causes of fire accidents in homes.
b. It is easy for the wind to blow some item onto the candle, or for the candle to fall over, and this will start a fire.

E CONCEPTUAL DEVELOPMENT

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

SOME FIRE RULES

1. Keep matches and lighters away from children.
2. Do not light a fire outside on a windy day.
3. Do not leave a room with a candle burning.
4. Never leave candles or lamps unattended.
5. Do not put candles and paraffin lamps near the edges of tables.
6. Do not throw water on a fire in the kitchen.
7. If you throw water on burning oil, the fire will spread.
8. Try and put a lid on the pan.

A FIRE DRILL FOR YOUR HOME

1. Make a family escape plan and make sure everybody knows what to do.
2. There should be two escape **routes**.
3. Have a meeting place outside your home so that you will know whether everyone is safe, if there is a fire.
4. Crawl along the floor if there is smoke.
5. Roll up in a blanket or carpet if your clothes catch alight.
6. This stops the oxygen from getting to the flames.

2. Explain the following about fires to the learners:
   a. There are many things you should know about what to do if there is a fire.
   b. Not all fires are the same.
   c. Water will put out most fires, but do not use water on burning oil, or anywhere near electricity.
   d. If you do this, the fire will spread.
   e. Switch off the electricity and try to put a lid on the pot with burning oil.
   f. Do not leave candles, paraffin lamps or stoves unattended.

3. Explain the following about making a fire drill plan for their families to the learners:
    a. Learners should make a fire drill plan for their families.
    b. Plan two escape routes from the house.
    c. All people living in the house need to know about these escape routes.
    d. In a house that is on fire, crawl along the floor as smoke rises.
    e. Do not open a closed door, in case there is a fire in that room.
    f. Test the handle of the door to see if it is hot.
    g. If it is not hot, then you can open the door.
    h. If your clothes catch fire, roll up in a blanket. This stops the oxygen from getting to the flames and the fire will die out.
    i. It is important that you decide on a meeting point outside the house.
    j. This will help you to know if everyone is safe.
    k. Show learners Resource 9: 'Five fire safety tips'.
    l. Read through all the safety tips to the learners.

Checkpoint 2

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

a. Why should you roll up in a blanket or carpet if your clothes catch alight?
b. Should all uncontrolled fires be treated in the same way?

Answers to the checkpoint questions are as follows:

a. The blanket stops oxygen from getting to the flames, so the fire will go out.
b. No, fires are different. Water should not be put on oil or electrical fires.

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
Study & Master	Stored energy in fuels	113-116
Viva	Stored energy in fuels	124-127
Platinum	Stored energy in fuels	124
Solutions for All	Stored energy in fuels	139-141
Day-by-Day	Stored energy in fuels	108-109
Oxford	Stored energy in fuels	88-89
Spot On	Stored energy in fuels	52-53
Top Class	Stored energy in fuels	83-86
Sasol Inzalo Bk B	Stored energy in fuels	20-25

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://goo.gl/6BN97o (4min 38sec) [The seven most common causes of house fires]
2. http://www.ducksters.com/science/earth_science/forest_fires.php [Forest fires]
3. https://www.youtube.com/watch?v=JJlSJokQE4g (6min 59sec) [Super smart fire safety rules for kids]

3 C

Term 3, Week 3, Lesson C
Lesson Title: Safety with fire
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	What to do if there is a fire accident.
CAPS Page Number	39

Lesson Objectives

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

- give appropriate ways of stopping fires
- know emergency phone numbers
- describe the steps for a fire drill.

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

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing	✓	8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 10: Fire drill safety tips	

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 there is a lot of smoke, what should you do to get outside?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

If there is a lot of smoke, you should crawl on the floor to get out as smoke rises.

D ACCESSING INFORMATION

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

FIRES

1. Fires need three things to burn:
   a. an input energy to catch alight, like a match or a lighter
   b. fuel, such as candle wax, paraffin, coal or petrol
   c. oxygen.
2. You can stop a fire by:
   a. stopping access to oxygen by covering a person in a blanket
   b. pouring water on fires that are not caused by oil or electricity
   c. putting a lid on a pot of burning oil to stop the supply of oxygen
   d. turning off the electricity at the mains switch.
3. If you see a fire:
   a. get out of the building
   b. learn these important emergency numbers:
   c. Fire: 107
   d. Police: 10111
   e. Cell phone operators: 112.

2. Explain this to the learners as follows:
   a. It is important to know what to do if there is a fire.
   b. It is a good idea to practise with your family and your school, in case there is a fire.
   c. This is called a fire drill.
3. Give learners 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 is the phone number of the fire department?
b. If there is a fire, what do we call the practice we then follow?

Answers to the checkpoint questions are as follows:

a. The phone number is 107.
b. This practice is called a fire drill.

E CONCEPTUAL DEVELOPMENT

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

PLAN AND PRACTICE A FIRE ESCAPE PLAN FOR THE SCHOOL

1. If there is a fire in your school, it is important that everyone moves to a safe place.
2. This is called a fire drill.
3. Find out what steps need to be taken during a fire drill, so you know how it works:
   a. What signal is used?
   b. Which grades go through which exits?
   c. Where are the assembly points?
   d. Where are the class registers kept?
   e. Who takes the roll call to make sure everyone is outside and safe?
   f. Who will call the emergency services?
4. Copy and complete the table below (keep a copy behind the classroom door):

TABLE OF INFORMATION FOR FIRE DRILL

Signal (siren, school bell, whistle)	
Exits for each grade	Gr 1: Gr 2: Gr 3: Gr 4: Gr 5: Gr 6: Gr 7:

Assembly points	
Place where class registers are kept	
People in charge of roll call	Gr 1: Gr 2: Gr 3: Gr 4: Gr 5: Gr 6: Gr 7:
Phone number for emergency services	

2. Explain this to the learners as follows:
    a. Show learners Resource 10: 'Fire drill safety tips'.
    a. Read through these steps with the learners.
    b. Learners must find out about the fire drill steps for the school.
    c. Ask them to compare these steps to the steps in Resource 10: 'Fire Drill Safety Tips'.
    d. Ask learners to copy the table from the chalkboard.
    e. Learners must fill the required information in on the table drawn in their workbooks.
    f. Assist them to get this information.
    g. Information will vary for each school.
    h. Once you have completed the table, place a copy behind the classroom door.

3. <u>ACTIVITY: FIRE DRILL PRACTICE</u>

    1. Tell the whole school in an assembly about what to do in case of a fire.
    2. Hold a fire drill practice.
    3. Observe what happens.
    4. Discuss ways in which the fire drill can be improved.
    5. Write these improvements down in your workbook.
    6. If possible, have a second fire drill practice with the improvements implemented.

4. Explain this to the learners as follows:
    a. Get the learners to present the steps for a fire drill to the rest of the school.
    a. Ask the head's permission to hold a fire drill practice.
    a. Learners must observe what happens.
    a. After the fire drill, learners must write down the improvements in their workbooks.
5. Model answer (answers may vary):

<u>IMPROVEMENTS FOR FIRE DRILL PRACTICE</u>

1. *Classes must walk quickly to the assembly point in a line.*
2. *Learners must be quiet until dismissed after the roll call.*
3. *No running is allowed.*

Checkpoint 2

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

a. What is an assembly point?
b. What is the signal for a fire in your school?

Answers to the checkpoint questions are as follows:

a. An assembly point is a place for a group to meet in an emergency.
b. Answers will vary according to the signal that the school uses.

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
Study & Master	Stored energy in fuels	117-119
Viva	Stored energy in fuels	124-127
Platinum	Stored energy in fuels	125
Solutions for All	Stored energy in fuels	141-145
Day-by-Day	Stored energy in fuels	110-111
Oxford	Stored energy in fuels	89-90
Spot On	Stored energy in fuels	52-53
Top Class	Stored energy in fuels	83-86
Sasol Inzalo Bk B	Stored energy in fuels	20-25

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://classroom.kidshealth.org/3to5/personal/safety/fire_safety.pdf [Fire safety]
2. https://goo.gl/3VmKCL (9min 32sec) [Fire safety: what every child should know]
3. https://goo.gl/N6lx5D (4min 13sec) [Stop, drop and roll]

TOPIC OVERVIEW:
Energy and electricity
Term 3, Weeks 4A – 6B

A. TOPIC OVERVIEW

TERM 3, WEEKS 4A – 6B

- This topic runs for 2½ weeks.
- It is presented over 8 lessons.
- This topic counts for 16% in the end-of-year exam.
- 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 4	GRADE 5	GRADE 6&7
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Input and output energy • Energy can be transferred from a source to where it is needed	• Cells and batteries store energy • Circuits are systems that transfer electrical energy to where it is needed • Make a simple circuit with a cell, wires and a light bulb • From the power station, electricity is transferred in a circuit to our homes and back to the power station • The power station needs a source of energy in the form of a fuel such as coal • Draw and write the pathway that electrical energy makes from the power station to our homes and schools	• Simple circuits: systems for transferring energy • Simple circuits have a source of energy, conducting material, devices for changing electricity into a useful output energy • A circuit is a complete pathway for electricity • A switch can break or complete the circuit pathway • Draw simple closed circuit diagrams • The national electricity supply system: energy transfers in the national grid; conserving electricity in the home

	• Safety precautions to be taken when working with electricity	

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	transferred	Moved from one place to another
2.	component	A part of something, especially in an electrical circuit or motor
3.	generated	Has been made
4.	steam	When water is heated up it changes to a gas (vapour) called steam; the white mist of water droplets in the air from boiling water
5.	overload	Too many of something
6.	exposed	Make something visible by uncovering it
7.	conductor	A material that allows the flow of electrical energy through it is called a conductor – this material conducts electricity
8.	electrical circuit	Pathway to and from the electrical source where it is needed
9.	pylons	High structures designed to hold electrical cables off the ground
10.	transmission lines	Thick cables that carry electricity from the power station to a substation
11.	turbine	A giant fan that turns and makes electricity

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Modern life depends on the availability of electrical energy, so it is important for us to understand simple electrical circuits. Most of us use electricity every day to run appliances, give us light and to make things move. Electricity can be dangerous so it is important to know what to do in an emergency.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

4 A

Term 3, Week 4, Lesson A
Lesson Title: Cells and batteries
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Cells and batteries
CAPS Page Number	40

Lesson Objectives

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

- describe how electrical energy is stored in cells and batteries
- define what a cell and battery are.

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

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 11: Cells	A torch with batteries
Resource 12: A battery	
Resource 13: A 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:

Why is it important to practise a fire drill?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

It is important to practise a fire drill, so that if there is an emergency, learners will know what to do and where to go.

D ACCESSING INFORMATION

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

CELLS AND BATTERIES

1. Fuels store energy.
2. Fuels are burned to give heat, light or movement energy.
3. Cells and batteries store energy.
4. They store chemical energy that is changed into electrical energy.
5. Energy is stored inside the cell until it is needed to power a device.
6. The two ends of a cell are different.
7. One is called the positive (+) end and the other the negative (-) end.

8. Two or more cells together make a battery.
9. A battery will store more chemical energy than a cell.
10. When all the chemical energy has been used up, we say the cell or battery is flat.

2. Explain this to the learners as follows:
    a. Show learners Resource 11: ‘Cells’.
    b. Explain that in everyday life we talk about batteries.
    c. In science, we talk about cells.
    d. One battery is a number of cells joined together.
    e. Show learners Resource 12: ‘A battery’.
    f. Explain that inside the plastic casing, there will be a number of cells.
    g. Cells and batteries store chemical energy.
    h. This energy is changed to electrical energy.
    i. Batteries and cells are dead when all the chemical energy has been used up.
3. Give learners 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 type of energy does a cell store?
b. What is a battery?

