Interesting Science fact #4

The average human body carries ten times more bacterial cells than human cells.

NATURAL SCIENCES

LESSON PLAN

GRADE 7 TERM 2

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.

The NECT has successfully brought together groups of people interested in education to work together 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 scale-up process. NECT has already begun this scale-up process in its Universalisation Programme and in its Provincialisation Programme.

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

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

www.nect.org.za

CONTENTS

PROGRAMME ORIENTATION

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

- A full set of lesson plans for the term (3 X 1 hour lessons per week)
- A Resourcepack with images to support the lesson plans
- A full colour poster
- An outline of the assessment requirements for the term
- A tracker to help you monitor your progress

Lesson Plan Structure

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

   3 x 1 hour

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

Lesson Plan Contents

1. The lesson plan starts with a **CONTENTS PAGE** that lists all the topics for the term, together with a breakdown of the lessons for that topic. You will notice that lessons are named by the week and lesson number, for example, Week 8 Lesson 8C.
2. Every topic begins with a 2 - 4 page **TOPIC OVERVIEW**. The topic overview pages are grey, making them easy to identify. The topic overview can be used to introduce the topic to learners. The topic overview includes:

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

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

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

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

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

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

b. ***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.

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

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

b. ***Possible Resources****.* Here, you will see the resources that you should ideally have for the lesson. If you need to use the poster or pages from the Resourcepack, 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 roucane.

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 Resourcefor 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 ResourcePACK.** You will have seen that the *Possible Resource*s ection in the lesson plan will let you know which resources you will need to use in a lesson.

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

   - WriTING your name on all resources
   - Sticking Resources onto cardboard or paper
   - LaminaTING all resources, or covering them in contact paper
   - Filing the Resourcepapers in plastic sleeves once you have completed a topic

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

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

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

Lesson Plan Roucane

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

Remember, every Natural Sciences lesson follows this roucane:

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

CAPS AND THE LESSON PLANS

A vehicle to implement CAPS

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

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

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

Content and Time Allocation

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

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

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

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

PROGRAMME ORIENTATION

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

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

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

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

REFLECTING ON THE LESSONS THAT YOU TEACH

It is important to reflect on your teaching. Through reflection, we become aware of what is working and what is not, what we need to change and what we do not. Reflecing 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 teach – 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 checkpoint 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 checkpoint 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:
Properties of materials
Term 2, Weeks 1A – 2C

A. TOPIC OVERVIEW

Term 2, Weeks 1a – 2c

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

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

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

B. SEQUENTIAL TABLE

GRADE 6	GRADE 7	GRADE 8
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Solids, liquids and gases	• Physical properties of materials determine their suitability for a particular use such as: strength; flexibility; boiling and melting points; electrical conductivity, heat conductivity • Temperature at which liquid starts boiling • Factors taken into account when using materials • Environmental impact	• Atoms as the building blocks of matter • Sub-atomic particles

C. SCIENTIFIC VOCABULARY

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

	TERM	EXPLANATION
1.	matter	Matter is the term for anything that has mass and takes up space.

2.	physical properties	The physical property is the way in which a material or substance behaves when put through a change. It is also anything that tells us what a material looks like.
3.	flexible	Able to bend easily without breaking
4.	boiling point	The point at which a material changes from a liquid to a gas
5.	melting point	The point at which a material changes from a solid to a liquid
6.	fabric	Cloth or material used to make clothes
7.	rigid	Unable to bend or be forced out of shape
8.	compressive strength	The strength of an object that stops it from being crushed, or changing shape when it is pushed or squeezed
9.	tensile strength	The strength of an object that stops it from breaking apart when it is pulled apart
10.	impact	To have a major effect
11.	conductivity	How easily a material lets heat or electricity flow through it
12.	insulator	A substance that does not allow the flow of heat or electricity
13.	greenhouse gas	A gas like carbon dioxide that traps heat in the atmosphere
14.	biodegradable	Can be broken down by bacteria
15.	thermal	Related to producing or using heat

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Materials are a part of everyday life, and knowing their properties is important for us to understand their functionality and uses. Engineers and scientists use this knowledge to make informed choices.

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 2, Week 1, Lesson A
Lesson Title: Physical properties of materials
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Strength and flexibility
CAPS Page Number	22

Lesson Objectives

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

- define the physical properties of a material
- list the physical properties a material could have
- define compressive strength, tensile strength and flexibility
- investigate and compare the strength of materials.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Squares (20cm x 20cm) of: exercise book paper, shopping bag plastic, tinfoil, fabric, thin cardboard, newspaper	
Six paper clips bent into hooks	
Sticky tape	
A piece of string approximately 15cm long or an elastic band	
A one litre bottle	
A measuring jug	
A two-litre bottle of 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:

Is the ability to roll your tongue an inherited variation or a variation caused by the environment?

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

Inherited variation

D ACCESSING INFORMATION

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

PHYSICAL PROPERTIES OF MATERIALS

1. Everything around us is made of matter.
2. Matter takes up space and has mass. It can be a liquid, solid or gas.
3. Materials are substances we use to make things or do things with.
4. Materials can be natural like wood, or man-made like plastic.
5. We choose materials for certain uses, depending on their physical properties.

6. Physical properties include:
   a. Strength - how strong it is
   b. Flexibility - how easily it bends
   c. Melting point - the temperature at which the material changes from a solid to a liquid
   d. Boiling point - the temperature at which a material changes from a liquid to a gas
   e. Electrical conductivity - how easily the material lets electricity flow through it
   f. Heat conductivity - how easily the material allows heat to move through it

STRENGTH AND FLEXIBILITY

1. Materials can have strength in different ways.
2. Concrete is a very strong material that does not change shape easily.
3. It is not easy to crush.
4. We say it has compressive strength.
5. Steel is strong in a different way.
6. It can resist being stretched.
7. We say steel has tensile strength.
8. Flexibility is a measure of how easy it is to bend a material.
9. Fabric for clothing is an example of a flexible material.

2. Explain this to the learners as follows:
   a. You should have learnt in previous grades that everything around us is made up of matter.
   b. Matter takes up space and has mass.
3. Ask the learners if they can remember the three states matter can be found in?
   (Answer: Solid, liquid and gas)
4. Continue to explain:
   a. Materials are substances we use to make things or do things with.
   b. These materials can be natural like wood, or man-made like plastic.
   c. When choosing which materials to use, we need to look at their suitability.
   d. When choosing materials to make a mattress, we would choose sponge and not concrete.
   e. The suitability of the materials for use will depend on their **physical properties**.
   f. A physical property can be something as simple as colour.
   g. Other physical properties are:
      - **Strength**
      - **Flexibility**
      - **Boiling point**
      - **Melting point**
      - **Conductivity**

5. Tell the learners that we are going to look at strength and flexibility in this lesson.
6. Ask the learners if they can give you an example of something that is built using concrete and steel?

   (Possible answer: Bridges, buildings)
7. Explain to the learners:
   a. Concrete and steel are both very strong materials but they are strong in different ways.
   b. Steel can resist being stretched. It can resist pressure so that it does not crack or break.
   c. We say steel has **tensile** strength.
   d. Concrete does not change shape easily once it is hard, and it is not easy to crush.
   e. We say concrete has **compressive** strength.
   f. When used together in buildings, concrete and steel make very strong structures.
7. Ask the learners if they can think of any other materials that may have compressive strength?

   (Possible answers: Rocks, bricks)
8. Explain to the learners:
   a. Flexibility can be another physical property of materials.
   b. If something can bend without breaking, we say it is **flexible**.
   c. Rubber, soft plastics and **fabrics** are examples of flexible materials.
9. Read through the information written on the chalkboard with the learners.
10. Ask the learners if they have any questions.
11. Tell the learners to copy the information written on the chalkboard into their workbooks.
12. Give the learners some time to complete this task.

Checkpoint 1

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

a. What is matter?
b. What are the physical properties of materials?

Answers to the checkpoint questions are as follows:

a. Matter is anything that takes up space and has mass.
b. The physical properties of materials are the ways in which a material acts, or what the material is like.

E CONCEPTUAL DEVELOPMENT

1. Explain to the learners:
   a. Paper, soft plastic, tinfoil and fabric are all examples of flexible materials.
   b. Remember if something is flexible, it means it will bend.
   c. Some flexible materials are stronger than others.
   d. Today we are going to do a test on some flexible materials to see which is the strongest.
2. Write the following on the chalkboard (always try to do this before the lesson starts):

AIM

In this investigation, we will compare the STRENGTH of six FLEXIBLE materials.

YOU NEED:

- Squares (20cm x 20cm) of: exercise book paper, shopping bag plastic, tinfoil, fabric, thin cardboard, newspaper
- Six paperclips bent into hooks
- Sticky tape
- A piece of string approximately 15cm long, or an elastic band
- A one litre bottle
- A measuring jug
- A two litre bottle of water

METHOD

1. Tape each square to the edge of a table or window sill.
2. Hook the paperclip through each square at the same distance from the edge.
3. Tie the string or elastic around the neck of the 1 litre bottle so that you have a loop to hang it with.
4. Hang the bottle on the hook on the first piece of material.
5. Pour 250ml of water into the bottle.
6. If the material holds, add another 250ml.
7. Continue until either the material breaks/ tears or the bottle is full.
8. Repeat the test for each square,
9. Write your results in a table like the one below:

MATERIAL	How much water it could hold before tearing
Exercise book	
Shopping bag plastic	
Tinfoil	
Fabric	
Thin cardboard	
Newspaper	

CONCLUSION

1. Which of these flexible materials was the weakest?
2. Which of these flexible materials was the strongest?
3. Which of these materials stretched the most?

(The above investigation can be done by the learners in groups, if you have enough material, or as a demonstration by the teacher.)

3. Read through the investigation written on the chalkboard with the learners.
4. Tell the learners to copy the table on the chalkboard into their workbooks so that they can record the results.
5. Either demonstrate the investigation to the learners, or have the learners do the investigation in groups.
6. Once the investigation is complete, have the learners write the answers to the questions in their workbooks.
7. Allow the learners some time to complete this task.
8. With the learners' input, complete the model answer on the chalkboard. Your results may be different depending on the quality of the materials used.

CONCLUSION

a. The tinfoil was the weakest.

b. The fabric was the strongest.

c. The plastic bag stretched the most.

9. Discuss the answers with the learners.

Checkpoint 2

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

a. What does it mean if something is flexible?
b. What is an example of a material that has compressive strength?

Answers to the checkpoint questions are as follows:

a. It can bend without breaking.
b. Concrete, rocks, bricks

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Properties of materials	57-60
Via Afrika	Properties of materials	58-61
Platinum	Properties of materials	65-67
Spot On	Properties of materials	57-59
Step-by-Step	Properties of materials	72-77
Pelican	Properties of materials	81-85
Solutions for All Natural Sciences	Properties of materials	101-104
Shuters Top Class Natural Sciences	Properties of materials	70-72
Sasol Inzalo Bk A	Properties of materials	148-157

G ADDITIONAL ACTIVITIES/ READING

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

1. http://study.com/academy/lesson/physical-property-of-matter-definition-examples-quiz.html (4min 04sec) [Physical Property of Matter: Definition & Examples]
2. https://www.youtube.com/watch?v=ELchwUIIWa8 (3min 30 sec) [What's Matter? - Crash Course Kids #3.1]

1 B

Term 2, Week 1, Lesson B
Lesson Title: Physical properties of materials
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Boiling and melting points
CAPS Page Number	22

Lesson Objectives

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

- define the physical properties of a material
- list the physical properties a material could have
- define compressive strength, tensile strength and flexibility
- investigate and compare the strength of materials.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	Hot plate/primus stove
Candle and matches	Pot with water
Bunsen burner	
Retort stand	
Flask with 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 do we call the physical property of something that can bend easily?

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

Flexibility

D ACCESSING INFORMATION

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

BOILING POINTS AND MELTING POINTS

1. Water can be a solid (ice), a liquid or a gas (water vapour).
2. Melting occurs when a solid substance changes into a liquid state.
3. The melting point is the temperature at which the solid becomes a liquid.
4. Different substances have different melting points, e.g.: Iron melts at 1538°C and ice melts at around 0°C.
5. If you heat a liquid it will eventually boil.
6. We call this the boiling point.
7. Different substances boil at different temperatures e.g.: Iron boils at 2862°C and water at around 100°C.
8. Boiling points and melting points can vary slightly depending on air pressure or impurities in the liquid.
9. An example is that water boils at about 96°C in Johannesburg because of the lower air pressure.

2. Read over the information written on the chalkboard with the learners.
3. Show the learners the unlit candle and tell them that it is a solid. Now light the candle.
4. Explain this to the learners as follows:
    a. The candle is made of wax.
    b. It was in a solid state.
    c. When we lit the candle, the heat from the flame started to melt the wax.
    d. The temperature at which a solid changes to a liquid is called the **melting point**.
    e. The melting point of wax is around 60°C. Ice melts at around 0°C and iron melts at around 1538°C.
5. Ask the learners what theses differing temperatures tell us about melting points?

    (Answer: Different substances melt at different temperatures.)
6. Set up either a Bunsen burner, retort stand and flask with water OR a hot plate with a pot and water. Allow the water to come to the boil as you explain the following:
    a. If you heat a liquid it will eventually boil.
    b. The temperature at which it comes to the boil is known as the **boiling point**.
    c. Different substances boil at different temperatures.
    d. Water boils at around 100°C but iron boils at a much higher temperature. Iron boils at around 2862°C.
7. Tell the learners to observe the water that you are boiling.
8. Ask the learners the following questions:
    a. What can you see the water doing as it comes to the boil?

        (Answer: The surface of the water is moving and we can see bubbles.)
    b. What are the two states of water we can observe as the water is boiling?

        (Answer: Liquid in the container and gas in the form of water vapour coming off the surface.)
9. Ask the learners if they have any questions.
10. Tell the learners to copy the information written on the chalkboard into their workbooks.
11. Give the learners some time to complete this task.

Checkpoint 1

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

a. What is the melting point of a substance?
b. Do all substances have the same melting point?

Answers to the checkpoint questions are as follows:

a. The temperature at which a solid becomes a liquid.
b. No.

E CONCEPTUAL DEVELOPMENT

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

MATERIAL	MELTING POINT (°c)	BOILING POINT (°c)
Iron	1538	2862
Lead	327	1749
Gold	1064	2856
Water	0	100
Paraffin	-20	150
Wax	60	370

1. Which is higher, the melting point or boiling point of a substance?
2. Paraffin has a _____melting point than water, but a _____ boiling point.
3. Which substance has the highest melting point?
4. Which substance has the lowest boiling point?
5. Stainless steel has a melting point of 1400°C. Why does this physical property make it suitable for making pots?
6. What is the melting point of wax?
7. What is the boiling point of lead?

2. Read over the questions on the chalkboard with the learners.
3. Tell the learners to answer the questions in their work books.
4. Allow the learners some time to complete this task.
5. Write the model answer on the chalkboard:

1. *Boiling point*
2. *Paraffin has a <u>lower</u> melting point than water, but a <u>higher</u> boiling point.*
3. *Iron*
4. *Water*
5. *Water boils at about 100°C and stainless steel only melts at 1400°C so a pot made of stainless steel will not melt if you use it on the stove for cooking or boiling water,*
6. *60°C*
7. *1749°C*

6. Read over the model answer with the learners.
7. Tell the learners to add anything they are missing to their own tables.

Checkpoint 2

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

a. What is the boiling point of a substance?
b. Is the boiling point the same for all substances?

Answers to the checkpoint questions are as follows:

a. The temperature at which a substance comes to the boil
b. No

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Boiling and melting points	60-61
Via Afrika	Boiling and melting points	62-65
Platinum	Boiling and melting points	68
Spot On	Boiling and melting points	60-61
Step-by-Step	Boiling and melting points	78-79
Pelican	Boiling and melting points	85-88
Solutions for All Natural Sciences	Boiling and melting points	112-117
Shuters Top Class Natural Sciences	Boiling and melting points	75-78
Sasol Inzalo Bk A	Boiling and melting points	157-167

G ADDITIONAL ACTIVITIES/ READING

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

1. http://study.com/academy/lesson/what-is-melting-point-definition-range-determination.html (7min 11sec) [What is Melting Point? - Definition, Range and Determination]
2. https://www.youtube.com/watch?v=gZBt4_Ds3II (2min 51sec) [States of Matter - Boiling Points]

1 C

Term 2, Week 1, Lesson C
Lesson Title: Physical properties of materials
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Heat and electrical conductivity
CAPS Page Number	22

Lesson Objectives

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

- define electrical conductivity
- define heat conductivity
- explain the purpose of insulators.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
A bowl of boiling water	
A metal spoon, a wooden spoon, a plastic spoon, a metal spoon with a plastic handle	
A pot/frying pan	
A piece of electrical wire	

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 boiling point of water?

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

> *Around 100°C*

D ACCESSING INFORMATION

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

> ELECTRICAL CONDUCTIVITY
>
> 1. Electricity moves as an electrical current.
> 2. Some materials allow electricity to flow through them easily.
> 3. Materials that allow electricity to move through them are called electrical conductors.
> 4. Examples of conductors are copper and stainless steel.
> 5. Some materials do not allow electricity to pass through them.
> 6. These are called electrical insulators.
> 7. An example of an insulator is plastic.
> 8. The property of carrying electricity is called electrical conductivity.
> 9. We use the electrical conductivity of copper to make electrical wiring.
> 10. The wire is covered in an insulator like plastic to protect us from electrical shock.

HEAT CONDUCTIVITY

1. Some materials allow heat to flow through them easily.
2. The ability of a material to allow heat to travel through it is called heat or thermal conductivity.
3. Examples of materials that have good thermal conductivity are aluminum and stainless steel.
4. Materials with low thermal conductivity are known as thermal insulators

2. Read over the information written on the chalkboard with the learners.
3. Explain this to the learners as follows:
   a. Electricity moves as an electrical current.
   b. Some materials allow electricity to move through them easily.
   c. We call these materials, electrical **conductors**.
   d. Examples of conductors are copper and stainless steel.
   e. Other materials do not allow electricity to pass through them.
   f. We call these materials, electrical **insulators**.
   g. An example of an insulator is plastic.
4. Show the learners the piece of electrical wire.
5. Explain as follows:
   a. Copper is a good electrical conductor.
   b. You can see the copper wire on the inside of this electrical wiring.
   c. Because electricity is very dangerous, the wire needs to be covered with an insulator so that we do not get shocked when touching it.
   d. This electrical wire is covered with plastic to insulate us from the electrical current that is moving through the copper wire.
6. Continue to explain as follows:
   a. Some materials allow heat to flow through them easily.
   b. The ability of a material to allow heat to travel through it is called heat or thermal conductivity.
   c. Examples of materials that have good thermal conductivity are stainless steel and aluminum.
   d. Materials that do not have good thermal conductivity are called **thermal** insulators.
7. Ask the learners if they have any questions.
8. Tell the learners to copy the information written on the chalkboard into their workbooks.
9. Give the learners some time to complete this task.

Checkpoint 1

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

a. How does electricity move?
b. What do we call materials that cannot carry electrical current?

Answers to the checkpoint questions are as follows:

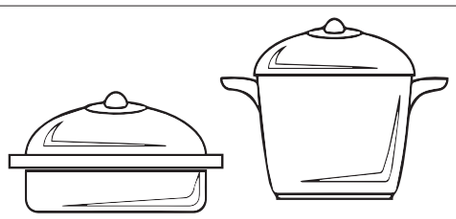
a. By electrical current.
b. Electrical insulators.

E CONCEPTUAL DEVELOPMENT

1. Do the following activity with the learners:

1. Pour boiling water to fill a bowl.
2. Stand a wooden spoon, a plastic spoon, a metal spoon, a roll of aluminum foil and a metal spoon with a plastic handle in the bowl of boiling water.
3. Allow them to stay in the water for three minutes.
4. Ask one of the learners to come up and to touch the handles of the spoons with a fingertip.
5. After he/she has touched each spoon ask the following questions:
   a. Is the wooden spoon hot? *(Answer: No)*
   b. Is the plastic spoon hot? *(Answer: No)*
   c. Is the metal spoon hot? (*Answer: Yes)*
   d. Is the plastic handle hot? *(Answer: No)*
   e. Is the aluminum foil hot? *(Answer: Yes)*
6. Ask the learners the following questions:
   a. Which materials were good conductors of heat?
      (Answer: Metal and aluminum)
   b. Why would a metal spoon have a plastic handle?
      (Answer: The plastic handle acts as an insulator against heat)

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



1. Name a material that would be a good material to make a pot out of.
2. Why is this a suitable material?
3. What would be a safe choice of material for the handles?
4. Why would this be a safe choice?

3. Tell the learners to answer the questions in their work books.
4. Allow the learners some time to complete this task.
5. Model answer

1. *Stainless steel*
2. *It conducts heat, and has a high melting point.*
3. *Plastic*
4. *Plastic does not conduct heat so the handles will not be hot to touch.*

6. Read over the model answer with the learners.

Checkpoint 2

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

a. What is thermal conductivity?
b. What is an electrical insulator?

