"Cherish the natural world, because you're a part of it and you depend on it."

-Sir David Attenborough

NATURAL SCIENCES

LESSON PLAN

GRADE 8 TERM 1

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 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

COVID – 19 INFORMATION:

What is COVID-19?
COVID-19 is a disease caused by a new strain of coronavirus. ‘CO’ stands for corona, ‘VI’ for virus, and ‘D’ for disease. Formerly, this disease was referred to as ‘2019 novel coronavirus’ or ‘2019-nCoV.’
The COVID-19 virus is a new virus linked to the same family of viruses as Severe Acute Respiratory Syndrome (SARS) and some types of common cold.

What are the symptoms of COVID-19?
Symptoms can include fever, cough and shortness of breath. In more severe cases, infection can cause pneumonia or breathing difficulties. More rarely, the disease can be fatal. These symptoms are similar to the flu (influenza) or the common cold, which are a lot more common than COVID-19. This is why testing is required to confirm if someone has COVID-19.

PSYCHOSOCIAL SUPPORT

It is natural for children to feel stress, anxiety, grief, and worry during an ongoing pandemic like COVID-19. Fear and anxiety about their own health and the health of loved ones can be overwhelming and cause strong emotions. In today’s digital world, children also access different kinds of information and news through social media and digital platforms, some of them may not be factually true, causing further stress and anxiety. It is enhanced when children are not able to go out, play, attend school or interact freely. For those children and families who are subjected to quarantine or isolation there may be an increased risk of violence and abuse. When stress levels go up for adults and children, there is a greater risk of gender based violence and other forms of violence against children.
Role as parent or caregiver:
• To promote an environment where children can grow up and develop their full potential having fun and being safe and healthy.
• To facilitate a space where children are listened to, they can express their thoughts and feelings, and are free to ask any question and are answered honestly.

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 Resource pack with images to support the lesson plans
- A full colour poster
- An outline of the assessment requirements for the term
- A tracker to help you monitor your progress

Lesson Plan Structure

1. Term 1 lesson plans are structured to run for 9 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 pages **TOPIC OVERVIEW**. The topic overview pages are grey, making them easy to identify. The topic overview can be used to introduce the topic to learners. The topic overview includes:

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

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

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

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

- POINT – if the word is a noun, point at the object or at a picture of the object as you say the

word.

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

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

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

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

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

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

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

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

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

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

Explain to learners that this is an important Resource for them, because these are the notes

they will revise when preparing for tests and exams.

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

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

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

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

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

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

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

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

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

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

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

6. **ASSESSMENT.** At the end of the lesson plans, you will find the CAPS assessment requirements for the term.

Lesson Plan Routine

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

Remember, every Natural Sciences lesson follows this Routine:

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

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***

CAPS AND THE LESSON PLANS

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

Grade 8			
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**
Photosynthesis and respiration Interactions and interdependence within the environment Micro-organisms	Atoms Particle model of matter Chemical reactions	Static electricity Energy transfer in electrical systems Series and parallel circuits Visible light	The Solar System Beyond the Solar System Looking into space

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).

CAPS AND THE LESSON PLANS

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	1½
		(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

REFLECTING ON THE LESSONS THAT YOU TEACH

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

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

Use the tool below to help you reflect on the lessons that you teach. You do not need to use this for every lesson that you 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?		

REFLECTING ON THE LESSONS THAT YOU TEACH

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?		

REFLECTING ON THE LESSONS THAT YOU TEACH

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:
Photosynthesis and respiration
Term 1, Weeks 1A – 2C

A. TOPIC OVERVIEW

Term 1, 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 7	GRADE 8	GRADE 9
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• All living things can carry out all the seven life processes: nutrition, growth, reproduction, respiration, excretion, sensitivity, movement. • Living things need energy, gases, water, soil and favourable temperatures.	• Interactions and interdependency in an ecosystem are driven by the need for energy to sustain life. • The Sun is the important source providing this energy in the form of light and heat. • Plants use carbon dioxide, water and energy from the Sun to produce glucose. This process is called photosynthesis. • Oxygen is released into the air as a by-product: carbon dioxide + water *Sunlight, chlorophyll* →	• N/A

	glucose + oxygen • Plants change glucose into starch, cellulose and other chemical compounds to enable processes, such as growth and reproduction. • Food contains energy that can be released from food. This process is called respiration. • Respiration is the process by which energy is released from food: glucose + oxygen energy + carbon dioxide + water.	

C. SCIENTIFIC VOCABULARY

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

	TERM	EXPLANATION
1.	photosynthesis	It is the process whereby green plants use the light energy from the Sun and carbon dioxide from the air to produce food in the form of glucose as well as oxygen.
2.	interdependency	A relationship in which both parties depend on each other for something
3.	respiration	Respiration is the process by which energy is released from the food in the presence of oxygen.
4.	breathing	Moving in and out of air in the lungs.
5.	glucose	Glucose is a simple sugar.
6.	starch	Starch is a complex sugar that has string-like molecules.
7.	chlorophyll	It is a green pigment in the cells of plants that absorbs radiant energy.
8.	chemical reaction	A process in which one or more substanc4es are converted to one or more different substances or products.
9.	cellulose	A substance that exists in the cell walls of plants

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Learners will learn that everything on Earth is driven by the need for energy. The Sun is the main source of energy. Plants make their own food by using the energy of the Sun. This process is called photosynthesis. Plants provide energy to animals that release the energy in a process called respiration.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

TOPIC: Photosynthesis and respiration

Term 1, Week 1, Lesson A

1 A

Lesson Title: The need for energy

Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Photosynthesis and respiration
CAPS Page Number	35

Lesson Objectives

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

- state the main source of energy
- explain the need for energy by living organisms
- determine the amount of energy that is in the food that we eat.

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 1: The nutritional value of an apple	
Cans and cans of food and drinks, containing nutritional values on the labels	

C CLASSROOM MANAGEMENT

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

Where do we get our energy from to breathe, move and learn?

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 obtain our energy from the food that we eat.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard. Always try to do this before the lesson starts.

THE NEED FOR ENERGY

1. All living things need energy to sustain life.
2. Energy drives all the interactions between plants and animals in an ecosystem.
3. The Sun is the main source of energy of all living things on Earth.
4. The Sun provides energy in the form of light energy and heat energy.
5. Green plants depend on the energy from the Sun to make food.
6. Animals depend on plants for food and energy.
7. The energy in an ecosystem is linked to food.
8. Energy is measured in joules (J) or kilojoules (kJ).
9. An average learner needs 7150 kJ of energy each day to perform activities.

2. Explain this to the learners as follows:
   a. No living thing can exist without energy.
   b. The Sun is the main source of energy on Earth. Without the Sun, all life on Earth will die.

c. The interactions between living organisms in an ecosystem are driven by the need for energy. They depend on one another for energy.

d. Living organisms need food because energy is stored in food.

e. Each living organism needs a certain amount of energy each day to perform the life processes, namely movement, reproduction, breathing, feeding, excretion, growth and sensitivity to the environment.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information into their workbooks.

Checkpoint 1

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

a. What is the main source of energy on Earth?

b. Why are animals dependent on plants for energy?

Answers to the checkpoint questions are as follows:

c. The Sun

d. Energy is stored in food and animals cannot produce their own food.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Energy in an ecosystem is linked to food because the energy is stored in food.
   b. Only plants can access the energy of the Sun. They use the energy of the Sun to make food.
   c. Plants do not rely on other organisms for energy.
   d. Animals cannot use the energy from the Sun directly. Neither can they produce their own food. They rely on the plants for food and energy.
   e. Plants make the energy of the Sun available to the animals.
2. The following activity should be done in groups. Give each group a can of food. They must then write down the energy that the can of food contains. Each group should write the name of the can of food and the energy value of the food on the chalkboard. You can also show the learners the nutritional value of an apple on Resource 1.

TASK

Complete the following task in groups.

1. Take the can of food that was handed out and find the nutritional value label on the can.
2. Find the energy value of the food on the can and write it down.
3. The teacher will ask you to write the name of the can of food and its energy value on the chalkboard.

3. Ask each group to use the values on the board to put together a list of foods that they can eat to get 7150 kJ of energy.
4. Let each group give feedback to the rest of the class. Check whether they have added the values correctly.

Checkpoint 2

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

a. How many kilojoules of energy do you need a day to survive?
b. You only have baked beans in the cupboard. If the energy value of each can of baked beans is 1228 kJ, how many cans do you have to eat in a day? Use a calculator.

Answers to the checkpoint questions are as follows:

a. 7150 kJ of energy
b. 7150 ÷ 1228 = 5,8
   You will have to eat six cans of baked beans.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Photosynthesis and respiration	12
Top Class Natural Sciences	Photosynthesis and respiration	2-3
Via Africa Natural Sciences	Photosynthesis and respiration	8
Solutions for All Natural Science	Photosynthesis and respiration	2-4
Spot on Natural Sciences	Photosynthesis and respiration	1-2
Placanum Natural Sciences	Photosynthesis and respiration	2
Step-by-step	Photosynthesis and respiration	4
Natural Sciences	Photosynthesis and respiration	3
Sasol Inzalo Bk A	Photosynthesis and respiration	4-5

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.highered.mheducation.com/sites/9834092339/student.../bomb_calorimeter.html [Bomb calorimeter]

1 B

Term 1, Week 1, Lesson B
Lesson Title: The process of photosynthesis
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	The process of photosynthesis
CAPS Page Number	35

Lesson Objectives

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

- explain the process of photosynthesis
- list the requirements for the process of photosynthesis
- give the products of photosynthesis
- write an equation for the process of photosynthesis.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE Resources

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 2: Picture of a plant	
A real-life green plant in a pot	

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 main source of energy on Earth?

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

The main source of energy on Earth is the Sun.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard and copy the diagram onto the chalkboard as well. Always try to do this before the lesson starts.

1. Plants rely on the Sun for energy.
2. Only plants can make food. That is why they are called producers.
3. Through the process of photosynthesis plants use light energy from the Sun, and water and carbon dioxide to produce glucose and oxygen.
4. The green leaves of a plant contain chlorophyll, which is a pigment in the cells that absorb the light energy of the Sun. It also gives a leaf its green colour.
5. This process takes place through a series of chemical reactions. These reactions can be summarised as follows:
   Water (H_2O) + Carbon dioxide (CO_2) $\xrightarrow[\text{chlorophyll}]{\text{Light energy}}$ Glucose ($C_6H_{12}O_2$) + Oxygen (O_2)
6. **Glucose** is a sugar and the simplest form of food.
7. The plant absorbs water from the soil and carbon dioxide from the air.
8. The glucose is stored in the plant as food, and the oxygen is a by-product that is released into the air.

TOPIC: Photosynthesis and respiration

Checkpoint 1

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

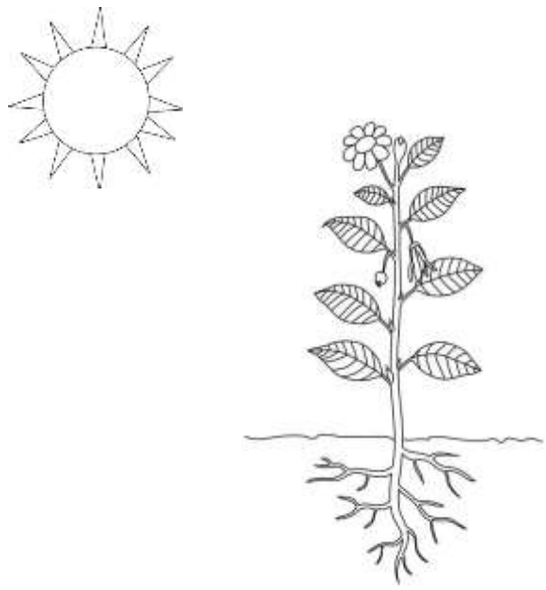
a. What is the function of chlorophyll in a plant?

b. What is necessary for the process of photosynthesis?

Answers to the checkpoint questions are as follows:

a. It absorbs the energy of the Sun that is needed to produce food.

b. Sunlight, chlorophyll, water and carbon dioxide.



2. Explain this to the learners as follows:

   a. Plants produce food by using the light energy of the Sun through a process called photosynthesis.

   b. In addition to the sunlight, plants also need water and carbon dioxide to produce glucose and oxygen gas.

   c. Plants have chlorophyll in their leaves that enables them to absorb the energy of the Sun.

   d. Chlorophyll is a pigment that also colours the leaves green.

   e. The chemical reactions that take place during the process of photosynthesis can be summed up in the following equation:

   Water (H_2O) + Carbon dioxide (CO_2) $\xrightarrow{\text{Light energy, chlorophyll}}$ Glucose ($C_6H_{12}O_2$) + Oxygen (O_2)

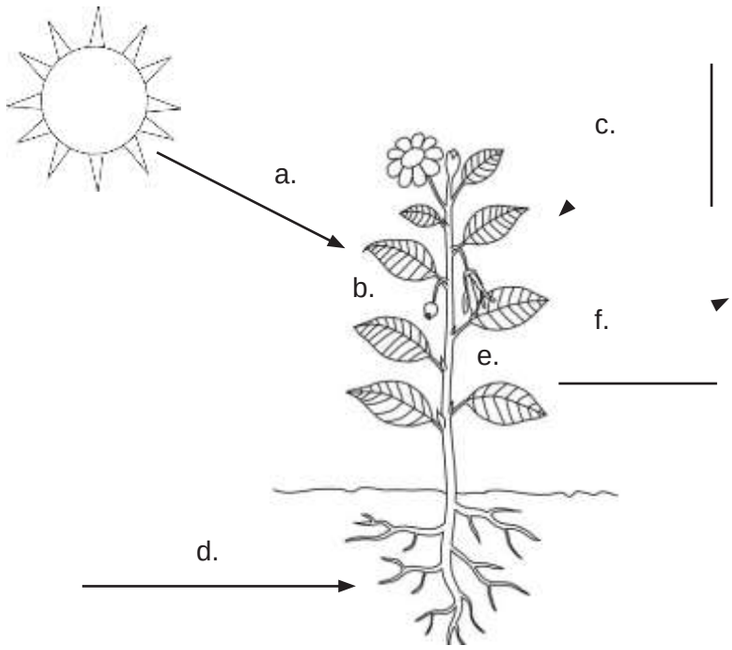
3. Read through the information written on the chalkboard with the learners.