Answers to the checkpoint questions are as follows:

a. A cell stores chemical energy.
b. A battery is a number of cells joined together.

E CONCEPTUAL DEVELOPMENT

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

HOW A TORCH WORKS

1. Cells are used to make a torch light up.
2. Together they make a battery.
3. The energy from the battery is transferred to the torch bulb.
4. The torch bulb lights up when it is switched on.
5. The torch bulb gives off light energy and heat energy.

2. Explain this to the learners as follows:
    a. Show learners Resource 13: ‘A torch’.
    b. The two cells make a battery.
    c. When you switch on the torch, the energy stored in the battery is **transferred** to the torch bulb.
    d. The bulb gives off light and a little heat.
    e. When the battery is dead, the torch will not give off light.
    f. Point out the switch on the torch.
    g. Point out the two cells with their positive and negative ends.
    h. If the teacher has a torch, demonstrate this to the learners.
    i. Also show them that the positive end of a cell has to connect with the negative end of the next cell.

Checkpoint 2

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

a. Where does a torch get its energy from?
b. What energy does a torch give off?

Answers to the checkpoint questions are as follows:

a. A torch gets its energy from the battery (or cells).
b. A torch gives off light and heat energy.

3. 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
Study & Master	Energy and electricity	120-121
Viva	Energy and electricity	129-130
Platinum	Energy and electricity	128-129
Solutions for All	Energy and electricity	148-149
Day-by-Day	Energy and electricity	113-114
Oxford	Energy and electricity	91-92
Spot On	Energy and electricity	54
Top Class	Energy and electricity	88
Sasol Inzalo Bk B	Energy and electricity	30-34

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://goo.gl/87sAVY [Cells and batteries]
2. https://goo.gl/ucRqj6 (7min 47sec) [Science - Electricity – Cell, battery and symbols for circuit]

4 B

Term 3, Week 4, Lesson B
Lesson Title: Electrical energy is transferred / Cells & Batteries
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Electrical energy transfer
CAPS Page Number	40

Lesson Objectives

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

- follow the pathway of an electrical circuit
- list the three parts that a circuit must always have
- identify these three parts in the electrical circuit of a torch.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing	✓	8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	✓
6. Identifying problems & issues		12. Recording Information			

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 13: A 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 type of energy does a cell store?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

A cell stores chemical energy.

D ACCESSING INFORMATION

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

ELECTRICITY IS TRANSFERRED IN A CIRCUIT

1. Electricity is a type of energy.
2. Electricity travels from the battery to the light bulb.
3. It then travels back again to the battery.
4. This path is called the **electrical circuit.**
5. The path is made using connecting metal wire.
6. A circuit transfers electricity from its source (a battery or mains electricity) to where it is needed.
7. Electrical energy needs a complete pathway to travel along.
8. An electric circuit must always have three parts:
   a. a source of energy like a cell or battery
   b. a path for the electrical energy to flow along
   c. an output component that changes the electrical energy to the needed energy, such as a light bulb or a buzzer.

2. Explain this to the learners as follows:
    a. Electrical energy must flow along a pathway.
    b. This pathway must be a loop.
    c. It must go from the source, to the output device and back again.
    d. Three things must be present in a circuit: the source of energy (cell or battery), the path for the electrical energy to flow along, and an output component such as a blight bulb, a buzzer or a motor.
    e. If there is a break in the pathway, the circuit will not work.
3. Give learners 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 three things must an electrical circuit have?
b. Can you give an example of a source of energy?

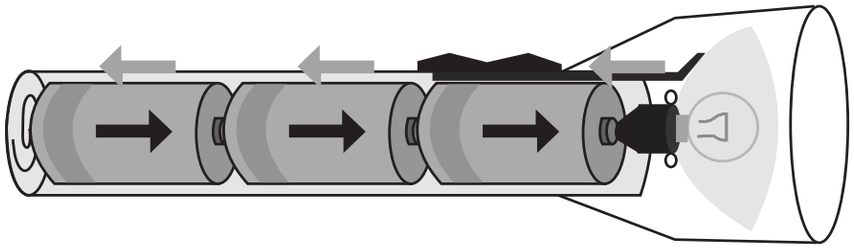
Answers to the checkpoint questions are as follows:

a. A circuit must have a source of energy, a pathway and an output device.
b. A source of energy for an electrical circuit would be a cell or a battery.

E CONCEPTUAL DEVELOPMENT

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

2. THE CIRCUIT FOR A TORCH



1. The arrows show the direction in which the electrical energy flows.
2. When the switch is on, the electrical energy will flow from the cells.
3. It flows through the light bulb and back to the cells.
4. This is a complete pathway.

3. Explain this to the learners as follows:
    a. Point out the three parts that a circuit must have on the drawing of a torch.
    b. A circuit must have a source of energy (the cell), a path (follow the arrows) and an output component (the light bulb).
    c. Get learners to trace the path with their fingers once they have drawn the torch in their workbooks.

Checkpoint 2

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

a. What is the output component in a torch?
b. When the switch is switched on, does this make the pathway complete?

Answers to the checkpoint questions are as follows:

a. The output component is the light bulb.
b. Yes, it does.

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
Study & Master	Energy and electricity	122
Viva	Energy and electricity	130-131
Platinum	Energy and electricity	130
Solutions for All	Energy and electricity	149-150
Day-by-Day	Energy and electricity	114-115
Oxford	Energy and electricity	93-94
Spot On	Energy and electricity	55
Top Class	Energy and electricity	89
Sasol Inzalo Bk B	Energy and electricity	32-33

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://goo.gl/vThN0u (6min 49sec) [Electricity - Bill Nye the Science Guy]
2. https://goo.gl/p42HM3 [Lesson plan of electric circuit Grade V]
3. https://goo.gl/wsdAA9 (4min 21sec) [Electrical circuits: energy transfer and conservation]

4 C

Term 3, Week 4, Lesson C
Lesson Title: Making a simple circuit - Cells & Batteries
Time for lesson: 1½ hours

A POLICY AND OUTCOMES

Sub-Topic	Making a simple circuit
CAPS Page Number	40

Lesson Objectives

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

- make a simple circuit with a cell and a light bulb
- describe that a circuit needs to be closed for the output device to work.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing	✓	8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 14: A simple circuit	
Resource 15: Components of an electrical circuit	
A 1,5V cell; electrical wire – about 40 cm, a light bulb, a light bulb holder, a wire stripper (to take the plastic off the ends of the wire), a small screw driver, insulation tape	A pair of scissors may be used instead of a wire stripper A knife may be used instead of a screw driver

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 three things must an electric circuit have?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

An electric circuit must have a source of power, a pathway and an output component.

D ACCESSING INFORMATION

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

PARTS OF ELECTRICAL CIRCUITS

1. Electrical circuits are made up of many parts.
2. These parts are called **components**.
3. The cell is the source of energy for the circuit.
4. The wire connects the components.
5. This makes the pathway for the electrical energy to flow along.

2. Explain this to the learners as follows:
   a. Electrical circuits are made up of a number of components.
   b. For electricity to flow through a circuit, all the components must be connected with wire.
   c. If there is a switch, the switch must be on for the circuit to work.
   d. Show learners Resource 15: 'Components of an electrical circuit'.
   e. Explain each component to the learners.
3. Give learners 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 do we call the parts that make up an electrical circuit?
b. Which of these components is the source of energy for a circuit?

Answers to the checkpoint questions are as follows:

a. We call these components.
b. The cell will be the source of energy for a circuit.

E CONCEPTUAL DEVELOPMENT

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

ACTIVITY: MAKE A SIMPLE CIRCUIT

MAKE A SIMPLE CIRCUIT

You will need:
a 1,5V cell
electrical wire – about 40 cm
a light bulb
a light bulb holder
a wire stripper (to take the plastic off the ends of the wire)
a small screw driver
insulation tape

METHOD

1. Cut the wire into two equal lengths.
2. Remove about 1cm of plastic from each end.
3. Tape one end of a piece of wire to the positive (+) end of the cell.
4. Tape one end of the other piece of wire to the negative (-) end of the cell.
5. Join the two free ends of the wires to the bulb holder.
6. Either unscrew the screws a bit, or twist the wire around the screw and tighten, or tape the ends of the wire to the screws.
7. Observe what happens.
8. Take the one wire off the light bulb.
9. Observe what happens.
10. Tidy up the workspace.

2. Explain this to the learners as follows:
    a. This can be a teacher-led demonstration or put learners into groups of 4-6.
    b. Read through what is on the chalkboard.
    c. Make sure the learners understand what all the components and tools are.
    d. Hold up each component and name it.
    e. Explain how the tools work.
    f. Demonstrate the wire stripper.
    g. Read through the method, explaining each step carefully.
    h. Show learners Resource 14: 'A simple circuit'.
    i. Explain that the electrical energy flows from the positive end of the cell through the wire and the components and back to the negative end of the cell.
    j. The learners' circuit will not have a switch.
    k. One learner from each group must fetch the materials and tools.
    l. Learners must tidy up their workspace and return all the components and tools.
3. Write the following on the chalkboard (always try to do this before the lesson starts). Then ask the learners to answer the following questions:

TASK: A SIMPLE CIRCUIT

1. When the wires were all joined, did the light bulb glow?
2. Explain why this happened.
3. When the one wire was taken off the light bulb, did the light bulb glow?
4. Explain why this happened.

4. Give learners time to complete this task in their workbooks.
5. A model answer:

TASK: A SIMPLE CIRCUIT

1. *Yes, the bulb did glow.*
2. *Three things were present that were necessary for a circuit: a source of electrical energy, a pathway and an output component.*
3. *No, the light bulb stopped glowing.*
4. *The pathway was not complete.*

Checkpoint 2

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

a. What is a wire stripper used for?
b. What happens when the one wire is taken off the light bulb?

Answers to the checkpoint questions are as follows:

a. A wire stripper is used to take the plastic off the ends of the electrical wire.
b. The light bulb stops shining.

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
Study & Master	Energy and electricity	123-124
Viva	Energy and electricity	131
Platinum	Energy and electricity	131
Solutions for All	Energy and electricity	150-151
Day-by-Day	Energy and electricity	116
Oxford	Energy and electricity	95
Spot On	Energy and electricity	56
Top Class	Energy and electricity	89-90
Sasol Inzalo Bk B	Energy and electricity	32-34

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.wikihow.com/Make-a-Simple-Electrical-Circuit [Make a simple circuit]
2. https://goo.gl/vBtnLA (5min 37sec) [Simple circuit for kids]
3. https://goo.gl/TmvXiJ (2min 26sec) [Explaining an electrical circuit]

5 A

Term 3, Week 5, Lesson A
Lesson Title: Mains electricity
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Mains electricity
CAPS Page Number	40

Lesson Objectives

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

- define mains electricity
- describe the circuit from the power station to our homes and back
- understand the purpose of a substation.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	
6. Identifying problems & issues	✓	12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 16: From the power station to your home and back	

C CLASSROOM MANAGEMENT

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

Can you name an output component in an electrical circuit?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Any of the following: a light bulb, a buzzer, a motor.