Answers to the checkpoint questions are as follows:

a. The ability of a material to allow heat to flow through it.
b. Materials that do not allow electricity to move through them.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Boiling and melting points	-
Via Afrika	Boiling and melting points	62-65
Platinum	Boiling and melting points	69-70
Spot On	Boiling and melting points	63
Step-by-Step	Boiling and melting points	-
Pelican	Boiling and melting points	86-88
Solutions for All Natural Sciences	Boiling and melting points	117-119
Shuters Top Class Natural Sciences	Boiling and melting points	73
Sasol Inzalo Bk A	Boiling and melting points	147-149

G ADDITIONAL ACTIVITIES/ READING

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

1. http://study.com/academy/lesson/what-is-electrical-conductivity-definition-measurement-quiz.html (4min 01sec) [What is Electrical Conductivity? - Definition and Measurement]
2. http://study.com/academy/lesson/heat-transfer-through-conduction-equation-examples.html (6min 45 sec) [Heat Transfer Through Conduction: Equation and Examples]

2 A

Term 2, Week 2, Lesson A
Lesson Title: Physical properties of materials
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Factors to consider when choosing materials
CAPS Page Number	22

Lesson Objectives

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

- name materials used in their natural state
- explain what a processed material is, with examples
- list other factors that are considered in the design and manufacture of items.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
A piece of wood and a piece of paper	

C CLASSROOM MANAGEMENT

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

What does conductivity mean?

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

A materials ability to transfer electricity or heat

D ACCESSING INFORMATION

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

FACTORS TO CONSIDER WHEN CHOOSING MATERIALS

1. All materials used to make things come from the Earth's natural resources.
2. We can use these materials in their natural state, for example we use wood to make furniture.
3. We can also process these materials.
4. When we process natural resources, we change them. An example is turning trees into paper.
5. When we use materials to make things, we also need to think about cost, colour and texture.

COST

1. The cost of something is how cheap or expensive it is.
2. When making a product, the cost of the materials needs to be thought about.
3. Cold drink bottles used to be made from glass. They are now made from plastic.
4. One of the reasons for this is that plastic is cheaper to make and transport.
5. Things that affect the cost of materials are how much they cost to mine or make.
6. Another factor is whether the materials come from South Africa or another country.

COLOUR

1. Materials have different colours.
2. Sometimes the original colour of the material will be changed to make it better suited to its purpose.
3. Plastic can be clear or coloured.
4. Traffic lights need three different colours of plastic: red, yellow and green.

TEXTURE

1. The texture of something describes how it feels when you touch it.
2. The texture of something should be suitable for its use.
3. Blankets are soft while concrete floors are smooth and easy to clean.

2. Read over the information written on the chalkboard with the learners.
3. Explain this to the learners as follows:
   a. There are many materials available on Earth.
   b. Materials start out in their natural state. Examples are wood from trees and gold ore from rocks.
   c. These resources can be used in their natural state. For example, wood from trees can be used to make furniture.
   d. These natural resources can be changed or processed. They are then called processed materials.
4. Show the learners the piece of wood.
5. Ask the learners if they know a product that wood can be processed into?
   (Answer: Paper, cardboard)
6. Show the learners the piece of wood and paper.
7. Explain as follows:
   a. The wood is processed to make paper and paper products.
   b. When a product or item is being designed or planned, the engineer or designer thinks about many things.
   c. Costs of materials, colour and texture must also be considered.
   d. The cost of something is how cheap or expensive the item is.
8. Ask the learners:
   a. What are coke bottles made from?
      (Answer: Plastic)
   b. Coke bottles were not always made from plastic. Does anyone know what they were made from before plastic?
      (Answer: Glass)

9. Continue to explain as follows:
    a. One of the reasons that coke is now in plastic bottles is because they are cheaper to use and transport.
    b. Another thing that needs to be thought about when choosing materials is colour.
    c. The colour needs to be suitable for its purpose.
    d. An example is that traffic lights need red, yellow and green plastic to cover them.
    e. Blue, orange and purple plastic would not be suitable for this.
    f. The last thing that needs to be thought about is the texture of materials.
    g. Texture is how something feels when you touch it.
10. Tell the learners to touch their clothes, the desk, the surface of their workbooks and to see how the surfaces all feel different.
11. Ask the learners if they have any questions.
12. Tell the learners to copy the information written on the chalkboard into their workbooks.
13. Give the learners some time to complete this task.

Checkpoint 1

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

a. What do we call the physical property that describes how something feels when you touch it?
b. What do we call materials that have been changed from their natural state into something else?

Answers to the checkpoint questions are as follows:

a. Texture
b. Processed materials

E CONCEPTUAL DEVELOPMENT

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

1. The words below describe some properties of materials:					
smooth	soft	insulator	red	strong	
hard	cheap	colourful	white	conductivity	
flexible	rough	expensive	high	melting	point

Write two physical properties of materials that each of these would need:

a. A hospital floor that is easy to clean and not expensive
b. A tool that can bend and is safe to use with electricity
c. A material that is used to make clothes
d. A cooking pot.

2. Match the natural resource in column A with the processed material/product in column B

A: Natural resource	B: Processed material/product
Rubber	Fabric
Gold ore	Paper
Cotton plant	Oil
Trees	Tyres
Coal	A ring

3. Read through the activities written on the chalkboard with the learners.
4. Tell the learners to answer the questions in their work books.
5. Allow the learners some time to complete this task.
6. Write the model answer on the chalkboard:

a. A hospital floor that is easy to clean and not expensive (smooth, hard, cheap)
b. A tool that can bend and is safe to use with electricity (flexible, insulator)
c. A material that is used to make clothes (soft, smooth, flexible, colourful)
d. A cooking pot (strong, high melting point, conductivity)

A: Natural resource	*B: Processed material/product*
Rubber	*Tyres*
Gold ore	*A ring*
Cotton plant	*Fabric*
Trees	*Paper*
Coal	*Oil*

7. Read over the model answer with the learners.

Checkpoint 2

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

a. What is the opposite of something that is expensive?
b. What are some of the things that affect the cost of materials?

Answers to the checkpoint questions are as follows:

a. Cheap
b. How much it costs to mine or make them; if they come from South Africa or overseas.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Boiling and melting points	-
Via Afrika	Boiling and melting points	66
Platinum	Boiling and melting points	72
Spot On	Boiling and melting points	64
Step-by-Step	Boiling and melting points	-
Pelican	Boiling and melting points	88-91
Solutions for All Natural Sciences	Boiling and melting points	120-122
Shuters Top Class Natural Sciences	Boiling and melting points	79-80
Sasol Inzalo Bk A	Boiling and melting points	-

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=1o9mVZxoayA (5min 03sec) [How Its Made Car Tires]
2. https://www.youtube.com/watch?v=2MUGbe6vRpo (3 min 59 sec) [Ever wonder how paper is made?]

2 B

Term 2, Week 2, Lesson B
Lesson Title: Skill focus:Fair testing in investigations
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Fair testing in investigations
CAPS Page Number	22

Lesson Objectives

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

- define what a fair test is
- define the term 'variable'
- define the term 'constant'
- explain how to conduct a fair test'.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
Squares (20cm x 20cm) of the following: plastic wrap/packet, paper serviette/kitchen towel, newspaper, fabric of any kind	
Four glasses/ jars/ beakers of the same size	
Four elastic bands or four pieces of string	
A measuring jug	
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 might affect the cost of materials?

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

The cost of mining; the cost of manufacture; whether it is from South Africa or overseas

D ACCESSING INFORMATION

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

SCIENCE INVESTIGATIONS: A FAIR TEST

1. A fair test is a scientific investigation that is carefully controlled.
2. The investigation answers a specific scientific question.
3. In a fair test, two or more things are compared.
4. During the test, various things can affect the result.
5. We call these things ‘variables’.
6. To do a fair test, we keep everything the same, changing only one thing at a time.
7. The things we don’t change are called the ’constants’.
8. The thing we change is called the ’variable’.
9. Changing only one variable at a time will give an accurate result.
10. The one that we change will show differences between the things we are comparing and allow us to make conclusions.

2. Read over the information written on the chalkboard with the learners.
3. Explain this to the learners as follows:
    a. If a scientist wants to prove an idea or theory, he or she needs to plan a test, investigation or experiment.
    b. In Science, we cannot let our emotions influence the answer.
    c. A method scientists can use to make sure they are getting an accurate answer, is by doing what is called a 'Fair Test'.
    d. A fair test starts with a question that the scientist wants solved.
    e. Today we are going to design a 'Fair Test' together. I will explain as we go along.
4. Ask the learners if they know what it means if something is water 'resistant'.

    (Answer: Water does not go through it but runs off.)
5. Tell them that together we will now design a fair test to see which types of materials are water resistant.
6. Ask the learners to think of 4 different materials that are in the classroom that we can test.
7. Write their suggestions on the board and from that, circle 4 materials to test, only one material must be water resistant.
8. Erase the other examples from the board.
9. Explain as follows:
    a. When planning a fair test, we start with a question.
10. Ask the learners what they think the question should be for this test.

    (Answer: Which of the four materials will be water resistant?) Write this question on the board.
11. Ask the learners to predict which material, they think may be water resistant.

    (Answer: There is no right or wrong answer at this stage. Learners are predicting an outcome.)
12. Ask the learners how they think we should test the 4 materials to see which one is water resistant.

    (Answer: Pour water over each of the materials)
13. Explain as follows:
    a. We need to cut the materials to the same size.
    b. We call this a constant.
    c. We will use jars of the same size.
14. Ask the learners why we use jars of the same size.

    (Answer: This is a constant)
15. Ask the learners what the variable will be.

    (Answer: The different materials that we are using.)

16. Explain as follows:
    a. Only one variable can be used in a fair test.
    b. We will now use an elastic band to attach each material to the top of each jar.
    c. We will pour the same amount of water over the top of each jar (1 cup).
17. Ask the learners:
    a. Why do we use the same amount of water?
       (Answer: This is a constant)
18. Ask learners:
    a. Which material is completely water resistant? *(Answers will vary according to material.)*
    b. Which material allowed the most water through? *(Answers will vary according to material.)*
    c. Did any of the materials break apart? *(Answers will vary according to materials.)*
19. Ask the learners if they have any questions.
20. Tell the learners to copy the information written on the chalkboard into their workbooks.
21. Give the learners some time to complete this task.

Checkpoint 1

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

a. What do we call something that should not change in a fair test?
b. What do we call the thing that we change in a fair test?

Answers to the checkpoint questions are as follows:

a. A constant
b. A variable

E CONCEPTUAL DEVELOPMENT

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

> 1. What is a fair test?
> 2. What does a scientist always start a fair test with?
> 3. What is a constant in a fair test?
> 4. What is a variable in a fair test?
> 5. What were the constants in the 'water-resistant' test?
> 6. What was the variable in the 'water-resistant' test?
> 7. What conclusion did you draw from this test?

2. Read through the questions written on the chalkboard with the learners.
3. Tell the learners to answer the questions in their work books.
4. Allow the learners some time to complete this task.
5. Write the model answer on the chalkboard:

> *1. A fair test is a controlled test, investigation or experiment to answer a question.*
> *2. A question that needs an answer.*
> *3. A constant is the thing that does not change in a fair test.*
> *4. A variable is the one thing that is different in the things being tested.*
> *5. The constants:*
> *a. The size of the materials (20cm x 20cm)*
> *b. The size of the jars*
> *c. The string/elastic bands used*
> *d. The amount of water poured onto each material.*
> *6. The variable was the difference in the types of materials on the tops of the jars.*
> *7. (Conclusions will vary according to materials used.)*

8. Read over the model answer with the learners.

<u>Checkpoint 2</u>

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

a. Why do we change only one variable at a time?
b. How many variables and how often should they be changed in a fair test?

Answers to the checkpoint questions are as follows:

a. Changing one variable at a time will give an accurate result.
b. One at a time

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Design a fair test	-
Via Afrika	Design a fair test	-
Platinum	Design a fair test	74-75
Spot On	Design a fair test	-
Step-by-Step	Design a fair test	-
Pelican	Design a fair test	-
Solutions for All Natural Sciences	Design a fair test	-
Shuters Top Class Natural Sciences	Design a fair test	-
Sasol Inzalo Bk A	Design a fair test	-

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=uZ4L0Ds7chI (7min 08sec) [1L Variables and Fair Testing]
2. https://www.youtube.com/watch?v=x2606GQmDqY (8min 14 sec) [Scientific Variables]

2 C

Term 2, Week 1, Lesson C
Lesson Title: Physical properties of materials
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Environmental impact
CAPS Page Number	22

Lesson Objectives

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

- explain how the production and use of materials has an impact on the environment
- explain the effects of mining on the environment
- list some of the environmental issues with plastics
- explain what a greenhouse gas is and the environmental impact of these gases..

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	

C CLASSROOM MANAGEMENT

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

What do we call the factor that we change in a fair test?

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

Variable

D ACCESSING INFORMATION

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

ENVIRONMENTAL IMPACT

1. The materials used to make the objects we use every day come from mining or manufacturing.
2. Mining and manufacturing can cause damage to the planet.
3. Both mining and manufacturing processes need a lot of energy.
4. This energy often consists of burning fuels such as coal or oil.
5. When burning these fuels, harmful gases are released into the environment.
6. These gases can trap heat in the atmosphere and are thought to be causing the planet to get hotter.
7. They are known as greenhouse gases.

MINING

1. Mining is a process of taking precious metals from the Earth.
2. During this process, chemicals are often used which are harmful to the environment.
3. These chemicals end up in our water supplies.
4. These chemicals are harmful to humans, animals and plants.
5. Dust that blows off mine dumps is harmful to the health of people who live nearby.

PLASTIC

1. Plastics are a big group of materials made up of chemicals called polymers.
2. The problem with most plastics is that they are not **biodegradable**.
3. If something is **biodegradable**, it means it can be broken down by bacteria.
4. If plastic is not burnt, it survives for hundreds of years.
5. When plastic is burnt, it releases poisonous gases into the air.
6. Plastic that is not burnt is often responsible for litter.
7. Much plastic ends up in the ocean where it kills fish and birds.

2. Read over the information written on the chalkboard with the learners.
3. Explain this to the learners as follows:
   a. Most things we use every day have been made in a factory.
   b. We say they have been manufactured.
   c. Manufacturing makes use of materials mined from underground, natural resources or other manufactured parts.
4. Ask the learners if they can think of things they use every day that were made in a factory,
   (Possible answers: cell phones, taxis, kettles, books, soap)
5. Continue to explain as follows:
   a. The problem with mining and manufacturing is that they have a huge impact on the environment.
   b. Mining and manufacturing both need a lot of energy to complete all the processes required.
   c. To make this energy, sometimes fuels like coal and oil are burnt.
   d. Electricity in South Africa is often made by burning coal, too.
   e. The burning of these fuels causes the release of poisonous gases into the atmosphere.
   f. Some of these gases get trapped in the atmosphere and are thought to be causing the planet to get hotter.
   g. We call these gases, greenhouse gases.
6. Ask the learners if they know the name of the main electricity supplier in South Africa?
   (Answer: Eskom)
7. Continue to explain as follows:
   a. Mining provides jobs and a lot of materials to sell oversea. We call this export.
   b. Mining does, however, cause harm to the environment.
   c. Besides the greenhouse gases, miming also causes damage to our water supply.
   d. Harmful chemicals are used during mining and these get into our water.
   e. The dust from mine dumps is also harmful to those that live near them as mine dumps are also full of chemicals.
   f. Many mines are now trying to limit the damage and impact they are having on the environment.

8. Ask the learners:
    a. Can you name some things made from plastic?

       (Possible answers: toys, plates, cups, chairs, buckets, tables, shopping bags, coke bottles)
    b. Why do you think plastic is used so much?

       (Possible answers: Easy to shape into anything, cheap, strong, not heavy)
9. Explain to the learners:
    a. Plastic is made from chemicals called polymers.
    b. Most plastics are not biodegradable.
    c. If something is biodegradable, it can be broken down by bacteria.
    d. Most plastic needs to be burnt. This process then releases poisonous gases, including greenhouse gases, into the atmosphere.
    e. If plastics are not burnt, they lie on the Earth's surface, sometimes for hundreds of years.
    f. Plastic is lightweight and blows around easily.
    g. Plastic is responsible for most of our litter.
    h. A lot of plastic ends up in our oceans where it kills birds and fish.
10. Ask the learners:
    a. Why do you think there is a government tax on plastic shopping bags?

       (Answer: The government is trying to get people to stop using plastic shopping bags.)
    b. Do you think people are using fewer plastic bags? Give a reason for your answer.

       (Answers should encourage discussion.)
11. Ask the learners if they have any questions.
12. Tell the learners to copy the information written on the chalkboard into their workbooks.
13. Give the learners some time to complete this task.

Checkpoint 1

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

a. What do we call a gas that traps heat in the atmosphere?
b. What does it mean if something is biodegradable?

Answers to the checkpoint questions are as follows:

a. A greenhouse gas.
b. It means it can be broken down by bacteria.

E CONCEPTUAL DEVELOPMENT

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

PLASTIC

1. Name three things made of plastic that you use in a week.
2. Name three things that make plastic useful in manufacturing.
3. Name three ways in which plastic is harmful to the environment.
4. What do you think can be done to help with plastic pollution?

2. Read the following passage to the learners twice:

Plastic is fantastic in many ways. It is cheap, strong and isn't heavy. Chemicals and sunlight don't damage it easily. Plastic can replace natural materials like wood. Plastic can help make once very heavy things, like cars and aeroplanes, much lighter. This means that they use less fuel, making them cheaper to drive and fly. Plastics are a part of our daily lives. Just look around you.

There are a few problems with plastics, though. Plastics are made from fossil fuels. One of these fossil fuels is oil. Oil spilt from drilling at sea, or during transportation in big ships, has a big impact on the environment, killing bird and sea life.

Plastic also lasts for a long, long time. Most plastic is not biodegradable, which means that it is not broken down by bacteria once it is thrown away. Plastic can take thousands of years to break down. One way in which plastic is waste is treated is by burning, which sends poisonous chemicals into the atmosphere.

Plastic is also a huge cause of litter. We see plastic waste all around us on the sides of the roads. A lot of this plastic ends up in the sea which causes death to fish and birds.

Harmful chemicals in plastics can also be absorbed by the human body and are thought to cause disease.

Plastic is useful but also more harmful than most people realise.

3. Ask the learners if there was any part of the passage you read that they did not understand.
4. Ask the learners how they think the environmental impact of plastic can be managed?

   (Lead the discussion. Ideas could be: taxes on plastics, more focus on recycling, research into biodegradable plastic, community clean-up drives, alternatives to plastic, education about plastic.)
5. Read through the questions written on the chalkboard with the learners.
6. Tell the learners to answer the questions in their work books.
7. Allow the learners some time to complete this task.
8. Write the model answer on the chalkboard:

PLASTIC

1. *(Answers will vary.)*
2. *Cheap, strong, not heavy, chemicals and sunlight don't damage it easily.*
3. *Made partly from oil and there are often oil spills. Litter. Not biodegradable. Sea pollution. Thought to cause disease in humans.*
4. *(Answers will vary.)*

9. Read over the model answer with the learners.

Checkpoint 2

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

a. Name one fossil fuel that plastic is made from?
b. How long does it take plastic to break down?

Answers to the checkpoint questions are as follows:

a. Oil
b. It can take thousands of years.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Impact on the environment	62-63
Via Afrika	Impact on the environment	66-67
Platinum	Impact on the environment	76-77
Spot On	Impact on the environment	65-67
Step-by-Step	Impact on the environment	80-81
Pelican	Impact on the environment	92-95
Solutions for All Natural Sciences	Impact on the environment	123-125
Shuters Top Class Natural Sciences	Impact on the environment	80-82
Sasol Inzalo Bk A	Impact on the environment	188-171

G ADDITIONAL ACTIVITIES/ READING

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

1. https://www.youtube.com/watch?v=Ifzr9pLzVLU (2min 48sec) [Plastic Bag and its environmental impacts]
2. https://www.youtube.com/watch?v=X9QnT1jspHc (2min 45sec) [Plastic Bottles' Impact on the Environment]

TOPIC OVERVIEW:
Separating mixtures
Term 2, Weeks 3A – 4C

A. TOPIC OVERVIEW

Term 2, Weeks 3a – 4c

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

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

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

B. SEQUENTIAL TABLE

GRADE 6	GRADE 7	GRADE 8
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• Mixtures: mixtures of materials • Solutions as special mixtures: solutions; soluble substances; saturated solutions; insoluble substances • Dissolving	• Mixtures • Methods of physical separation: properties; hand sorting; sieving; filtration; magnets; evaporation; distillation; chromatography • Sorting and recycling materials: responsibility; selection; waste management and consequences	• Density of materials • Expansion and contraction of materials • Pressure

C. SCIENTIFIC VOCABULARY

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

	TERM	EXPLANATION
1.	mixture	When two or more substances with different physical properties are mixed together
2.	particle	Small parts that make up matter
3.	dissolve	When the particles of a solid substance spread between the particles of a liquid so that you can no longer tell the two substances apart. The solid has dissolved into the liquid.
4.	insoluble	A solid that does not dissolve into a liquid is insoluble.
5.	pure substances	A substance that is made up of one kind of particle
6.	filtration	The method used to separate a solid from a liquid using a filter
7.	solution	A mixture made up of a solid that is dissolved into a liquid. An example is sugar dissolved into water. This sugary water is a solution.
8.	solute	The substance that dissolves when making a solution. In sugary water, the solute would be the sugar
9.	solvent	The liquid in which the solute dissolves. In the sugary water, water is the solvent.
10.	evaporation	This is the process of changing from a liquid to a gas. A solute can be removed from a solvent in this way.
11.	distillation	A method of separating two liquids with different boiling points. This can be used to purify a liquid or separate a solvent from a solution.
12.	condensation	The change of state from a gas to a liquid. This normally happens when the gas is cooled.
13.	chromatography	A very specialised scientific method of separating a mixture into different parts using dyes and machines to process the mixture at specific speeds to separate them
14.	recycle	Taking waste and turning it into something useable
15.	organic waste	Waste that comes from plants or animals that can be broken down naturally by other living things
16.	landfill	The place where our rubbish is taken and buried. A covered-over rubbish dump
17.	methane	A greenhouse gas that is made by rubbish which is breaking down in landfills
18.	matter	Matter consists of various types of particles, each with mass and size.