4. Ask the learners if they have any questions.

5. Tell the learners to copy the information and diagram on the chalkboard into their workbooks.

E CONCEPTUAL DEVELOPMENT

1. Use the diagram on the chalkboard to explain the following to the learners. Draw the arrows on the diagram as you explain each part.



   a. A plant needs the light energy from the Sun to produce food.
   b. The leaves of a plant contain chlorophyll to capture the sunlight.
   c. A plant absorbs carbon dioxide gas from the air.
   d. A plant absorbs water from the soil through the roots.
   e. Glucose is produced in the leaves.
   f. Oxygen is released back into the air.

2. Put the green pot plant in front of the class or use the picture of the plant in Resource 2. Let different learners come to the front and explain the process of photosynthesis by pointing at the plant, the air and the soil.
3. Ask the rest of the class whether the explanations were correct.

Checkpoint 2

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

   a. What gases are a part of the photosynthesis process?
   b. What is the food called that the plant produces?

Answers to the checkpoint questions are as follows:

   a. Carbon dioxide and oxygen
   b. Glucose

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Photosynthesis and respiration	13
Top Class Natural Sciences	Photosynthesis and respiration	3-4
Via Africa Natural Sciences	Photosynthesis and respiration	8-9
Solutions for All: Natural Science	Photosynthesis and respiration	6-7
Spot on Natural Sciences	Photosynthesis and respiration	2-5
Platinum Natural Sciences	Photosynthesis and respiration	2-3
Step-by-step	Photosynthesis and respiration	4-5
Natural Sciences	Photosynthesis and respiration	4-8
Sasol Inzalo Bk A	Photosynthesis and respiration	4-7

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=2xNwZCk2CHY (6min 20sec) [Photosynthesis video]

1 C

Term 1, Week 1, Lesson C
Lesson Title: The food of plants
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Photosynthesis and respiration
CAPS Page Number	35

Lesson Objectives

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

- describe how glucose is stored
- explain the various forms in which glucose is stored
- test for the presence of starch in food.

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

SCIENCE PROCESS SKILLS

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

TOPIC: Photosynthesis and respiration

B POSSIBLE Resources

For this lesson, you will need:

Resource 3: Picture of glucose molecule and sucrose molecule	
Rice, beans or other grains, iodine solution, beaker, water, bunsen burner or other source of heat, matches, syringe, leaves, clear methylated spirits or surgical spirits	

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 process called whereby plants produce their own food?

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.

Photosynthesis

D ACCESSING INFORMATION

1. Write the following onto the chalkboard. Always try to do this before the lesson starts.

HOW FOOD IS STORED IN A PLANT

1. During photosynthesis a plant produces glucose in its leaves.
2. Glucose is a sugar and the simplest form of food.
3. The glucose is transferred to other parts of the plant for storage.
4. The plant changes the glucose to starch and cellulose so that it can be stored.
5. Plants store the starch in their roots, stems, leaves, fruit and seeds.
6. Cellulose is part of the walls of cells and provides plants with support. This is the reason why trees can grow so tall.
7. Sucrose consists of two glucose molecules that are bonded together and are transported from one part of the plant to another.
8. The sugar and starch in plants are food for humans and animals.
9. Plants also need food to live and use the food they produce.

2. Explain this to the learners as follows:
   a. Plants make food during photosynthesis in the simple form of glucose, which is a sugar.
   b. Plants do not store this sugar as food. Glucose is changed to starch and then stored in different parts of the plant as food.
   c. Plants store the food in their roots (carrots), leaves (spinach), fruit (bananas), seeds (peas) and stems (celery).
   d. In some plants, such as trees, the glucose is changed to cellulose to support the plant.
   e. Animals and humans eat these parts of the plants as food.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is the food called that plants make during photosynthesis?
b. In what form do the plants store their food?

Answers to the checkpoint questions are as follows:

a. Glucose
b. Starch

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. When we refer to glucose as a sugar we are not referring to the white substance that we put in our coffee or over our porridge.
   a. Simple sugars, such as glucose, are made of relatively small molecules, while complex sugars, such as starch, form long chains of molecules.
   a. The white sugar that we use in our homes consists of sucrose molecules that are made of two or more glucose molecules. Show the learners the glucose molecule and sucrose molecule in Resource 3.
   a. Energy is stored in sugars and therefore glucose and starch are considered sources of energy.
   a. We know that plants store food as starch and we can test for starch in plants. We call it the iodine test.
2. The following activity can be done as a demonstration or in groups depending on the apparatus that is available. Try to set up the experiment before the class starts or hand out the apparatus before explaining the activity.

ACTIVITY

How do we know for sure that starch is a product of photosynthesis in plants? Let us perform the following iodine test for starch.

1. Put cooked rice grains in a beaker or test tube and add boiling water. Rice is the seed of an Asian grass plant.
2. Use a bunsen burner or other source of heat to boil the rice in the water.
3. Use a dropper or syringe to put a few drops of brown iodine solution in the test tube or beaker. Do not add too much iodine.
4. Observe what happens to the colour of the iodine solution.
5. You can repeat the experiment by testing whether a green leaf contains starch. Covering the leaves in alcohol (surgical spirits or clear methylated spirits) before adding the iodine solution will assist with the test.

3. The brown colour of the iodine should change to dark blue or black. This indicates that starch is present in the rice. Discuss this result with the learners.
4. You can repeat the experiment with anything that contains starch, such as bananas, potatoes and wheat (bread or pasta).

Checkpoint 2

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

a. What is needed for the starch test?
b. How do we know that a substance contains starch?

Answers to the checkpoint questions are as follows:

a. Iodine solution
b. When iodine is added to the substance the iodine will change to a dark blue or black colour.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Photosynthesis and respiration	15
Top Class Natural Sciences	Photosynthesis and respiration	5
Via Africa Natural Sciences	Photosynthesis and respiration	10-11
Solutions for All Natural Science	Photosynthesis and respiration	7
Spot on Natural Sciences	Photosynthesis and respiration	3
Platinum Placanum Natural Sciences	Photosynthesis and respiration	3-4
Step-by-step	Photosynthesis and respiration	4-5
Natural Sciences	Photosynthesis and respiration	4-8
Sasol Inzalo Bk A	Photosynthesis and respiration	8

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=0s_xZqvwm_s (2min 17sec) [Iodine test for starch in a leaf]

2 A

Term 1, Week 2, Lesson A
Lesson Title: The process of respiration
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Photosynthesis and respiration
CAPS Page Number	35

Lesson Objectives

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

- explain why respiration takes place in living organisms
- describe the process of respiration
- list the requirements for respiration and products of respiration
- write an equation for respiration.

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:

Coloured paper or cardboard, pairs of scissors	Plain white paper

C CLASSROOM MANAGEMENT

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

In what form does a plant store the glucose that is made during photosynthesis?

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

D ACCESSING INFORMATION

1. Write the following onto the chalkboard and copy the diagram onto the chalkboard as well. Always try to do this before the lesson starts.

RESPIRATION

1. All living organisms require energy to survive.
2. Living organisms obtain energy from the food that is stored in plants.
3. The body of a living organism releases the energy that is trapped in the food.
4. **Respiration** is the process where energy is released in the body of a living organism by breaking down the eaten food into simpler materials in the presence of oxygen.
5. During respiration the sugars, such as glucose, are broken down to release energy.
6. Oxygen is needed for respiration.
7. Carbon dioxide and water are formed during respiration.
8. Glucose ($C_6H_{12}O_6$) + oxygen gas (O_2) → Energy + carbon dioxide (CO_2) + water (H_2O)
9. Respiration occurs in every cell of a living organism.

2. Explain this to the learners as follows:
   a. All living organisms, even plants, need energy for carrying out biological functions that are important for survival.
   b. Animals eat plants, or other animals, to obtain energy.

c. When an animal has eaten a plant, or other animal, its body breaks down the food and the energy in the food is released.
d. When energy is released in a series of chemical reactions, this process is called respiration.
e. During respiration oxygen is used to break down glucose and release its energy.
f. Plants absorb oxygen from the air while animals inhale oxygen.
g. Carbon dioxide is produced and released back into the atmosphere.
h. Respiration needs oxygen and its by-products are water and carbon dioxide.
i. **Mitochondria** are the cellular structures in the cells of plants that are responsible for respiration.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information and diagram on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is needed for the process of respiration?
b. What is released during respiration?

Answers to the checkpoint questions are as follows:

a. Food and oxygen
b. Energy, carbon dioxide and water

E CONCEPTUAL DEVELOPMENT

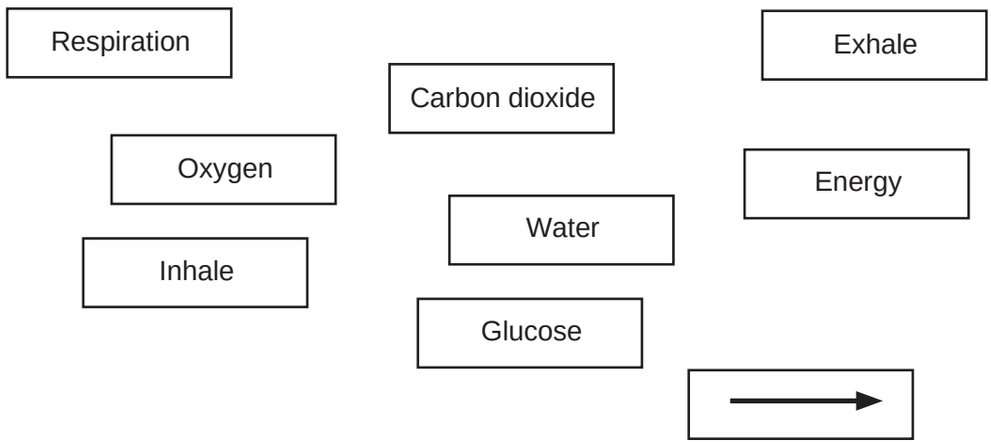
1. Explain the process of respiration to the learners by using the example of a cow eating grass:
   a. The grass contains starch.
   b. The cow eats the grass.
   c. The starch is broken down into glucose inside the cow.
   d. The glucose molecules move to the bloodstream where they are transferred to the cells.
   e. The cow inhales oxygen.
   f. Respiration takes place in the cells and energy is released.
   g. The cow uses this energy to move to the next patch of grass.
   h. The cow exhales carbon dioxide.

2. Let the learners do the following activity. They will work individually. Provide coloured paper, cardboard or plain paper. Also provide pairs of scissors to learners where necessary.

ACTIVITY

Use koki pens and scissors for this activity.

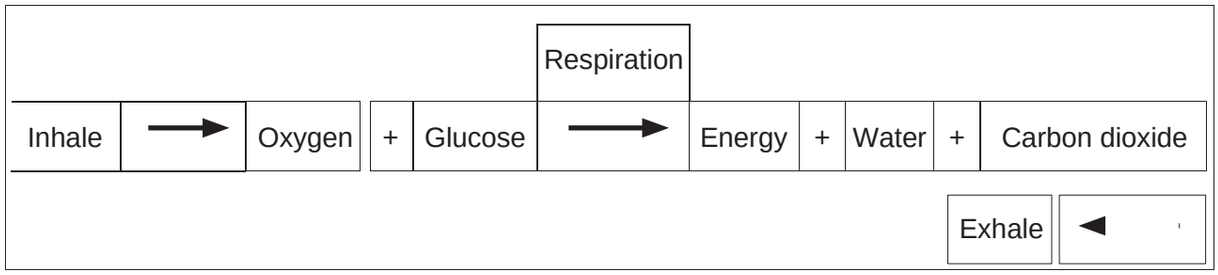
1. Use the paper that is provided to make cards.
2. Write the following on each card:



Also make a few cards with arrows,
and also add some with plus signs.

3. Now put the cards in the right order to indicate the process of respiration. Stick the cards in this order in your book.
4. Tell the learners to add plus signs if necessary.

3. Let each learner show his or her order of cards to represent respiration. Discuss it with the learners. A possible order of the cards is shown below:



Checkpoint 2

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

a. How does an animal obtain oxygen?
b. How does an animal get rid of carbon dioxide?