D ACCESSING INFORMATION

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

MAINS ELECTRICITY

1. Electricity is **generated** at a power station.
2. This type of electricity is called mains electricity.
3. When the electricity is generated, it then travels through electrical cables to a substation.
4. These cables are held high above the ground by **pylons**.
5. A substation is where the strength of the electricity is changed.
6. From the substation, the electrical energy is transferred to an electrical box on a house.
7. The electrical energy goes to the wall sockets.
8. Appliances such as stoves, heaters, and lights are plugged into the sockets.
9. The electrical energy will travel through the appliance, back to the wall socket, through the substation and back to the power station.
10. The electrical energy has to travel in a circuit.

2. Explain this to the learners as follows:
   a. Electricity is generated (made) at a power station.
   b. It then travels along thick metal cables called transmission lines.
   c. These cables are held up by pylons.
   d. The electrical energy goes to a substation where the strength of the electricity is changed.
   e. This is to make it safe for houses to use.
   f. Electrical energy is used in homes and businesses and it then travels back to the power station.
   g. Show learners Resource 16: 'From the power station to your home and back'.
   h. Point out the circuit that electrical energy travels along from the power station to your home and back to the power station.
3. Give learners 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 do we call the structure that holds up electrical cables high above the ground?
b. What does a substation do?

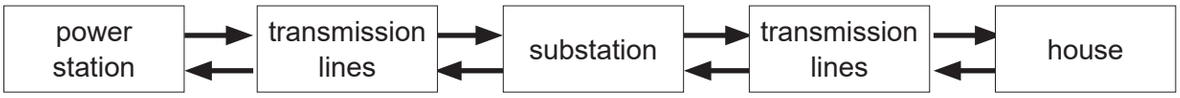
Answers to the checkpoint questions are as follows:

a. Pylons hold up electrical cables.
b. A substation changes the strength of the electrical energy.

E CONCEPTUAL DEVELOPMENT

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

THE MAINS ELECTRICITY CIRCUIT



2. Explain this to the learners as follows:
   a. Show learners Resource 16: 'From the power station to your home and back'.
   b. Point out the circuit (pathway) that the electrical energy travels along.
   c. Electrical energy starts at the power station, then travels along the transmission lines held up by pylons, to the substation, and then along more transmission lines to your home.
   d. The electrical energy then travels back along this path to the power station.
3. Give learners time to copy the flow diagram into their workbooks.

Checkpoint 2

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

a. What do we call the thick metal cables that electrical energy travels along?
b. What do we call the place where electrical energy is generated (made)?

Answers to the checkpoint questions are as follows:

a. These cables are called transmission lines.
b. Electrical energy is generated in a power station.

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
Study & Master	Mains electricity	124-125
Viva	Mains electricity	132-133
Platinum	Mains electricity	134-135
Solutions for All	Mains electricity	152-153
Day-by-Day	Mains electricity	117
Oxford	Mains electricity	96-97
Spot On	Mains electricity	57
Top Class	Mains electricity	91
Sasol Inzalo Bk B	Mains electricity	35

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.alliantenergykids.com/EnergyBasics/AllAboutElectricity/000416 [How electricity gets to your house]
2. https://goo.gl/kuQzLU [Energy transfers]
3. https://goo.gl/3PBP04 (5min 18sec) [Energy 101: Electricity generation]
4. https://goo.gl/DqTs7n (2min 12sec) [How a coal power station works]

5 B

Term 3, Week 5, Lesson B
Lesson Title:Source of energy for a power station
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Mains electricity
CAPS Page Number	40

Lesson Objectives

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

- describe what source of energy is used in our power stations
- describe the energy change that the power station generates.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	
6. Identifying problems & issues	✓	12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 17: A coal mine	

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 mains electricity generated?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Mains electricity is generated at a power station.

D ACCESSING INFORMATION

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

A SOURCE OF ENERGY FOR A POWER STATION

1. All power stations need a source of energy to generate electricity.
2. In South Africa, most of our power stations use coal.
3. South Africa has a good supply of coal.
4. Coal is mined from underground.
5. Coal is used in a power station to heat water.
6. This changes to **steam**.
7. The steam is used to turn the blades of a **turbine**.
8. A turbine is a giant fan.
9. When the turbine turns, it makes electricity.
10. Burning coal releases carbon dioxide into the air.
11. This pollutes the air.

2. Explain this to the learners as follows:
   a. Show learners Resource 17: A coal mine.
   b. South Africa has a good amount of coal to be mined.
   c. This makes it a good source of fuel to generate electricity.
   d. However, it creates a great deal of air pollution.
3. Give learners 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 do we use in South Africa as a source of fuel for the power stations?
b. What is a turbine?

Answers to the checkpoint questions are as follows:

a. We use coal as a source of fuel to generate electricity.
b. A turbine is a giant fan that is turned by steam.

E CONCEPTUAL DEVELOPMENT

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

TASK: COAL AS A SOURCES OF FUEL FOR POWER STATIONS

THE MAINS ELECTRICITY CIRCUIT

Copy and complete the following sentences by choosing a word from the list below. Underline the word you have chosen when rewriting the sentences.

pollution, coal, fan, carbon dioxide, steam, turbines

1. In South Africa, our power stations use ____ as a fuel.
2. Coal is burned to turn water into ____.
3. This steam is used to turn the ____.
4. The turbine is a big ____.
5. Burning coal releases ____ ____ into the air.
6. This causes air ____.

2. Explain this to the learners as follows:
   a. Learners must copy and complete the sentences in their workbooks.
   b. The chosen word must be underlined.
   c. Read through the list of words and the sentences before the learners start the task.
   d. When complete, go through the correct answers and discuss these with the learners.
3. Give learners time to complete this task in their workbooks.
4. A model answer

TASK: SOURCES OF FUEL FOR POWER STATIONS

1. *In South Africa, our power stations use coal as a fuel.*
2. *Coal is burned to turn water into steam.*
3. *This steam is used to turn the turbines.*
4. *The turbine is a big fan.*
5. *Burning coal releases carbon dioxide into the air.*
6. *This causes air pollution.*

Checkpoint 2

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

a. What does coal heat up in a power station?
b. What gas is released when coal is burned?

Answers to the checkpoint questions are as follows:

a. Coal heats up water to turn it into steam.
b. Coal releases carbon dioxide when it is burned.

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
Study & Master	Mains electricity	-
Viva	Mains electricity	133-134
Platinum	Mains electricity	135-136
Solutions for All	Mains electricity	154
Day-by-Day	Mains electricity	118
Oxford	Mains electricity	98
Spot On	Mains electricity	58
Top Class	Mains electricity	91
Sasol Inzalo Bk B	Mains electricity	35-36

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://goo.gl/NwfnkE [Mains electricity]
2. https://goo.gl/cN9yl5 (2mins 59sec) [Fossil fuels]
3. https://www.youtube.com/watch?v=IdPTuwKEfmA (7min 02sec) [How does a thermal power plant work?]

5 C

Term 3, Week 5, Lesson C
Lesson Title: How mains electricity gets into our homes / schools
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Mains electricity
CAPS Page Number	40

Lesson Objectives

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

- identify a wall socket
- describe what an appliance is
- describe the useful output energy of an appliance.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring	✓	10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 18: A wall socket and an appliance	

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 fuel do South African power stations use?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

South African power stations use coal as their fuel.

D ACCESSING INFORMATION

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

USING APPLICANCES

1. If a building is connected to mains electricity, it will have an electrical box.
2. This is where the transmission lines are connected from the substation.
3. There will be an electricity meter which will record the amount of electricity used.
4. In the building, the wires run through the ceiling and then down to the wall sockets.
5. When an appliance is plugged into a wall socket and the switches on the wall socket and the appliance are turned on, the appliance will work.
6. An appliance will change electrical energy into some form of useful energy.

2. Explain this to the learners as follows:
   a. Electrical energy is transferred from a substation to our homes and buildings.
   b. It goes through an electrical box, through wires to wall sockets.
   c. Appliances are plugged into wall sockets.
   d. When both the wall socket and the appliance are turned on, the electrical energy is changed into other useful energy such as heat or movement.
3. Give learners 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 measures the amount of electricity we use in our homes?
b. What is an electrical appliance plugged into so that it can work?

Answers to the checkpoint questions are as follows:

a. An electrical meter measures the electricity we use.
b. An electrical appliance is plugged into a wall socket.

E CONCEPTUAL DEVELOPMENT

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

TASK: HOW MUCH MAINS ELECTRICITY DO I USE EVERY DAY?

1. When an appliance is plugged into a wall socket, it is connected to mains electricity.
2. The appliance changes electrical energy into another useful energy, such as heat or movement.
3. Copy and complete the table below:

TABLE SHOWING USAGE OF MAINS ELECTRICITY

Appliance (heater, stove, etc.)	**Time in minutes**	**If electricity costs R1,25 per minute, find the cost.**

4. How much would it cost you per week to use these electrical goods?

2. Explain this to the learners as follows:
   a. Copy the table into your workbook.
   b. Learners must write down three appliances that they used the day before. These appliances must use mains electricity.
   c. Hot water from a geyser, stove, heater, hair dryer or anything else that plugs into a wall socket can be put into the table.
   d. Ask learners to write down how long they used mains electricity for.
   e. They must then calculate the cost by multiplying the minutes by R1, 25.
   f. This is not the actual cost of electricity, as this cost changes.
   g. Learners must answer Question 4 in their workbooks.
3. Give learners time to complete this task in their workbooks.
4. Model answer (answers will vary):

TASK: HOW MUCH MAINS ELECTRICITY DO I USE EVERY DAY?

Appliance (heater, stove, etc.)	**Time in minutes**	**If electricity costs R1,25 per minute, find the cost.**
heater	*60 minutes*	*R75*
stove	*15 minutes*	*R18,75*
hair dryer	*10 minutes*	*R12,50*

4. *It costs R106,25 per day so it would cost R743,75 per week*

Checkpoint 2

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

a. When does an appliance start to use mains electricity?
b. Is a hair dryer an electrical appliance? How do you know?

Answers to the checkpoint questions are as follows:

a. When an appliance is plugged into a wall and is switched on, it uses mains electricity.
b. Yes, a hair dryer is an electrical appliance as it is plugged into a wall socket.

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
Study & Master	Mains electricity	-
Viva	Mains electricity	-
Platinum	Mains electricity	134
Solutions for All	Mains electricity	153
Day-by-Day	Mains electricity	117
Oxford	Mains electricity	97
Spot On	Mains electricity	57
Top Class	Mains electricity	92
Sasol Inzalo Bk B	Mains electricity	37

G ADDITIONAL ACTIVITIES/ READING

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

N/A

6 A

Term 3, Week 6, Lesson A
Lesson Title: Path of mains electricity
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Mains electricity
CAPS Page Number	40

Lesson Objectives

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

- list in order the path of mains electricity
- describe the purposes of the parts that make up the path.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing	✓	9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying	✓	11. Doing Investigations		17. Communicating	✓
6. Identifying problems & issues		12. Recording Information			

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 16: From the power station to your house and back	
Resources 19-24: The National Grid	

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 do the transmission lines go to before electrical energy reaches a wall socket?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Transmission lines go into electrical boxes in buildings.

D ACCESSING INFORMATION

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

THE ELECTRICAL ENERGY PATH IN DETAIL

1. Electrical energy is generated at power stations, at 22 000 volts.
2. It then goes to a step-up transformer (a substation), where the voltage is raised to 400 000 volts.
3. This occurs so that the energy can travel along the power cables across the country.
4. Pylons hold up the cables.
5. The cables then go to a step-down transformer (a substation), where the voltage is lowered to 11 000 volts.
6. The electrical energy then travels along thinner wires on single poles.
7. A local transformer will step-down the voltage to 240 volts.
8. This then travels to our homes and businesses, and back again.
9. This is known as the National Grid.