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Mixtures and separating mixtures have a scientific basis. Mixtures are a part of everyday life, such as a cup of tea with sugar, right down to complicated industrial processes. There are practical applications for separation of mixtures which could be useful in daily life. Careers in chemistry and environmental management rely on a knowledge of mixtures and separation of mixtures. Awareness and management of the environment are becoming increasingly important.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

3 A

Term 2, Week 3, Lesson A
Lesson Title: Mixtures
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	What are mixtures?
CAPS Page Number	22

Lesson Objectives

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

- define pure substances
- explain what a mixture is
- explain the difference between mixtures that can be separated by physical means, and those that cannot
- define the terms solution, solute, solvent and insoluble.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Dried beans (or similar), samp (or similar), salt water, clear jar/ beaker/ glass, spoon or something to stir with	
Resource 1: Water particles	
Resource 2: Salt particles	
Resource 3: Water and salt solution	

C CLASSROOM MANAGEMENT

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

What do we call the things that do not change?

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

Constants

D ACCESSING INFORMATION

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

MIXTURES

1. All things that take up space and have mass, are made up of matter.
2. Matter is made up of particles.
3. Particles are so small that we cannot see them.
4. Substances can be made up of one kind of particle or a mixture of particles.
5. A pure substance is made up of only one type of particle.
6. An example is pure water.
7. All the particles in a glass of pure water are exactly the same.
8. A mixture is made up of two or more substances.
9. This means that a mixture is an impure substance.
10. Most things around us are a mixture of particles.
11. The air we breathe is a mixture of different gases.

TOPIC: Seperating mixtures

SOME WORDS TO KNOW:

1. Solution: The mixture made of a solid mixed into a liquid
2. Solute: The substance that dissolves when making a solution is called the solute.
3. Solvent: The liquid in which a solute dissolves, is the solvent..

2. Explain this to the learners as follows:
   a. You should have learnt in previous grades that everything around us is made up of **matter**.
   b. Matter takes up space and has a mass.
   c. Matter is made up of what are known as **particles**.
   d. Particles are so small that we cannot see them individually.
   e. Substances can be made up of one kind of particle or a mixture of particles.
   f. Substances that are made up of one kind of particle are called **pure substances**.

   (Put up Resource 1: 'Table salt particles' and Resource 2: 'Water particles' and refer to these while you explain. You should also supply salt in a glass and water in a glass, to refer to.)
3. Continue to explain:
   a. The water in this glass is made up of particles.
   b. All the particles in a glass of water are the same.
   c. The particles in this salt are all arranged in the same way.
4. Ask the learners if they can remember what a substance that is made up of only one kind of particle is called.

   (Possible answer: A pure substance)
5. Explain to the learners:
   a. A **mixture** is made up of two or more substances or materials that have different physical properties.
   b. A mixture is not a pure substance.
   c. Most things around us are a mixture.
   d. The air we breathe is a mixture of gases.
6. Ask the learners if they can remember any of the gases that are found in the air we breathe.

   (Possible answers: Oxygen, nitrogen and carbon dioxide)
7. Explain to the learners as you demonstrate:
   a. I am going to make a mixture of beans and samp. (Mix the beans and the samp together in a bowl.)
   b. You can see that although they are mixed together, you can still see beans and samp separately.
   c. Their physical properties have not changed. They are just mixed together.

d. Now if I mix the salt into the water and stir it for long enough, the salt seems to disappear. *(Stir a teaspoon of salt into a glass of water until it dissolves.)*

e. We say that the salt has dissolved into the water.

8. Ask the learners what they think this mixture will now taste like?

   (Answer: Salty)

9. Continue to explain:

   a. The mixture now looks like water but will taste like salt.

   b. This is called a salt water **solution**.

   c. The water is the **solvent**.

   d. The salt is the **solute**.

   e. The mixture of the two together is called a solution.

   (Show learners Resource 3: 'Salt solution')

10. Explain as follows:

    The particles of the salt and the water have combined and now look different.

11. Read through the information written on the chalkboard with the learners.

12. Ask the learners if they have any questions.

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

14. Give the learners some time to complete this task.

Checkpoint 1

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

a. What are the tiny things that matter is made up of, called?

b. What is a pure substance?

Answers to the checkpoint questions are as follows:

a. Particles

b. A pure substance is made up of only one type of particle.

E CONCEPTUAL DEVELOPMENT

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

1. Write down if the following are pure substances or mixtures:
   a. Water
   b. Pure aluminium metal
   c. Air
   d. Carbon dioxide
   e. A cup of tea
2. Match Column A with Column B

A	B
Solvent	sugar
Solution	water
Solute	sugar and water mixed together

2. Tell the learners to write the questions from the chalkboard into their workbooks and to answer them.
3. Allow the learners some time to complete this task.
4. With the learners' input, complete the model answer on the chalkboard:

MODEL ANSWER

Write down if the following are pure substances or mixtures:

a. Water - PURE
b. Pure aluminium metal - PURE
c. Air - MIXTURE
d. Carbon dioxide - PURE
e. A cup of tea - MIXTURE

Match Column A with Column B

A	B
Solvent	sugar
Solution	water
Solute	sugar and water mixed together

5. Discuss the answers with the learners.

Checkpoint 2

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

a. Is the air we breathe a pure substance or a mixture?
b. In a sugar, salt and water solution, what are the solutes?

Answers to the checkpoint questions are as follows:

a. A mixture
b. Sugar and salt

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Mixtures	64
Via Afrika	Mixtures	68
Platinum	Mixtures	80-81
Spot On	Mixtures	70
Step-by-Step	Mixtures	82
Pelican	Mixtures	98-102
Solutions for All Natural Sciences	Mixtures	130-137
Shuters Top Class Natural Sciences	Mixtures	84-85
Sasol Inzalo Bk A	Mixtures	175-180

G ADDITIONAL ACTIVITIES/ READING

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

1. https://www.youtube.com/watch?v=AOqH5ktwoDE (3min 52sec) [Mixtures and Solutions]
2. https://www.youtube.com/watch?v=XEAiLm2zuvc (5min 42sec) [Solution, Suspension and Colloid]

3 B

Term 2, Week 3, Lesson B
Lesson Title: Methods of physical separation
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Hand-sorting, sieving and magnets
CAPS Page Number	22

Lesson Objectives

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

- define the physical properties of a material
- list the physical properties a material could have
- define compressive strength, tensile strength and flexibility
- investigate and compare the strength of materials.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
Samp and bean mixture from a previous lesson, sieve, flour mixed together with small stones, a strong magnet, drawing pins, pins, wood nails or similar, iron filings, dry sand, sheet of paper	
Magnifying glass	

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 solution?

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

A solution is a mixture that consists of a solid that is dissolved into a liquid.

D ACCESSING INFORMATION

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

PHYSICAL SEPARATION OF MIXTURES

HAND-SORTING

1. Hand sorting can be used to separate mixtures when a mixture is made of solids that are easy to handle.
2. These solids can have different shapes, colours or sizes.
3. Hand-sorting is easy and does not need any special equipment but takes a long time.
4. An example of hand-sorting could be sorting fruit by size and quality before it is packed.

TOPIC: Seperating mixtures

SIEVING

1. Sieving is a method used to separate mixtures where the combined solids have different sizes.
2. Sieving involves passing a mixture through a sieve.
3. A sieve is made of a net of metal of plastic.
4. The holes in this net allow the smaller solids to fall through, keeping the bigger solids behind.
5. Sand and stones can be separated this way.

USING MAGNETS

1. A magnet can attract metals such as iron, steel and nickel.
2. In a mixture where one of the substances is magnetic, a magnet can be used to separate the mixture.
3. An example is using magnets to remove magnetic objects from waste dumps.

2. Read over the information written on the chalkboard with the learners.
   (You will need the mixture of beans and samp from the previous lesson.)
3. Ask the learners how we could separate the samp and beans?
   (Answer: We could pour them out on a table and sort them by hand.)
4. Explain this to the learners as follows:
   a. Some mixtures are easier to separate than others.
   b. If the mixture is made up of solids that are easy to handle, they can be separated by hand.
   c. If they are different sizes, colours or shapes, the separation method is easy.
   d. Hand-sorting can take a long time, though.
5. Ask the learners if they can think of a job that involves hand-sorting?
   (Possible answers: Sorting fruit by size and quality before packing it for the shops.)
6. Continue to explain as follows:
   a. Sieving is another way of separating mixtures.
   b. We use a sieve to separate a mixture that has solids of different sizes but they are too small to sort by hand.
   c. A sieve has holes that are all the same size.
   d. The holes allow the smaller solids to fall through while keeping the bigger solids behind.

   (Demonstrate sieving to the learners, or ask one of the learners to come up and sieve the flour from the stones. Show them the sieve. Separate the flour and stones using the sieve.)

7. Ask the learners if any of them know what a magnet does?

   (Answer: a magnet has properties that attract iron-containing objects.)

8. Continue to explain as follows:

   a. Magnets can attract objects that contain iron.

   (Show the learners how the magnet attracts the drawing pins, pins or wood nails.)

   a. Magnets can be used to separate mixtures that contain magnetic and non-magnetic things.
   b. The magnet will pull the magnetic things away from the non-magnetic things.
   c. This method of separating solids is often used in waste management.
   d. Strong magnets pull the metal materials from the rubbish dump so that they can be **recycled**.

9. Ask the learners if they have any questions.
10. Tell the learners to copy the information written on the chalkboard into their workbooks.
11. Give the learners some time to complete this task.

Checkpoint 1

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

a. What would be a suitable method to separate maize seeds and stones?
b. What would be a suitable method to separate sand and stones?

Answers to the checkpoint questions are as follows:

a. Hand-sorting.
b. Sieving.

E CONCEPTUAL DEVELOPMENT

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

AIM

To separate a mixture using a magnet

WHAT YOU NEED

- A small quantity of iron filings
- A small handful of dry sand
- A strong magnet
- A sheet of paper

METHOD

1. Mix the sand and iron filings together.
2. Pour onto a sheet of paper.
3. Run the magnet through the mixture a few times.
4. Pour the sand to one side.
5. The iron filings and the sand should now be separated.

2. Read through the activity with the learners.
3. Either have the learners do the activity in groups (if resources allow) or demonstrate the activity, step-by-step. You may want one or two learners to assist.
4. Ask the learners the following questions after the **activity**:
   a. Why would the sand and iron filings be difficult to sort by hand?
      (Answer: They are too small.)
   b. Why would using a sieve not be a suitable method to separate these two solids?
      (Answer: They are too similar in size.)
   c. What made using a magnet a suitable way to separate this mixture?
      (Answer: The iron filings have magnetic properties and the sand does not.)
   d. Would using a magnet be a suitable method to separate pins and needles from each other?
      (Answer: No, because they are both magnetic.)
5. Ask the learners if they have any questions.

Checkpoint 2

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

a. Is hand-sorting a suitable method for separating a mixture of four different kinds of sweets?
b. Is using a magnet a suitable method for separating paper and plastic?

Answers to the checkpoint questions are as follows:

a. Yes. They are easy to see and separate.
b. No. Neither plastic nor paper will be attracted to the magnet.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Methods of physical separation	65-67
Via Afrika	Methods of physical separation	68-70
Platinum	Methods of physical separation	82-84
Spot On	Methods of physical separation	70-72
Step-by-Step	Methods of physical separation	82-86
Pelican	Methods of physical separation	102-103
Solutions for All Natural Sciences	Methods of physical separation	138-146
Shuters Top Class Natural Sciences	Methods of physical separation	85-86
Sasol Inzalo Bk A	Methods of physical separation	179-185

G ADDITIONAL ACTIVITIES/ READING

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

1. https://www.youtube.com/watch?v=pcesrdcNzig (3min 02sec) [Particle Size Determination by Wet Sieving]
2. https://www.youtube.com/watch?v=-fyw2ZvgBGU (2min 51sec) [Waste-Away Group Recycling Works Plant Single Stream]

3 C

Term 2, Week 3, Lesson C
Lesson Title: Methods of physical separation
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Filtration and evaporation
CAPS Page Number	22-23

Lesson Objectives

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

- define an insoluble substance
- define filtration
- define evaporation
- explain the process of filtration
- explain the process of evaporation.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	Paper folded into a funnel shape
Sand, water, a funnel, three beakers or glass jars, filter paper, salt, a wide shallow container, cotton wool/ finely woven cloth,	
Resource 4: Salt pans	
Resource 5: Salt harvesting	
Resource 6: Salt collection	

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 physical separation methods did you learn about in the last lesson?

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

Hand-sorting, sieving and using a magnet

D ACCESSING INFORMATION

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

FILTRATION

1. Mixtures sometimes contain solids that do not dissolve into the liquid or solvent.
2. These solids are said to be insoluble, which means they do not dissolve.
3. Filtration is a good method to separate an insoluble solid from a liquid.
4. To filter something, we pour the mixture through a filter which should catch the solids that did not dissolve.
5. The material that is used to catch or trap the solids is called a filter.
6. A filter is different from a sieve in that the spaces in a filter are only big enough to allow a liquid to pass through them.

EVAPORATION

1. Evaporation is a method to separate a solution.
2. During evaporation, the solvent (or liquid) is turned into a gas.
3. Once the gas has evaporated, the solute (or solids) are left behind.
4. Heating speeds up the rate at which evaporation happens.

2. Read over the information written on the chalkboard with the learners.

   (Use the funnel, water, sand, glass beaker and filter paper for the demonstration.)

3. Explain this to the learners as follows:
   a. Mixtures sometimes contain solids that do not dissolve into the liquid or solvent.
   b. These solids are said to be insoluble.
   c. Insoluble means unable to dissolve.
   d. In these situations, filtration is a good way to separate the insoluble solids from the liquid.

      (Mix the sand in the beaker of water and allow it to settle for a few moments.)

4. Ask a learner to come up and assist you for the rest of the explanation. Tell the learner to follow the instructions as you explain.
5. Continue to explain as follows:
   a. We can separate the sand from the water using a filter.
   b. We will line the funnel with a piece of filter paper. Cotton wool or cloth can be used if we do not have filter paper.
   c. The spaces in the filter paper are so small that only the liquid will pass through and the solids will be trapped behind.

      (Demonstrate filtration to the learners with the help of a learner.)

6. Ask the learners what a solution is?

   (Answer: A solution is a mixture of a solid and a liquid where the solid dissolves into the liquid.)

7. Explain as follows: *(You will need a glass jar, water, salt and the wide, shallow container for the demonstration.)*
   a. It is possible to separate a solution.
   b. We use the process of evaporation to separate the solid (solute) from the liquid (the solution).
8. Ask the learners the following questions:
   a. After it rains, water forms little puddles. What happens to those puddles?

      (Answer: They eventually dry up.)

   b. Why do they dry up?

      (Answer: They soak into the soil, or the sun dries them (they evaporate).

9. Continue to explain as follows:
    a. We are going to look at how the process of evaporation works.

       (Mix a large amount of salt into the water until it dissolves. Pour this water into the shallow container. Put the container in a sunny spot.)
    b. The water in this solution will evaporate and leave the salt behind.
    c. We will check on this in the next lesson to see if evaporation has taken place and if the salt has been left behind.
10. Tell the learners to copy the information written on the chalkboard into their workbooks.
11. Give the learners some time to complete this task.

Checkpoint 1

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

a. What is a good method to separate a liquid and an insoluble solid?
b. What would be a good method to separate a solution?

Answers to the checkpoint questions are as follows:

a. Filtration.
b. Evaporation.

E CONCEPTUAL DEVELOPMENT

1. Put Resource 4, Resource 5 and Resource 6 up on the chalkboard.
2. Write the following on the chalkboard (always try and do this before the lesson begins):

SALT

1. Name one thing we use salt for.
2. Where is the Cerebos salt mine? Name two places.
3. Where does the water come from that is used to get the salt?
4. Describe briefly how salt is harvested. What then happens to the salt?

3. Read the following twice to the learners:

SALT HARVESTING

Salt is a very important and useful substance. The Cerebos salt factory at Coega near Port Elizabeth produces salt for our use. The salt is taken from sea water. Sea water is held in shallow evaporating ponds or pans out in the open. The sun and the wind evaporate the water from these ponds and the salt is left behind. This salt is then collected, cleaned and packaged before finding its way to the shops.

4. Read through the questions written on the chalkboard with the learners.
5. Tell the learners to complete the activity in their workbooks using the information you have read to them, as well as the Resources you have put on the chalkboard.
6. Allow the learners some time to complete the activity.
7. Write the model answer on the chalkboard:

SALT

1. *Flavouring food (answers may vary).*
2. *At Coega, near Port Elizabeth.*
3. *The sea.*
4. *Sea water is put in shallow evaporating ponds or pans out in the open. The sun and the wind evaporate the water from these ponds and the salt is left behind. This salt is then collected, cleaned and packaged before finding its way to the shops.*

8. Ask learners to correct any errors.
9. Ask the learners if they have any questions.

Checkpoint 2

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

a. Where does the water go during the process of salt harvesting?
b. What speeds up this process?

Answers to the checkpoint questions are as follows:

a. It evaporates.
b. The sun and wind.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Methods of physical separation	65-68
Via Afrika	Methods of physical separation	69-70
Platinum	Methods of physical separation	83-85
Spot On	Methods of physical separation	71-73
Step-by-Step	Methods of physical separation	87
Pelican	Methods of physical separation	103-105
Solutions for All Natural Sciences	Methods of physical separation	141-148
Shuters Top Class Natural Sciences	Methods of physical separation	85-87
Sasol Inzalo Bk A	Methods of physical separation	181-186

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=bTVc4UqgwVo (3min 21sec) [Salt - How it is formed / harvested]
2. https://www.sciencelearn.org.nz/resources/426-wetlands-the-rivers'-kidneys [Wetlands-the rivers' kidneys]

4 A

Term 2, Week 4, Lesson A
Lesson Title: Methods of physical separation
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Distillation and chromatography
CAPS Page Number	23

Lesson Objectives

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

- explain the process of distillation
- explain the process of chromatography.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
Evaporation experiment from previous lesson	
Resource 7.1, 7.2, 7.3, 7.4: Distillation of water	
Pot with tight fitting lid, hot plate. Water, salt, bowl, 2 Koki pens (choose from these colours ONLY: Green, black, purple, orange, brown), filter paper, two glass jars/ beakers, methylated spirits/ rubbing alcohol/ 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:

> Complete the following sentence: Evaporation is a process of separating a solvent from a _____?

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

> *Solute.*

D ACCESSING INFORMATION

1. Draw the following information on the chalkboard (always try and do this before the lesson starts):

> DISTILLATION
>
> 1. In evaporation, you are able to separate the solvent (liquid) and the solute (solid) but only the solute is left behind.
> 2. The solvent has evaporated and can no longer be used.
> 3. It is possible to separate a solution where both the solute and the solvent, once separated, can be used again.
> 4. Distillation involves evaporation of the solvent, followed by condensation and collection of the condensed liquid.
> 5. A special piece of equipment called a Liebig condenser is used to extract pure (distilled) water from a saltwater solution.

6. The saltwater solution is brought to the boil. The escaping water vapour is then trapped in a long tube and cooled.
7. The cooled water vapour condenses and is then collected at the other end.
8. The salt will be left on one side and the distilled or pure water at the other end.

CHROMATOGRAPHY

1. Pigments are substances that give colour to living tissue and materials like ink.
2. Pigment makes blood red, or your pen blue.
3. Chromatography is used to separate mixtures of different pigments.
4. A solvent is added to a mixture of pigments, and these pigments are then allowed to move through something, like paper.
5. The solvent could be water or alcohol.
6. Some pigments travel faster and further. In this way they are separated.

2. Read over the information written on the chalkboard with the learners.

   (Put Resource 7.1: Distillation, of water up on the chalkboard)

3. Ask the learners the following questions: (You will need the 'Evaporation experiment' from the previous lesson)

   a. How did we separate the salt (solute) from the water (solvent) in this experiment?

   (Answer: Evaporation)

   b. What is left behind in the dish?

   (Answer: The solute or the salt)

   c. What happened to the water/ solvent?

   (Answer: It evaporated)

   d. Is it possible to get the water back?

   (Answer: No)

4. Explain to the learners as follows:

   a. There may be a situation where you would like to separate a solution into both the solvent (liquid) and solute (solid).

   b. This is possible through a process of distillation.

   c. Distillation involves bringing a solution to the boil, catching the water vapour, allowing it to cool and condensing back into a liquid.