Answers to the checkpoint questions are as follows:

a. An animal breathes in the oxygen from the air.
b. An animal breathes out carbon dioxide.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Photosynthesis and respiration	16-19
Top Class Natural Sciences	Photosynthesis and respiration	7-8
Via Africa Natural Sciences	Photosynthesis and respiration	11-13
Solutions for All: Natural Science	Photosynthesis and respiration	10-12
Spot on Natural Sciences	Photosynthesis and respiration	6-7
Platinum Natural Sciences	Photosynthesis and respiration	11-12
Step-by-step	Photosynthesis and respiration	8-10
Natural Sciences	Photosynthesis and respiration	8-10
Sasol Inzalo Bk A	Photosynthesis and respiration	15-17

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://youtu.be/9pSj2bgzTmM (1min 51sec) [The respiration of plants]

2 B

Term 1, Week 2, Lesson B
Lesson Title: Respiration and breathing
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Photosynthesis and respiration
CAPS Page Number	35

Lesson Objectives

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

- define respiration
- define breathing
- distinguish between respiration and breathing.

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 4: Diagram of a chest	
Freshly prepared lime water ($Ca(OH)_2$), beaker, straw	

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 respiration?

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.

Respiration is the process whereby energy is released from glucose in the presence of oxygen.

D ACCESSING INFORMATION

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

THE DIFFERENCE BETWEEN RESPIRATION AND BREATHING

1. Respiration is the process where energy is released in the body of a living organism through glucose being broken down in the presence of oxygen. The by-products are carbon dioxide and water.
2. Glucose ($C_6H_{12}O_6$) + oxygen gas (O_2) → Energy + carbon dioxide (CO_2) + water (H_2O)
3. A living organism must breathe in oxygen for the process of respiration, and then exhales the carbon dioxide that is formed during respiration.
4. The process of respiration is an oxidation reaction where glucose is oxidised (burned) to release energy.
5. During respiration oxygen in the air is exchanged with the carbon dioxide in the blood.
6. Breathing is the action of taking in fresh air and getting rid of foul air.
7. Breathing uses energy to contract the respiratory muscles so that oxygen can be inhaled and carbon dioxide exhaled.

2. Explain this to the learners as follows:
    a. Living organisms use the act of breathing to obtain oxygen for respiration and get rid of the by-product carbon dioxide.
    b. Both breathing and respiration use oxygen and release carbon dioxide.
    c. Respiration releases energy that is used to contract the respiratory muscles.
    d. Breathing is one of the seven life processes.
    e. Breathing is not a chemical reaction.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What gas do we breathe in?
b. What process produces energy?

Answers to the checkpoint questions are as follows:

a. Oxygen
b. Respiration

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
    a. When we need a lot of energy we need more food and oxygen to produce more energy.
    b. When we exercise we need more energy. Our bodies will tell us to breathe harder and deeper so that we can get more oxygen for the respiration process.
    c. During exercise respiration takes place faster so that more energy can be released more quickly.
    d. Breathing helps to obtain oxygen that is transported from the lungs to the heart and blood.
    e. The carbon dioxide that is formed during respiration moves from the blood and heart to the lungs where breathing helps to remove the carbon dioxide.
2. Use the diagram on Resource 4 to explain to the learners how the chest moves during breathing. When a person inhales the lungs fill with oxygen and the chest lifts.
3. When a person exhales carbon dioxide is removed from the lungs and the chest falls. Let each learner inhale and exhale while putting their hand on their chest.
4. Draw the following table on the chalkboard. Tell the learners to copy the table in their books and use it to write down the similarities and the differences between breathing and respiration. Try to draw the table on the chalkboard before the class starts.

TOPIC: Photosynthesis and respiration

ACTIVITY

Copy the following table in your book and write down the similarities and differences between breathing and respiration.

Breathing	Respiration

4. Let the learners come to the chalkboard one at a time and write down one entry. Do this until there are no more new entries.
5. Make sure that their answers are correct. See the table below.

Breathing	Respiration
It involves a contraction of respiratory muscles.	It is a chemical reaction with reactants and products.
It uses energy to contract the respiratory muscles.	It releases energy from food (glucose).
It involves oxygen and carbon dioxide.	It involves oxygen and carbon dioxide.
Breathing is needed for respiration.	Respiration needs breathing.

6. Discuss the similarities and differences between breathing and respiration.
7. Do the following activity to test for the presence of carbon dioxide. You can either do a demonstration where one of the learners blows into the clear limewater or learners can work in groups to test for the presence of carbon dioxide. It depends on how many straws, beakers and amount limewater you have. Prepare the limewater ahead and have it and the apparatus ready before the class starts.

ACTIVITY

The test for carbon dioxide is that it makes clear limewater milky. Test whether the gas that is exhaled is indeed carbon dioxide, the product of respiration.

1. Fetch clear limewater and a straw from the teacher.
2. Pour the limewater into the beaker. Note how clear the limewater is.
3. Put the straw in the limewater and blow slowly through the straw.
4. Observe how the clear limewater becomes milky.
5. The following reaction took place in the beaker:
   Carbon dioxide + limewater → calcium carbonate (precipitate)

Checkpoint 2

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

a. What is one similarity between breathing and respiration?
b. What is one difference between breathing and respiration?

Answers to the checkpoint questions are as follows:

a. Both involve oxygen and carbon dioxide.
b. Respiration results in a release of energy while breathing uses energy.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Photosynthesis and respiration	16-19
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Platinum Natural Sciences	Photosynthesis and respiration	11-12
Step-by-step	Photosynthesis and respiration	8-10
Natural Sciences	Photosynthesis and respiration	8-10
Sasol Inzalo Bk A	Photosynthesis and respiration	15-17

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=Xp0o19gWX7E (4min 39sec) [Difference between respiration and breathing]

2 C

Term 1, Week 2, Lesson C
Lesson Title: The cycle of photosynthesis and respiration
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Photosynthesis and respiration
CAPS Page Number	35

Lesson Objectives

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

- define photosynthesis
- define respiration
- explain how photosynthesis and respiration are linked.

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:

Resource 5: Diagram on photosynthesis and respiration	
Green pot plant	

C CLASSROOM MANAGEMENT

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

Describe the difference between respiration and breathing.

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.

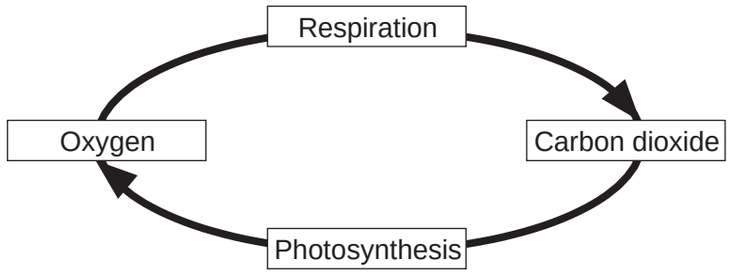
Respiration is a chemical reaction where energy is released while breathing is a muscular contraction to obtain oxygen and release carbon dioxide.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard and copy the diagram onto the chalkboard as well. Always try to do this before the lesson starts.

PHOTOSYNTHESIS AND RESPIRATION

1. Photosynthesis and respiration are always considered opposite processes.
2. During photosynthesis plants use energy from the Sun, and carbon dioxide and water to make glucose and oxygen.
3. During respiration plants and animals change the glucose in the presence of oxygen to energy, with water and carbon dioxide as by-products.
4. The process of photosynthesis uses carbon dioxide and releases oxygen.
5. The process of respiration uses oxygen and releases carbon dioxide.
6. Plants release oxygen that animals and humans need for respiration.



2. Explain this to the learners as follows:
   a. The processes of photosynthesis and respiration need each other.
   b. The oxygen that is released during the process of photosynthesis is used during the process of respiration.
   c. The carbon dioxide that is released during the process of respiration is needed for the process of photosynthesis.
   d. Respiration releases the energy in glucose.
   e. Plants can photosynthesis and respire, but animals can only respire.
3. Read through the information written on the chalkboard with the learners. Also explain the diagram
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information and diagram on the chalkboard into their workbooks.

Checkpoint 1

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

a. What gas is used during photosynthesis?
b. What gas is released during respiration?

Answers to the checkpoint questions are as follows:

a. Carbon dioxide
b. Carbon dioxide

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Animals and plants rely on each other for oxygen and carbon dioxide.
   b. There is a fine balance between the amount of oxygen and carbon dioxide in the air.
   c. When we cut down trees we kill the sources of oxygen so that there is less oxygen on Earth.
   d. Exhaust gases from cars and factories pump more carbon dioxide into the air. The plants and trees cannot absorb all these huge amounts of carbon dioxide.
   e. More carbon dioxide in the air contributes to the greenhouse effect.
2. Divide the class into pairs. Show them Resource 5 and ask them to explain the processes on the diagram to the other learner. You could also use a green pot plant that they can use to explain the cycle.

ACTIVITY

In pairs, discuss the diagram that the teacher shows you. Explain to your fellow learner the processes that are involved and how they are related.

3. The diagram is a summary of the processes of photosynthesis and respiration. When explaining the diagram learners should mention the following:
   a. Photosynthesis uses the energy from the Sun to make food that is stored in the leaves and fruit of the plant.
   b. During the process of photosynthesis carbon dioxide is absorbed by the leaves as well as water from the soil. Oxygen is released.
   c. During respiration the glucose stored in the starch releases energy in the presence of oxygen. Carbon dioxide and water are released back into the atmosphere.
   d. The process of photosynthesis uses the carbon dioxide released during respiration.
   e. The process of respiration uses the oxygen released during photosynthesis.

Checkpoint 2

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

a. What is the difference between photosynthesis and respiration?
b. Why is it important to grow many trees?

Answers to the checkpoint questions are as follows:

a. Photosynthesis uses energy and respiration releases energy.
b. Trees release oxygen during photosynthesis that animals and humans need.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Photosynthesis and respiration	15-19
Top Class Natural Sciences	Photosynthesis and respiration	5-8
Via Africa Natural Sciences	Photosynthesis and respiration	10-13
Solutions for All Natural Science	Photosynthesis and respiration	7-12
Spot on Natural Sciences	Photosynthesis and respiration	3-7
Placanum Natural Sciences	Photosynthesis and respiration	11-12
Step-by-step	Photosynthesis and respiration	4-5
Natural Sciences	Photosynthesis and respiration	8-10
Sasol Inzalo Bk A	Photosynthesis and respiration	8-12

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=0KewZzZRUDY (1min 42sec) [Photosynthesis and respiration cycle]

TOPIC OVERVIEW:

Interactions and interdependence within the environment

Term 1, Weeks 3A – 7C

A. TOPIC OVERVIEW

- This topic runs for 5 weeks.
- It is presented over 15 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 7	GRADE 8	GRADE 9
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• There are many different kinds of living things, including plants, animals and micro-organisms. • Plants, animals and micro-organisms, and their habitats make up the total biodiversity of the Earth. • The five main groups of living organisms include Bacteria, Protista, Fungi, Plants and animals.	• Ecology is the study of interactions. • All ecosystems combined make up the biosphere. • Ecosystems contain producers and consumers. • Consumers can be herbivores, carnivores, omnivores or decomposers. • Plants and algae capture energy from the Sun by the process of photosynthesis. • Energy is passed along a food chain from producers to consumers and decomposers. • Individuals can contribute to conservation in various ways.	• N/A

C. SCIENTIFIC VOCABULARY

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

	TERM	EXPLANATION
1.	Ecology	It is the study of interactions of organisms with one another and with the physical environment.
2.	Ecosystem	It is all the living and non-living things in an environment and the different ways in which they interact with each other.
3.	Food chain	A number of steps in an ecosystem showing the flow of energy from one organism to another organism
4.	Adaptation	A feature that makes a plant or animal well-suited to survive in its environment
5.	Conservation	It is the sustainable use of the Resources in an ecosystem.
6.	Biosphere	A combination of all the ecosystems
7.	Terrestrial	Dealing with land; to do with the Earth

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Learners will understand that an ecosystem consists of biotic and abiotic factors and that interrelationships exist between these factors in an ecosystem. Producers obtain their food from plants and decomposers break down any dead plant and animal matter. This forms a food chain and many interlinked food chains are called food webs. Organisms have to adapt to survive and humans have to protect the ecosystems.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

TOPIC: Interactions and interdependence within the environment

Term 1, Week 3, Lesson A

3 A

Lesson Title: Ecology: the bigger picture

Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Interactions and interdependence within the environment
CAPS Page Number	36

Lesson Objectives

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

- define ecology
- list the four levels of ecological interactions
- define populations, communities, ecosystems and biospheres
- identify populations, communities, ecosystems and biospheres.

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 6: Wetland ecosystem	Old magazines

C CLASSROOM MANAGEMENT

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

During which process is oxygen used and carbon dioxide released?

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.