2. Explain this to the learners as follows:
   a. In lesson 5A, the learners learnt about the path that electrical energy travels along.
   b. In this lesson, they will learn about step-up and step-down transformers.
   c. The voltages at each stage show the strength of electrical energy.
3. Give learners 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 voltage leaves the step-up transformer?
b. Why is the voltage raised to such a high level?

Answers to the checkpoint questions are as follows:

a. The step-up transformer sends out a voltage of 400 000 volts.
b. The voltage is raised so that electricity can travel along the cables across the country.

E CONCEPTUAL DEVELOPMENT

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

TASK: THE PATHWAY FOR MAINS ELECTRICITY

1. Match the following sentences to the correct pictures in Resources 19-24: 'The National Grid'.
2. Rewrite the sentences below in the correct order.
   a. The electrical energy travels along single poles.
   b. In a power station, a turbine spins to generate electricity.
   c. This substation has step-down transformers that lower the voltage to 11 000 volts.
   d. A local transformer steps the voltage down to 240 volts for use in our homes and buildings.
   e. The heavy power cables are carried by pylons across the country.
   f. This substation has step-up transformers that raise the voltage to 400 000 volts.

2. Explain this to the learners as follows:
   a. Show learners Resources 19 – 24: 'The National Grid'.
   b. Learners must look carefully at the pictures.
   c. Learners must also use what they wrote in their workbooks.
   d. Learners must put the sentences on the chalkboard in the correct order according to the National Grid.
   e. They must write the sentences in their correct order in their workbooks.
   f. When learners have finished this task, go through the model answer.
   g. Discuss the correct order with the learners.
3. Give learners time to complete this task in their workbooks.
4. Model answer

TASK: THE PATHWAY FOR MAINS ELECTRICITY

a. *In a power station, a turbine spins to generate electricity.*
b. *This substation has step-up transformers that raise the voltage to 400 000 volts.*
c. *The heavy power cables are carried by pylons across the country.*
d. *This substation has step-down transformers that lower the voltage to 11 000 volts.*
e. *The electrical energy travels along single poles.*
f. *A local transformer steps the voltage down to 240 volts for use in our homes and buildings.*

Checkpoint 2

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

a. What voltage is the electrical energy we use in our buildings in South Africa?
b. What do we call the place where voltage is either lowered or raised?

Answers to the checkpoint questions are as follows:

a. In South Africa, the voltage is 240 volts.
b. A substation is where voltages are lowered or raised.

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
Study & Master	Mains electricity	124
Viva	Mains electricity	134
Platinum	Mains electricity	136
Solutions for All	Mains electricity	153
Day-by-Day	Mains electricity	117
Oxford	Mains electricity	96-97
Spot On	Mains electricity	57
Top Class	Mains electricity	94
Sasol Inzalo Bk B	Mains electricity	37

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://goo.gl/553BpP [Energy transfers in the national grid]
2. https://goo.gl/NwfnkE [Mains electricity]

6 B

Term 3, Week 6, Lesson A
Lesson Title: Safety with electricity
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Mains electricity
CAPS Page Number	40

Lesson Objectives

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

- list some safety rules when working with electricity
- identify unsafe practices when working with electricity.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	✓
6. Identifying problems & issues		12. Recording Information			

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 25: A worn electrical cord	
Resource 26: An overloaded wall socket	
A shoe box or similar to represent the electric box with a mains switch Another box to represent the wall socket, the heater or the electric appliance. A blanket	

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 electricity voltage in our homes?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Our homes use 240 volts.

D ACCESSING INFORMATION

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

SAFETY WITH ELECTRICITY

1. Electricity can be very dangerous.
2. Mains electricity can cause your body to heat up and burn badly.
3. It can even kill you.
4. Never put your fingers or a metal object into a wall socket.
5. Do not overload sockets.
6. This can cause a fire.
7. Do not use an electrical appliance with wires that are exposed.
8. Do not use electrical appliances near water.
9. Water conducts electricity.
10. Do not play near electrical poles, wires or near a substation.

2. Explain this to the learners as follows:
    a. Electricity can kill.
    b. Be very careful when using electricity.
    c. Never put anything into a wall socket except an electrical plug.
    d. Overloading a wall socket can lead to a fire.
    e. Show learners Resource 25: 'A worn electric cord'.
    f. If the metal wire becomes exposed, you could get a shock from the mains electricity.
    g. If an appliance has exposed wires, ask an electrician to fix it.
    h. Show learners Resource 26: 'An overloaded wall socket'.
    i. Explain that this can cause a fire.
    j. Water is a good conductor of electricity.
    k. This means electricity will travel easily through it.
    l. Never use an electrical appliance in a bathroom or near water.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. Why should you not use an electrical appliance in a bathroom?
b. What could happen if you overload a wall socket?

Answers to the checkpoint questions are as follows:

a. Water is a good conductor of electricity, so you could get shocked.
b. A fire can start if you overload a wall socket.

E CONCEPTUAL DEVELOPMENT

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

WHAT TO DO IN AN EMERGENCY

1. If there is a problem with any electrical appliance or wires sparking, switch off the device or switch off the main switch at the electrical box.
2. Unplug the electrical appliance.
3. Get the wires fixed by an electrician.
4. If someone is being shocked by electrical energy, do not touch him or her.
5. If you do this, you will also get shocked.
6. Switch off the main switch in the electrical box.
7. Call an ambulance on 10111.
8. Do not pour water on a fire that is electrical.
9. To deal with an electrical fire, use sand or a dry chemical fire extinguisher.
10. Water is a good conductor of electricity.
11. If someone's clothes have caught alight from a fire, roll him or her up in a blanket.

2. Explain this to the learners as follows:
    a. Electrical energy can be very dangerous, and it can kill people.
    b. Knowing what to do when there is a problem can save people's lives.
    c. Go through the steps of what to do in an emergency.
3. ACTIVITY: ROLE PLAY AN EMERGENCY SITUATION

ACTIVITY: ROLE PLAY AN EMERGENCY SITUATION

1. Get learners to role play the following scenarios:
    a. A child has stuck her finger in a wall socket and is being shocked.
    b. A fire has started on an electrical heater.
    c. An electrical appliance is sparking.
    d. A person's clothing has caught alight from a fire.

4. Explain this to the learners as follows:
    a. Go outside with the learners.
    b. Find a shoe box or similar box and let this be the electric box.
    c. Find another box to represent the wall socket, the heater and the electric appliance.
    d. Find a blanket.
    e. Choose two learners for each scenario.
    f. Role play each scenario.
5. Model answer:

ACTIVITY: ROLE PLAY AN EMERGENCY SITUATION

Scenario a.: A child has stuck her finger in a wall socket and is being shocked

1. One learner must play the child and pretend to be shocked with fingers in a wall socket.
2. The second learner should go to the electrical mains box and switch the mains switch off.
3. Then someone should call the ambulance on 10111.

Scenario b.: A fire has started on an electrical heater

1. One learner needs to find sand.
2. Sand must be poured on the fire to put it out.
3. A second learner needs to switch off the mains switch at the electrical box.

Scenario c.: An electrical appliance is sparking

1. One learner must switch off the wall socket and unplug the appliance.
2. One learner must switch the mains switch off.

Scenario d.: A person's clothing has caught alight from a fire

1. One learner must play the role of the person whose clothes are alight.
2. A second learner must roll the first learner up in a blanket.
3. This stops the oxygen from getting to the flames.
4. Someone should call an ambulance on 10111.

Checkpoint 2

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

a. Where do you find the mains switch?
b. What is the phone number for an ambulance?

Answers to the checkpoint questions are as follows:

a. It is found in the electrical box.
b. To call an ambulance, phone 10111.

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
Study & Master	Mains electricity	127-129
Viva	Mains electricity	137-142
Platinum	Mains electricity	138-139
Solutions for All	Mains electricity	156-159
Day-by-Day	Mains electricity	119-120
Oxford	Mains electricity	99-101
Spot On	Mains electricity	59-61
Top Class	Mains electricity	95-97
Sasol Inzalo Bk B	Mains electricity	38-40

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.bchydro.com/safety-outages/electrical-safety/safety-at-home/safety-for-kids.html [Electrical safety for kids]
2. https://goo.gl/bVe9zW [Top 10 rules for electric safety]
3. https://goo.gl/Av8VKI (4min 26sec) [Kids safety]
4. https://goo.gl/X5i2if (3min 30sec] [Electrical safety tips]

TOPIC OVERVIEW:

Energy and movement

Term 3, Weeks 6C – 7B

A. TOPIC OVERVIEW

TERM 3, WEEKS 6C – 7B

- This topic runs for 1 week.
- It is presented over 3 lessons.
- This topic counts for 6% in the end-of-year exam.
- 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 4	GRADE 5	GRADE 6&7
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Energy around us: movement, heat, light, sound; energy is stored in sources such as food, wood, coal, oil, gas; energy is transferred from a source to where it is needed • Input and output energy: machines and appliances need an input energy to make them work; machines and appliances provide an output energy useful to us	• Elastic and springs: we can make things move using stretched or twisted elastic and compressed springs; describing how things work that use stretched elastic bands and compressed springs: aeroplanes, a catapult, a jack-in-a-box	• Potential and kinetic energy: potential energy; kinetic energy; potential and kinetic energy in systems • Energy transfer to surroundings: useful and 'wasted' energy

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	elastic	A material that returns quickly to its original shape after it has been bent or stretched
2.	compressed	Parts of something pushed or squeezed together
3.	propeller	Piece of equipment consisting of blades that swing around

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Understanding elastic energy is important as it leads to a better understanding of mechanical systems.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

6 C

Term 3, Week 6, Lesson C
Lesson Title: Elastic and Springs
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Make things move with elastic and springs
CAPS Page Number	41

Lesson Objectives

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

- describe how things move when using stretched or twisted elastic
- describe how things move when using compressed springs.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring		10. Planning Investigations	✓	16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Elastic bands, springs	

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 should you not use electrical appliances near water?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Water is a good conductor of electricity and, so you might get shocked by mains electricity.

D ACCESSING INFORMATION

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

MAKING THINGS MOVE USING ELASTICS AND SPRINGS

1. To make elastic move things, it needs to be twisted or stretched.
2. The **elastic** in a toy aeroplane is twisted.
3. When the elastic is released, the aeroplane will move.
4. The elastic in a catapult is stretched.
5. When the elastic is released, the catapult will shoot an object off the catapult.
6. To make a spring move things, it needs to be **compressed**.
7. When a compressed spring is released, it will make something move.

2. Explain this to the learners as follows:
   a. If you let go of an elastic band when stretched or twisted, it will move.
   b. The same thing happens when a spring is compressed (squashed) and released.
   c. The spring will move.
3. Give learners 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 must you do to an elastic band before it will move?
b. What must you do to a spring before it will move?

Answers to the checkpoint questions are as follows:

a. The elastic band must be twisted or stretched before it will move.
b. The spring must be compressed before it will move.

E CONCEPTUAL DEVELOPMENT

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

ACTIVITY: MAKE AN ELASTIC BAND AND A SPRING MOVE

YOU WILL NEED:

elastic bands

springs.