5. Do the following demonstration, explaining as you go:

You will need: the hotplate, the pot with a tight-fitting lid, water, salt, spoon.

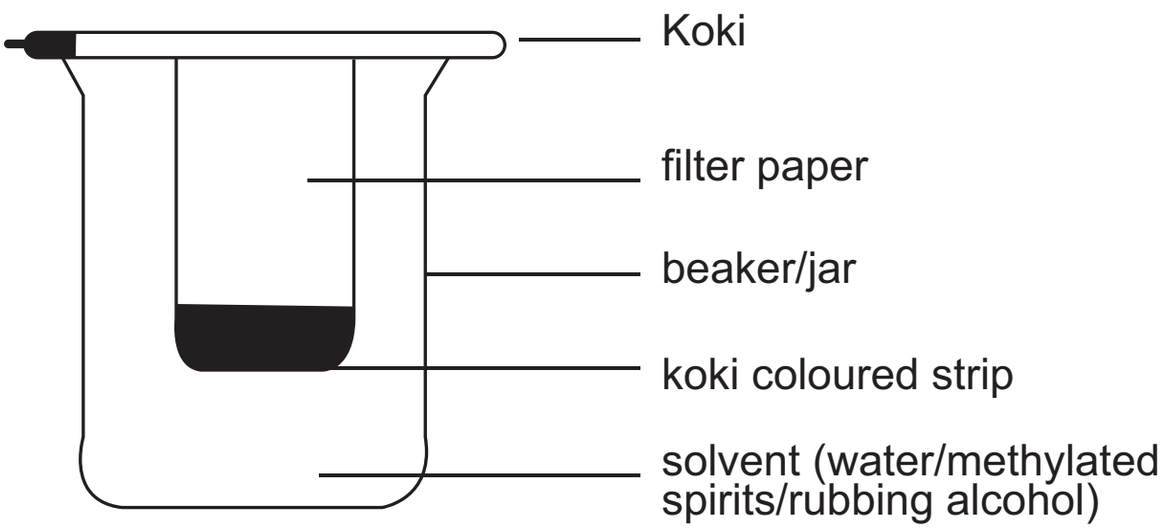
1. Pour the water into the pot.
2. Stir in some salt.
3. Have a learner taste the water and confirm that it is salty.
4. Put the lid on the pot and bring it to the boil.
5. Once water vapour starts to collect on the lid, quickly remove the lid and catch the condensed water in a separate bowl.
6. Have the learner taste this condensed water. It should not be salty.

6. Continue to explain as follows (refer to Resource 7.1 as you explain):
   a. Distillation of a saltwater solution in a laboratory requires a special piece of equipment, called a Liebig condenser.
   b. The saltwater solution is boiled in a flask over a Bunsen burner.
   c. As the solution starts to boil, the water will begin to evaporate.
   d. The water rises to the top of the flask and passes through the condensing tube or Liebig condenser.
   e. Cool water, on the sides of the Liebig condenser, cools the water vapour to a liquid.
   f. This cooled liquid is caught in the collecting beaker.
7. Ask the learners to look at Resource 7. They should then explain how the water in the condensing tube stays cold.

   (Answer: The water is constantly changing in the condenser. The warm water flows out of the condenser through a tube, with fresh cold water coming in from a tap.)
8. Continue to explain as follows:
   a. Chromatography is another way to do more complex separation of mixtures.
   b. It is used to separate pigments.
   c. Pigment is a substance that gives things colour, like blood is red and ink can be blue.
   d. Once a pigment is mixed with a solvent, it is put onto a surface on which it spreads or moves.
   e. Some pigments move or spread faster than others.
   f. In this way, they can be separated.
   g. This is usually done by expensive machines in a science laboratory, but we are going to do a simple experiment on chromatography.
9. Ask the learners if they have ever spilled water on something they had previously written down with pen or a Koki. Ask them what happened next.

   (Possible answer: It starts to run and colours seem to spread.)
10. Set up the following experiment/ activity with help from one or two learners, explaining as you go:

1. Pour about 3cm of water, methylated spirits or rubbing alcohol (the solvent) into the bottom of two glass beakers or jars.
2. Cut two strips of filter paper as long as the height of the beakers or jars.
3. Using two different Kokis, colour a 1cm thick block on the bottom of each strip using a different colour on each strip.
4. Stick the strip to the Koki using tape or Prestik
5. Balance the Koki across the jar with the end of the strip in the solvent.
6. Observe what happens.
7. The experiment will look something like this:



11. After doing the experiment and observing, ask the learners the following questions:
    a. What happened in this test?

    (Answer: The pigments have separated.)

    b. Which colour surprised you the most with the number of pigments?

    (Answers will vary.)

    c. What pigments can you see in_____ (choose a colour from experiment)?

    (Answers will vary.)
12. Tell the learners to copy the information written on the chalkboard into their workbooks.
13. Give the learners some time to complete this task.

Checkpoint 1

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

a. What separation method can we use to separate a solution and keep all parts of that solution?
b. After evaporation, what needs to happen in order for distillation to take place?

Answers to the checkpoint questions are as follows:

a. Distillation
b. Condensation

E CONCEPTUAL DEVELOPMENT

1. Put Resource 7.1, 7.2. 7.3 and 7.4 up in various points in the classroom.
2. Write the following on the chalkboard (try and do this before the lesson begins):

DISTILLATION USING A LIEBIG CONDENSER

1. Draw and label the apparatus used to separate a solution, using a Liebig condenser.
2. Write a step-by-step explanation of how a Liebig condenser would separate a saltwater solution into a solute (salt) and solvent (water).

3. Read through the activity written on the chalkboard with the learners.
4. Tell the learners to complete the activity in their workbooks.
5. Allow the learners some time to complete the activity.
6. Write the model answer on the chalkboard:.

DISTILLATION USING A CONDENSER

1. *(Refer learners to Resources 7.1. 7.2. 7.3, and 7.4. Talk them through the diagram to ensure that all parts and labels are present.)*
2. *Step 1 – The salt water solution will evaporate.*
   Step 2 – The water vapour rises into the condensing tube.
   Step 3 – The Liebig condenser allows the cold water to travel between the two tubes.
   Step 4 – This cools the surface of the condensing tube.
   Step 5 – The water vapour condenses on the cold surface forming water droplets.
   Step 6 – The water droplets (solvent) fall into the receiving flask.
   Step 7 – The salt (solute) stays behind in the distillation flask.

7. Have learners correct any errors.
8. Ask the learners if they have any questions.

Checkpoint 2

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

1. What does liquid water turn into when heated?
2. Name the process of a liquid turning into a gas.

Answers to the checkpoint questions are as follows:

1. Water vapour
2. Evaporation

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Methods of physical separation	68-70
Via Afrika	Methods of physical separation	70-71
Platinum	Methods of physical separation	86-88
Spot On	Methods of physical separation	74-77
Step-by-Step	Methods of physical separation	88-91
Pelican	Methods of physical separation	105-109
Solutions for All Natural Sciences	Methods of physical separation	150-156
Shuters Top Class Natural Sciences	Methods of physical separation	87-91
Sasol Inzalo Bk A	Methods of physical separation	188-194

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=V5ep0-ojPGw (6min 37sec) [Simple distillation]
2. https://www.youtube.com/watch?v=PvHvx7k7UPU (4min 10sec) [Chromatography]

4 B

Term 2, Week 4, Lesson B
Lesson Title: Practical task
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Practical task: separating a mixture
CAPS Page Number	22-23

Lesson Objectives

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

- identify different components of a mixture
- separate a mixture using different methods of separation.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Two glass beakers, two spoons, five spoons of sand, five spoons of salt, five spoons of beans/ samp	Two glass jars, paper towel/ a piece of fabric
Water, filter paper	

C CLASSROOM MANAGEMENT

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

What method of separation uses a Liebig condenser?

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

Distillation.

D ACCESSING INFORMATION

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

METHODS OF PHYSICAL SEPARATION

1. Hand sorting is used to separate mixtures when a mixture is made of solid particles that have different sizes, colours, textures or shapes and are easy to handle.
2. Sieving is used to separate mixtures where the particles are of different sizes.
3. Filtration is used to separate a solid from a liquid.
4. Magnets are used to separate metals from non-metals.
5. Evaporation is used to remove a solute from a solvent.
6. Distillation is used to separate two liquids with different boiling points.
7. Chromatography is used to separate mixtures of different pigments.

2. Read over the information written on the chalkboard with the learners.
3. Do the following demonstration, explaining as you go:

TOPIC: Seperating mixtures

You will need: two glass jars, two spoons of sand, salt, beans, water and filter paper/ paper, towel.

1. Place the measured amounts of sand, salt and beans into one of the jars.
2. Add about ½ a cup of water to the same jar and mix.

4. Ask the learners to suggest how we can separate the sand, water, salt and bean mixture.
   (Answer: Pour the mixture through the filter paper to separate the solids from the liquids.)
5. Place the filter paper over the second jar. Now pour the mixture through the filter paper.
6. The sand and beans will remain in the filter paper and the salt and water will pass through the filter paper into the jar.
7. Ask the learners to name the method used.
   (Answer: Filtration)
8. Explain as follows: We have now separated the sand and beans from the salt and water.
9. Ask the learners: How do we separate the sand and beans mixture?
   (Answer: You separate the mixture by hand.)
10. Explain that this is hand sorting, another method used to separate mixtures.
11. Separate the beans from the sand.
12. Ask the learners what method can be used to separate the salt from the water.
    (Answer: Evaporation)
13. Explain the following:
    a. You will leave the salt and water in the jar in a sunny spot.
    b. The water will evaporate leaving the salt behind.
14. Tell the learners to copy the information written on the chalkboard into their workbooks.
15. Give the learners some time to complete this task.

Checkpoint 1

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

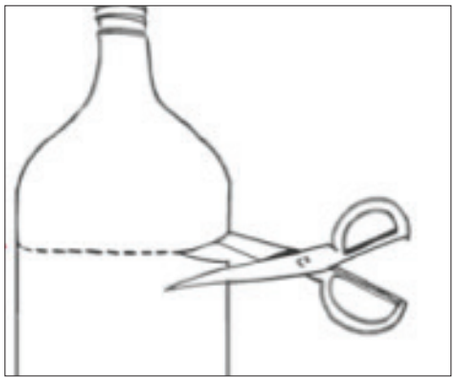
a. Name the methods used to separate the above mixture.
b. What is a mixture?

Answers to the checkpoint questions are as follows:

a. Filtration, hand sorting and evaporation
b. A mixture is two or more substances with different physical properties that are mixed together.

E CONCEPTUAL DEVELOPMENT

1. This activity will be done in groups.
2. To do this activity, each group will need the following:
   - Two glass jars
   - a container of water
   - a tablespoon of sand
   - a teaspoon of salt
   - a tablespoon of a mixture of samp and beans (or a few small stones and leaves)
   - a piece of filter paper, cloth or paper towel
   - A spoon or stick for stirring
   - a plate, polystyrene tray or piece of newspaper to work on
   - a funnel (this can be constructed out of a few sheets of paper or the top of a coke bottle can be cut off)



3. Ensure you have these materials prepared for each group before the lesson starts.
4. Tell the learners that they are going to be doing an investigation where they will be looking at separating mixtures.
5. They will be looking at a mixture made up of 4 solids and a liquid.
6. They will be planning and conducting an investigation on how to separate this mixture
7. Divide the learners into groups of six.
8. 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 of 6.
2. Each group will be doing tasks to separate a mixture.
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:
   - Two glass jars
   - a container of water

- a tablespoon of sand
- a teaspoon of salt
- a tablespoon of a mixture of samp and beans (or a few small stones and leaves)
- a piece of filter paper, cloth or paper towel
- a spoon or stick for stirring
- a plate, polystyrene tray or piece of newspaper to work on
- a funnel

9. Read through the practical task with the learners.
10. Remind the learners that in previous lessons they learnt about a number of different ways to separate mixtures.
11. Remind them that they have looked at hand-sorting, filtration, evaporation, seiving and using magnets.
12. Tell the learners that today they are going to be conducting a practical task where they are going to be separating a mixture.
13. Have each group collect the equipment they will need (as listed on the board) for the task.
14. Write the following 'Investigation method' onto the chalkboard:

METHOD

a. Mix the sand, salt, samp and beans (or leaves and stones) together in one of the glass jars.
b. Now pour enough water into the same jar to almost fill it.
c. Give the mixture a good stir.

15. Read through the task with the learners.
16. Ask them if they have any questions.
17. Tell the learners they have 5 minutes to complete this task.
18. Supervise the learners whilst they complete the task and answer any questions that they may have.
19. After 5 minutes call the learners back to attention.
20. Tell the learners that they are now going to work together as a group to separate the mixture into water, salt, sand and samp and beans (or leaves and stones).
21. The following will need to be written on the chalkboard:

TOPIC: Seperating mixtures

Task 1 (13 marks)

1. Choose a name for this practical task.
2. Describe how you would separate the solids from the liquids.
3. What is this separation method called?

As a group, do the actual task of separation using your chosen method.

4. Were you able to separate all of the solids from the liquid?
5. What solids were you able to separate from the liquid?
6. Which solids were you unable to separate from the liquid using this method?
7. Why were you unable to separate the salt from the water using this method?
8. What method could you use to separate the salt and dissolved sand from the water?
9. Explain how you would carry out this method of separation.
10. Once you are left with the sand and salt, what method could you use to separate them?

22. Read through task 1 with the learners.
23. Ask them if they have any questions.
24. Tell the learners they have 10 minutes to complete task 1 and to answer the questions in their workbooks.
25. Supervise the learners whilst they complete the task and answer any questions they may have.
26. After 15 minutes call the learners back to attention.
27. Tell the learners that they are now going to work together, as a group, to separate the solids that have been separated from the liquid.
28. The following will need to be written on the chalkboard:

Task 2 (7 marks)

Pour the solids that you were able to separate from the liquid onto the plate or piece of newspaper.

1. What method can you use to you separate the samp and beans (or stones and leaves) from the wet sand?
2. What method can you use to separate the samp and beans (or stones and leaves) from eachother?

Try and separate the larger solids (samp and beans or stones and leaves) from the wet sand.

3. Are the larger solids (samp, beans, stones, leaves) completely free of the sand?
4. Why are the larger particles not completely free from the sand?
5. How can this sand be removed from the larger solids (samp, beans, stones, leaves)?

29. Read through task 2 with the learners.
30. Ask them if they have any questions.
31. Tell the learners they have 10 minutes to complete task 2 and to answer the questions.
32. Supervise the learners whilst they complete the task and answer any questions they may have.
33. After 10 minutes call the learners back to attention.
34. Have learners hand in their workbooks for assessment.
35. Learners must then tidy up investigation areas and hand back equipment.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Methods of physical separation	-
Via Afrika	Methods of physical separation	-
Platinum	Methods of physical separation	89
Spot On	Methods of physical separation	-
Step-by-Step	Methods of physical separation	-
Pelican	Methods of physical separation	108-109
Solutions for All Natural Sciences	Methods of physical separation	-
Shuters Top Class Natural Sciences	Methods of physical separation	-
Sasol Inzalo Bk A	Methods of physical separation	194-196

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=-HpRdpk1aXU (6min 52sec) [Separating a mixture of salt and sand)
2. https://www.youtube.com/watch?v=GKH-x3kwyxQ (2min 17sec) [Separating sand and salt]

4 C

Term 2, Week 4, Lesson C
Lesson Title: Sorting and recycling materials
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Sorting and recycling materials
CAPS Page Number	23

Lesson Objectives

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

- understand the responsibility to recycle
- list recyclable materials
- name systems for sorting and disposing of waste
- identify negative consequences associated with poor waste management.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
Resource 8: Water pollution	
Resource 10: Land pollution	
Resource 11: A landfill	

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 method of separating materials can be used to separate water and pencil shavings?

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

Filtration or hand sorting

D ACCESSING INFORMATION

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

SORTING AND RECYCLING MATERIALS

1. It is every person's responsibility to get rid of waste in a proper manner so that it does not affect our environment.
2. You can reduce the amount of waste you produce by re-using or recycling some materials.
3. Materials like glass, paper, plastic and metal can be re-used or recycled.
4. Organic waste can be made into compost.
5. Materials that cannot be re-used or recycled must be dumped.
6. Landfills are places where you dump materials that cannot be re-used or recycled.
7. It costs money to maintain a landfill because:
   a. a landfill must be properly prepared
   b. the waste must be collected from houses and businesses and transported to the landfill
   c. machines that are used to move the waste must be maintained.
8. Poor waste management has negative consequences.

1. Read through the information written on the chalkboard, with the learners.
2. Ask the learners the following question:

   What is **recycling**?

   (*Answer: Recycling is the process of taking waste materials and turning them into a new product.)*
3. Explain the following to the learners:

   Every person creates waste and it is therefore everyone's responsibility to dispose of the waste so that it does not harm the environment.
4. Ask the learners the following question:

   What do we mean by 'environment'?

   (Answer: The surroundings in which a person, animal or plant lives)
5. Ask learners to name materials that can be recycled and re-used. Write the materials on the chalkboard.

   (Answers may vary): paper, cardboard (boxes), glass (jars or bottles), metal (cans), organic matter (vegetable skins)
6. Discuss ways of re-using some of these materials:
   a. Glass jars can be washed and re-used.
   b. Cardboard boxes and paper can be cut and redecorated as gift boxes or used to start a fire.
   c. Metal cans can be used for storage.
   d. Organic waste can be used to make compost and put on vegetable gardens.
7. Ask learners to name materials that cannot be recycled. Write the materials on the board.

   (Answers may vary: light bulbs, fluorescent tubes, laminated or wax paper, disposable batteries, Pyrex dishes and ceramics)
8. Explain as follows:
   a. Materials that cannot be recycled or reused are thrown away at a **landfill**.
   b. A landfill is a site where waste materials are buried.
   c. There are costs in running and maintaining a landfill.
9. Ask the learners if they have any questions and answer them.
10. Tell the learners to copy the information written on the chalkboard into their workbooks.
11. Give the learners some time to complete this task.

Checkpoint 1

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

a. What is recycling?
b. How can we re-use organic waste?

Answers to the checkpoint questions are as follows:

a. Recycling is the process of taking waste materials and turning them into a new product.
b. You can create a compost heap.

E CONCEPTUAL DEVELOPMENT

1. Explain to the learners:
   a. When materials are not recycled, but dumped, there can be negative consequences.
   b. This means that rotting waste can lead to problems such as pollution and the spreading of diseases.
   c. Discuss this with the class (pollution and disease)
   d. Materials that could be recycled, but are dumped, are a waste of materials and space.
2. Write the following questions on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

1. What are the different types of pollution that you can see in the pictures on the board?
2. What are the five consequences of poor waste management?

3. Put Resource 8, Resource 9, Resource 10 and Resource 11 up on the chalkboard (Pictures of water and land pollution).
4. Explain the following:
   a. The problems caused by rubbish being dumped in rivers
      (bad smells, disease, dangerous, not attractive to look at)
   b. The problems caused by food being left to rot near a house
      (attracts insects, vermin and rodents that can spread disease)
   c. The problems caused by over-dumping
      (waste of land)
5. Tell the learners to copy down the questions from the chalkboard into their workbooks and to answer them.
6. Allow the learners some time to complete this task.
7. Model Answer

1. *The different types of pollution are related to water, air and land.*
2. *Poor waste management leads to problems such as:*
   a. *Pollution of our soil, water and air which can harm the people, plants and animals living there.*
   b. *Diseases can be spread by houseflies, and vermin such as rats.*
   c. *Blocked sewage systems and blocked water drainage systems can be a health hazard and spread disease.*
   d. *Overloaded landfills means that more land has to be used and wasted on landfills, which could be used for farming instead.*
   e. *Valuable materials are wasted instead of being recycled.*

8. Discuss the answers with the learners and allow them to make corrections.

Checkpoint 2

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

a. Name two consequences of poor waste management.
b. What is meant by negative consequences?