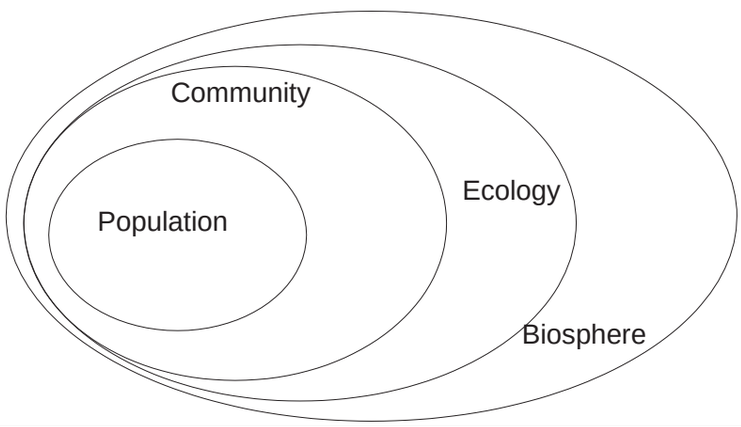
During the process of respiration

D ACCESSING INFORMATION

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

ECOLOGY

1. Ecology is the study of the interactions between organisms, and between living organisms and their physical and chemical environment.
2. Ecology is studied on four levels, namely populations, communities, ecosystems and biospheres.
3. A population is a group of organisms of the same species that live in the same area.
4. A community is composed of different species that share a common area and are interdependent on each other.
5. An ecosystem consists of communities and their environment.
6. All ecosystems combine to make up the biosphere.



2. Explain this to the learners as follows:
    a. Ecology is the scientific study of the way in which living organisms interact with each other and their environment. It is all about interactions.
    b. The study includes the composition of the living organisms, their distribution and numbers, as well as the way in which they adapt to change.
    c. Ecology is a very big field of study. It includes all the interactions on Earth.
    d. The study of ecology has been divided into four levels to make it easier to study.
    e. The four levels include populations, communities, ecologies and biospheres.
    f. A population is a group of organisms of the same species that live together in the same area and are able to breed with each other.
    g. In a community, different species co-exist in a common location and rely on each other in some or other way.
    h. An ecosystem consists of all the living and non-living things in an area. The living things affect each other and their environment.
    i. A biosphere is a collection of all the water ecosystems and land ecosystems.
    j. Populations fit into a community, communities fit into an ecosystem and ecosystems fit into biosphere.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What do we call a group of living organisms of the same species?
b. What do we call a group of ecosystems?

Answers to the checkpoint questions are as follows:

a. Population
b. Biosphere

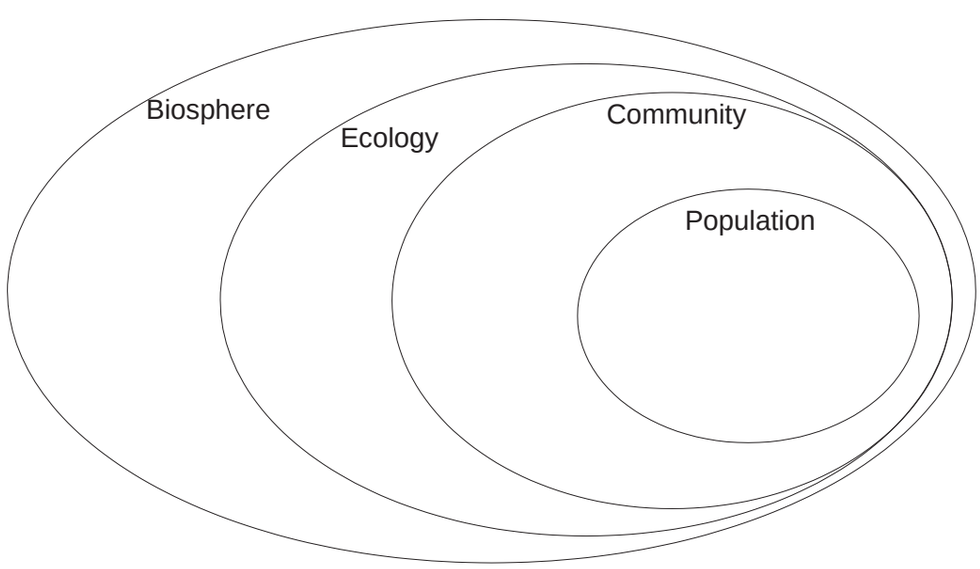
E CONCEPTUAL DEVELOPMENT

1. Use Resource 6 to explain the following to the learners:
   a. When we have different populations in an area they form a community.
   b. A group of fish in a dam is a population. When there is a population of storks and a population of water lilies at the dam that co-exist with the fish. The fish, storks and water lilies form a community.
   c. The fish, storks, water lilies and populations of other organisms, together with their habitat, form an ecosystem.
   d. The habitat consists of water, soil and sunlight.
   e. This wetland ecosystem and other ecosystems in the area will form a biosphere.
2. Tell the learners to do the following activity. They have to recopy the diagram on the chalkboard on a clean page in their books so that there are spaces to draw or paste pictures.

TASK

Complete the following task. Use old magazines.

1. Find pictures of the same species and paste them in the circle that is labeled 'Population'.
2. Find pictures of a different species to the one in the first circle and paste them in the circle that is labeled 'Community'. Together, these two circles represent a community.
3. Find pictures of soil, water and sunlight and paste them in the circle labeled 'ecosystem'. The community, together with the water, soil and sunlight forms an ecosystem.
4. Find pictures of a different ecosystem. If you started off with a land ecosystem, try to find pictures of a water ecosystem. If you started off with a water ecosystem, try to find pictures of a land ecosystem.



3. Choose a few learners to come to the front of the class and explain their diagram.

Checkpoint *2*

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

a. What does a community consist of?

b. What does an ecosystem consist of?

Answers to the checkpoint questions are as follows:

a. Different populations

b. A community and its habitat

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Interactions and interdependence within the environment	20-21
Top Class Natural Sciences	Interactions and interdependence within the environment	12-13
Via Africa Natural Sciences	Interactions and interdependence within the environment	14
Solutions for All Natural Science	Interactions and interdependence within the environment	17-19
Spot on Natural Sciences	Interactions and interdependence within the environment	10-11
Placanum Natural Sciences	Interactions and interdependence within the environment	18
Step-by-step	Interactions and interdependence within the environment	14-16
Natural Sciences	Interactions and interdependence within the environment	17-21
Sasol Inzalo Bk A	Interactions and interdependence within the environmentn	26-29

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=xwrsu4w9qkI (2min 15sec) [The Biosphere]

3B

Term 1, Week 3, Lesson B
Lesson Title: Biotic and abiotic factors
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Interactions and interdependence within the environment
CAPS Page Number	36

Lesson Objectives

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

- define ecosystem
- identify the biotic factors in an ecosystem
- identify the abiotic factors in an ecosystem
- explain the interaction between the biotic and abiotic factors.

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:

Resource 7: Ostrich population	Small ecosystems around the school, such as a pond, dam, river or ant heap.
Resource 8: Ecosystem	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:(Show Resource 7)

Does the picture show a population, community, ecosystem or biosphere?

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 picture shows a population of ostriches.

D ACCESSING INFORMATION

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

ECOSYSTEMS

1. An ecological community is made up of plants, animals and micro-organisms together with their environment.
2. There is an interrelationship between living organisms and their environment.
3. Examples of ecosystems are grasslands, forests, lakes and oceans.

BIOTIC FACTORS

1. Biotic factors are everything that lives.
2. All living organisms, such as plants, animals and micro-organisms, are biotic factors.

ABIOTIC FACTORS

Abiotic factors

1. are non-living.
2. are soil, stones, rocks, water sunlight and air.
3. affect the way in which living organisms grow, carry out activities and survive.

2. Explain this to the learners as follows:
    a. Plants, animals and micro-organisms, together with their habitat, form an ecological community.
    b. Living things are dependent on non-living things for survival.
    c. Biotic factors are everything that lives and can perform the life processes.
    d. Biotic factors are animal, plants and micro-organisms.
    e. Abiotic factors are soil, air, sunlight and water.
    f. Abiotic factors are not alive. Soil and water cannot breathe or reproduce.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What are the living things in an ecosystem called?
b. Can you give examples of abiotic factors?

Answers to the checkpoint questions are as follows:

a. Biotic factors
b. Soil, air, sunlight, water

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
    a. All living organisms are considered the biotic factors of an ecosystem.
    b. Living organisms function within an environment. They depend on the abiotic factors in the environment.
    c. Air provides oxygen and carbon dioxide for the processes of photosynthesis and respiration.
    d. Soil, stones and rocks are important to plants. The plants grow in soil and are anchored between rocks. Many animals have homes in soil and rocks.
    e. Sunlight is necessary to plants for the production of food through photosynthesis.
    f. Water is a necessary requirement for the process of respiration. Water is also the habitat of fish and other water life.
    g. Other abiotic factors include wind, steep or gentle slopes, temperature.
    h. Biotic and abiotic factors act together as a system.
    i. If the abiotic factors are not suitable to the lives of living organisms, they will struggle to survive.

2. Show the learners Resource 8 and ask them to answer the following questions in their books.

TASK

Look at the picture that the teacher is showing you. Use the picture to answer the following questions in your book.

1. Why is the picture of the waterhole an ecosystem?
2. Identify the biotic factors.
3. Identify the abiotic factors.
4. Explain how the living organisms rely on their environment.

3. Give the learners enough time to complete the questions.
4. Provide the learners with the answers to the questions. The answers are below.
   1. *The picture consists of a community of three populations of animals, plants and their environment, which includes the water, soil, air and sunlight.*
   2. *Trees, bushes, zebra, springbuck and giraffes*
   3. *Air, sunlight, water, stones, sand and soil*
   4. *The animals and plants need water and oxygen in the air for respiration. The plants need the sunlight and carbon dioxide in the air for photosynthesis. The plants grow in the soil.*

Checkpoint 2

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

a. Why do animals need water?
b. Why do plants need sunlight?

Answers to the checkpoint questions are as follows:

a. Animals need water for the process of respiration where energy is released.
b. Plants need sunlight, which is the energy of the Sun, to make food through the process of photosynthesis.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Interactions and interdependence within the environment	22
Top Class Natural Sciences	Interactions and interdependence within the environment	12
Via Africa Natural Sciences	Interactions and interdependence within the environment	15-16
Solutions for All: Natural Science	Interactions and interdependence within the environment	20-23
Spot on Natural Sciences	Interactions and interdependence within the environment	12-13
Platinum Natural Sciences	Interactions and interdependence within the environment	18-20
Step-by-step	Interactions and interdependence within the environment	11
Natural Sciences	Interactions and interdependence within the environment	22-23
Sasol Inzalo Bk A	Interactions and interdependence within the environment	31-37

G ADDITIONAL ACTIVITIES/ READING

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

1. Http://eco-globe.com › Biology [List of different ecosystems with examples]

3C

Term 1, Week 3, Lesson C
Lesson Title: Inside an ecosystem
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Interactions and interdependence within the environment
CAPS Page Number	36

Lesson Objectives

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

- describe the size and area of an ecosystem
- list different types of ecosystems
- explain how an ecosystem stays healthy.

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:

Resource 9: Bushveld	
Visit a garden.	

C CLASSROOM MANAGEMENT

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

Can you give the abiotic factors of an ecosystem?

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.

Air, sunlight, water, soil

D ACCESSING INFORMATION

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

ECOSYSTEM: SIZE AND AREA

1. An ecosystem includes a specific limited area in which the organisms interact with each other and their environment.
2. An ecosystem does not have a fence or visible boundaries.
3. The size of an ecosystem is not fixed. It varies according to the ecosystem.
4. An ecosystem is a self-contained unit.
5. Animals and plants obtain food and shelter from their environment that enables them to survive.
6. Examples of ecosystems include water ecosystems and **terrestrial** ecosystems.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is the size of an ecosystem?
b. What are the boundaries of an ecosystem?

Answers to the checkpoint questions are as follows:

a. An ecosystem does not have a specific size. It can be big or small.
b. The boundaries of an ecosystem are not visible but are determined by the fact that the biotic and abiotic factors are self-sufficient.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. An area is considered an ecosystem when the living and non-living things interact with each other.
   b. An ecosystem can be any size. A pond is a small ecosystem while a desert is a vast ecosystem.
   c. An ecosystem is self-sufficient. This means that the living things are able to survive in that environment.
   d. Frogs are part of a freshwater ecosystem because they get their food from the ecosystem. The ecosystem also protects them.
   e. Fish can survive in a water ecosystem but will die in a land ecosystem.
   f. It might look as if the boundary of an ocean ecosystem is the coastal line but sea birds also form part of an ocean ecosystem because they eat the fish.
   g. Meerkats need an ecosystem where they can build their houses under the ground and where there is a good supply of insects.
   h. An ecosystem is healthy when it can provide the living organisms with food, light and shelter.
2. Show the learners the picture on Resource 9 and ask them to answer the following questions in their books.

TASK

Look at the picture that the teacher is showing you. Use the picture to answer the following questions in your book.

1. Estimate how big the ecosystem is. You can use the size of a number of soccer fields as a measurement.
2. Where do you think is the boundary of the ecosystem?
3. What animals do you think will survive in this ecosystem?
4. What abiotic factor is necessary in this ecosystem for animals to survive?

3. Give the learners enough time to complete the questions.
4. Provide the learners with the answers to the questions. The answers are below.
   1. *The bushveld ecosystem can have the size of ten to twenty, or even more, soccer fields.*
   2. *The boundary of the ecosystem will be at the point where there are no more bushes and trees.*
   3. *Animals that eat the leaves of the trees and bushes will be able to survive here. Birds will also survive in this ecosystem because they use the trees to build their nests in. Small animals, such as insects, rats and snakes will also be able to survive.*
   4. *Water: all living organisms need water to survive.*

Checkpoint 2

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

a. What living organisms will you find in a flowerbed ecosystem?
b. Why is the flowerbed considered an ecosystem?