METHOD

1. Take an elastic band.
2. Stretch the elastic band between the two fore-fingers on each hand.
3. Let the elastic band go.
4. Observe what happens.
5. Take a spring.
6. Place the spring on a table.
7. Press the spring downwards.
8. Let the spring go.
9. Observe what happens.
10. Write down your observations in your workbook.

2. Explain this to the learners as follows:
   a. This can be a teacher-led demonstration or learners can be grouped into pairs.
   b. Tell learners to observe what happens when elastic bands are stretched and released.
   c. Tell learners to observe what happens when springs are compressed and released.
   d. Learners must write down their observations in their workbooks.Give learners time to complete this task in their workbooks.
3. Model answer

MAKE AN ELASTIC BAND AND A SPRING MOVE

My observations:

The elastic band was stretched between two fingers and released. The elastic band shot off – it moved very fast.

The spring was compressed on a table. When released, the spring shot up.

Checkpoint 2

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

a. What do we mean when we say a spring is compressed?
b. What happens when the spring is released?

Answers to the checkpoint questions are as follows:

a. A spring is compressed when it is squashed.
b. The spring will shoot up.

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
Study & Master	Energy and movement	130
Viva	Energy and movement	147
Platinum	Energy and movement	142-143
Solutions for All	Energy and movement	163
Day-by-Day	Energy and movement	123
Oxford	Energy and movement	102-103
Spot On	Energy and movement	62
Top Class	Energy and movement	99
Sasol Inzalo Bk B	Energy and movement	44

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.scienceworld.ca/resources/units/elastic-energy [Elastic energy]
2. https://goo.gl/t5Zyim (2min 24sec) [Elastic potential energy with the science geeks]
3. https://goo.gl/Cca5m9 (3min 44sec) [Potential and kinetic energy lesson for kids]

7 A

Term 3, Week 7, Lesson A
Lesson Title: Elastic and Springs
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Energy is stored
CAPS Page Number	41

Lesson Objectives

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

- describe how an elastic band that is twisted or stretched has stored energy
- describe how, when a spring is compressed, it has stored energy
- investigate stored energy in an elastic band.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing	✓	9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Elastic bands, a spring, a ruler	

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 must you do to a spring before it will move?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

A spring must be compressed before it will move.

D ACCESSING INFORMATION

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

STORED ENERGY IN ELASTIC BANDS AND SPRINGS

1. Food and fuels are forms of stored energy.
2. Cells and batteries are forms of stored energy.
3. When an elastic band is being stretched or twisted, it is being loaded with stored energy.
4. To give the elastic band more stored energy, it can be stretched or twisted more.
5. When a spring is compressed, it is being loaded with stored energy.

2. Explain this to the learners as follows:
   a. There are many types of stored energy such as food, cells/ batteries and fuels.
   b. An elastic band has stored energy when it is stretched or twisted.
   c. The more an elastic band is twisted or stretched, the more stored energy it will have.
   d. The more a spring is compressed, the more stored energy it will have.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. Name three things that have stored energy?
b. What must you do to an elastic band to give it more stored energy?

Answers to the checkpoint questions are as follows:

a. Food, fuels and cells/ batteries have stored energy.
b. An elastic band will have more stored energy if it is twisted or stretched more.

E CONCEPTUAL DEVELOPMENT

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

ACTIVITY: GIVING MORE STORED ENERGY TO ELASTIC BANDS AND SPRINGS

YOU WILL NEED:

elastic bands
a spring
a ruler.

METHOD

1. Take an elastic band.
2. Stretch the elastic band between two forefingers.
3. Get someone to measure the distance between your two forefingers.
4. Let it go.
5. Measure with a ruler how far the elastic band travelled.
6. Take the elastic band.
7. Stretch the elastic band another 2 cm.
8. Let it go.
9. Measure with a ruler how far the elastic band travelled.

Results of activity

Distance elastic band is stretched	**Distance elastic band moved**

2. Explain this to the learners as follows:
    a. We observed the movement of elastic bands and springs in the previous lesson.
    b. The more an elastic band is stretched, the more stored energy it will have.
    c. Learners must work in groups and perform this activity.
    d. Learners must record the results of the activity in their workbooks.
3. Model answer (Answers will vary):

Results of activity	
Distance elastic band is stretched	**Distance elastic band moved**
10 cm	*1 metre 20 cm*
12 cm	*1 metre 50 cm*

Checkpoint 2

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

a. Is the following statement true or false: An elastic band will have more stored energy when it is stretched the furthest?
b. When is a spring loaded with stored energy?

Answers to the checkpoint questions are as follows:

a. True
b. A spring is loaded with stored energy when it is compressed.

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
Study & Master	Energy and movement	130
Viva	Energy and movement	147-149
Platinum	Energy and movement	143
Solutions for All	Energy and movement	164-165
Day-by-Day	Energy and movement	124-125
Oxford	Energy and movement	103-104
Spot On	Energy and movement	62-63
Top Class	Energy and movement	99-100
Sasol Inzalo Bk B	Energy and movement	45-52

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://goo.gl/sFbN33 [Forces and elasticity]
2. https://goo.gl/SrWy8B [Potential energy]
3. https://goo.gl/n5Eq3C [Stretched rubber bands are loaded with potential energy]

7 B

Term 3, Week 7, Lesson B
Lesson Title: Movement energy
Time for lesson: 1½ hours

A POLICY AND OUTCOMES

Sub-Topic	Elastic and springs
CAPS Page Number	41

Lesson Objectives

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

- describe when an elastic band has the most stored energy
- describe when a spring has the most stored energy
- demonstrate an example of stored energy being converted into movement energy.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting	✓	14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring	✓	10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 27: A catapult	
Resource 28: A jack-in-a-box	
Resource 29: An elastic band powered aeroplane	
A catapult, a small stone	

C CLASSROOM MANAGEMENT

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

When does an elastic band have stored energy?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

An elastic band has stored energy when it is stretched or twisted.

D ACCESSING INFORMATION

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

MOVEMENT ENERGY

1. When an elastic band has been loaded with stored energy and the elastic band is released, the stored energy turns into movement energy.
2. When the elastic band on a catapult is stretched and fired, the stored energy turns into movement energy.
3. When released, the elastic band on a toy aeroplane will turn its **propeller**.
4. A jack-in-a-box will have stored energy when the box is closed.
5. This compresses the spring.
6. When the lid is opened, the stored energy changes into movement energy.

2. Explain this to the learners as follows:
   a. With elastic bands and springs, the stored energy is changed into movement energy.
   b. When an elastic band is stretch or twisted, it is loaded with stored energy.
   c. When it is released, this stored energy is changed into movement energy.

3. Explain the catapult to the learners as follows:
    a. Show learners Resource 27: 'A catapult'.
    b. When the elastic band is stretched and released, the stored energy is changed into movement energy.
    c. The stone in the catapult will fly out of the elastic band.
    d. The more the elastic band is stretched, the greater the stored energy and the more movement energy it will release.
4. Explain the elastic band powered aeroplane to the learners as follows:
    a. Show learners Resource 29: 'An elastic powered aeroplane'.
    b. When the elastic band is twisted and released, the stored energy is changed into movement energy.
    c. The propeller of the aeroplane will turn quickly and make the aeroplane fly.
    d. The more the elastic band is twisted, the greater the stored energy and the more movement energy it will release.
5. Explain the jack-in-a-box to the learners as follows:
    a. Show learners Resource 28: 'A jack-in-a-box'.
    b. A jack-in-a-box is a toy.
    c. When you open the lid of the box, the jack pops out on a spring.
    d. The spring is compressed, and when it is released it changes into movement energy.
6. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. How do you give an elastic-powered aeroplane movement energy?
b. What does a jack-in-a-box use to give it movement energy?

Answers to the checkpoint questions are as follows:

a. You twist the elastic band as far as it will go. When it is released, it changes stored energy into movement energy.
b. A jack-in-a-box will use a compressed spring to give it energy.

E CONCEPTUAL DEVELOPMENT

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

ACTIVITY: ESTIMATE HOW FAR A CATAPULT WILL FIRE A STONE

YOU WILL NEED:

a catapult

a small stone.

METHOD

1. Make a line on the ground and stand on this line.
2. Put a small stone in the catapult.
3. Pull the catapult back a small distance.
4. Fire the catapult.
5. Measure the distance the stone travels and record this information on the table.
6. Pull the catapult back a medium distance.
7. Fire the catapult.
8. Pull the catapult back as far as you can.
9. Fire the catapult.
10. Measure the distance the stone travels and record this information on the table.

Distance stone travelled	
Stored energy of catapult	**Distance stone travelled**
Elastic pulled back a small distance	
Elastic pulled back a medium distance	
Elastic pulled back to its full distance	

2. Explain this to the learners as follows:
   a. Learners must copy the table into their workbooks.
   b. This should be a teacher-led demonstration as it is dangerous.
   c. Tell learners about the safety aspect of a catapult.
   d. It can be used as a weapon and therefore needs to be treated carefully.
   e. Conduct the investigation as described on the chalkboard.
   f. Get learners to record the distances the stone travelled for each case.
3. A model answer (answers will vary greatly):

Distance stone travelled	
Stored energy of catapult	**Distance stone travelled**
Elastic pulled back a small distance	*1,25 m*
Elastic pulled back a medium distance	*1, 75 m*
Elastic pulled back to its full distance	*2,5 m*

Checkpoint 2

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

a. What does a catapult use as stored energy?
b. When will a catapult have its biggest stored energy?

Answers to the checkpoint questions are as follows:

a. A catapult uses a stretched elastic band as stored energy.
b. A catapult will have its greatest stored energy when the elastic band is pulled back as far as it will go.

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
Study & Master	Energy and movement	131-132
Viva	Energy and movement	149-151
Platinum	Energy and movement	144-147
Solutions for All	Energy and movement	166-171
Day-by-Day	Energy and movement	126
Oxford	Energy and movement	105-107
Spot On	Energy and movement	64-65
Top Class	Energy and movement	100-102
Sasol Inzalo Bk B	Energy and movement	44-52

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://goo.gl/e18Awm (5min 13sec) [How to make a rubber band plane out of paper]
2. https://goo.gl/KT98c8 (4min 47sec) [What is potential energy?]
3. https://goo.gl/g1Jy7w [Energy and movement]

TOPIC OVERVIEW:

Systems for moving things

Term 3, Weeks 7C – 9C

A. TOPIC OVERVIEW

Term 3, Weeks 7c – 9b

- This topic runs for 2 ½ weeks.
- It is presented over 7 lessons.
- This topic counts for 14% in the end-of-year exam.
- 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 4	GRADE 5	GRADE 6&7
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Energy around us, including movement • Machines need an input of energy to make them work • Machines provide an output energy useful to us	• Many vehicles are systems that use wheels and axles; identify different vehicles that have wheels and axles like prams, bicycles, motor bikes, cars, trucks • Wheels and axles help vehicles to move more easily • Make and evaluate wheels and axles	• Potential and kinetic energy: potential energy; kinetic energy; potential and kinetic energy in systems

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	systems	Two or more things working together
2.	friction	When one surface or object rubs against another
3.	vehicles	A vehicle is a machine used to transport people or goods
4.	spokes	The wire rods going from one side of a wheel to the centre
5.	rotate	To turn

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Many vehicles use wheels and axles to make them move. Prams, cars, trucks, motor bikes and bicycles all use wheels and axles. Gears are wheels with teeth and pulleys are wheels with grooves. Both gears and pulleys make work easier.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

7 C

Term 3, Week 7, Lesson C
Lesson Title: Wheels and axles
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Wheels and axles
CAPS Page Number	41

Lesson Objectives

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

- identify wheels and axles on different vehicles
- describe wheels and axles as a system

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

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	7. Raising Questions	✓	13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations		17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 30: Wheels and an axle	
Resource 31: A wheel barrow	
Resource 32: A bicycle	
Resource 33: A taxi	
Resource 34: A donkey cart	

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 type of energy does a compressed spring produce when it is released?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

A compressed spring releases movement energy when it is released.