Answers to the checkpoint questions are as follows:

a. Any of the answers listed in the model answer, such as pollution, the spread of diseases, overloaded landfills, harm to humans, plants and animals, and waste of products which could have been recycled
b. Negative consequences have a bad effect on the environment.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Sorting and recycling materials	72-75
Via Afrika	Sorting and recycling materials	72-75
Platinum	Sorting and recycling materials	90-93
Spot On	Sorting and recycling materials	78-81
Step-by-Step	Sorting and recycling materials	92-96
Pelican	Sorting and recycling materials	109-112
Solutions for All Natural Sciences	Sorting and recycling materials	157-163
Shuters Top Class Natural Sciences	Sorting and recycling materials	91-95
Sasol Inzalo Bk A	Sorting and recycling materials	197-199

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=vP3pbh_-pu8 (7min 40sec) [Pollution (Land, air and water pollution)]
2. https://www.youtube.com/watch?v=kjBIAs0J9lg (4min 29sec) [Introduction to recycling]
3. https://www.sciencelearn.org.nz/resources/2258-material-world-recycling-and-biodegradability [Material world - Recycling and biodegradability]

TOPIC OVERVIEW:
Acids, bases and neutrals
Term 2, Weeks 5A – 6B

A. TOPIC OVERVIEW

Term 2, Weeks 5a – 6b

- This topic runs for 2 weeks.
- It is presented over 5 lessons.
- This topic's position in the term is as follows:

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

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

B. SEQUENTIAL TABLE

GRADE 6	GRADE 7	GRADE 8
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
N/A	• Tastes of substances: human tongue • Properties of acids, bases and neutrals: important group of chemicals; foods and household chemicals; acids are sour, rough on the skin and many are dangerous; bases are bitter, slippery on the skin and many are dangerous; neutrals • Acid-base indicators: litmus paper	• Reactants and products: substances react to form products with different chemical properties; re-arrangement of atoms; indigenous knowledge (brewing)

C. SCIENTIFIC VOCABULARY

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

	TERM	EXPLANATION
1.	Tongue	a fleshy movable part of the mouth used for tasting
2.	Taste	the sensation of flavour perceived in the mouth and throat on contact with a substance.
3.	Taste buds	sensory organs that are found on your tongue and allow you to experience tastes
4.	Sweet	tasting as if it contains sugar
5.	Sour	tasting sharp like unripe fruit
6.	Salty	tasting like salt
7.	Bitter	tasting sharp, not sweet
8.	Acids	substances with a sour taste that feel rough on the skin
9.	Bases	substances with a bitter taste that feel slippery
10.	Neutral	a substance that is not an acid or a base
11.	Rough	not smooth, uneven
12.	Corrosive	a substance that eats through certain materials like clothing and metals, and burns the skin.
13.	Alkaline/Alkali	a base that can dissolve in water
14.	Caustic	able to burn or corrode organic tissue by chemical reaction
15.	Indicators	dyes that change colour in acids and bases
16.	Litmus paper	paper stained with a substance called litmus, used to indicate acids, bases and neutrals
17.	Properties	a description of how a substance behaves and its characteristics
18.	Reacting	the process of substances combining with each other

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Acids and bases are all around us in the food we eat and even in the soaps and lotions that we use. It is important to be able to identify them as they can be harmful. Acids and bases have many uses in our lives. Chemists need to know the difference between the two.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

5 A

Term 2, Week 5, Lesson A
Lesson Title: Tastes of substances
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	What does it taste like?
CAPS Page Number	23

Lesson Objectives

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

- name different tastes
- conduct an experiment
- identify different taste areas on the tongue.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Diagram of the tongue	Tea with no milk
Teaspoons, a lemon, an orange, coffee with no milk, saltwater, sugar water, fizzy drink, cups	
A blindfold	

C CLASSROOM MANAGEMENT

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

> Name some of the different tastes you know?

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

> *Salty, sour, bitter, sweet*

D ACCESSING INFORMATION

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

> TASTES OF SUBSTANCES
>
> 1. The human tongue is an organ that allows us to taste.
> 2. On the tongue there are taste buds.
> 3. The four different tastes are: salty, sweet, sour and bitter.
> 4. There are survival advantages to being able to identify these tastes:
>   a. You can taste when an apple is sweet which means it is ripe. If it is sour, it is not ripe.
>   b. You can identify rotten food, as it would be bitter, and you would avoid eating it.
> 5. Not all substances are safe to taste.

6.

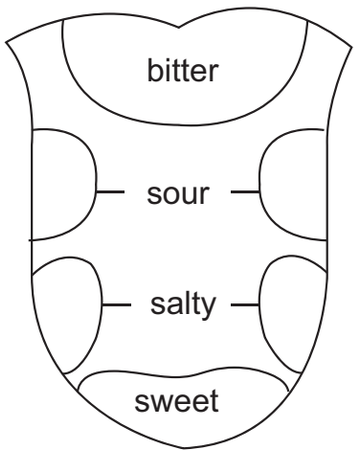


Diagram of a human tongue showing the different taste areas

2. Explain this to the learners as follows:
   a. The **tongue** is an organ.
   b. Tell the learners to look at one another's tongues.
3. Continue to explain:
   a. On the tongue they should see little bumps which are called **taste buds**.
   b. These taste buds allow us to distinguish between four tastes.
   c. These tastes are **salty, bitter, sweet** and **sour**.
   d. The sense of **taste** is important for our survival.
   e. It stops us from eating foods which can be harmful, like unripe fruit or rotten food.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.
5. Give the learners some time to complete this task.

Checkpoint 1

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

a. What sensory organ on the tongue enables us to taste?
b. Name the four different types of taste.

Answers to the checkpoint questions are as follows:

a. Taste buds
b. Salty, bitter, sweet and sour

E CONCEPTUAL DEVELOPMENT

(Set out the food/juice in the cups, each with its own teaspoon for tasting. It is not necessary to have a teaspoon for the lemon and orange, if you cut them into pieces.)

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

DESCRIBE THE TASTE OF SUBSTANCES	
Substance	**Taste**
lemon	
coffee without milk	
sugar water	
orange	
fizzy drink	
salt water	

2. Explain to the learners:
   a. We are now going to ask for volunteers to sample some foods and to identify the food and its taste. (Make sure that the learners are not allergic to any of the foods before choosing them as volunteers.)
   b. We will put a blindfold on the learners so that they cannot see the food, and they will have to use their sense of taste.
3. Ask the volunteer to first name the food and then describe the taste. (Remember the list of foods will be on the board).
4. Tell the learners to copy the table from the chalkboard into their workbooks and to fill in the results.
5. Allow the learners some time to complete the task.
6. *Model Answer*

DESCRIBE THE TASTE OF SUBSTANCES	
Substance	*Taste*
lemon	*sour*
coffee without milk	*bitter*
sugar water	*sweet*
orange	*sweet/sour*
fizzy drink	*sweet*
salt water	*salty*

7. Discuss the answers with the learners.

Checkpoint 2

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

a. How can taste be important for survival?
b. Is it safe to taste any substance?

Answers to the checkpoint questions are as follows:

a. You are able to taste if something is harmful, and will spit it out or not eat it.
b. No, it is not. Only taste something, if you have been told that it is safe to do so.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Tastes of substances	76-77
Via Afrika	Tastes of substances	76
Platinum	Tastes of substances	95-97
Spot On	Tastes of substances	83-84
Step-by-Step	Tastes of substances	97-100
Pelican	Tastes of substances	118
Solutions for All Natural Sciences	Tastes of substances	168
Shuters Top Class Natural Sciences	Tastes of substances	96
Sasol Inzalo Bk A	Tastes of substances	206-209

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=j7GibFhuBmE (1min 54 sec) [Sense of taste and smell - Our tongue and nose]
2. https://www.youtube.com/watch?v=C4rdqXXzPGU (3min 52sec) [Your tongue: The taste-maker!]
3. https://www.onhealth.com/content/1/tongue_facts

5 B

Term 2, Week 5, Lesson B
Lesson Title: Properties of acids
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Identifying acids
CAPS Page Number	23-24

Lesson Objectives

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

- list the properties of an acid
- identify acids in everyday use.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 12: Danger sign and Corrosive safety sign	
Computer with internet connection	
Lemons cut into quarters	

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 organ do we use for tasting?

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

> *The tongue*

D ACCESSING INFORMATION

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

> PROPERTIES OF ACIDS
>
> 1. Acids taste sour.
> 2. Acids feel rough on the skin.
> 3. Many acids are strong and corrosive, and are dangerous to taste or feel.
> 4. Acids can be weak or strong.
> 5. Strong acids are more dangerous.
> 6. Dangerous acids are marked with symbols to warn people of the danger.

2. Explain this to the learners as follows:
   a. Many everyday substances contain **acids**.
   b. Household cleaning products and foods can contain acids.
3. Continue to explain that to identify an acid it has to have certain **properties**:
   a. It will taste sour.
   b. It will feel **rough** on your skin.
   c. Some acids are **corrosive**, which means that they eat away at other materials.

4. Explain that it is not safe to taste and feel unknown substances.
5. Dangerous acids are marked with a symbol to show that they are toxic or corrosive.
6. (Show the learners the symbols: Resource 12: 'Danger sign' and 'Corrosive safely sign'.)
7. Tell the learners to copy the information written on the chalkboard into their workbooks.
8. Give the learners some time to complete this task.

Checkpoint 1

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

a. What are the properties of an acid?
b. What does corrosive mean?

Answers to the checkpoint questions are as follows:

a. Acids taste sour, feel rough on your skin and can be corrosive.
b. Corrosive means that a substance can eat through certain materials like clothing and metals, and it burns the skin.

E CONCEPTUAL DEVELOPMENT

1. Demonstrate the properties of acids using a lemon:
   a. Divide the class into groups.
   b. Give each group a piece of lemon.
   c. Tell them to taste the lemon by squeezing the juice out.
   d. Ask them what it tastes like.
      (Answer: It is sour.)
      This is one of the properties of an acid.
   e. Ask them to rub some juice on their arm and to describe what it feels like.
      (Answer: It feels rough on the skin.)
      This is another property of acids.
2. Write the following on the chalkboard (always try to do this before the lesson starts):

IDENTIFYING NATURAL ACIDS Match column A with column B	
Column A - Acid	**Column B – Where it is found**
Citric acid	in stomach juices
Lactic acid	in fizzy drinks
Carbonic acid	in lemons and citrus fruit
Hydrochloric acid	in vinegar
Ethanoic acid	in sour milk

3. Explain the following to the learners:
    a. Acids can be found in household items like lemons (citric acid), sour milk (lactic acid), vinegar (ethanoic acid), fizzy drinks (carbonic acid) and also in our stomachs.
    b. Acids like hydrochloric acids are strong and are found in the stomach or in the chemicals that we put into swimming pools.
    c. Sulfuric acid is another example of a strong acid. It is used when making batteries and fireworks.
    d. Weak acids are like those found in fizzy drinks and vinegar.
4. Tell the learners to copy the table from the chalkboard into their workbooks and to match the columns.
5. Give the learners some time to complete this task.
6. Model answer

IDENTIFYING NATURAL ACIDS *Match column A with column B*	
Column A - Acid	*Column B – Where it is found*
Citric acid	*in stomach juices*
Lactic acid	*in fizzy drinks*
Carbonic acid	*in lemons and citrus fruit*
Hydrochloric acid	*in vinegar*
Ethanoic acid	*in sour milk*

7. Discuss the answers with the learners.

Checkpoint 2

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

a. Can you name an example of a strong acid?
b. What kind of acid do we find in fizzy drinks?

Answers to the checkpoint questions are as follows:

a. Hydrochloric acid or sulphuric acid
b. Carbonic acid.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Acids, bases and neutrals	77-78
Via Afrika	Acids, bases and neutrals	77
Platinum	Acids, bases and neutrals	95-100
Spot On	Acids, bases and neutrals	86
Step-by-Step	Acids, bases and neutrals	101
Pelican	Acids, bases and neutrals	119-120
Solutions for All Natural Sciences	Acids, bases and neutrals	169
Shuters Top Class Natural Sciences	Acids, bases and neutrals	97
Sasol Inzalo Bk A	Acids, bases and neutrals	209-213

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=j0cwMFj0rRY&index=3&list=PLHOGBLPrsnMpFFt1cXF4Fqrq4DdZpLHdI (25sec) [Knowing acids]
2. https://www.youtube.com/watch?v=H0TCNLXQACM&list=PLHOGBLPrsnMpFFt1cXF4Fqrq4DdZpLHdI&index=4 (50sec) [Acids found in nature]
3. http://www.s-cool.co.uk/gcse/chemistry/acids-and-alkalis/revise-it/acids-alkalis-and-neutral-substances

5 C

Term 2, Week 5, Lesson C
Lesson Title: Properties of acids
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Identifying bases
CAPS Page Number	24

Lesson Objectives

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

- define what a base is
- list the properties of a base
- identify bases we use every day.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
Three teaspoons of bicarbonate of soda, water	
Cups, teaspoons	

C CLASSROOM MANAGEMENT

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

How can you identify an acid?

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

An acid is a substance with a sour taste and it feels rough on the skin.

D ACCESSING INFORMATION

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

PROPERTIES OF A BASE

1. Bases taste bitter.
2. Bases feel slippery on the skin.
3. Many bases are caustic and are dangerous to taste or feel.
4. Bases are the opposite of acids.
5. A base is known as an alkali, if the base is soluble in water.
6. Not all bases are alkalis but all alkalis are bases.

2. Explain this to the learners as follows:
   a. **Bases** are the opposites of acids.
   c. Bases are found in many products that we use daily.
4. Continue to explain that to identify an acid it has to have certain properties:
   a. Bases taste bitter.
   b. Bases feel slippery on the skin.
   c. Bases are dangerous to taste and feel because they can be **caustic**. This means that they can burn or corrode organic tissue.

4. Explain that it is not safe to taste or feel unknown substances.
5. Tell the learners to copy the information written on the chalkboard into their workbooks.
6. Give the learners some time to complete this task.

Checkpoint 1

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

a. What are the properties of a base?
b. Why is it dangerous to taste or touch an unknown base?

Answers to the checkpoint questions are as follows:

a. A base tastes bitter, feels slippery on the skin and can be caustic.
b. It could be caustic, which means that it is able to burn or corrode organic tissue.

E CONCEPTUAL DEVELOPMENT

1. Demonstrate the properties of bases, using bicarbonate of soda:

   (Dissolve about ½ teaspoon of bicarbonate of soda in 20ml (about 4 teaspoons) of water, and make up enough for four groups in little cups.)

   a. Divide the class into four groups.
   b. Give each group a cup with the water and bicarbonate of soda mixture.
   c. Tell them to taste the mixture.
   d. Ask them what it tastes like.
      (Answer: It is bitter.)

      This is one of the properties of a base.
   e. Ask them to rub some of the mixture between their fingers and to describe what it feels like.

      (Answer: It feels slippery)

      This is another property of bases.
2. Write the following on the chalkboard (always try to do this before the lesson starts):

IDENTIFYING BASES ACCORDING TO THEIR PROPERTIES	
Base	**The property that makes it a base**
black coffee	
washing powder	
banana	
black tea	
Handy Andy	
bicarbonate of soda	

3. Explain the following to the learners:
    a. Household bases include things like: bicarbonate of soda, washing powder, toothpaste, most soaps, most bleaches and other cleaning products.
    b. Strong bases can attack materials and burn the skin.
    c. Bases that attack materials and burn skin are known as caustic.
4. Explain the activity to the learners, using the information on the chalkboard:
    a. The table on the chalkboard requires the learners to give a reason for the substance being a base.
    a. The learners must focus on the **properties** of a base, which is how a base feels and tastes.
5. Tell the learners to copy the table from the chalkboard into their workbooks and to fill in the properties.
6. Give the learners some time to complete this task.
7. Model answer

IDENTIFYING BASES ACCORDING TO THEIR PROPERTIES	
Base	*The property that makes it a base*
black coffee	*tastes bitter*
washing powder	*feels slippery*
banana	*feels slippery*
black tea	*tastes bitter*
Handy Andy	*feels slippery*
bicarbonate of soda	*tastes bitter and feels slippery*

8. Discuss the answers with the learners.

Checkpoint 2

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

a. What does caustic mean?
b. Is a base the opposite of an acid?

Answers to the checkpoint questions are as follows:

a. It means that a substance is able to burn or corrode organic tissue.
b. Yes, a base is the opposite of an acid.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Acids, bases and neutrals	78
Via Afrika	Acids, bases and neutrals	78
Platinum	Acids, bases and neutrals	101-102
Spot On	Acids, bases and neutrals	87
Step-by-Step	Acids, bases and neutrals	102
Pelican	Acids, bases and neutrals	121-122
Solutions for All Natural Sciences	Acids, bases and neutrals	170-171
Shuters Top Class Natural Sciences	Acids, bases and neutrals	97-98
Sasol Inzalo Bk A	Acids, bases and neutrals	213-215

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.ck12.org/chemistry/base/lesson/Properties-of-Bases-MS-PS/
2. http://study.com/academy/lesson/base-in-chemistry-definition-example-quiz.html

6 A

Term 2, Week 6, Lesson A
Lesson Title: Properties of acids, bases and neutrals
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Identifying neutrals
CAPS Page Number	24

Lesson Objectives

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

- define what a neutral is
- sort substances into acids, bases, neutrals.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet access	
Resource 13 Page 17: pH Scale	

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 base?

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

A substance with a bitter taste that feels slippery

D ACCESSING INFORMATION

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

NEUTRAL SUBSTANCES

1. Neutral substances are neither bases nor acids.
2. They are not dangerous.
3. Everyday substances that we use, like pure water, cooking oil, sugar solutions and salt solutions, are examples of neutrals.
4. You can make a neutral substance by **reacting** an acid with a base.
5. The pH scale is used to measure the strength of an acid (pH0 to just below pH7) or a base (just above pH7 to pH14).
6. A neutral is in the middle and has a pH of 7.

2. Explain this to the learners as follows:
   a. A **neutral** is neither a base nor an acid.
   b. A neutral is harmless.
   c. Neutrals are things like pure water, a sugar water solution, a salt water solution and cooking oil.

3. Put Resource 13 Page 17, 'pH Scale', up on the board.
4. Show how the colours change. Also point out some levels, for example, "A pH level of 3 will be an acid and an example of this is orange juice"; "A pH level of 12 will be a base and an example of this is soapy water".
5. Continue to explain how to identify a neutral using the pH scale (point out these levels on the pH scale, as they are mentioned):
   a. The pH scale is used to measure the strength of an acid or a base.
   b. **Neutral** substances have a pH of 7.
   c. Acids start at a pH of 0 and go up to just below a pH of 7.
   d. The lower the pH value, the stronger the acid.
   e. Bases start at just above a pH of 7 and end at a pH of 14.
   f. The higher the pH value, the stronger the base.
6. Tell the learners to copy the information written on the chalkboard into their workbooks.
7. Give the learners some time to complete this task.

Checkpoint 1

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

a. What is a neutral?
b. What is the pH level of a neutral?

Answers to the checkpoint questions are as follows:

a. A neutral is neither a base nor an acid.
b. A neutral has a pH of 7

E CONCEPTUAL DEVELOPMENT

1. Explain to the learners:
   a. An acid and a base, mixed together correctly, can form a neutral.
   b. A strong acid or a strong base can be dangerous.
   c. A neutral is not dangerous.
2. Write the following on the chalkboard (always try to do this before the lesson starts):

SORT SUBSTANCES INTO ACID, NEUTRAL OR BASE

Substances: lemon, black coffee, pure water, salt, washing powder, vinegar, stomach juices, oil, bicarbonate of soda

Acid	Neutral	Base

3. Ask the learners to list the properties of an acid.
   (Answer: An acid tastes sour, feels rough, and is corrosive.)
4. Ask learners to list the properties of a base.
   (Answer: A base tastes bitter, feels slippery, and is caustic.)
5. Ask learners to explain what a neutral is.
   (Answer: A neutral is neither a base nor an acid.)
6. Explain the following to the learners:
   a. The table on the chalkboard lists substances that need to be sorted into acids, bases or neutrals.
   b. They must focus on the properties of an acid, base or neutral.
7. Tell the learners to copy the table from the chalkboard into their workbooks and to sort the substances into the correct columns.
8. Give the learners some time to complete this task.
9. Model answer

SORT SUBSTANCES INTO ACID, NEUTRAL OR BASE		
Acid	*Neutral*	*Base*
lemon	*pure water*	*black coffee*
vinegar	*salt*	*washing powder*
stomach juices	*oil*	*bicarbonate of soda*

10. Discuss the answers with the learners.

Checkpoint 2

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

a. Can an acid and a base be mixed together to form a neutral?
b. Is a neutral dangerous?

Answers to the checkpoint questions are as follows:

a. Yes, if mixed correctly, an acid and a base can be mixed together to form a neutral.
b. No, a neutral is not dangerous

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Acids, bases and neutrals	78
Via Afrika	Acids, bases and neutrals	78
Platinum	Acids, bases and neutrals	103
Spot On	Acids, bases and neutrals	85
Step-by-Step	Acids, bases and neutrals	102
Pelican	Acids, bases and neutrals	122
Solutions for All Natural Sciences	Acids, bases and neutrals	170
Shuters Top Class Natural Sciences	Acids, bases and neutrals	98
Sasol Inzalo Bk A	Acids, bases and neutrals	216-231

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=M8tTELZD5Ek (2min 22sec) [The pH scale]
2. http://www.mstworkbooks.co.za/natural-sciences/gr7/gr7-mm-03.html

6 B

Term 2, Week 6, Lesson B
Lesson Title: Acid-base indicators
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Litmus paper tests
CAPS Page Number	24

Lesson Objectives

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

- define what an indicator is
- use litmus paper to test for acids and bases.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Nine small containers/jars, nine plastic teaspoons	Yoghurt tubs
Water	
Dishwashing liquid (one teaspoon dissolved in a cup of water)	
Sugar water (one tablespoon dissolved in a cup of water)	
Lemon juice, soda water, vinegar	
Disprin (one tablet dissolved in a cup of water)	
Handy Andy (one tablespoon dissolved in a cup of water)	
Baking soda (one tablespoon dissolved in a cup of water)	
Blue litmus paper, red litmus paper	Red cabbage juice
Computer with internet connection	

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 neutral?