Answers to the checkpoint questions are as follows:

a. Butterflies, bees, worms, flowers, plants, birds
b. The plants can grow in the soil, the bees and butterflies get nectar from the flowers, the worms can have their home in the soil and the birds can eat the worms.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Interactions and interdependence within the environment	22-23
Top Class Natural Sciences	Interactions and interdependence within the environment	13
Via Africa Natural Sciences	Interactions and interdependence within the environment	20
Solutions for All: Natural Science	Interactions and interdependence within the environment	24-25
Spot on Natural Sciences	Interactions and interdependence within the environment	13-15
Platinum Natural Sciences	Interactions and interdependence within the environment	21
Step-by-step	Interactions and interdependence within the environment	11-12
Natural Sciences	Interactions and interdependence within the environment	21
Sasol Inzalo Bk A	Interactions and interdependence within the environment	37

G ADDITIONAL ACTIVITIES/ READING

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

1. https://www.youtube.com/watch?v=pPw51fDTl68 (2min 9sec) [Limiting factors in an ecosystem]

4 A

Term 1, Week 4, Lesson A
Lesson Title: Producers and consumers
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Interactions and interdependence within the environment
CAPS Page Number	36

Lesson Objectives

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

- explain what producers are
- explain what consumers are
- distinguish between primary, secondary and tertiary consumers
- identify producers and consumers in an ecosystem.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE Resources

For this lesson, you will need:

Resource 10: Producers and consumers	

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 an ecosystem?

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 ecosystem is a community and its environment. These act as a system.

D ACCESSING INFORMATION

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

PRODUCERS

1. Living organisms are classified into groups according to the way in which they obtain their food.
2. Producers are one of the feeding groups.
3. Producers are able to produce their own food by means of photosynthesis.
4. Plants and algae are producers. They produce chlorophyll to trap the Sun's energy.
5. Producers do not depend on other organisms for food.

CONSUMERS

1. Consumers are another feeding group.
2. Animals and some micro-organisms are consumers because they need to consume food. They cannot make their own food.
3. Consumers that get their food directly from plants are called primary consumers.
4. Consumers that get their food from primary consumers are called secondary consumers.
5. Tertiary consumers eat secondary consumers.

2. Explain this to the learners as follows:
    a. Plants are the only components of an ecosystem that can produce food. This is the reason why they are called producers.
    b. Plants are able to use sunlight to make their own food during the process of photosynthesis.
    c. The food is stored as starch that can be used by producers or consumers.
    d. Producers do not depend on others for food.
    e. Consumers are grouped according to the food that they eat.
    f. Primary consumers eat plants.
    g. Secondary consumers eat primary consumers.
    h. Tertiary consumers eat secondary consumers.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is a producer?
b. What is a secondary consumer?

Answers to the checkpoint questions are as follows:

a. It is a living organism that can produce its own food.
b. It is a living organism that eats a primary consumer.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
    a. Plants and algae are producers and eat the food that they produce themselves.
    b. Algae are the ocean's producers. Algae include microscopic plankton, seaweed and giant kelp.
    c. Consumers rely on other organisms for their energy and food supply.
    d. There are different types of consumers depending on the kind of food they eat.
    e. Primary consumers eat plants, so they get their food directly from the plants.
    f. Examples of primary consumers are giraffes, springbuck and buffaloes.
    g. Secondary consumers eat primary consumers so they get their food indirectly from the plants because the primary consumers eat the plants.
    h. Secondary consumers include lions and leopards.
    i. Tertiary consumers are eagles and snakes. They eat secondary consumers.

2. Show the learners the picture on Resource 10 and ask them to answer the following questions in their books.

TASK

Look at the picture that the teacher is showing you. Use the picture to answer the following questions in your book.

1. How many consumers are there?
2. Name six consumers that eat producers.
3. Name six consumers that eat primary consumers.
4. Are there any consumers that eat plants and other consumers? If so, name them.

3. Give the learners enough time to complete the questions.
4. Provide the learners with the answers to the questions. The answers are below.
   1. *There are eighteen consumers.*
   2. *Elephant, zebra, hippopotamus, buffalo, rhinoceros, buck*
   3. *Crocodile, eagle, secretary bird, lion, leopard, hyena*
   4. *Yes. They are warthog, gorilla, ostrich and lemur.*

Checkpoint 2

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

a. Why can consumers not produce their own food?
b. Which living organisms eat the food that plants produce?

Answers to the checkpoint questions are as follows:

a. They do not have chlorophyll and can therefore not photosynthesis.
b. The plant itself and the consumers

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Feeding relationships	26-27
Top Class Natural Sciences	Feeding relationships	19-20
Via Africa Natural Sciences	Feeding relationships	21-22
Solutions for All: Natural Science	Feeding relationships	27-28
Spot on Natural Sciences	Feeding relationships	16-17
Platinum Natural Sciences	Feeding relationships	22-23
Step-by-step	Feeding relationships	17
Natural Sciences	Feeding relationships	29
Sasol Inzalo Bk A	Feeding relationships	40-43

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.study.com/academy/lesson/producers-consumers-decomposers-in-ecosystems.html (2min 45sec) [Producers, consumers and decomposers in an ecosystem]

4 B

Term 1, Week 4, Lesson B
Lesson Title: Herbivores, carnivores and omnivores
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Feeding relationships
CAPS Page Number	37

Lesson Objectives

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

- describe a herbivore, carnivore and omnivore
- distinguish between herbivores, carnivores and omnivores
- identify herbivores, carnivores and omnivores in an ecosystem.

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

SCIENCE PROCESS SKILLS

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

TOPIC: Interactions and interdependence within the environment

B POSSIBLE Resources

For this lesson, you will need:

Resource 11: Herbivores, carnivores, omnivores	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:

Give a difference between a producer and a consumer.

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 producer can make its own food and does not eat other living organisms. A consumer cannot make its own food. It has to eat other living organisms.

D ACCESSING INFORMATION

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

HERBIVORES

1. Consumers can be classified according to what they eat.
2. Herbivores are animals that feed on plants.
3. Examples of herbivores are locusts, sparrows, elephants and cows.
4. Herbivores, such as buffaloes, that eat grass are called grazers.
5. Herbivores, such as giraffes and kudus, eat the leaves of trees and are called browsers.

CARNIVORES

1. Carnivores are animals that feed on other animals.
2. Predators are carnivores that catch and kill their prey before eating them.
3. Scavengers feed on dead animals and decaying meat. A vulture is a scavenger.
4. Insectivores eat insects, such as termites and grasshoppers.

OMNIVORES

1. Omnivores feed on animals and plants.
2. Warthogs and baboons eat fruit, roots, insects and worms.
3. Humans are also omnivores because they eat meat, vegetables and fruits.

2. Explain this to the learners as follows:
   a. Herbivores are animals that feed on plants only.
   b. When herbivores eat grass they are called grazers. When they feed on the leaves of trees they are called browsers.
   c. Examples of herbivores are cows, giraffes and elephants.
   d. Carnivores feed on animals that are dead or alive.
   e. Predators catch their prey while it is still alive. They kill the prey and eat it.
   f. Scavengers feed on animals that have died.
   g. Insectivores eat insects, such as ants, beetles and grasshoppers.
   h. Omnivores are animals that eat both plants and animals. Humans eat meat, fruit and vegetables. Many birds eat plants and worms.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is a herbivore?
b. Can you name three types of carnivores?

Answers to the checkpoint questions are as follows:

a. A herbivore is an animal that eats only plants.
b. Predators, scavengers and insectivores

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Herbivores get their food directly from plants.
   b. Herbivores use the nutrients from the plants to grow. Herbivores then are a source of food and energy for animals that eat them.
   c. Animals that eat berries and fruit are also considered herbivores.
   d. Animals that hunt other animals are called predators.
   e. Carnivores are not always true predators or scavengers. A hungry lion will gladly eat the remains of a carcass, while a hungry hyena might try to catch a small buck.
   f. Scavengers help to clean the environment by eating dead and decaying materials.
   g. Insectivores eat any insects. Many insects are herbivores, such as locusts.
   h. Humans are considered omnivores but some people do not eat meat. They eat only plants, beans and fruits. They are called vegetarians.
2. Show the learners the picture on Resource 11 and ask them to answer question 1 in their books.

TASK

1. Look at the picture that the teacher is showing you. Use the picture to identify the herbivores, carnivores and omnivores. Copy the table into your workbook and list the herbivores, carnivores and omnivores.

Herbivores	Carnivores	Omnivores

2. Read the following passage and identify the predators, scavengers and insectivores. Copy the table below in your book and list the herbivores, carnivores and omnivores.

Did you know that ladybirds hunt down their prey? They kill aphids and small insects before eating them. But ladybirds are eaten by a swallow or lizard. Eagles are able to fly over an area and catch meerkats and other small animals. Termites are a delicious meal for an aardwolf while the bat-eared fox prefer ants, beetles and grasshoppers. Frogs and rats should be on the lookout for snakes because they might just become a snake's prey. Hyenas and jackals would gladly eat the remains of the meat that lions do not eat. Vultures and kites wait for animals to die before eating them.

Predators	Scavengers	Insectivores

3. Give the learners enough time to complete the questions.
4. Provide the learners with the answers to the questions. The answers are below

Herbivores	Carnivores	Omnivores
Snail	*Hawk*	*Black bear*
Goat	*Shark*	*Urban squirrel*
Giraffe	*Jaguar*	*Robin*
Rabbit	*Crocodile*	*Warthog*
Cow	*Spider*	

Predators	Scavengers	Insectivores
Eagles	*Hyenas*	*Lizard*
Snakes	*Jackals*	*Swallow*
Lions	*Vultures*	*Aardwolf*
Ladybirds	*Kites*	*Bat-eared fox*
		Frogs

5. Take the learners outside to the schoolyard to look for animals and insects. Let them list the animals that they see and then classify the animals as herbivores, carnivores or omnivores. A magnifying glass can help them to see small animals and insects.

Checkpoint 2

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

a. Why can consumers not produce their own food?
b. Which living organisms eat the food that plants produce?

Answers to the checkpoint questions are as follows:

a. They do not have chlorophyll and therefore cannot photosynthesise.
b. The plant itself and the consumers.

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:

Successful Natural Sciences	Feeding relationships	27-28
Top Class Natural Sciences	Feeding relationships	20-21
Via Africa Natural Sciences	Feeding relationships	22-23
Solutions for All Natural Science	Feeding relationships	28-31
Spot on Natural Sciences	Feeding relationships	18
Placanum Natural Sciences	Feeding relationships	23-25
Step-by-step	Feeding relationships	18
Natural Sciences	Feeding relationships	26-27
Sasol Inzalo Bk A	Feeding relationships	43-45

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=VejLXTsJrJc (3min 51sec) [Teeth of herbivores, carnivores and omnivores]

4 C

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

A POLICY AND OUTCOMES

Sub-Topic	Feeding relationships
CAPS Page Number	37

Lesson Objectives

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

- define a decomposer
- describe the role of a decomposer in an ecosystem
- give examples of decomposers.

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:

Resource 12: Earthworms	Live earthworms, millipedes, mushrooms, rotten fruit (bananas, apples, lemons, etc.)
Resource 13: Mushrooms	

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 are the three types of carnivores?

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.

Predators, scavengers, insectivores

D ACCESSING INFORMATION

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

DECOMPOSERS

1. Decomposers are living organisms that break down the remains of dead plants and animals into simpler substances.
2. The simpler substances are either eaten or released back into the soil.
3. The roots of plants absorb the nutrients that are in the decomposed matter.
4. Decomposers recycle nutrients back into an ecosystem.
5. Decomposers can have different sizes.
6. Bacteria are very small decomposers while mushrooms are big decomposers.

2. Explain this to the learners as follows:
   a. Decomposers are living organisms that decompose the remains of dead plants and animals and their waste.
   b. The decomposed materials are released as nutrients back into the environment.
   c. Nutrients are released back into the ecosystem where plants can absorb it again.
   d. Some decomposers can easily be seen, such as earthworms and dung beetles, but other decomposers are micro-organisms, such as moulds and bacteria.

e. Show the learners Resource 12 and Resource 13. Point out examples of decomposers, such as mushrooms, millipedes and earthworms.

f. Show the learners any earthworms, millipedes, mushrooms or rotten fruit that you have brought to the classroom.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. Can you give two examples of decomposers?

b. What happens to the materials that decomposers break down?

Answers to the checkpoint questions are as follows:

a. Earthworms, millipedes, bacteria, fungi, mushrooms

b. The nutrients are released back into the soil.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. There is a limited supply of materials and nutrients on Earth. These need to be recycled by decomposers, otherwise they will be lost forever.
   b. Decomposers clean up the remains of dead plants and animals by breaking them down into nutrients, which plants can absorb again from the soil.
   c. Dung beetles feed on the dung of large herbivores.
   d. When fungi feed on dead matter they release chemicals, called digestive enzymes, onto the dead materials that break down the dead matter.
   e. Decomposing fungi are mushrooms and moulds.
   f. Flies lay eggs in dung and rotting flesh. They provide food for their worm-like larvae, called maggots. Maggots only eat dead flesh.
   g. Show the rotten fruit, such as an apple, and explain that a rotting fruit is actually being decomposed. The fruit will decompose until nothing is left of it.
   h. Decomposers are also important to humans. They are used to treat human sewage that contains human waste. The decomposing bacteria break down sewage into simpler substances to produce fertilisers.
2. Ask the learners to complete the following task. They must draw and fill in a mind map with the terms given below. This task summarises the work done in previous lessons on producers, consumers, herbivores, carnivores, predators, scavengers, insectivores and decomposers. You might want to explain each term to make sure that the learners are clear what each term means.