D ACCESSING INFORMATION

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

WHEELS AND AXLES ARE SYSTEMS

1. A **system** is something that is made from two or more parts that work together.
2. Wheels and axles are a system used in **vehicles**.
3. Vehicles transport people and goods on land.
4. A wheel and axle make it easier to move a heavy load.
5. A wheel cannot work on its own.
6. An axle is needed to connect two wheels.
7. An axle is a rod going through the centre of the wheels.
8. An axle keeps the wheels in place.

2. Explain this to the learners as follows:
    a. Wheels and axles are a system as they are made from two or more parts that work together.
    b. Wheels need to be round to work smoothly.
    c. An axle is a rod that goes through the centre of the wheels.
    d. Show learners Resource 30: Wheels and an axle.
    e. These are train wheels with an axle going through the wheels centres.
3. Give learners 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 is a system?
b. What is an axle?

Answers to the checkpoint questions are as follows:

a. A system is made up of two or more parts that work together.
b. An axle is a rod that goes through the centre of wheels and connects them.

E CONCEPTUAL DEVELOPMENT

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

WHEELS AND AXLES MOVE VEHICLES

1. The wheels and axle of a cart are a system.
2. The wheels turn on the axle.
3. The axle is **attached** to the cart.
4. The axle holds the wheels in place.

2. Explain this to the learners as follows:
    a. Wheels need to be round (circular) in order to run smoothly.
    b. Wheels will not work without an axle holding them place.
    c. Axles also attach the wheel and axle system to the cart.
    d. Show learners Resource 34: A donkey cart.
    e. Point to the wheels and axle.
    f. Discuss how the wheels are round (circular).
    g. Point to the axle running through the centres of the wheels.
    h. Show how the axle attaches the wheels to the cart.
3. Discuss the following with the learners:
    a. Show learners Resource 31: A wheelbarrow.
    b. A wheelbarrow only has one wheel.
    c. It still needs an axle to attach the wheel to the wheelbarrow.
    d. The wheel turns on the axle.
    e. Show learners Resource 32: A bicycle.
    f. Show learners Resource 33: A taxi.

g. For both of these resources, point out the wheels and axle.
h. Discuss with the learners how the axle is attached to the vehicle.
i. Discuss with the learners how the wheel turns on the axle.

4. Activity: Wheels and Axles

ACTIVITY: WHEELS AND AXLES

Copy and complete the following sentences by using the words from the list below.

axle, round, wheel, one, centre

1. An ___ holds wheels in place.
2. The axle must go through the ____ of the wheel.
3. All wheels must be ____ in shape.
4. A wheelbarrow only has ___ axle.
5. A ____ turns on the axle.

5. Model answer:

ACTIVITY: WHEELS AND AXLES

1. *An axle holds wheels in place.*
2. *The axle must go through the centre of the wheel.*
3. *All wheels must be round in shape.*
4. *A wheelbarrow only has one axle.*
5. *A wheel turns on the axle.*

Checkpoint 2

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

1. How are wheels attached to a vehicle?
2. How are wheels connected to each other?

Answers to the checkpoint questions are as follows:

1. An axle attaches wheels to a vehicle.
2. An axle holds the wheels in place and connects them so they turn together.

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
Study & Master	Systems for moving things	133-134
Viva	Systems for moving things	152
Platinum	Systems for moving things	150-152
Solutions for All	Systems for moving things	176-177
Day-by-Day	Systems for moving things	129-131
Oxford	Systems for moving things	108
Spot On	Systems for moving things	66-67
Top Class	Systems for moving things	103-104
Sasol Inzalo Bk B	Systems for moving things	54-58

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://goo.gl/USXUIB (1min 42sec) [Wheel and axle – simple machines]
2. https://goo.gl/e4zHfm (2min 16sec) [Simple machines - the axle and wheel]
3. https://goo.gl/xz91YV (2min 57sec) [Simple machines: wheel and axle]

8 A

Term 3, Week 8, Lesson A
Lesson Title: Wheels and Axles
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	How wheels and axles work
CAPS Page Number	41

Lesson Objectives

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

- describe how wheels and axles help vehicles convert stored energy to movement energy
- describe the difference between solid wheels and wheels with spokes
- investigate the force of friction on objects
- describe the impact of friction on movement energy.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring	✓	10. Planning Investigations	✓	16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 30: Train wheels and an axle	
Resource 32: A bicycle	
Three pencils, a book	

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 holds wheels in their place?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

An axle holds wheels in their place.

D ACCESSING INFORMATION

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

WHEELS AND AXLES

1. A car or van travels fast.
2. The wheels of these vehicles will be turning fast.
3. For a vehicle to move, it needs an input energy.
4. The energy used in vehicles is a fuel called petrol or diesel.
5. This is stored energy.
6. The vehicle needs a system to change the stored energy into movement energy.
7. One of the systems consists of wheels and axles.
8. Wheels and axles are simple machines that change stored input energy into an output energy of movement.

2. Explain this to the learners as follows:
    a. A vehicle such as a car or taxi needs to move.
    b. The stored energy used in vehicles is a fuel called petrol or diesel.
    c. This input energy needs to be changed to movement energy.
    d. Movement energy will be the output energy.
    e. Wheels and axles form one of the systems that help the energy to change.
3. Give learners 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 is the stored input energy that vehicles use?
b. What energy is this changed to with the help of wheels and axles?

Answers to the checkpoint questions are as follows:

a. Vehicles use petrol or diesel as their input energy.
b. This energy is changed to movement energy.

E CONCEPTUAL DEVELOPMENT

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

WHEELS AND AXLES MAKE MOVEMENT EASIER

1. As a wheel turns, it makes the vehicle move.
2. Only a small part of the wheel touches the ground.
3. This makes it easier to move.
4. The type and size of the wheel is important.
5. Small wheels will turn faster.
6. Large wheels will turn more slowly and it will be more difficult to start them moving.
7. Wheels can be solid.
8. Train wheels are solid.
9. Wheels are made lighter by having **spokes**.
10. Bicycle wheels have spokes.

2. Explain this to the learners as follows:
    a. Wheels make movement easier as only a small part of the wheel touches the ground.
    b. Wheels can be solid or have spokes.
    c. Show learners Resource 30: ‘Train wheels and an axle’.
    d. These wheels are solid.
    e. Train wheels need to be strong and durable (last a long time).
    f. Show learners Resource 32: ‘A bicycle’.
    g. A bicycle’s wheels have spokes.
    h. The wheel is not solid.
    i. Bicycle wheels need to be light.

3. Write the following on the chalkboard (always try to do this before the lesson starts):
4. ACTIVITY: Investigate whether an object moves more easily on wheels

ACTIVITY: MOVE A BOOK ON WHEELS

YOU WILL NEED:

three pencils

a book.

METHOD

1. Place a book on your desk.
2. Push the book along the surface of the desk.
3. Feel how much effort you need to push the book.
4. Place three pencils apart from each other under the book.
5. Push the books again.
6. Feel how much effort you need to push the book with the 'wheels' under it.

5. Explain this to the learners as follows:
   a. Read through the activity with the learners.
   b. Put learners into pairs to do this activity.
   c. Let each learner feel the difference between pushing the book with and without 'wheels'.
   d. The pencils act as wheels.
6. After the activity, explain the following to the learners:
   a. The first time you pushed the book, the bottom of the book rubbed against the desk.
   b. This slowed down the movement.
   c. This is called friction.
   d. When the book was rolled with three pencils under it, a small part of the pencils touched the desk.
   e. There is less friction.
   f. This makes the book easier to move.
   g. This is how wheels help vehicles to move.

Checkpoint 2

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

a. Which turn faster: small wheels or large wheels?
b. Why does a bicycle wheel have spokes?

Answers to the checkpoint questions are as follows:

a. Small wheels will turn faster.
b. The spokes make the wheel much lighter, which is a requirement of bicycles.

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
Study & Master	Systems for moving things	134
Viva	Systems for moving things	154-159
Platinum	Systems for moving things	151
Solutions for All	Systems for moving things	176-177
Day-by-Day	Systems for moving things	130-131
Oxford	Systems for moving things	108
Spot On	Systems for moving things	66
Top Class	Systems for moving things	104-105
Sasol Inzalo Bk B	Systems for moving things	59-60

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.ducksters.com/science/friction.php [Friction]
2. https://goo.gl/lyyO0y (2min 21sec) [What is friction?]

8 B

Term 3, Week 8, Lesson B
Lesson Title: Wheels and Axles
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Invesitgate wheels and axles
CAPS Page Number	41

Lesson Objectives

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

- describe how wheels help a vehicle to move
- investigate whether the axle turns or not.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring	✓	10. Planning Investigations	✓	16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 31: A wheelbarrow	
Resource 32: A bicycle	
Waste materials to make two wheels (cardboard, coke cans, bottle tops, etc.) Waste materials to make an axle (dowel sticks, wooden pencils, straws) A pair of scissors Elastic bands	

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 will turn faster: small wheels or large wheels?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Small wheels will turn faster than large wheels.

D ACCESSING INFORMATION

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

FIXED AXLES

1. A fixed axle is one that does not turn.
2. The wheels **rotate** (turn) around the axle.
3. Most vehicles have a fixed axle and not a turning axle.
4. With a turning axle, the wheels will not turn.
5. The wheels move with the axle.
6. When turning, one wheel will be dragged.
7. With a fixed axle, the axle does not turn but the wheels turn.
8. When turning, the inside wheel will turn more slowly than the outside wheel.
9. A fixed axle is much better for vehicles as the wheels do not drag when turning.

2. Explain this to the learners as follows:
   a. A fixed axle works better than a turning axle.
   b. Wheels do not drag if a fixed axle is used.
   c. Show learners Resource 31: 'A wheelbarrow'.
   d. The wheelbarrow has a fixed axle.
   e. The axle does not turn but the wheels turn around the axle.
   f. Show learners Resource 32: 'A bicycle'.
   g. The bicycle has a fixed axle. .
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. With a fixed axle, what moves: the axle or the wheels?
b. Do most vehicles have a fixed axle or a moving axle?

Answers to the checkpoint questions are as follows:

a. With a fixed axle, the wheels move.
b. Most vehicles have a fixed axle.

E CONCEPTUAL DEVELOPMENT

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

MAKE WHEELS AND AN AXLE

YOU WILL NEED:

waste materials to make two wheels (bottle caps, coke cans, cardboard)
waste materials to make an axle (straws, dowel sticks, wooden pencils)
elastic bands
a pair of scissors.

METHOD

1. Make a hole in the middle of the wheels for the axle to fit through.
2. The wheels must fit tightly onto the axle.
3. If the wheels are loose, tie elastic bands over the axle inside the wheel.
4. When the wheels and axle have been made, roll your them on a flat surface.
5. Evaluate your set of wheels and axle by answering the following questions:
   a. Do the wheels turn smoothly?
   b. Do the wheels stay on the axle?
   c. How can you improve your set of wheels?