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

A neutral is neither a base nor an acid

D ACCESSING INFORMATION

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

ACID-BASE INDICATORS

1. It is not safe to taste a substance to see if it is an acid, a base or a neutral.
2. To test a substance, you use an indicator, which is a chemical that changes colour when it comes into contact with an acid, a base or a neutral.
3. Litmus paper is used as an acid-base indicator.
4. Litmus paper comes in red and blue.
5. Red litmus paper:
   a. Turns blue in a base
   b. Remains red in an acid
   c. Remains red in a neutral solution.
6. Blue litmus paper:
   a. Turns red in an acid
   b. Remains blue in a base
   c. Remains blue in a neutral solution.
7. The substance you test must be in liquid form.
8. We always use both red and blue litmus papers to test a substance.

2. Ask the learners :
   a. How can you tell the difference between an acid and a base?
      (Answer: Acids taste sour and feel rough while bases taste bitter and feel slippery.)
3. Continue to explain:
   a. Even though you know what acids and bases taste like, it is not safe to taste and feel unknown substances because they could be harmful.
   b. Another way to see if a substance is a base or an acid is to use an indicator.
   c. An indicator is a chemical that changes colour when it comes into contact with an acid or a base.
   d. **Litmus paper** is used as an acid-base indicator (show the learners your litmus papers).
   e. Red litmus paper will turn blue in a base and stays red in an acid or a neutral solution.
   f. Blue litmus paper will turn red in an acid and stays blue in a base or a neutral solution.
   g. You always use both red and blue litmus papers to test a substance.
   h. The substance that you test must be a liquid.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.
5. Give the learners some time to complete this task.

Checkpoint 1

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

a. What is an indicator?
b. What is litmus paper used for?

Answers to the checkpoint questions are as follows:

a. An indicator is a chemical that changes colour when it comes into contact with an acid or a base.
b. Litmus paper is used as an acid-base indicator.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. We are going to conduct an investigation to see how litmus paper responds to acids, bases and neutrals.
   b. Remember it is important to test a substance with both red and blue litmus paper.
2. Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATION: How does litmus paper respond to acids, bases and neutrals?

AIM: To determine how litmus paper responds to some household acids, bases and neutrals.

Results:

Substance	Colour with blue litmus	Colour with red litmus	Acid, base, neutral
Water			
Dishwashing liquid			
Sugar water			
Lemon juice			
Disprin			
Handy Andy			
Soda water			
Vinegar			
Baking soda			

QUESTIONS

1. What colour will the litmus paper turn when a substance is an acid?
2. Which of the substances you tested are acids?
3. What colour will the litmus paper turn when a substance is a base?
4. Which of the substances you tested are bases?

5. What colour will the litmus paper turn when a substance is neutral?
6. Which of the substances you tested are neutral?

3. Tell the learners to copy the information written on the chalkboard into their workbooks.
4. Give the learners some time to complete this task.
5. Explain the following:
   a. We are going to test each of the above substances to see how they react to blue litmus paper and red litmus paper.
   b. The learners will record the results in the table.
   c. The learners will complete the last column and answer the questions once the investigation is complete.
6. Cut a piece of blue litmus paper.
7. Put a drop of water onto the blue litmus paper.
8. Ask the learners to observe and record the result in the table.
9. Cut a piece of red litmus paper.
10. Put a drop of water onto the red litmus paper.
11. Ask the learners to observe and record the results in the table.
12. Repeat the following steps when testing the dishwashing liquid, sugar water, lemon juice, Disprin, Handy Andy, soda water, vinegar and baking soda:
    a. Cut a piece of blue litmus paper.
    b. Put a drop of _____ onto the blue litmus paper.
    c. Ask the learners to observe and record the result in the table.
    d. Cut a piece of red litmus paper.
    e. Put a drop of _____ onto the red litmus paper.
    f. Ask the learners to observe and record the results in the table.
13. Explain as follows:
    a. Look at the table and fill in the last column.
    b. Now answer the questions.
14. Give the learners some time to complete this task.
15. Model answer

Results:

Substance	*Colour with blue litmus*	*Colour with red litmus*	*Acid, base, neutral*
Water	*blue*	*red*	*neutral*
Dishwashing liquid	*blue*	*blue*	*base*
Sugar water	*blue*	*red*	*neutral*
Lemon juice	*red*	*red*	*acid*
Disprin	*red*	*red*	*acid*
Handy Andy	*blue*	*blue*	*base*
Soda water	*red*	*red*	*acid*
Vinegar	*red*	*red*	*acid*
Baking soda	*blue*	*blue*	*base*

ANSWERS

1. *The blue litmus paper changed to red and the red litmus remained red in an acid.*
2. *Lemon juice, Disprin, soda water and vinegar are acids.*
3. *The blue litmus paper remains blue and the red litmus changes to blue in a base.*
4. *Dishwashing liquid, Handy Andy and baking soda are bases.*
5. *Neither the red nor the blue litmus changes colour when the substance is neutral.*
6. *Water and sugar water are neutral substances.*

16. Discuss the answers with the learners.

Checkpoint 2

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

a. What colour is red litmus paper in the presence of an acid?
b. What colour is red litmus paper in the presence of a neutral?

Answers to the checkpoint questions are as follows:

a. Red litmus paper turns red in the presence of an acid.
b. Red litmus paper turns red in the presence of a neutral.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Acids, bases and neutrals	79-81
Via Afrika	Acids, bases and neutrals	78-81
Platinum	Acids, bases and neutrals	104-108
Spot On	Acids, bases and neutrals	88-90
Step-by-Step	Acids, bases and neutrals	103-104
Pelican	Acids, bases and neutrals	122-129
Solutions for All Natural Sciences	Acids, bases and neutrals	171-177
Shuters Top Class Natural Sciences	Acids, bases and neutrals	99-102
Sasol Inzalo Bk A	Acids, bases and neutrals	216-231

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=j3HhPxRSiA0 (3min 53 sec) [Understanding the Litmus Paper Test for Acids and Bases]
2. [Acids and Bases]

TOPIC OVERVIEW:
Arrangement of elements on the Periodic Table
Term 2, Weeks 6C – 8C

A. TOPIC OVERVIEW

Term 2, Weeks 6c – 8c

- This topic runs for 2 weeks.
- It is presented over 7 lessons.
- This topic's position in the term is as follows:

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

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

B. SEQUENTIAL TABLE

GRADE 6	GRADE 7	GRADE 8
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
N/A	• Arrangement of elements on the Periodic Table (a classification system with three main categories) • Some properties of metals, semi-metals and non-metals	• Compounds (the Periodic Table and names of compounds)

C. SCIENTIFIC VOCABULARY

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

	TERM	EXPLANATION
1.	Periodic Table	A list of all the elements arranged in a table
2.	element	A pure substance that cannot be broken down
3.	matter	Anything that occupies space and has mass
4.	periods	The horizontal rows in the Periodic Table
5.	groups	The vertical columns in the Periodic Table
6.	symbol	An abbreviation for a chemical element
7.	atomic number	The number of protons in one atom of an element
8.	atomic mass	The total number of protons and neutrons in a nucleus
9.	metal	A chemical element that conducts heat and electricity
10.	non-metal	Any element that does not conduct heat or electricity
11.	semi-metal	An element that shares some properties with metals and some with non-metals
12.	semi-conductor	An element or substance that conducts electricity only when it is heated up
13.	brittle	Breaks easily
14.	ductile	Can be stretched
15.	malleable	Can be bent and flattened
16.	noble gas	A stable gas that does not combine with other elements
17.	properties	How something looks, feels or acts

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Chemicals are substances that we use in our everyday lives. Knowing how to identify them is important. We need to know which substances are harmful. Knowing the chemical make-up of a substance can even save a life. Being able to identify the symbol of an element is useful knowledge. If you want to follow a career in a scientific field, having a knowledge of the Periodic Table will stand you in good stead.

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 2, Week 6, Lesson C
Lesson Title: The Periodic Table
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Introducing the Periodic Table
CAPS Page Number	25

Lesson Objectives

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

- explain what a Periodic Table is
- understand what a classification system is
- identify what an element is
- know the history of the Periodic Table.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet access	
Poster: The Periodic Table of Elements	

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 acid-base indicator did we use to test for acids, bases and neutrals?

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

> *We used red and blue litmus paper to test for acids, bases and neutrals.*

D ACCESSING INFORMATION

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

> THE PERIODIC TABLE
>
> 1. The version of the Periodic Table we use today is based on the version that was first proposed by Dmitri Mendeleev, a Russian scientist, in the 1860s.
> 2. The Periodic Table is a classification system.
> 3. The elements are arranged on the Periodic Table according to their properties.
> 4. An element is a pure substance that cannot be broken down.
> 5. The rows on the table are called periods.
> 6. The columns on the table are called groups.

2. Read the following passage to the learners.

> People have been interested in science from the earliest times. Early man discovered how to process natural ores into metals for ornaments, weapons and tools. At least 3000 years ago, ancient people were already using embalming fluids (chemicals) obtained from plants to preserve the bodies of dead people and animals!
>
> Mankind has been studying and experimenting with materials to try to understand matter for thousands of years. Scientists, especially, wanted some understanding of all the different substances that they were working with.

TOPIC: Elements on the Periodic Table

Over time, many different elements were discovered by scientists all over the world. These elements make up all the materials around us. But what do we mean by the word element? An element is a pure substance which cannot be broken down any further.

Over time, our knowledge about the elements and their behaviour increased and scientists recognised the need to organise this information. They began to observe patterns and similarities in the way some groups of elements behaved, and recorded these observations. Scientists wanted some way to classify the elements according to the properties that they were observing.

The version of the Periodic Table that we use today was first proposed by Dmitri Mendeleev in the 1860s. Mendeleev was a brilliant Russian scientist. While other scientists made many contributions to the design of the Periodic Table, Mendeleev was the one who first showed that the table could predict the existence and properties of elements that were still undiscovered at the time.

3. Explain this to the learners as follows:
    a. Chemicals have been used as embalming fluids by the Egyptians for many years.
    b. Dmitri Mendeleev, a Russian scientist, decided to organise these **elements** according to their **properties**.
4. Continue to explain:
    a. An element is a pure substance that cannot be broken down.
    b. These elements are arranged on a table or chart.
    c. This is known as the **Periodic Table**.
    d. The Periodic Table is a table of all known elements that have been arranged in a scientific sequence.
    e. The rows on the table are called **periods**.
    f. The columns on the table are called **groups**.
5. Tell the learners to copy the information written on the chalkboard into their workbooks.
6. Give the learners some time to complete this task.

Checkpoint 1

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

a. What is an element?

b. What are the rows on a Periodic Table called?

Answers to the checkpoint questions are as follows:

a. An element is a pure substance that cannot be broken down.

b. The rows on a Periodic Table are called periods.

E CONCEPTUAL DEVELOPMENT

1. Show the learners the poster: 'The Periodic Table of Elements'.
2. Explain to the learners:
   a. The Periodic Table is a classification system.
   b. The elements that make up matter and materials in the world are represented by a name and symbol on the Periodic Table.
   c. There are more than 100 elements that are known today.
   d. Ninety-one of these elements occur naturally in the Earth's air, soil and rocks.
3. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

1. What is the Periodic Table?
2. Can you remember four facts that you have learnt about the Periodic Table? Write these down.

4. Tell the learners to copy down the questions from the chalkboard into their workbooks and to answer them.
5. Allow the learners some time to complete this task.
6. Model Answer

1. *The Periodic Table is a table of all known elements that have been arranged in a scientific sequence.*
2. *Some of the facts that we have learnt about the Periodic Table are as follows (learners should list four of these possible answers):*
   a. *The Periodic Table is a classification system.*
   b. *The Periodic Table is a table of all known elements that have been arranged in a scientific sequence.*
   c. *The elements are represented by a name and symbol on the Periodic Table.*
   d. *The rows on the table are called periods.*
   e. *The columns on the table are called groups.*
   f. *There are more than 100 elements that are known today.*

7. Discuss the answers with the learners.

Checkpoint 2

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

a. How are elements represented on the Periodic Table?
b. Who proposed the first Periodic Table?

Answers to the checkpoint questions are as follows:

a. Elements are represented by a name and symbol on the Periodic Table.
b. Dmitri Mendeleev proposed the first Periodic Table.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	The Periodic Table	82
Via Afrika	The Periodic Table	82-85
Platinum	The Periodic Table	109-110
Spot On	The Periodic Table	91-92
Step-by-Step	The Periodic Table	105-106
Pelican	The Periodic Table	130-132
Solutions for All Natural Sciences	The Periodic Table	178-179
Shuters Top Class Natural Sciences	The Periodic Table	103-104
Sasol Inzalo Bk A	The Periodic Table	232-233

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.chemicool.com/
2. https://www.youtube.com/watch?v=0RRVV4Diomg (11min 21 sec) [The Periodic Table: Crash course chemistry #4]
3. https://www.youtube.com/watch?v=fPnwBITSmgU (4min 24sec) [The genius of Mendeleev's Periodic Table - Lou Serico]

7 A

Term 2, Week 7, Lesson A
Lesson Title:Arrangement of elements on the Periodic Table
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Name, symbol and atomic mass
CAPS Page Number	25

Lesson Objectives

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

- understand the arrangement of elements on the Periodic Table
- recognize an element by its name, symbol or atomic number
- recall the first 20 elements of the Periodic Table.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet connection	
Poster: The Periodic Table of Elements	
Resources 14 - 18: Key for the Nitrogen box on the Periodic Table	
Resources: 18 - 22 Periodic Table 15.1, 15.2, 15.3, 15.4	

C CLASSROOM MANAGEMENT

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

What is a Periodic Table?

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

The Periodic Table is a table of all known elements arranged in a scientific sequence.

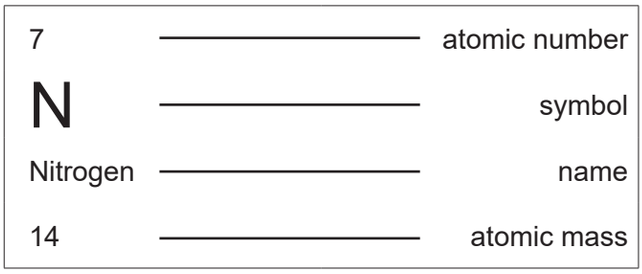
D ACCESSING INFORMATION

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

ARRANGEMENT OF ELEMENTS ON THE PERIODIC TABLE

1. Each element has its own name, symbol, atomic number, position and atomic mass on the Periodic Table.
2. The symbol:
   a. This comes from the name of the element.
   b. This is usually the first letter, or the first two letters of the element's name.
3. The first letter of the symbol is always a capital letter, for example, the symbol for Nitrogen is 'N'.
4. If the symbol has two letters, the second letter is always a small letter, for example, Aluminium is 'Al'.
5. Some elements have symbols that come from their Latin names, for example, Potassium which is 'K' from the Latin word, Kalium.
6. The atomic number is the number of protons in one atom of that element.

7. If the atomic number of the element is 7 it means that the element has seven protons.
8. The atomic number is found above the symbol.
9. The elements are arranged from left to right, in numerical order according to their atomic number, on the Periodic Table.
10. The atomic mass is the number which is written below the symbol. This means that Nitrogen has an atomic mass of 14.
11. This is the key for the Nitrogen box on the Periodic Table:



2. Show the learners the poster: 'The Periodic Table of Elements'.
   Point to the Nitrogen box on the Periodic Table.
3. Now show Resource 14: 'Key for the Nitrogen box on the Periodic Table', and point to each part of the box when it is mentioned.
4. Explain the following to the learners:
   a. Each **element** on the Periodic Table has its own name, **symbol, atomic number, atomic mass** and position.
   b. The name of the element is written in the box, and is found below the symbol.
   c. The symbol for the element appears in the middle of the box.
   d. The symbol is usually the first letter, or the first two letters of the element.
   e. Take note that the symbol is written as a capital letter (show an example on the Periodic Table poster). If there are two letters in the symbol, the first letter will be a capital letter and the second letter will be a small letter. Show an example on the Periodic Table poster.
   f. Sometimes the symbol is a different letter because the element's Latin name has been used. Point out an example like Potassium which has the symbol 'K', from the Latin word, Kalium.
   g. The atomic number is written above the symbol and tells you how many protons are in one atom of that element.
   h. The atomic mass is the other number at the bottom of the block.
5. Tell the learners to copy the information written on the chalkboard into their workbooks.
6. Give the learners some time to complete this task.

Checkpoint 1

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

a. Are the symbols on the Periodic Table always written in capital letters?
b. What do we call the number written above the symbol?

Answers to the checkpoint questions are as follows:

a. The symbols are written in capital letters. If there is a second letter, it will be written in a small letter.
b. The number above the symbol is the atomic number.

E CONCEPTUAL DEVELOPMENT

1. Hand out Resources 15.1, 15.2, 15.3 and 15.4: The Periodic Table. Spread them around the class so that they can be shared amongst the learners.
2. Explain to the learners:
   a. Look at the Periodic Table.
   b. What element do you see at atomic number 11?
      (Answer: Sodium)
   c. What is the atomic number of Oxygen?
      (Answer: 8)
   d. What is the symbol for Sulfur?
      (Answer: S)
   e. What is the atomic mass of Helium?
      (Answer: 4)
3. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

Fill in the name, symbol and atomic number for the first 20 elements on the Periodic Table.

Atomic number	Element symbol	Element name
1	H	Hydrogen
	DRAW TABLE WITH 20 LINES	
20	Ca	Calcium

4. Explain that they must use the Periodic Table that has been handed out, to fill in the table.
5. Tell the learners to copy the Activity that is written on the chalkboard into their workbooks.
6. The first and last elements have been done for you.
7. Give the learners some time to complete this task.
8. Model answer

Atomic number	*Element symbol*	*Element name*
1	*H*	*Hydrogen*
2	*He*	*Helium*
3	*Li*	*Lithium*
4	*Be*	*Beryllium*
5	*B*	*Boron*
6	*C*	*Carbon*
7	*N*	*Nitrogen*
8	*O*	*Oxygen*
9	*F*	*Fluorine*
10	*Ne*	*Neon*
11	*Na*	*Sodium*
12	*Mg*	*Magnesium*
13	*Al*	*Aluminium*
14	*Si*	*Silicon*
15	*P*	*Phosphorus*
16	*S*	*Sulfur*
17	*Cl*	*Chlorine*
18	*Ar*	*Argon*
19	*K*	*Potassium*
20	*Ca*	*Calcium*

10. Discuss the answers with the learners.

Checkpoint 2

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

a. What is the atomic number and name of the symbol 'F'.
b. What is the name of the symbol 'Mg'?

Answers to the checkpoint questions are as follows:

a. The atomic number for 'F' is 9, and its name is Fluorine.
b. Magnesium is the name for 'Mg'.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	The Periodic Table	82-86
Via Afrika	The Periodic Table	86-87
Platinum	The Periodic Table	110-111
Spot On	The Periodic Table	93
Step-by-Step	The Periodic Table	106-107
Pelican	The Periodic Table	133-134
Solutions for All Natural Sciences	The Periodic Table	108-181
Shuters Top Class Natural Sciences	The Periodic Table	104-105
Sasol Inzalo Bk A	The Periodic Table	233-239

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=VgVQKCcfwnU (2min 53sec) [The NEW Periodic Table Song]
2. http://www.sparknotes.com/chemistry/fundamentals/periodictable/section2.rhtml
3. https://www.lenntech.com/periodic/number/atomic-number.htm

7 B

Term 2, Week 7, Lesson B
Lesson Title:Arrangement of elements on the Periodic Table
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	The three main categories of elements
CAPS Page Number	25

Lesson Objectives

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

- identify the three main categories of elements
- understand where to find the three categories on the Periodic Table.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet access	
Poster: The Periodic Table of Elements	
Resources 15.1, 15.2, 15.3, 15.4:	
The Periodic Table	

C CLASSROOM MANAGEMENT

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

> What is the name of the first element on the Periodic Table?

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

> *The first element on the Periodic Table is hydrogen.*

D ACCESSING INFORMATION

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

> THE THREE MAIN CATEGORIES OF ELEMENTS
>
> 1. The elements on the Periodic Table are arranged into three main categories: metals, semi-metals and non-metals.
> 2. Metals are found on the left-hand side of the table.
> 3. Non-metals are found on the right-hand side of the table.
> 4. Semi-metals are found in the region between metals and non-metals.

2. Hand out Resources 15.1, 15.2, 15.3 and 15.4: The Periodic Table. Spread them around the class so that they can be shared amongst the learners. Tell the learners to look at the Periodic Table while you explain.
3. Explain this to the learners as follows:
   a. Remember that the elements are arranged by atomic number.
   b. The elements on the Periodic Table are arranged into three main categories: **metals**, **non-metals** and **semi-metals**.
4. Continue to explain:
   e. A metal is a chemical element that conducts heat and electricity.

b. A non-metal is any element that does not conduct heat or electricity.
c. A semi-metal is an element that shares some properties with metals and some with non-metals.

5. Tell the learners to copy the information written on the chalkboard into their workbooks.
6. Give the learners some time to complete this task.

Checkpoint 1

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

a. How many categories are the elements arranged into?
b. What is the name given to each of these categories?

Answers to the checkpoint questions are as follows:

a. The elements on the Periodic Table are arranged into three main categories.
b. The three categories are: metals, semi-metals and non-metals.