TASK

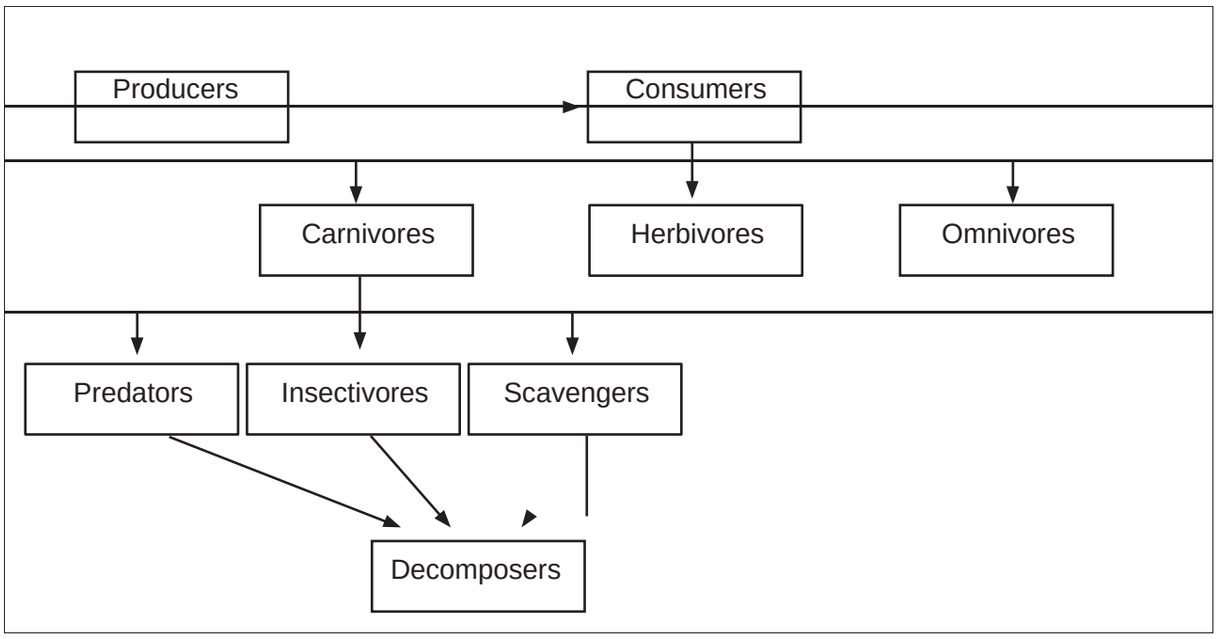
Use the following terms to make a mind map. The mind map should show how the different types of living organisms are linked to one another.

Producers | Herbivores | Carnivores | Insectivores

Consumers | Predators | Scavengers

Decomposers | Omnivores

3. Give the learners enough time to complete the questions.
4. Provide the learners with a correct mind map. It is shown below. This might not be the only correct mind map. Evaluate each learner's mind map and suggest changes when terms are placed in the wrong places.



Checkpoint 2

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

a. Why are decomposers important to humans?
b. What are the larvae of flies called that feed on dead matter?

Answers to the checkpoint questions are as follows:

a. They are used to decompose human waste.
b. Maggots

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Feeding relationships	29
Top Class Natural Sciences	Feeding relationships	21
Via Africa Natural Sciences	Feeding relationships	21-22
Solutions for All: Natural Science	Feeding relationships	31
Spot on Natural Sciences	Feeding relationships	16
Platinum Natural Sciences	Feeding relationships	26-27
Step-by-step	Feeding relationships	19
Natural Sciences	Feeding relationships	26
Sasol Inzalo Bk A	Feeding relationships	46-47

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=VejLXTsJrJc (3min 51sec) [Teeth of herbivores, carnivores and omnivores]

5 A

Term 1, Week 5, Lesson A
Lesson Title: Food chains
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Energy flow: food chains and food webs
CAPS Page Number	38

Lesson Objectives

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

- describe what a food chain is
- draw a food chain
- interpret a given food chain.

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:

Resource 14: Food chain with decomposer	
Resource 15: Simple food chain	

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 function of a decomposer?

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 decomposer breaks down dead plant and animal matter.

D ACCESSING INFORMATION

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

FOOD CHAINS

1. All biotic components in an ecosystem need energy to survive.
2. The energy from the Sun is the main source of energy on Earth.
3. A food chain shows the transfer of energy between organisms.
4. A food chain always starts with a producer. Plants use the energy of the Sun to make food.
5. The energy is transferred from the producers to the consumers.
6. A food chain ends with decomposers.
7. When animals and plants die their energy is released back into the environment as heat energy. Scavengers also get their energy from dead animals.
8. Producers → Herbivore → Carnivore
9. The arrows of a food chain represent the direction of the flow of energy.

2. Explain this to the learners as follows:
   a. The flow of energy is a key function of an ecosystem because all living organisms are dependent on energy. If an animal or plant is referred to as 'indigenous' it means that it naturally occurs in that area.

b. Energy cannot be created or destroyed. It can only be transferred along a food chain.
c. A food chain always starts with a producer because a producer makes the energy of the Sun available to other living organisms.
d. Energy is passed along from the producers to the consumers. These are the herbivores, carnivores and omnivores.
e. Decomposers are at the end of a food chain but are not always shown in a simple food chain.
f. The energy of dead plants and animals is released back into the environment as heat.
g. Consumers are named according to their position in the food chain.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is a food chain?
b. What do the arrows in a food chain represent?

Answers to the checkpoint questions are as follows:

a. A food chain shows the transfer of energy between living organisms.
b. The flow of energy

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Energy passes through an ecosystem along a food chain from a producer to consumers.
   b. A specific order exists in terms of the consumers and what they eat.
   c. We can explain it by using an example of a food chain that exists in a grassland ecosystem:

      Grass → Impala → Lions

   d. Through the process of photosynthesis energy is stored in the grass as food. The grass is the producer.
   e. When the impala eats the grass, energy is transferred from the grass to the impala. The impala is the herbivore or a primary consumer.
   f. The impala uses some of the energy for life processes and the rest of the energy is stored.
   g. When the lion eats the impala, energy is transferred to the lion. The lion is the carnivore or the secondary consumer.

h. Although decomposers are considered the last link in a food chain, they can also break down dead plants and animals in each link. In this case decomposers can break down dead grass, dead impala or dead lion.

2. Ask the learners to complete the following task. Show them Resource 14. Ask them to use the food chain to answer question 1. When everyone has finished question 1, show them Resource 15 and ask them to use the food chain to answer question 2.

TASK

1. Use the food chain that the teacher is showing to draw your own food chain. Then answer the following questions.
   - 1.1. What is the herbivore in the food chain?
   - 1.2 Why is the mouse between the grasshopper and the snake?
   - 1.3 . Why are there arrows from all the components in the food chain pointing to the mushrooms?
   - 1.4. What type of consumer is the snake?
2. Use the food chain also to answer the following questions.
   - 2.1. Can you identify the producer, herbivore and carnivore in the food chain?
   - 2.2. What do the arrows represent?

3. Give the learners enough time to complete the questions.
4. Provide the learners with the correct answers:
   - *1.1. Grass → grasshopper → mouse → snake → eagle*
     The herbivore is the grasshopper.
   - *1.2. The mouse feeds on the grasshopper and is eaten by the snake.*
   - *1.3. The mushrooms are the decomposers and they can decompose grasshopper, mouse, snake, eagle or dead grass.*
   - *1.4. A tertiary consumer because it eats a secondary consumer*
   - *2.1. The producer is the corn plant, the herbivore is the grasshopper and the carnivores are the snake and lizard.*
   - *2.2. The arrows indicate the flow of energy from the corn, through the grasshopper and the lizard to the snake.*

Checkpoint 2

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

a. In what order are living organisms in a food chain?
b. Where do decomposers fit into a food chain?

Answers to the checkpoint questions are as follows:

a. producer → herbivore → carnivore
b. Decomposers can be linked to every stage of a food chain.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Interactions and interdependence within the environment	32
Top Class Natural Sciences	Interactions and interdependence within the environment	24-25
Via Africa Natural Sciences	Interactions and interdependence within the environment	23
Solutions for All: Natural Science	Interactions and interdependence within the environment	33
Spot on Natural Sciences	Interactions and interdependence within the environment	18
Platinum Natural Sciences	Interactions and interdependence within the environment	28-29
Step-by-step	Interactions and interdependence within the environment	23
Natural Sciences	Interactions and interdependence within the environment	30-32
Sasol Inzalo Bk A	Interactions and interdependence within the environment	47- 49

G ADDITIONAL ACTIVITIES/ READING

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

http:// interactivesites.weebly.com/food-chains.html [The food chain game]

5B

Term 1, Week 5, Lesson B
Lesson Title: Food webs
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Energy flow: food chains and food webs
CAPS Page Number	38

Lesson Objectives

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

- describe what a food web is
- draw a food web
- interpret a given food chain

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 16: A food web	Any examples of food web diagrams, drawn or from a magazine
Resource 17: Jungle ecosystem	

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 food chain?

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 food chain shows the flow of energy between living organisms in an ecosystem.

D ACCESSING INFORMATION

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

FOOD WEBS

1. There are many food chains in an ecosystem.
2. The reason for this is that animals sometimes eat more than one kind of food.
3. Food chains in an ecosystem are interlinked. This means that animals can be a part of more than one food chain.
4. A food web is a group of food chains that are connected.
5. Food webs help us to understand what animals eat.

2. Explain this to the learners as follows:
   a. Food chains never exist in isolation.
   b. Animals do not always eat one kind of food. Butterflies feed on nectar, pollen and rotting fruit while a toucan eats fruit, insects, young bird and eggs. Use Resource 17 to show learners the butterflies and the toucan.
   c. Food chains are interlinked when organisms eat more than one species, which in turn are eaten by other organisms.
   d. Food webs help us understand what animals eat and how they are linked in a community.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

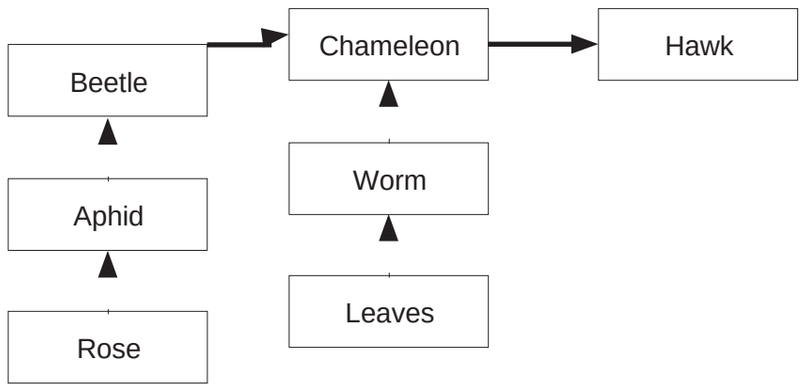
a. Why is there more than one food chain in an ecosystem?
b. What is a food web?

Answers to the checkpoint questions are as follows:

a. Animals eat more than one kind of food and are eaten by more than one animal.
b. A food web is a group of food chains that are connected in an ecosystem.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Different food chains in an ecosystem are interconnected to form a complex web of feeding interactions.
   b. Let us look at two simple food chains and see how they are connected to form a food web.
   c. Leaves → worm → chameleon → hawk
      Rose → aphid → beetle → chameleon → hawk
   d. Now let us draw a web.



2. Ask the learners to complete the following task. Show them Resource 16. Ask them to use the food web to answer question 1 in their books.

TASK

1. Look at the food web that the teacher is showing you and answer the following question in your book by using the food web.
   1.1. How many food chains are there in the food web?
   1.2. How many components does the shortest food chain have?
   1.3. What does the jackal eat?
   1.4. What herbivores do you see?
2. Use the following food chains to draw a food web.
   leaves → caterpillar → sparrow → eagle
   leaves → worm → frog → snake → eagle
   leaves → caterpillar → spider → snake → peacock

3. Give the learners enough time to complete the questions.
4. Provide the learners with the correct answers:

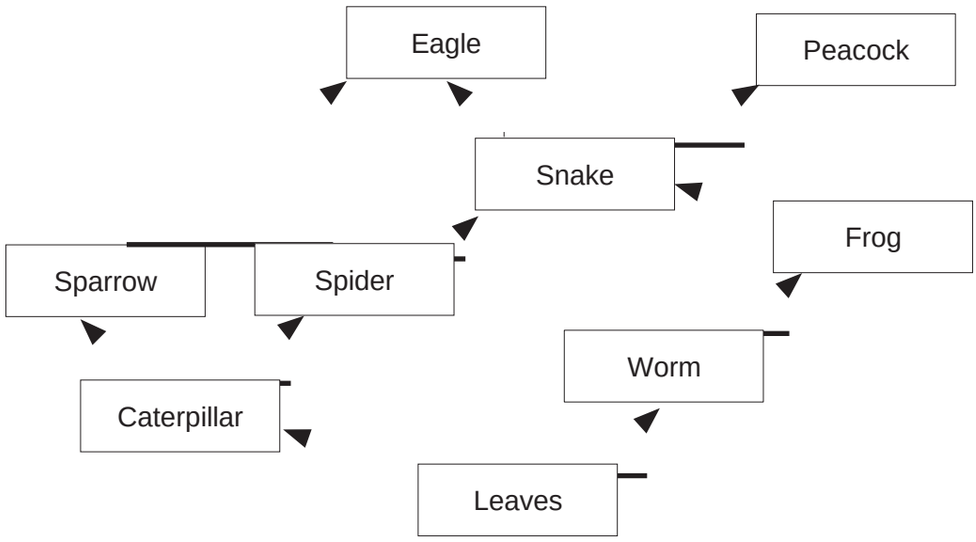
1.1. There are nine food chains.