2. Explain this to the learners as follows:
    a. Put learners into pairs.
    b. Each group of learners must make a set of wheels on an axle.
    c. The axle must be fixed.
    d. Learners might need to use elastic bands to fix the wheels to the axle.
    e. Learners must then test their sets of wheels.
    f. The set of wheels must be evaluated.
    g. Improvements to the sets of wheels must be made.
    h. Test the sets of wheels again.
    i. Keep doing this until the sets of wheels run smoothly and straight.

Checkpoint 2

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

a. Which wheel will turn faster when turning: the inside wheel or the outside wheel?
b. What happens to wheels if a turning axle is used?

Answers to the checkpoint questions are as follows:

a. The outside wheel will turn faster when turning.
b. The wheels will drag when turning.

3. 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
Study & Master	Systems for moving things	-
Viva	Systems for moving things	154-159
Platinum	Systems for moving things	149; 152
Solutions for All	Systems for moving things	175; 178-179
Day-by-Day	Systems for moving things	132
Oxford	Systems for moving things	109
Spot On	Systems for moving things	67
Top Class	Systems for moving things	105-106
Sasol Inzalo Bk B	Systems for moving things	58-60

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=2vRiL_ygaG0 [Wheels and axle experiment]
2. http://www.instructables.com/id/Easy-Rubberband-Car/ [Easy rubber band car]

8 C

Term 3, Week 8, Lesson C
Lesson Title: Wheels and Axles
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Design a toy car
CAPS Page Number	41

Lesson Objectives

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

- write a design brief
- write specifications
- draw a labelled design for a toy car.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing	✓	15. Making/ constructing	✓
4. Measuring	✓	10. Planning Investigations	✓	16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

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:

Why does a fixed axle work better than a turning axle?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

The wheels do not drag on a fixed axle.

D ACCESSING INFORMATION

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

DESIGN A TOY CAR

DESIGN BRIEF

Design and build a toy car with two axles and four wheels. Compare your toy car with other groups by sending the cars down a ramp.

SPECIFICATIONS

Write down the following:

1. The materials to be used to make the toy car
2. The tools to be used
3. The materials needed to fix the axles to the toy car.

2. Explain this to the learners as follows:
    a. A Design Brief is a short sentence about what the learners are going to design and make.
    b. Ask learners to copy down the Design Brief in their workbooks.
    c. Put learners into pairs.
    d. Give them a few minutes to discuss their ideas for the design of a toy car.
    e. Specifications give more detail than the design brief, like the materials and tools required, how big the design will be, and who you are designing for, etc.
    f. Each learner must write down the specifications for this task.
3. Give learners 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 is a design brief?
b. What are specifications?

Answers to the checkpoint questions are as follows:

a. A design brief is a short sentence that tells you what you are going to design and make.
b. Specifications tell you in more detail about the design.

E CONCEPTUAL DEVELOPMENT

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

ACTIVITY: DRAW A DESIGN FOR A TOY CAR

1. In your workbooks, draw a labelled design for a toy car.
2. Your drawing should be about half-a- page in your workbook.
3. Give your drawing a heading.
4. Label all the materials you will be using.
5. Label the main parts of the toy car, such as wheels, axles, and chassis.
6. When designing your wheels and axles, put spacers between the body of the car and the wheels.
7. You can use an elastic band for this.
8. Also put an elastic band on the ends of the axles to stop the wheels from falling off.
9. These are called stoppers.
10. When you have finished designing your toy car, get together with your partner and decide whose design you are going to make.

2. Explain this to the learners as follows:
    a. The design of the toy car must be drawn in detail.
    b. The drawing must have a heading and be labelled.
    c. Learners must think about how they are going to make the wheels and axles. Learners will also need to think about the material to be used for the body of the car.
    d. The wheels should not touch the body of the car. This will slow the toy car down.

e. Wheels must not fall off the axle, so learners need to put something at the ends of each axle.

f. When learners have finished designing their toy car, they must get together with their partners and decide whose design they are going to choose.

Checkpoint 2

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

a. Why should the wheels not touch the body of the car?

b. Why do you need to make stoppers for the ends of each axle?

Answers to the checkpoint questions are as follows:

a. This will slow the toy car down.

b. Stoppers will stop the wheels from falling off the axles.

3. 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
Study & Master	Systems for moving things	135-136
Viva	Systems for moving things	160-162
Platinum	Systems for moving things	154-155
Solutions for All	Systems for moving things	182--185
Day-by-Day	Systems for moving things	133
Oxford	Systems for moving things	112-113
Spot On	Systems for moving things	70
Top Class	Systems for moving things	108-109
Sasol Inzalo Bk B	Systems for moving things	61-64

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=QzY9RH_JnL0 (1min 51sec) [How to make an air-powered car]
2. https://www.youtube.com/watch?v=jEErRzOzEdE (7min 55sec) [How to make a car using a plastic bottle]

9 A

Term 3, Week 9, Lesson A
Lesson Title: Wheels and Axles
Time for lesson: 1½ hours

A POLICY AND OUTCOMES

Sub-Topic	Make a toy car that can move
CAPS Page Number	41

Lesson Objectives

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

- select appropriate materials
- use a design to make a vehicle
- use tools safely
- gather the correct materials and tools.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	✓
3. Comparing		9. Hypothesizing		15. Making/ constructing	✓
4. Measuring		10. Planning Investigations	✓	16. Evaluating and improving products	
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	
6. Identifying problems & issues		12. Recording Information	✓		

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Materials for wheels: plastic or metal jar lids, bottle tops, corks, cotton reels, cardboard circles cut out Materials for axles: a skewer stick, a dowel stick, strong plastic drinking straws A sharp nail Sticky tape or glue A hammer A pair of scissors	

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 you need to place stoppers on an axle with wheels?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

Stoppers prevent the wheels from falling off the axle.

D ACCESSING INFORMATION

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

INSTRUCTIONS FOR MAKING A TOY CAR

MAKE THE MAIN BODY AND WHEELS

YOU WILL NEED:

material for the body of the car
material for the wheels
material for the axle
a nail
a hammer
sticky tape or glue
your chosen design.

METHOD

1. Take four wheels.
2. Mark two lines across each wheel.
3. Where the two lines cross is the centre of the circle.
4. Make a hole in the centre by hammering a nail into it.
5. Make sure the hole is big enough for the axle to fit through it.
6. Make two axles each with two wheels.
7. Fit the axles to the body of your car.
8. Tape or glue the wheels to the axles.
9. Test that the wheels turn smoothly.

2. Explain this to the learners as follows:
   a. Find waste material that can be used as wheels.
   b. The two wheels on each axle need to be the same size.
   c. Read through the instructions with the learners before they start the manufacturing process.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. How do you find the centre of a wheel?
b. If the wheels are taped to the axle, is the axle then fixed or turning?

Answers to the checkpoint questions are as follows:

a. Draw two lines across the wheel, and the place where they cross will be the centre.
b. The axle is a turning axle.

E CONCEPTUAL DEVELOPMENT

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

ACTIVITY: MAKE THE TOY CAR

1. Gather all the tools and materials needed to make the toy car.
2. If necessary, improve the design of the car while you make it.
3. Work safely: do not run, point the pair of scissors downwards, and pay attention to what you are doing.
4. Tidy up your work space when you are finished.

2. Explain this to the learners as follows:
   a. One learner from each team must gather the tools and materials needed.
   b. Learners must work safely.
   c. Learners must tidy up their workspace when they are finished.

Checkpoint 2

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

a. Give one safety working rule?
b. What should you do before you start making your toy car?

Answers to the checkpoint questions are as follows:

a. Any of: do not run, point a pair of scissors downwards, or pay careful attention to what you are doing.
b. You should first gather all tools and materials.

3. 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
Study & Master	Systems for moving things	135-137
Viva	Systems for moving things	161-163
Platinum	Systems for moving things	-
Solutions for All	Systems for moving things	186-189
Day-by-Day	Systems for moving things	133-134
Oxford	Systems for moving things	113
Spot On	Systems for moving things	68-70
Top Class	Systems for moving things	106-109
Sasol Inzalo Bk B	Systems for moving things	61-67

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://goo.gl/cfzf4O (6min 45sec) [Cereal Box rubber band car]
2. https://inventorsoftomorrow.com/2016/10/25/wheels-and-axles-2/ [Wheels and axles]

9 B

Term 3, Week 9, Lesson B
Lesson Title: Wheels and Axles
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Testing the toy car
CAPS Page Number	41

Lesson Objectives

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

- test a toy car
- describe a fair test.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	✓
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	
6. Identifying problems & issues	✓	12. Recording Information	✓		

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:

What is a Design Brief?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

A Design Brief is a short sentence describing what you must design and make.

D ACCESSING INFORMATION

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

A FAIR TEST

1. A fair test occurs when no-one receives an advantage.
2. To test the toy cars, each toy car needs to go down the same ramp.
3. Each toy car needs to start from the same position.

2. Explain this to the learners as follows:
   a. Read through what is written on the chalkboard.
   b. Discuss what a fair test is with the learners.
3. Give learners 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 is a fair test?
b. What must happen for the toy cars to be given a fair test?

Answers to the checkpoint questions are as follows:

a. A fair test occurs when no-one receives an advantage.
b. The toy cars must use the same ramp and have the same starting position.

E CONCEPTUAL DEVELOPMENT

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

TEST THE TOY CAR

1. Find a ramp somewhere at your school.
2. A ramp is a slope made of man-made material like cement.
3. The ramp must be smooth.
4. Place two toy cars at the top of the ramp.
5. A member of each team holds the toy car in place.
6. The teacher counts down from five.
7. The members let the cars go.
8. Each toy car should have a first attempt to see which car can go the furthest.
9. Adjust your toy car if necessary.
10. Check to see:
    a. Are the wheels straight?
    b. Do the wheels turn smoothly on the axle?
    c. How fast does the car go?
11. Decide who the winner is of the two cars.
12. The next two cars do the same.
13. At the end, the winners of each race will race against each other until there is one winner.
14. This car and team will be named the winners!

2. Explain this to the learners as follows:
    a. Find a suitable ramp in the school.
    b. Otherwise, raise one side of a table by using bricks or books.
    c. Make sure a team member catches the cars at the other end of the table.
    d. Two cars will race against each other.
    e. See which car will go the fastest.
    f. Winners will play against winners until there is one final winner.
    g. Read through the process on the chalkboard.

Checkpoint 2

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

a. What is a ramp?
b. Why must the toy cars start from the same place?

Answers to the checkpoint questions are as follows:

a. A ramp is a slope.
b. This is so each car has no advantage.

3. 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
Study & Master	Systems for moving things	137
Viva	Systems for moving things	163
Platinum	Systems for moving things	154-155
Solutions for All	Systems for moving things	-
Day-by-Day	Systems for moving things	133
Oxford	Systems for moving things	114-155
Spot On	Systems for moving things	70
Top Class	Systems for moving things	109
Sasol Inzalo Bk B	Systems for moving things	66-67

G ADDITIONAL ACTIVITIES/ READING

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

N/A

9 C

Term 3, Week 9, Lesson C
Lesson Title: Evaluate the vehicle
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Wheels and axles
CAPS Page Number	41

Lesson Objectives

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

- evaluate their toy car according to certain criteria
- make improvements to their toy car according to the evaluation.

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

SCIENCE PROCESS SKILLS					
1. Accessing & recalling Information	✓	7. Raising Questions		13. Interpreting Information	✓
2. Observing		8. Predicting		14. Designing	
3. Comparing		9. Hypothesizing		15. Making/ constructing	
4. Measuring		10. Planning Investigations		16. Evaluating and improving products	✓
5. Sorting & Classifying		11. Doing Investigations	✓	17. Communicating	✓
6. Identifying problems & issues	✓	12. Recording Information	✓		

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:

Why must the wheels on an axle be straight?