E CONCEPTUAL DEVELOPMENT

1. Tell the learners to look at the poster: 'The Periodic Table of Elements', and the Resources 15.1, 15.2, 15.3 and 15.4:The Periodic Table.
2. Explain to the learners:
   a. When you look at the Periodic Table, the metal elements are on the left-hand side. Note that although hydrogen is found on the left-hand side of the table, it is classified as a non-metal because of the way it behaves.
   b. Non-metals are found on the far right-hand side of the table.
   c. Semi-metals are found in the region between metals and non-metals.
3. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

1. Use the Periodic Table to fill in the names of the elements in the table below.

Atomic number	Element name
5	
14	
32	
33	
51	
52	
84	
85	

2. Which category do you think these elements belong to?

3. Ask the learners to look at the poster: The Periodic Table of Elements.
4. Explain the following:
   a. If you look at the poster you will notice that it is colourful.
   b. Some Periodic Tables use colour to show you the different categories.
   c. This poster has a colour key at the top to tell you what the colours represent.
   d. The metals are represented by the green, purple and blue colours. (Point this out on the poster.)
   e. The non-metals are represented by the orange colours. (Point this out on the poster.)
   f. The semi-metals are represented by the yellow colour. (Point this out on the poster.)
   g. Semi-metals are also known as metalloids.
6. Colour is used to make it easier to identify the three categories.
7. Tell the learners to copy the activity written on the chalkboard into their workbooks.
8. Give the learners some time to complete this activity.
9. Model answer

1. Use the Periodic Table to fill in the names of the elements in the table below.

Atomic number	*Element name*
5	*Boron*
14	*Silicon*
32	*Germanium*
33	*Arsenic*
51	*Antimony*
52	*Tellurium*
84	*Polonium*
85	*Astatine*

2. These elements belong to the semi-metal category.

10. Discuss the answers with the learners.

Checkpoint 2

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

a. Is hydrogen a metal?
b. Where do you find the semi-metals on the Periodic Table?

Answers to the checkpoint questions are as follows:

a. Hydrogen is not a metal.
b. Semi-metals are found in the region between metals and non-metals.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	Arrangement of elements	82-86
Via Afrika	Arrangement of elements	84-85
Platinum	Arrangement of elements	112-113
Spot On	Arrangement of elements	93
Step-by-Step	Arrangement of elements	107
Pelican	Arrangement of elements	134-135
Solutions for All Natural Sciences	Arrangement of elements	180-182
Shuters Top Class Natural Sciences	Arrangement of elements	104-106
Sasol Inzalo Bk A	Arrangement of elements	239-248

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.chem4kids.com/files/elem_pertable.html
2. https://www.windows2universe.org/earth/geology/metals.html
3. https://www.youtube.com/watch?v=OoooStZQHdA (1min 28sec) [Metals, Nonmetals, and Metalloids on the Periodic Table]
4. https://www.youtube.com/watch?v=5R08N3u5Z_Y (5min 15sec) [Metals, Nonmetals, and Metalloids]

7 C

Term 2, Week 7, Lesson C
Lesson Title: Properties of metals, semi-metals and non-metals
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Properties of metals
CAPS Page Number	25

Lesson Objectives

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

- define the physical properties of a material
- list the physical properties a material could have
- define compressive strength, tensile strength and flexibility
- investigate and compare the strength of materials.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet access	
Resource 16.1 16.2 16.3 16.4: Properties of metals	

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 three categories are the elements divided into on the Periodic Table?

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

> *The elements on the Periodic Table are divided into three categories: metals, semi-metals and non-metals.*

D ACCESSING INFORMATION

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

> PROPERTIES OF METALS
>
> Metals have the following properties:
>
> 1. They are shiny.
> 2. They are ductile which means that they can be stretched.
> 3. They are malleable which means that they can be bent and flattened.
> 4. They are solid at room temperature except for mercury.
> 5. Mercury is a metal which is a liquid at room temperature.
> 6. They have high boiling points and melting points.
> 7. They are good conductors of heat and electricity.

2. Explain this to the learners as follows:
   a. We have already identified the three categories of the Periodic Table.
   b. We will now look more closely at metals.
3. Continue to explain:
   In Grade 5 pupils learnt about the properties of metals, and earlier this term they learnt about some of the physical properties of **matter**.

4. Ask the learners if they can name any of the properties of metals.
   These are some of the possible answers:
   a. *Metals are shiny.*
   b. *Metals are solids.*
      (Mention that mercury is the only liquid metal, and is liquid at room temperature.)
   c. *Metals have a high boiling point and melting point.*
   d. *Metals are good conductors of heat and electricity.*
5. Ask the leaners: What do we mean when we say a metal is a good conductor?
   (Answer: It allows heat and electricity to pass easily through it.)
6. Explain to the learners that:
   a. Metals are **ductile** which means that they can be stretched until they are thin.
   b. Metals are **malleable** which means that they can be bent and flattened.
6. Tell the learners to copy the information written on the chalkboard into their workbooks.
7. Give the learners some time to complete this task.

Checkpoint 1

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

a. Is mercury a metal?
b. Are all metals solid?

Answers to the checkpoint questions are as follows:

a. Mercury is a metal.
b. Not all metals are solid because mercury is a liquid metal at room temperature.

E CONCEPTUAL DEVELOPMENT

1. Ask the learners to name the properties of metals.
   (Answer: Some of the properties of metals are that they are shiny, solid, malleable, ductile, good conductors of heat and electricity, and have a high boiling and melting point).
2. Hand out Resource 16.1, 16.2, 16.3, 16.4: 'Properties of metals'. Spread them around the class so that they can be shared amongst the learners.
3. Ask the learners to look at the pictures and to identify the property of the metal in each picture.
4. Give the learners the opportunity to discuss the properties.
5. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

Study Resource 16 and complete the table:

Picture	**Property**
1	
2	
3	
4	
5	
6	
7	

6. Tell the learners to copy the information written on the chalkboard into their workbooks.
7. Give the learners some time to complete the table by filling in the properties of the metal in each picture.
8. Model answer

Picture	*Property*
1	*malleable*
2	*conducts heat*
3	*shiny*
4	*ductile*
5	*solid*
6	*high melting and boiling point*
7	*electrical conductor*

9. Discuss the answers with the learners.

Checkpoint 2

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

a. What does ductile mean?
b. What does malleable mean?

Answers to the checkpoint questions are as follows:

a. If a metal is ductile it means that it can be stretched until it is thin.
b. If a metal is malleable it means it can be bent and flattened.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	The Periodic Table	87
Via Afrika	The Periodic Table	88-89
Platinum	The Periodic Table	114-117
Spot On	The Periodic Table	95-96
Step-by-Step	The Periodic Table	108
Pelican	The Periodic Table	135-137
Solutions for All Natural Sciences	The Periodic Table	183
Shuters Top Class Natural Sciences	The Periodic Table	107
Sasol Inzalo Bk A	The Periodic Table	239-246

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.s-cool.co.uk/gcse/chemistry/metals-the-reactivity-series/revise-it/properties-of-metals-and-non-metals
2. https://www.youtube.com/watch?v=4gpEAj-Veio (5min 35sec) [Physical properties of metals]
3. https://www.youtube.com/watch?v=rl0IciM3db0 (6min 41sec) [E-learning Class 8 Free Tutorial - Know about Metals and Non-metals and its Concepts in English]

8 A

Term 2, Week 8, Lesson A
Lesson Title: Properties of metals, semi-metals and non-metals
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Properties of non-metals
CAPS Page Number	25

Lesson Objectives

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

- define the physical properties of a non-metal
- list the physical properties a non-metal could have
- apply the properties of materials.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet access	
Resource 15.1, 15.2, 15.3, 15.4: The Periodic Table	

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 will you find metals on the Periodic Table?

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

> *Metals are found on the left-hand side of the table.*

D ACCESSING INFORMATION

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

> PROPERTIES OF NON-METALS
>
> 1. The properties of non-metals will vary depending on whether they are a solid, liquid or gas.
> 2. Most non-metals are dull and weak.
> 3. Non-metals are brittle and can be crushed into a powder.
> 4. Non-metals are not ductile or malleable.
> 5. Non-metals are poor conductors of heat and electricity.
> 6. Non-metals have lower melting and boiling points than metals.
> 7. Non-metals are found on the right-hand side of the Periodic Table.

2. Explain this to the learners as follows:
   a. Non-metals can be a liquid, solid or a gas at room temperature.
   b. Depending on their natural state, non-metals will have different properties.
   c. Non-metals are elements that display properties opposite to those of metals.
3. Continue to explain:
   a. Non-metals are dull and weak.
   b. Non-metals are brittle and can be crushed into a powder.
   c. Non-metals are not ductile (which means that they cannot be stretched) or malleable.

d. Non-metals, like plastic, are poor conductors of heat and electricity, and are therefore good insulators.
e. Non-metals have a lower melting point and boiling point than metals.

4. Remind learners that non-metals are found on the right-hand side of the Periodic Table.
5. Tell the learners to copy the information written on the chalkboard into their workbooks.
6. Give the learners some time to complete this task.

Checkpoint 1

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

a. What does brittle mean?
b. Can a non-metal be a gas?

Answers to the checkpoint questions are as follows:

a. Brittle means that the non-metal can break easily and be crushed into a powder.
b. Yes, a non-metal can be a gas.

E CONCEPTUAL DEVELOPMENT

1. Revise the properties of non-metals.
2. Explain to the learners:
   a. Only 17 elements are classified as non-metals.
   b. Most non-metals are gases.
   c. The most common gases are hydrogen, nitrogen and oxygen.
   d. There is also a group of non-metals called noble gases.
   e. Noble gases are a family of seven stable gases that occur naturally and do not combine with other elements.
   f. There is one non-metal that is a liquid, and it is called bromine.
   g. There are a few non-metals that are solids (carbon, phosphorus, sulfur, selenium, and iodine).
3. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

1. Write down the names of the noble gases with their symbols.
2. Complete the table by filling in the opposite property of a non-metal.

Metal	**Non-metal**
Shiny	
Malleable and ductile	
Good conductor of heat	
Good conductor of electricity	
High melting point	

4. Hand out Resources 15.1, 15.2, 15.3 and 15.4: The Periodic Table. Spread them around the class so that they can be shared amongst the learners.
5. Tell the learners that they will use the Periodic Table to identify and write down the names and symbols of the six noble gases.
6. Ask them to look at the last group of non-metals on the far right-hand side.
7. Tell them that these are the noble gases.
8. Read through the names with them helium, neon, argon, krypton, xenon radon, and oganesson.
9. Tell the learners to copy the information written on the chalkboard into their workbooks.
10. Give the learners some time to complete this task.
11. Model Answers

1. *Helium (He), Neon (Ne), Argon (Ar), Krypton (Kr), Xenon (Xe), and Radon (Rn), and Oganesson (Og).*
2.

Metal	*Non-metal*
Shiny	*Dull*
Malleable and ductile	*Brittle*
Good conductor of heat	*Poor conductor of heat*
Good conductor of electricity	*Poor conductor of electricity*
High melting point	*Low melting point*

12. Discuss the answers with the learners.

Checkpoint 2

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

a. What is a noble gas?
b. Where do you find noble gases on the Periodic Table?

Answers to the checkpoint questions are as follows:

a. A noble gas is a stable gas that occurs naturally and does not combine with other elements.
b. Noble gases are the last group of non-metals on the far right-hand side of the Periodic Table.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	The Periodic Table	88-89
Via Afrika	The Periodic Table	88-89
Platinum	The Periodic Table	114-117
Spot On	The Periodic Table	95-96
Step-by-Step	The Periodic Table	107-108
Pelican	The Periodic Table	137-138
Solutions for All Natural Sciences	The Periodic Table	184-187
Shuters Top Class Natural Sciences	The Periodic Table	108
Sasol Inzalo Bk A	The Periodic Table	239-244

G ADDITIONAL ACTIVITIES/ READING

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

1. https://en.wikipedia.org/wiki/Nonmetal
2. https://www.youtube.com/watch?v=QdajjpfwZEM (7min 08sec) [Metals Metalloids Non Metals]
3. https://www.youtube.com/watch?v=Oz8GpDVz5ag (5min 24sec) [Physical Properties of Metals and Non Metals]

8 B

Term 2, Week 8, Lesson B
Lesson Title: Properties of metals, semi-metals and non-metals
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Properties of semi-metals
CAPS Page Number	25

Lesson Objectives

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

- define the physical properties of a semi-metal
- list the physical properties a semi-metal could have
- apply the properties of semi-metals.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet access	
Resources 15.1, 15.2, 15.3, 15.4: The Periodic Table	
Poster: The Periodic Table of Elements.	

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 are non-metals found on the Periodic Table?

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

Non-metals are found on the right-hand side of the Periodic Table.

D ACCESSING INFORMATION

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

PROPERTIES OF SEMI-METALS

1. Semi-metals have some properties of metals and some properties of non-metals.
2. Semi-metals are solids at room temperature.
3. There are only seven semi-metals: boron, silicon, germanium, arsenic, antimony, tellurium and polonium.
4. Semi-metals can be dull or shiny.
5. Semi-metals make good semi-conductors.
6. Semi-conductors are materials that conduct electricity only when they are heated.

2. Explain this to the learners as follows:
   a. Semi-metals are also known as metalloids.
   b. Semi-metals lie between metals and non-metals on the Periodic Table.
   c. Semi-metals are solids at room temperature and have some properties of both metals and non-metals.Continue to explain:

3. Tell the learners to look at the poster: 'The Periodic Table of Elements'. Point out the yellow blocks which are the semi-metals. There are only seven of them.
4. Read the names of the semi-metals: boron, silicon, germanium, arsenic, antimony, tellurium and polonium.
5. Continue to explain:
   a. Semi-metals can be dull or shiny.
   b. Semi-metals are semi-conductors. This means they conduct electricity only when they are heated.
6. Tell the learners to copy the information written on the chalkboard into their workbooks.
7. Give the learners some time to complete this task.

Checkpoint 1

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

a. How many semi-metals are there?
b. Where are semi-metals found on the Periodic Table?

Answers to the checkpoint questions are as follows:

a. There are seven semi-metals.
b. The semi-metals are found between metals and non-metals on the Periodic Table.

E CONCEPTUAL DEVELOPMENT

1. Remind the learners that the properties of semi-metals can be those of metals and non-metals.
2. Explain to the learners that silicon is an example of a semi-metal. It is shiny (which is a property of a metal), but it is brittle (which is the property of a non-metal). Silicon is a semi-conductor because it acts as a conductor when heated, and an insulator when cooled.
3. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

1. Which semi-metals are in the first 20 elements on the Periodic Table?
2. Look at the Periodic Table and fill in the table below.

Element name	Symbol	Metal, non-metal or semi-metal
Oxygen		
	Hg	
	Cl	
Hydrogen		
Silicon		
	Cu	
	B	

4. Give the learners Resource 15.1, 15.2, 15.3, 15.4: The Periodic Table.
5. Tell them that they will use it to complete the activity. The learners will need to record the missing element names or symbols, and then decide whether the element is a metal, non-metal or semi-metal.
6. Tell the learners to copy the information written on the chalkboard into their workbooks.
7. Give the learners some time to complete this task.
8. Model answer:

1. Boron and silicon are the only two semi-metals in the first 20 elements.

2.

Element name	*Symbol*	*Metal, non-metal or semi-metal*
Oxygen	*O*	*Non-metal*
Mercury	*Hg*	*Metal*
Chlorine	*Cl*	*Non-metal*
Hydrogen	*H*	*Non-metal*
Silicon	*Si*	*Semi-metal*
Copper	*Cu*	*Metal*
Boron	*B*	*Semi-metal*

9. Discuss the answers with the learners.

Checkpoint 2

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

a. What is a semi-conductor?
b. Is bromine a semi-metal?

Answers to the checkpoint questions are as follows:

a. A semi-conductor is a semi-metal that conducts electricity only when it is heated.
b. Bromine is not a semi-metal.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	The Periodic Table	89
Via Afrika	The Periodic Table	88-89
Platinum	The Periodic Table	118-119
Spot On	The Periodic Table	95
Step-by-Step	The Periodic Table	107-108
Pelican	The Periodic Table	137
Solutions for All Natural Sciences	The Periodic Table	184-187
Shuters Top Class Natural Sciences	The Periodic Table	108
Sasol Inzalo Bk A	The Periodic Table	245-248

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://simple.wikipedia.org/wiki/Semimetal
2. https://sciencenotes.org/list-metalloids-semimetals/
3. https://www.youtube.com/watch?v=uN2cVakPD-c (3min 37sec) [Metals, Non-metals and Metalloids - What Are Their Properties? - GCSE Chemistry]
4. https://www.youtube.com/watch?v=0pdRxrmgRoQ (7min 35sec) [Elements, Metals and Non-metals]

8 C

Term 2, Week 8, Lesson C
Lesson Title:Elements from the Periodic Table
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Elements in everyday life
CAPS Page Number	25

Lesson Objectives

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

- recall the properties of a metal, non-metal and semi-metal
- compare the properties of a metal, non-metal and semi-metal
- know the uses of a metal, non-metal and semi-metal.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Computer with internet access	
Resources 15.1, 15.2, 15.3, 15.4: The Periodic Table	
Poster: The Periodic Table of Elements.	

C CLASSROOM MANAGEMENT

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

Is a semi-metal the same as a non-metal?

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

A semi-metal is not the same as a non-metal.

D ACCESSING INFORMATION

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

ELEMENTS IN EVERYDAY LIFE

1. Copper is used in wire because it is a good conductor of electricity.
2. Lithium is used in rechargeable batteries.
3. Oxygen is the gas that we breathe in and need in order to survive.
4. Aluminium has many uses. Some include:
   a. Foil in packaging
   b. Cooking pots and pans
   c. Cool drink cans
   d. Constructing cars, aeroplanes, doors and windows.
5. Gold and silver are used in jewellery.
6. Chlorine is used to clean swimming pools.
7. Phosphorus and sulfur are used in matchstick heads.

2. Explain this to the learners as follows:
    a. The elements which are listed in the table are used for many things in everyday life.
    b. Ask the learners if they can give you any examples of an element and where it is used. *(Answers may vary.)*
3. Continue to explain:
    a. Copper is used in wire because it is a good conductor of electricity.
    b. Lithium is used in rechargeable batteries.
    c. Oxygen is the gas that we breathe in and need in order to survive.
    d. Aluminium is a shiny metal and the property that makes it so useful is that it is very light. It has many uses: foil in packaging, cooking pots and pans, cool drink cans, and in the construction of cars, aeroplanes, doors and windows.
    e. Gold and silver are used in jewellery.
    f. Chlorine is used to clean swimming pools.
    g. Phosphorus and sulfur are used to make the heads of matchsticks.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.
5. Give the learners some time to complete this task.

Checkpoint 1

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

a. Why do we need oxygen?
b. What is copper used for?

Answers to the checkpoint questions are as follows:

a. We need oxygen in order to survive.
b. Copper is used to make wire.

E CONCEPTUAL DEVELOPMENT

1. Explain to the learners:
    a. There are uses for every element in the Periodic Table.
    b. Use the poster: The Periodic Table of Elements and look for other examples of uses for elements in everyday life. The pictures on the poster will help the learners.
    c. Choose a few learners to come up (one at a time) to the poster and find the elements. Find at least four other elements.
    Some possible answers are: *Ce - Cerium is used in lighter fluid, Zn – Zinc is used to make brass instruments, Sb – Antimony is used in car batteries, P – Phosphorus is found in bones.*
2. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY

Use the poster: The Periodic Table of Elements and Resource 15.1, 15.2, 15.3, 15.4: 'The Periodic Table' to complete the table:

Symbol	**Element name**	**Use**
Na		
Co		
I		
Ne		
Sb		
As		
Tb		

3. Tell learners to use Resources 15.1, 15.2, 15.3, 15.4: 'The Periodic Table' to find the names of the elements for the activity.
4. Tell the learners (one at a time) to look at the poster: 'The Periodic Table of Elements'. They need to find the pictures on the Periodic Table that will help them work out the uses of the elements on the activity table. They must report back to the group.
5. Tell the learners to copy the information written on the chalkboard into their workbooks.
6. Give the learners some time to complete this task.
7. Model answer:

Symbol	*Element name*	*Use*
Na	*Sodium*	*used in salt*
Co	*Cobalt*	*used in magnets*
I	*Iodine*	*used as a disinfectant*
Ne	*Neon*	*used in neon lights*
Sb	*Antimony*	*used in car batteries*
As	*Arsenic*	*used as a poison*
Tb	*Terbium*	*used in fluorescent lights*

8. Discuss the answers with the learners.

Checkpoint 2

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

a. What is sodium used to make?
b. What is arsenic?

Answers to the checkpoint questions are as follows:

a. Sodium is used to make salt
b. Arsenic is a poison.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Oxford Successful	The Periodic Table	249
Via Afrika	The Periodic Table	-
Platinum	The Periodic Table	120-121
Spot On	The Periodic Table	94
Step-by-Step	The Periodic Table	-
Pelican	The Periodic Table	139
Solutions for All Natural Sciences	The Periodic Table	184-185
Shuters Top Class Natural Sciences	The Periodic Table	106
Sasol Inzalo Bk A	The Periodic Table	249-250

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=xqoQfN9DgNs (3min 17sec) [Why we need rare earth elements]
2. https://www.youtube.com/watch?v=qbaJCpigpFE (7min 58sec) [13 Most Fascinating Elements Explained]
3. https://www.youtube.com/watch?v=LFsdbLFHgY8 (9min 59 sec) [118 elements - Periodic Table of Videos]

NATURAL SCIENCES
ASSESSMENT
GRADE 7 TERM 2

GRADE 7 ASSESSMENT

- This section presents the CAPS assessment requirements for this grade for this term.
- See your prescribed textbooks for examples of the required assessments.
- An example of a practical task and an exam have been included. See your textbook and departmental resources for policy compliant tests.