1.2. Three component (green plant, mouse, owl)

1.3. The goat and the rabbit

1.4. The mouse and the rabbit

2.



Checkpoint 2

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

a. What is always the first organism in any food web?

b. Can you list some animals that eat grass?

Answers to the checkpoint questions are as follows:

a. A producer

b. Cows, buck, zebras, buffaloes, grasshoppers

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Interactions and interdependence within the environment	32-33
Top Class Natural Sciences	Interactions and interdependence within the environment	22-23
Via Africa Natural Sciences	Interactions and interdependence within the environment	26
Solutions for All: Natural Science	Interactions and interdependence within the environment	34
Spot on Natural Sciences	Interactions and interdependence within the environment	19
Platinum Natural Sciences	Interactions and interdependence within the environment	30-32
Step-by-step	Interactions and interdependence within the environment	24-27
Natural Sciences	Interactions and interdependence within the environment	32
Sasol Inzalo Bk A	Interactions and interdependence within the environment	53-54

G ADDITIONAL ACTIVITIES/ READING

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

1. http://www.wikihow.com/Draw-a-Food-Web [How to draw a food web]

5C

Term 1, Week 5, Lesson C
Lesson Title: Trophic levels
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Energy flow: food chains and food webs
CAPS Page Number	38

Lesson Objectives

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

- describe what a trophic level is
- draw a food pyramid
- interpret a food pyramid
- explain how energy is lost from one trophic level to another

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:

Resource 18: Trophic levels	
Resource 19: Food pyramid	

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 food web?

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 food web is a group of food chains that are interlinked in an ecosystem.

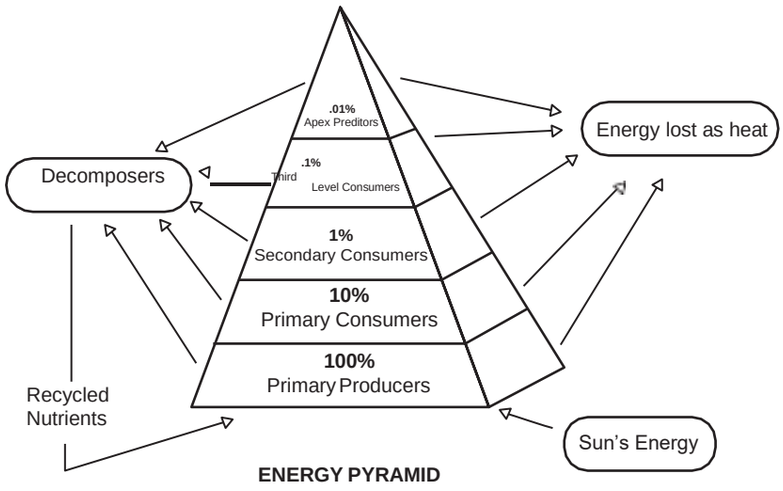
D ACCESSING INFORMATION

1. Write the following onto the chalkboard. Draw a simplified version of the food pyramid. It need not be three dimensional. Always try to do this before the lesson starts.

TROPHIC LEVELS

1. The energy that flows in an ecosystem comes from the Sun.
2. Energy flows through an environment through a series of feeding levels.
3. Each stage of feeding in a food chain is called a trophic level.
4. The trophic levels form a food pyramid that shows how much energy is available at each feeding level.

5.



ENERGY PYRAMID

6. A food pyramid has a maximum of four or five levels.
7. Energy at each trophic level is used for life processes while some energy is released as heat.
8. Only 10% of a feeding level's energy is available at the next feeding level.

2. Explain this to the learners as follows:
   a. Food chains can be represented by using a food pyramid.
   b. A food pyramid shows the different feeding levels, called trophic levels, as well as the amount of energy that is available at each level.
   c. Plants and algae play an important role in an ecosystem. They capture the energy of the Sun and make it available to other living organisms. They form the first trophic level.
   d. The second trophic level consists of the herbivores or primary consumers.
   e. The third and higher trophic levels consist of the secondary and tertiary consumers.
   f. Decomposers function at every trophic level.
   g. The energy decreases from a lower trophic level to a higher trophic level.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What are the feeding levels in an ecosystem called?

b. What does a feeding pyramid show?

Answers to the checkpoint questions are as follows:

a. Trophic levels

b. A feeding pyramid shows the amount of energy that is used at each level and the amount of energy that is available at the next level.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Energy cannot be created or destroyed and can be accounted for through all the trophic levels.
   b. A food pyramid is used to represent the amount of energy that is in each trophic level and the amount of energy that is transferred to the next level. In this way the energy can be tracked.
   c. Only a small amount of the energy of the Sun is used by organisms. Plants trap 1% of the energy of the Sun.
   d. Producers use the greatest amount of energy and therefore occupy the biggest space at the base of the triangle.
   e. A small part of energy is stored in one trophic level and passed on to the next trophic level. Only about 10% of energy is available at the next trophic level.
   f. Energy is used by living organisms for life processes. Energy is also lost as heat to the environment and cannot be transferred to the next trophic level.
   g. Because energy is lost at each level, the amount of energy becomes smaller and a pyramid is formed.
   h. The shape of a pyramid is not affected by the size or number of organisms.
2. Use the following example to explain a food pyramid. Use Resource 18.
   a. The trophic levels show the feeding positions of a food chain:
   green plants → grasshoppers → birds → snakes → owl.
   b. Grasshoppers need to eat a lot of grass to obtain enough energy. Many grasshoppers are needed to feed a bird. An owl does not need a lot of food and can survive on one or two snakes.
   c. Energy values can be assigned to each trophic level. Energy is measured in kilojoules (kJ).

d. 60 000 kJ of energy is stored in grass per square metre per year. T5800 kJ of energy is stored in every square metre per year. Each square meter contains grasshoppers. Similarly, 450 kJ, 45 kJ and 5 kJ of energy are stored in birds, snakes and owls respectively per square metre per year.

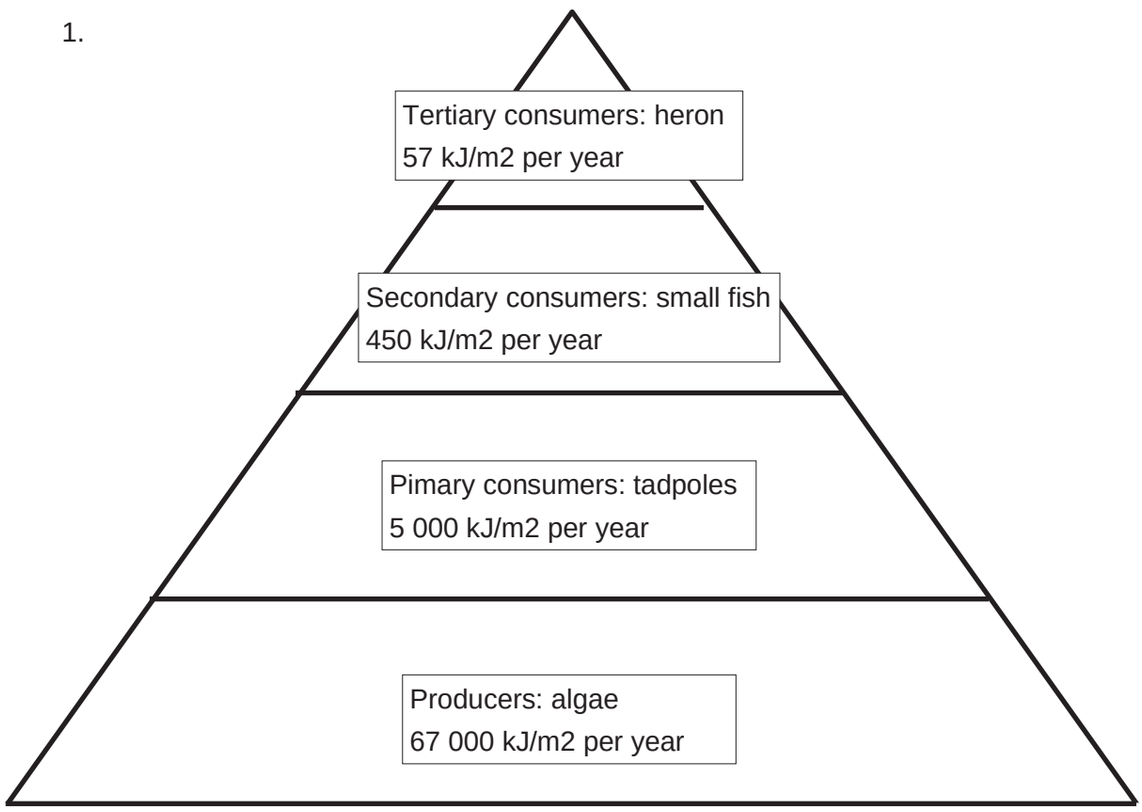
3. Ask the learners to complete the following task in their books. Show them Resource 19 so that they can answer question 2. Try to write the task on the chalkboard before the lesson starts.

TASK

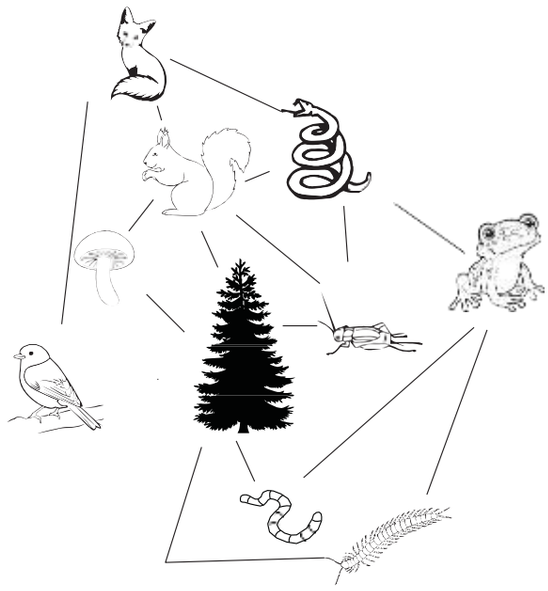
1. Draw and label a feeding pyramid that shows the amount of energy of each trophic level for the following food chain:
   algae → tadpoles → small fish → heron
   algae: 67 000 kJ/m2 per year
   tadpoles: 5 000 kJ/m2 per year
   small fish: 450 kJ/m2 per year
   heron: 57 kJ/m2 per year.
2. Look at the food pyramid that the teacher is demonstrating and draw a food web of the food pyramid in your book. You do not have to draw the organisms; you need only write the names.

3. Give the learners enough time to complete the questions.
4. Provide the learners with the correct answers:

1.



2.



Checkpoint 2

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

a. What percentage of energy is available to the next trophic level?

b. What happens to the energy that is not available to the next trophic level?

Answers to the checkpoint questions are as follows:

a. 10%

b. The energy is used for life processes and lost as heat to the environment.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Interactions and interdependence within the environment	30-31
Top Class Natural Sciences	Interactions and interdependence within the environment	23-24
Via Africa Natural Sciences	Interactions and interdependence within the environment	24-25
Solutions for All Natural Science	Interactions and interdependence within the environment	35-37
Spot on Natural Sciences	Interactions and interdependence within the environment	20-21
Placanum Natural Sciences	Interactions and interdependence within the environment	33-34
Step-by-step	Interactions and interdependence within the environment	23-24
Natural Sciences	Interactions and interdependence within the environment	29-30
Sasol Inzalo Bk A	Interactions and interdependence within the environment	49-52

G ADDITIONAL ACTIVITIES/ READING

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

1. https://www.youtube.com/watch?v=DD9ifcTlfQQ (3min 28sec) [How to draw a food pyramid]

6 A

Term 1, Week 6, Lesson A
Lesson Title: Factors that influence the balance in an ecosystem
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Balance in an ecosystem
CAPS Page Number	38

Lesson Objectives

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

- explain how an ecosystem is balanced
- list the natural factors that disturb the balance in an ecosystem
- list the human factors that disturb the balance in an ecosystem.

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

SCIENCE PROCESS SKILLS

1. Accessing & recalling Information	✓	6. Identifying problems & issues		11. Doing Investigations	
2. Observing		7. Raising Questions		12. Recording Information	
3. Comparing	✓	8. Predicing		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:

Resource 21: Veld fire	
Resource 22: Drought	
Resource 23: Oil spill	

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 trophic level is at the bottom of a food pyramid?