3. Learners should enter the classroom, then discuss the question with the teacher and answer it in their workbooks.
4. Discuss their answers with the learners.
5. Write the model answer onto the chalkboard.

If the wheels are not straight, the car will not run properly, if at all.

D ACCESSING INFORMATION

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

EVALUATION

1. To evaluate a product means to examine what is good and what could be improved.
2. You should also evaluate how you worked on making the product.
3. This will help you to improve and get better at designing and making.
4. Before a product is evaluated, you must remind yourself what the purpose of the product was in the first place.
5. Read through the Design Brief and Specifications to do this.

2. Explain this to the learners as follows:
   a. Evaluating a product is a very important step in the process of making and designing a product.
   b. Evaluation helps us to look critically both at how we worked and at the product.
   c. This process will enable you to improve the design and manufacture of future products.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

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

a. Give a reason why evaluation is important?
b. What must you do before you start the evaluation?

Answers to the checkpoint questions are as follows:

a. Either of the following: it makes us look at what can be improved; it makes us look at how we worked so that we can do better next time.
b. You must look at the Design Brief and Specifications to remind yourself of the purpose of designing and making the product.

E CONCEPTUAL DEVELOPMENT

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

EVALUATE THE TOY CAR

1. Complete and copy the table below:

Criteria	**Rating: 1 – 5:** **1 is excellent** **5 is poor**	**Comment: suggest improvements**
Do the wheels of the car turn easily?		
Does your car travel in a straight line?		
Is the body of the car made well?		
Are the wheels and axles made so that the wheels keep straight and do not fall off?		

2. Explain this to the learners as follows:
   a. Give learners time to discuss the evaluation and complete the table.
   b. Learners must copy and complete the table in their workbooks.
   c. The table must have a heading.
   d. They must work together with the team that designed and built the car.
3. Model answer (answers will vary)

EVALUATE THE TOY CAR

Criteria	Rating: 1 – 5: 1 is excellent 5 is poor	Comment: suggest improvements
Do the wheels of the car turn easily?	*4*	*The wheels could be kept straighter by putting the stopper and spacer closer together.*
Does your car travel in a straight line?	*4*	*It was quite straight. With the wheels being kept straighter, the car should travel better.*
Is the body of the car made well?	*5*	*It is sturdy and well-made.*
Are the wheels and axles made so that the wheels keep straight and do not fall off?	*3*	*The stoppers did not stay on the axles – two fell off. We need to glue the stoppers on more effectively and test them*

Checkpoint 2

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

a. What is the purpose of the stopper on an axle?
b. Why must the body of the car be well made?

Answers to the checkpoint questions are as follows:

a. The stopper stops the wheels from falling off the axles.
b. The body of the car must be well made so that it does not collapse when it is going down the ramp.

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
Study & Master	Systems for moving things	137
Viva	Systems for moving things	163
Platinum	Systems for moving things	157
Solutions for All	Systems for moving things	190
Day-by-Day	Systems for moving things	133
Oxford	Systems for moving things	115
Spot On	Systems for moving things	70
Top Class	Systems for moving things	109
Sasol Inzalo Bk B	Systems for moving things	67

G ADDITIONAL ACTIVITIES/ READING

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

N/A

NATURAL SCIENCES & TECHNOLOGY

ASSESSMENT GRADE 5 TERM 3

GRADE 5 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 tasks, tests and examinations.

   i. ***Tests and Examinations***

   Examinations must include questions on both Natural Sciences and Technology. 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 Tasks***

   Practical tasks give learners the opportunity to demonstrate knowledge, skills and understanding. Practical tasks form part of the activities included in these lesson plans. Each term, one practical task has been selected for assessment. A rubric is provided to conduct the assessment.

A minimum mark allocation is prescribed in CAPS for tests, practical tasks and examinations for each grade. For this grade, these are summarised in the table below:

GRADE 5 ASSESSMENT

Grade 5						
Programme of Formal Assessment						
Formal Asessments	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**TOTAL MARKS FOR THE YEAR**	**TOTAL**
School-based assessments	1 test [15 marks] 1 selected practical task [15 marks]	1 exam or test on work from terms 1 & 2 [45 marks] 1 selected practical task [15 marks]	1 test [15 marks] 1 selected practical task [15 marks]	1 selected practical task [15 marks]	135 marks	Together make up 75% of the total marks of the year
Exams **[60 minutes]**				Exam on work from terms 3 & 4 [45 marks]	45 marks	Makes up 25% of the total marks of the year
Number of formal assessments	2	2	2	2	Total 8 assessments [180 marks]	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.

A Test

The test included will need to be copied onto the chalkboard for learners to complete. There is also a test 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 & Technology
Grade 5
Practical Task
Term 3

15 Marks
Time allocation:
40 minutes (15 minutes preparation, 25 minutes task time)

NOTES TO THE TEACHER

1. This practical activity will be completed as part of Section E of lesson 3A.
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 for the learners.
6. The memo for assessing the practical task is provided.
7. The learners will be working in groups and will need the following items for each group to complete the tasks:
    - Three glass bottles or glasses of different sizes: small, medium and large
    - Four candles
    - Four saucers or bottle lids
    - Matches
    - A cellphone timer, clock or a watch
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 complete the drawings with a sharp pencil and the written answers should be completed in pen.

Grade 5
Natural Sciences & Technology
Term 3
Practical Task

Memorandum

(see Section E of Lesson 3A for instructions and questions)

<table>
<tr><th>CAPS Topic</th><th>Task</th><th>Expected answer/outcome</th><th>Marks</th></tr>
<tr><td></td><td>1</td><td></td><td></td></tr>
<tr><td>Stored energy in fuels</td><td>1.1</td><td>Answers will vary ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>1.2</td><td>Flame from match ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>1.3</td><td>Wax from candle ✓</td><td>1</td></tr>
<tr><td></td><td>2</td><td></td><td></td></tr>
<tr><td>Stored energy in fuels</td><td>2.1</td><td><table><tr><td>JAR</td><td>ESTIMATED TIME</td><td>ACTUAL TIME</td></tr><tr><td>Small</td><td></td><td></td></tr><tr><td>Medium</td><td></td><td></td></tr><tr><td>Large</td><td></td><td></td></tr></table>(Note: One mark can be given if all estimated times are recorded; ✓ and one mark if all actual times are recorded). ✓</td><td>2</td></tr>
<tr><td>Stored energy in fuels</td><td>2.2</td><td>The flame starts to flicker and eventually goes out. ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.3</td><td>Answers will vary, e.g.: no air, no oxygen ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.4</td><td>Fuel, oxygen and heat ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.5</td><td>Answers will vary – should link air/oxygen to life of flame ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.6</td><td>The candle under the smaller jar ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.7</td><td>There was less air and so less oxygen filling the space in the smaller jar ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.8</td><td>The candle under the largest jar ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.9</td><td>The jar is larger and so holds more air and so has more oxygen that is needed for the candle to burn. ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.10</td><td>The candle that was not covered ✓</td><td>1</td></tr>
<tr><td>Stored energy in fuels</td><td>2.11</td><td>The candle still has fuel, oxygen and heat ✓</td><td>1</td></tr>
<tr><td></td><td></td><td></td><td>TOTAL 15</td></tr>
</table>

Grade 5
Natural Sciences & Technology
Term 3
Test

15 Marks
30 Minutes

NOTE TO THE TEACHER:

If possible, photocopy this test for each learner. If this is not possible, write the test 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 of the following is an example of a liquid fuel?

a. gas

b. petrol

c. wood

d. coal

You have answered correctly if you have circled (B)

Question 1: Multiple choice [3]

1.1. Which one of these is NOT needed for a fire to burn?

a. oxygen

b. heat source

c. fuel

d. CO^2

1.2. Which of these statements is FALSE?

a. Fuels store energy

b. Energy cannot be stored

c. Electricity is a type of energy

d. When fuels are burnt they give off heat, light and/or movement energy

1.3. What is the voltage of electricity at the time it reaches our homes?

a. 22 000 volts

b. 120 volts

c. 240 volts

d. 400 000 volts

QUESTION 2 [3]

Write the one word that means the same as the sentence:

2.1. High structures built to hold electrical cables off the ground.

_____

2.2. A rapid burning or chemical change that produces heat and light.

_____

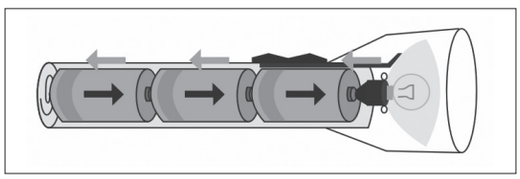
2.3. The rod going through the centre of a wheel which allows it to turn.

_____

QUESTION 3 [3]

(Note to educator: Use diagram below or use Resource13)

Look at the diagram of the torch below:



3.1. What is the energy source in this torch?

_____

3.2. Name the output component ot the torch.

_____

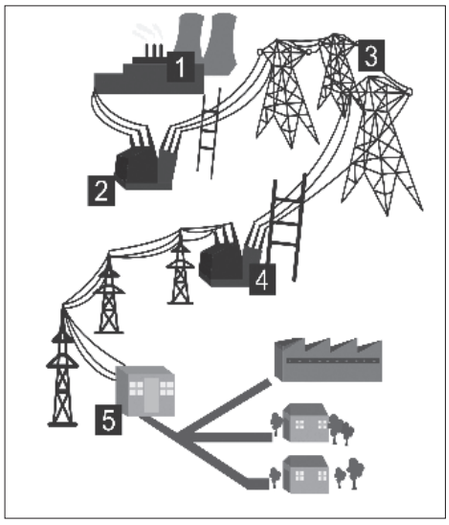
3.3. What is the output energy of the torch?

_____

Question 4 [6]

(Note to educator: Use diagram below or use Resources 19-24)

Study the diagram below:



4.1. This is a diagram of the National Grid. Who is the main supplier of electricity to our National Grid?

_____

4.2. What is the building represented at point 1?

_____

4.3. Explain, using the words below, how electricity is generated at a coal power station.

Coal, water, steam, fan, turbine, energy, electricity

_____

_____

_____

4.4. Do you think coal is a good way to generate electricity? Give a reason for your answer.

_____

TOTAL: [15]

Grade 5

Natural Sciences & Technology

Term 3

Test

Memorandum

CAPS Topic	Questions	Expected answer(s)	Marks
	1		
Stored energy in fuels	1.1	D ✓	1
Sored energy and fuels	1.2	B ✓	1
Energy and electricity	1.3	C ✓	1
	2.		
Energy and electricity	2.1	pylons ✓	1
Stored energy in fuels	2.2	combustion ✓	1
Systems for moving things	2.3	axle ✓	1
	3.		
Energy and electricity	3.1	batteries ✓	1
Energy and electricity	3.2	lightbulb ✓	1
Energy and electricity	3.3	light ✓	1
	4.		
Energy and electricity	4.1	ESKOM ✓	1
Energy and electricity	4.2	Power station ✓	1
	4.3	Steam is generated by heating water using coal ✓ The steam is used to turn the blades of a giant fan called a turbine ✓ This turbine generates electrical energy ✓	3
Energy and electricity	4.3	(Answers may vary) No. Coal is not a renewable resource. It generates a lot of pollution. ✓	1
			TOTAL 15