CAPS Assessment

Assessment is a continuous planned process that involves identifying, gathering, interpreTING and diagnosing information about the performance of learners.

Assessment involves generaTING and collecTING evidence of learner achievement and progress, and using this information to understand and provide assistance to the learner during the process of teaching and learning.

Assessment should be both *formal* and *informal*:

a. ***Informal Assessment*** involves regular checking of learners' class work and practical tasks; asking questions; discussions; informal classroom interactions; and giving constructive feedback. Informal assessment marks do not need to be recorded, but the teacher can make notes for future reference.

b. ***Formal Assessment*** provides teachers with a systematic way of evaluaTING how well learners are progressing. Formal Assessment consists of selected assessment tasks. These tasks are stipulated by CAPS and the marks need to be recorded. These tasks are done throughout the year, and include practical / investigations, project, tests and examinations.

i. Tests and Examinations

The weighTING of the marks should reflect the time allocated to each section in the curriculum content. Tests and exams should consist of a range of questions that cover different cognitive levels: recall; understanding; application; evaluation; analysis; and synthesis. CAPS aligned tests and examinations, with accompanying memoranda, are provided with these lesson plans.

ii. Practical / investigation tasks

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

iii. Poject

Projects give learners the opportunity to demonstrate knowledge, skills, understanding and application. The project can be given in any term but must be recorded for term 4 assessment.

A minimum mark allocation is prescribed in CAPS for, practical / investigation, projects, tests and examinations for each grade. These are summarised, by grade, in the table below:

Grade 7							
Programme of Formal Assessment							
	Term 1		**Term 2**		**Term 3**		**Term 4**
Form of Assessment	Practical task/ Investigation	Test	Practical task/ Investigation	Examination	Project	Test	Examination
Tools of Assessment	Rubric/memo/ checklist	Memo	Rubric/memo/ checklist	Memo	Rubric/memo/ checklist	Memo	Memo
Minimum Marks	**20**	**60**	**20**	**80**	**30**	**60**	**80**
Maximum Time Allocation	Dependent on nature of the task and context	90 minutes	Dependent on nature of the task and context	120 minutes	Dependent on nature of the task and context	90 minutes	120 minutes
Content and skills focus	Term 1	Term 1	Term 2	Terms 1 & 2	Any term (1 – 3)	Term 3	Terms 3 & 4
No. of Tasks	**2**		**2**		**2**		**1**

PRACTICAL TASK - INTRODUCTION

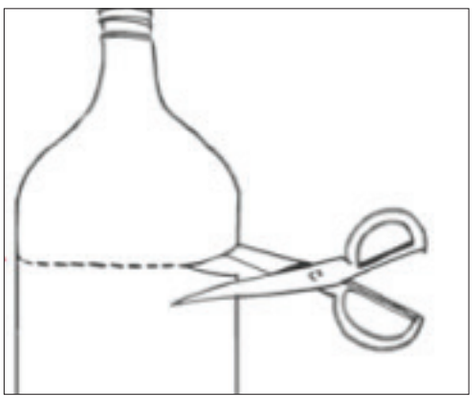
NS
GRADE 7
PRACTICAL TASK
TERM 2

20 MARKS

Time allocation: 60 minutes (20 minutes preparation, 40 minutes task time)

NOTE TO THE TEACHER

1. This practical activity will be completed as part of Section E of lesson 4B.
2. This practical will take place during the lesson after the teaching component in Section D, "Accessing Information".
3. The first 20 minutes will be used to teach Section D and prepare learners for the practical task.
4. The next 40 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. This task will be done in groups of 6.
7. Each group will need the following in order to complete the investigation:
    - Two glass jars
    - a container of water
    - a tablespoon of sand
    - a teaspoon of salt
    - a tablespoon of a mixture of samp and beans (or a few small stones and leaves)
    - a piece of filter paper, cloth or paper towel
    - a spoon or stick for stirring
    - a plate, polystyrene tray or piece of newspaper to work on
    - a funnel (this can be constructed out of a few sheets of paper or the top of a coke bottle can be cut off)The learners should complete the drawings with a sharp pencil if possible and the written answers should be completed in pen.



8. Ensure that you have all the materials ready and prepared for the learners before the lesson begins.
9. The memorandum for assessing the practical task is provided.
10. The learners should complete the drawings with a sharp pencil and the written answers should be completed in pen.

PRACTICAL TASK - MEMORANDUM

NS
GRADE 7
PRACTICAL TASK
TERM 2

20 MARKS

(see Section E of Lesson 4B for instructions and questions)

Topic	Activity	Expected answer/outcome	Marks
	1		
Separating mixtures	1.1	Separating a mixture of solids and liquids	**1**
Separating mixtures	1.2	The funnel was lined with a filter paper (or paper towel) and the mixture is poured through the filter allowing the solids to collect in the top and the liquid to pour through.	**2**
Separating mixtures	1.3	Filtration	**1**
Separating mixtures	1.4	No	**1**
Separating mixtures	1.5	The samp and beans (stones and leaves) Some of the sand	**2**
Separating mixtures	1.6	The salt Some of the sand	**2**
Separating mixtures	1.7	The salt has dissolved into the water	**1**
Separating mixtures	1.8	Evaporation	**1**
Separating mixtures	1.9	Place the jar in the sun and wait for the water to evaporate off	**1**
Separating mixtures	1.10	Sieving	**1**
	2		
Separating mixtures	2.1	Hand sorting	**2**
Separating mixtures	2.2	Hand sorting	**2**
Separating mixtures	2.3	No	**1**
Separating mixtures	2.4	Wet sand is still stuck to the larger objects	**1**
Separating mixtures	2.5	Wait for the sand to dry and then dust it from the larger objects	**1**
		TOTAL	**20**

TERM 2 EXAM

NS
GRADE 7
EXAM
TERM 2

80 MARKS
60 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 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 What do we call the land area of the biosphere?

A. hydrosphere
B. lithosphere
C. atmosphere
D. nanosphere

You have answered correctly if you have circled (B)

NS
GRADE 7
TERM 2
EXAM

80 MARKS

PART 1: Life and Living

Question 1: Multiple choice [4]

Read each question and circle the letter that shows the correct answer.

1.1. Which one of these is NOT part of the atmosphere?

A. Nitrogen.
B. Water vapour.
C. Carbon dioxide.
D. Soil.

1.2. Which of these statements is FALSE?

A. The hydrosphere is the parts of the Earth covered in water.
B. Dead organic matter was once living matter.
C. Water is essential for all life on Earth.
D. Plants are only found on the lithosphere.

1.3. Which of these statements is TRUE?

A. We call the living part of the Earth, the organic part.
B. We call the non-living part of the Earth, the biotic part.
C. We call the living part of the Earth, the inorganic part.
D. We call the non-living part of the Earth, the botanical part.

1.4. Which one of these is not one of the 5 classification kingdoms?

A. Bacteria.
B. Fungi.
C. Organisms.
D. Protista.

Question 2: Match the columns **[4]**

Instructions:

- Match the sentences in COLUMN A with the words in COLUMN B.
- Draw a line to join the sentence in COLUMN A with the correct word in COLUMN B. Do this as shown in the example below.

COLUMN A		COLUMN B
example	Needed by all living things to survive	A. Chlorophyll
2.1	Used by plants to get water and nutrients from soil	B. Roots
2.2	Allows plants to make their own food using energy from the sun	C. Carnivores
2.3	Species: Homo sapiens	D. Humans
2.4	Animals that eat other animals	E. Air

Question 3 **[6]**

Complete the following sentences using words in the block below:

gills, cartilage, fins, cold-blooded, eggs, shells, scales

Rewrite the sentences and underline your answers.

3.1 Fish have a moist skin covered in _____.

3.2 Fish have a skeleton that is made of hard bone or of _____.

3.3 Fish have _____ which are used for swimming.

3.4 Fish have _____ which are used to take oxygen out of the water for breathing.

3.5 To reproduce, fish lay _____ that have no _____.

3.6. Fish are _____ which means their body temperature changes with the temperature of the environment.

Question 4 **[5]**

Write the word that is being described in the sentence.
Only write the answer.

4.1 Animal with a backbone.

_____

4.2 Phyla in invertebrate group with soft bodies and a shell for protection.

_____

4.3 Phyla of most common animals on Earth.

_____

4.4 Animals without a backbone.

_____

4.5 Animal class to which snakes belong.

_____

Question 5 **[2]**

"Plants with seeds are divided into Angiosperms and Gymnosperms

Explain the main differences in reproduction between angiosperms and gymnosperms.

_____

_____

_____

_____

_____

_____

Question 6 **[4]**

Complete the following table showing the function of each of these flower parts in sexual reproduction:

FLOWER PART	FUNCTION
Anther	
Stigma	
Ovary	
Petals	

Question 7 **[5]**

Read the following statements and say whether each one is true or false:

7.1 Seeds can be dispersed by wind._____

7.2 Cross-pollination is when pollen is transferred from the anther of one flower to the stigma of another flower. _____

7.3 HIV can be spread by kissing._____

7.4 f I use contraception, a pregnancy can never happen._____

7.5 There is no cure for HIV infection. _____

Question 8 **[10]**

"Puberty is a confusing time. Our bodies are changing and we often don't feel in control of our emotions."

8.1. Using what you have learnt, and the words in the box below to help, write 5-7 lines explaining what you understand by puberty and what happens to a girl's and boy's body during puberty.

ages, hair, skin, breasts, menstruation, hips, voices, penis, hormones, sweating, feelings,pregnancy, sexuality

_____
_____
_____
_____
_____
_____
_____

8.2 Name the hormone that causes these changes in girls. _____

8.3 Name the hormone that causes these changes in boys. _____

PART 2: Matter and Materials

Question 9 **[4]**

Read each question and circle the letter that shows the correct answer.

9.1 Which one of these is NOT a physical property of materials?

A. Strength.
B. Flexibility.
C. Cost
D. Conductivity.

9.2 Which of these statements is FALSE?

A. Matter takes up space and has mass.
B. Matter can be a liquid, solid or gas.
C. Flexible materials break easily.
D. Materials can be natural or man-made.

9.3 Which of these statements is TRUE?

A. All materials have the same boiling point.
B. Ice melts at around 0ºC.
C. Water in Johannesburg and water in Cape Town boils at the same temperature.
D. The boiling point is the same as the melting point of a material.

9.4 Which one of these materials is a good conductor of heat?

A. Metal.
B. Wood.
C. Plastic.
D. Rubber

Question 10: Match the columns **[4]**

Instructions:

- Match the sentences in COLUMN A with the words in COLUMN B.
- Draw a line to join the sentence in COLUMN A with the correct word in COLUMN B. Do this as shown in the example below.

COLUMN A		COLUMN B
example	Related to or producing heat	A. Rigid
10.1	Unable to bend or be forced out of shape	B. Insulator
10.2	Can be broken down by bacteria	C. Biodegradable
10.3	A material that does not allow the flow of electricity	D. Tensile
10.4	The strength of an object that stops it from breaking when pulled	E. Thermal

Question 11 **[3]**

Complete the following sentences using words in the block below:

variables, fair test, constant, conclusions

Rewrite the sentences and underline your answers.

11.1 A _____ is a scientific investigation that is carefully controlled.(1)

In a fair test, we compare two or more things.

11.2 The things that remain the same in a fair test are called the _____. (1)

11.2 The things we change in a fair test are called the _____. (1)

Question 12 **[5]**

Write the word that is being described in the sentence.
Only write the answer.

12.1 A mixture made up of a solid that is dissolved into a liquid.

_____

12.2 The property of a solid that does not dissolve into a liquid.

_____

12.3 Small, microscopic parts that make up matter.

_____

12.4 The change of state from gas to liquid.

_____

12.5 A method of separating two liquids that have different boiling points.

_____

Question 13 **[2]**

Solute + solvent = solution

Describe a solute and a solvent, highlighting what is different between the two.

13.1 Solute:

_____

_____

13.2 Solvent:

_____

_____

Question 14 **[6]**

Place the following under the correct columns:

washing powder, oil, water, lemon, bicarbonate of soda, vinegar

ACID	NEUTRAL	BASES

Question 15 **[5]**

Read the following statements and say whether each one is true or false:

15.1 Indicators are dyes that change colour in acids and bases._____

15.2 Acids can be corrosive. _____.

15.3 Citric acid is found in stomach juices._____.

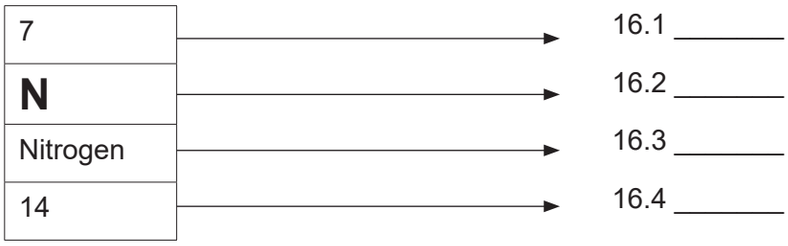
15.4 Bases are the opposite of acids and can never be dangerous._____.

15.5 Bases can be caustic and can burn organic tissue._____.

Question 16 **[4]**

Each element on the Periodic table has its own name, symbol, atomic number, atomic mass and position.

Below it the key for Nitrogen. Label what each part the key is informing us of.



Question 17 **[7]**

Answer the following questions in the spaces provided:

17.1 Name the three categories in which the elements are arranged on the Periodic Table.

_____

17.2 Name a metal that is a liquid at room temperature. _____

17.3 Some metals are malleable. What does that mean? _____

_____

17.4. Name the 2 most common gases in the atmosphere _____

_____

TOTAL [80]

TERM 2 EXAM – MEMORANDUM
NS **GRADE 7** **MEMORANDUM** **TERM 2** **80 MARKS**

Caps Topic	Questions	Expected answer(s)	Marks
PART 1: Life and the Living			
	1		
The biosphere	1.1	D✓	1
The biosphere	1.2	D✓	1
The biosphere	1.3	A✓	1
Biodiversity	1.4	C✓	1
	2		
Biodiversity	2.1	B✓	1
Biodiversity	2.2	A✓	1
Biodiversity	2.3	D✓	1
Biodiversity	2.4	C✓	1
	3		
Biodiversity	3.1	scales✓	1
Biodiversity	3.2	cartilage✓	1
Biodiversity	3.3	fins✓	1
Biodiversity	3.4	gills✓	1
Biodiversity	3.5	eggs✓shells✓	2
Biodiversity	3.6	cold-blooded✓	1
	4		
Biodiversity	4.1	vertebrate✓	1
Biodiversity	4.2	molluscs✓	1
Biodiversity	4.3	arthropods✓	1
Biodiversity	4.4	invertebrates	1
Biodiversity	4.5	reptiles✓	1

<table>
<tr><td></td><td>5</td><td></td><td></td></tr>
<tr><td>Sexual reproduction</td><td>5</td><td>Angiosperms reproduce by producing seeds in flowers.✓
Gymnosperms produce their seeds in cones ✓</td><td>2</td></tr>
<tr><td></td><td>6</td><td></td><td></td></tr>
<tr><td>Sexual reproduction</td><td>6</td><td><table><tr><th>FLOWER PART</th><th>FUNCTION</th></tr><tr><td>Anther</td><td>Makes the pollen grains that hold the male sex cells ✓</td></tr><tr><td>Stigma</td><td>The sticky tip of the female part that receives the pollen ✓</td></tr><tr><td>Ovary</td><td>The ovary holds the ovules which are the female sex cells ✓</td></tr><tr><td>Petals</td><td>Attract pollinators like insects and birds ✓</td></tr></table></td><td>4</td></tr>
<tr><td></td><td>7</td><td></td><td></td></tr>
<tr><td>Sexual reproduction</td><td>7.1</td><td>True ✓</td><td>1</td></tr>
<tr><td>Sexual reproduction</td><td>7.2</td><td>True ✓</td><td>1</td></tr>
<tr><td>Sexual reproduction</td><td>7.3</td><td>False ✓</td><td>1</td></tr>
<tr><td>Sexual reproduction</td><td>7.4</td><td>False ✓</td><td>1</td></tr>
<tr><td>Sexual reproduction</td><td>7.5</td><td>True ✓</td><td>1</td></tr>
</table>

	8		
Sexual reproduction	8.1	(Any 8 in total) In girls: • Can occur from the age of 10✓ • Breasts develop✓ • Hair grows on the vagina✓ • Hair grows under arms✓ • Skin becomes oily✓ • Hips widen✓ • Menstruation begins✓ • Feelings can become confusing✓ In boys: • Hair grows around penis ✓ • and scrotum✓ • Hair grows under arms✓ • Facial hair starts to grow✓ • Skin becomes oily✓ • Voice becomes deeper✓ • Penis becomes bigger✓ • Sperm is produced✓ • Increase in sweating✓	8
Sexual reproduction	8.2	Oestrogen✓	1
Sexual reproduction	8.3	Testosterone✓	1

<table>
<tr><th>Caps Topic</th><th>Questions</th><th>Expected answer(s)</th><th>Marks</th></tr>
<tr><td colspan="4">PART 8: Matter and Materials</td></tr>
<tr><td></td><td>9</td><td></td><td></td></tr>
<tr><td>Properties of materials</td><td>9.1</td><td>C✓</td><td>1</td></tr>
<tr><td>Properties of materials</td><td>9.2</td><td>C✓</td><td>1</td></tr>
<tr><td>Properties of materials</td><td>9.3</td><td>B✓</td><td>1</td></tr>
<tr><td>Properties of materials</td><td>9.4</td><td>A✓</td><td>1</td></tr>
<tr><td></td><td>10</td><td></td><td></td></tr>
<tr><td>Properties of materials</td><td>10.1</td><td>A✓</td><td>1</td></tr>
<tr><td>Properties of materials</td><td>10.2</td><td>C✓</td><td>1</td></tr>
<tr><td>Properties of materials</td><td>10.3</td><td>B✓</td><td>1</td></tr>
<tr><td>Properties of materials</td><td>10.4</td><td>D✓</td><td>1</td></tr>
<tr><td></td><td>11</td><td></td><td></td></tr>
<tr><td>Separating mixtures</td><td>11.1</td><td>fair test✓</td><td>1</td></tr>
<tr><td>Separating mixtures</td><td>11.2</td><td>constant✓</td><td>1</td></tr>
<tr><td>Separating mixtures</td><td>11.3</td><td>variables✓</td><td>1</td></tr>
<tr><td></td><td>12</td><td></td><td></td></tr>
<tr><td>Separating mixtures</td><td>12.1</td><td>solution✓</td><td>1</td></tr>
<tr><td>Separating mixtures</td><td>12.2</td><td>insoluble✓</td><td>1</td></tr>
<tr><td>Separating mixtures</td><td>12.3</td><td>particles✓</td><td>1</td></tr>
<tr><td>Separating mixtures</td><td>12.4</td><td>condensation✓</td><td>1</td></tr>
<tr><td>Separating mixtures</td><td>12.5</td><td>distillation✓</td><td>1</td></tr>
<tr><td></td><td>13</td><td></td><td></td></tr>
<tr><td>Separating mixtures</td><td>13.1</td><td>Solute: The substance that dissolves when making a solution e.g.: salt in a salt water solution✓</td><td>1</td></tr>
<tr><td>Separating mixtures</td><td>13.2</td><td>Solvent: The liquid in which the solute dissolves e.g.: water in a salt water solution✓</td><td>1</td></tr>
<tr><td></td><td>14</td><td></td><td></td></tr>
<tr><td>Acids, bases and neutrals</td><td>14</td><td><table><tr><td>ACID</td><td>NEUTRAL</td><td>BASE</td></tr><tr><td>lemon✓</td><td>oil✓</td><td>washing powder✓</td></tr><tr><td>vinegar✓</td><td>water✓</td><td>bicarbonate of soda✓</td></tr></table></td><td>6</td></tr>
</table>

	15		
Acids, bases and neutrals	15.1	True✓	1
Acids, bases and neutrals	15.2	True✓	1
Acids, bases and neutrals	15.3	False✓	1
Acids, bases and neutrals	15.4	False✓	1
Acids, bases and neutrals	15.5	True✓	1
	16		
Introduction to the Periodic Table of Elements	16.1.	atomic number✓	1
Introduction to the Periodic Table of Elements	16.2.	symbol✓	1
Introduction to the Periodic Table of Elements	16.3.	name✓	1
Introduction to the Periodic Table of Elements	16.4	atomic mass✓	1
	17		
Introduction to the Periodic Table of Elements	17.1	metals✓ non-metals✓ semi-metals✓	3
Introduction to the Periodic Table of Elements	17.2	mercury✓	1
Introduction to the Periodic Table of Elements	17.3	Can be bent or flattened✓	1
Introduction to the Periodic Table of Elements	17.4	oxygen✓ nitrogen✓	1
			TOTAL 80