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 producers

D ACCESSING INFORMATION

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

BALANCE IN AN ECOSYSTEM

1. An ecosystem provides Resources such as food, water, light and shelter, to living organisms.
2. When an ecosystem provides enough Resources for all the organisms living in it, there is a balance.
3. Resources limit and regulate the number of organisms in an ecosystem.
4. The carrying capacity of an ecosystem is the number of individuals of a population that an ecosystem can sustain without damaging the environment.
5. Natural and human disturbances can cause a disruption in the balance of an ecosystem.

NATURAL FACTORS

Natural factors are:

1. Fires
2. Floods
3. Droughts
4. Extreme changes in temperature
5. Unusual events such as volcanic activity or a tsunami.

HUMAN FACTORS

Human factors include:

1. Poaching and hunting
2. Water, air and soil pollution
3. Farming
4. Deforestation
5. Mining.

2. Explain this to the learners as follows:
   a. Plants and animals cannot function independently. They rely on food, water, light and shelter in an ecosystem.
   b. When all biotic and abiotic parts in an ecosystem work well together the ecosystem is in balance.
   c. Resources are limited and organisms compete for the Resources .
   d. An ecosystem can only accommodate as many organisms as its Resources can carry.
3. Explain the factors that influence the balance of an ecosystem as follows:
   a. Extremely high temperatures can cause a loss of water in plants and animals.
   b. Fires can destroy a habitat very quickly. Show the learners Resource 21.
   c. Droughts occur when there is little or no rain for long periods of time. Show the learners Resource 22.
   d. Floods can put strain on a community because animals can drown.
   e. During volcanic activity, the ecosystem can change permanently because the environment is covered in ashes and lava.
   f. People hunt animals for food. They also poach animals and steal plants to sell them.
   g. During deforestation trees are cut down and the habitat of animals is destroyed. Farming also destroys habitats.
   h. Mining and other human activities add to the pollution of the water, air and soil. Show the learners Resource 23 that shows water pollution during an oil spill.

4. Read through the information written on the chalkboard with the learners.
5. Ask the learners if they have any questions.
6. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. Can you name one natural factor that disturbs the balance of an ecosystem?
b. Can you name one human factor that disturbs the balance of an ecosystem?

Answers to the checkpoint questions are as follows:

a. Floods/ droughts/ extreme temperatures/ disease
b. Farming/ mining/ poaching/ pollution/ deforestation

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. In a grassland ecosystem, the grass grows when it rains.
   b. There is then more food for the grazers and the size of their populations increases.
   c. As more grazers eat grass the available food decreases.
   d. If the grass can grow again while being eaten, the ecosystem can sustain the grass-eating populations.
   e. If the grass is eaten more quickly than it can grow out, an unsustainable use of the grass occurs and the grass will not be able to recover.
   f. During the dry season, the grass will also struggle to grow.
   g. There will be no food for the grazers and they will either die or migrate.
   h. Luckily an ecosystem can recover quickly when it rains again.
2. Also explain the following to the learners:
   a. The influence of humans on an ecosystem is enormous.
   b. The habitats of animals are being destroyed.
   c. The human population is increasing. With the demand for more food habitats of animals are cleared to make space for farming.
   d. The trees in forests are also being cut down to clear space for building houses and factories.
   e. Water, air and soil pollution destroys animal habitats.
   f. Mining and factory wastes pollute rivers and dams.
   g. Animals are removed from their habitats.
   h. People hunt animals for food but with the increase in the human population too many animals are killed.
   i. Poachers are people that kill animals and sell their parts. Rhino' are killed and their horns are sold for medicinal use.

3. Ask the learners to complete the following task in their books. Use the explanation of the grassland as a case study. Learners must read through it and answer the questions that relate to it. You can retype it and hand out a copy to pairs of learners or you could repeat the explanation so that learners can have the information.

TASK

Read the passage on the grassland ecosystem and fill in the missing word in the statements that follow in your book.

In a grassland ecosystem, the grass grows when it rains. There is more food for the grazers and the size of their populations will increase. As more grazers eat grass the available food decreases. If the grass can grow again while being eaten, the ecosystem can sustain the grass-eating populations. If the grass is eaten more quickly than it can grow again, there is an unsustainable use of the grass and the grass will not be able to recover. During the dry season, the grass will also struggle to grow. There will be no food for the grazers and they will either die or migrate. Luckily an ecosystem can recover quickly when it rains again.

1. When there are more grazers in an area more _____ will move to the area to feed on them.
2. When grazers are being eaten the _____ of the populations will stay the same.
3. The grass will have a chance to _____.
4. We say that the ecosystem is _____.
5. When there is less grass the number of grazers will _____ and there will not be enough food for the _____.
6. The balance of the ecosystem will be _____.

3. Give the learners enough time to complete the questions.
4. Provide the learners with the correct answers:
    1. predators/ lions/ leopards/ cheetahs
    2. number of organisms
    3. recover/ grow again
    4. balanced
    5. decrease, predators/ lions/ leopards/ cheetahs
    6. disturbed/changed.

Checkpoint 2

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

a. In which way do people remove animals from an ecosystem?
b. In which way do people destroy the habitats of animals?

Answers to the checkpoint questions are as follows:

a. Poaching, hunting
b. Deforestation, farming, pollution.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Interactions and interdependence within the environment	34
Top Class Natural Sciences	Interactions and interdependence within the environment	28
Via Africa Natural Sciences	Interactions and interdependence within the environment	27-29
Solutions for All: Natural Science	Interactions and interdependence within the environment	39-41
Spot on Natural Sciences	Interactions and interdependence within the environment	22-29
Platinum Natural Sciences	Interactions and interdependence within the environment	35-37
Step-by-step	Interactions and interdependence within the environment	28
Natural Sciences	Interactions and interdependence within the environment	32-33
Sasol Inzalo Bk A	Interactions and interdependence within the environment	55-57

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=NEVfs_38XmQ (4min 37sec) [Flooding in Johannesburg]
2. https://www.youtube.com/watch?v=WxAaCszGLcA (42sec) [Driving through the Knysna fires]
3. https://www.youtube.com/watch?v=EanKE5Taxxs (2min 8sec) [Oil spill in Cape Town harbour]

6 B

Term 1, Week 6, Lesson B
Lesson Title: Factors that influence the balance in an ecosystem
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Balance in an ecosystem
CAPS Page Number	38

Lesson Objectives

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

- explain the impact of an imbalance in an ecosystem
- list the different impacts that an imbalance can have on an ecosystem
- give examples of the impact of an imbalance on an ecosystem.

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

SCIENCE PROCESS SKILLS

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

B POSSIBLE Resources

For this lesson, you will need:

Resource 20: Ecosystem with disturbances	

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 happens to the ecosystem when humans cut down trees in a forest?

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 habitat of many animals that live in a forest will be destroyed and the animals will die.

D ACCESSING INFORMATION

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

IMPACT OF AN IMBALANCE IN AN ECOSYSTEM

1. An unbalanced ecosystem affects the living organisms that live in it.
2. The impact of an imbalance on an ecosystem because of natural causes is not permanent.
3. The impact of human activity on an ecosystem is permanent and irreversible.

The impact of human factors on an ecosystem includes:

1. Loss of biodiversity. Biodiversity is the different plants and animals on Earth.
2. Erosion. Erosion occurs when the soil is worn away by water or wind.
3. Loss of habitat
4. Climate change

2. Explain this to the learners as follows:

When:

a. Resources are changed, the balance of living organisms in the food web is upset and an imbalance is created.
b. natural factors cause an imbalance in an ecosystem, although the effect is not permanent.

c. grass is burned during fires or, if there is a drought, the grass will grow again when it rains.

d. people hunt or poach animals, these animals therefore cannot contribute to the variety of animals.

e. grass is burned or eaten to the point where no grass is left, and the soil is exposed, water and wind can remove the top soil.

f. people cut down trees in forests or plough natural habitats for farming, the habitats of animals and plants are destroyed.

g. air is polluted with carbon dioxide, it creates a greenhouse effect where the climate temperatures increase.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is erosion?

b. What is biodiversity?

Answers to the checkpoint questions are as follows:

a. Erosion occurs when the soil is worn away by wind and water.

b. Biodiversity is the variety of plants and animals on Earth.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:

a. We change our habitat to suit our needs.

b. We clear habitats, such as grasslands, forests and wetlands, to meet our needs, which include farming and housing.

c. The impact on these ecosystems is that animals and plants lose their habitat and source of food.

d. A loss of habitat can result in a loss of species.

e. The main source of food of the giant panda, for example, is bamboo. The bamboo forests are being destroyed by humans and the pandas are being endangered, which means that there are few pandas left.

f. Pollution results in climate change.

g. Factories, power plants and cars release harmful gases, such as carbon dioxide. The carbon dioxide traps the Sun's heat and the Earth is heated. This changes the climate.

h. The ice in the polar regions is melting. Polar bears can only hunt seals on ice. There is little ice left and food for the polar bears becomes scarce.

i. Rhinos are being poached for their horns. Should all the rhinos be killed, a part of the 'Big Five' will cease to exist and there will be loss of biodiversity.

j. When one species is removed in a food chain, it has an effect on other organisms.

2. Ask the learners to complete the following task in their books. Always try to do this before the lesson starts. Show the learners Resource 20 and ask them to use the diagram to answer the questions. You can revise the terms that appear on the diagram before they answer the questions.

TASK

Look at the ecosystem and answer the following questions.

1. What is the disturbance in the ecosystem?
2. Is this disturbance a natural factor or a human factor?
3. What natural and/ or human factor caused the disturbance?
4. What is the effect of the disturbance on the environment?
5. What is the effect of the disturbance on the animals?
6. What is the impact of the disturbance on the ecosystem?
7. Is the impact reversible or permanent?

3. Give the learners enough time to complete the questions.
4. Provide the learners with the correct answers:

1. A fire

2. It can be a natural factor or a human factor.

3. As a natural factor the fire could be caused by lightning. As a human factor the fire could be caused by a man-made fire that was not put out properly or a bottle that acted as a magnifying glass.

4. All the trees and grass will have burned down.

5. Animals might be killed or escape from the ecosystem to another area.

6. A loss of food, destroyed habitat and small animals and insects might be removed from the ecosystem.

7. The impact is reversible. When it starts to rain the plants and trees can grow again.

Checkpoint 2

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

a. What does carbon dioxide gas create on Earth?
b. Why do people clear habitats?

Answers to the checkpoint questions are as follows:

a. A greenhouse effect.
b. People need space to build houses and to plough the ground for farming.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Interactions and interdependence within the environment	48-49
Top Class Natural Sciences	Interactions and interdependence within the environment	47-49
Via Africa Natural Sciences	Interactions and interdependence within the environment	45
Solutions for All: Natural Science	Interactions and interdependence within the environment	75-77
Day-by-Day	Interactions and interdependence within the environment	48-49
Oxford	Interactions and interdependence within the environment	40-41
Spot On	Interactions and interdependence within the environment	26-27
Top Class	Interactions and interdependence within the environment	45-47
Sasol Inzalo Bk A	Interactions and interdependence within the environment	82-86

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=M4jhjt1_eyM (2min 23sec) [Deforestation explained]
2. https://www.youtube.com/watch?v=oJAbATJCugs (3min 4sec) [Global warming]

6 C

Term 1, Week 6, Lesson C
Lesson Title: Adaptations
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Adaptations
CAPS Page Number	38

Lesson Objectives

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

- define adaptation
- name the three types of adaptation
- explain the three types of adaptation
- give examples of adaptations in plants, animals and predators.

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:

	Old magazines, cardboard

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 one impact of an imbalance on an ecosystem?

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.

Loss of habitat / climate change / erosion / loss of biodiversity

D ACCESSING INFORMATION

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

ADAPTATION

1. **Adaptation** is the change in the structural, functional and behavioural characteristics of an organism enabling it to adjust to changing conditions within an environment.

The types of adaptation are:

2. Structural: a special feature of a body
3. Functional: the way in which a body works
4. Behavioural: how a living organism behaves
5. Predators are well adapted to hunt their prey. Their eyes are in the front of their heads and they can estimate distances.
6. Plants adapt to their environment. In deserts, plants store water in their leaves while water lilies have breathing pores on top of their leaves.
7. Animals that live in extreme environments, such as camels and polar bears, must adapt in order to survive in the harsh conditions.

2. Explain this to the learners as follows:
   a. Adaptation is a process by which living organisms adjust to their environment. It is not a conscious choice. It happens over a long period of time.
   b. An organism gets a characteristic that enables it to survive harsh environmental conditions in habitats.

c. These characteristics can be structural, functional or behavioural.

d. Structural characteristics refer to how the animal's body has changed so that it has an advantage over another species.

e. A functional characteristic is shown in the way an animal uses its body features to move or survive.

f. A behavioural characteristic refers to how an animal acts to deal with harsh environmental situations.

g. Plants and animals have adapted in special ways to survive in their environments.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is adaptation?

b. Can you name three types of adaptation?

Answers to the checkpoint questions are as follows:

a. It is the way in which an animal changes to adjust to its environment.

b. Structural, functional and behavioural adaptation

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:

a. Adaptation is a slow process where there is a gradual change in the characteristics of an organism, enabling them to improve in order to survive in a changing environment.

b. This increases the chance of survival and reproduction so that a species can concanue to exist.

c. Structural adaptation: Giraffes have to compete with elephants for the leaves of trees. Therefore, their necks have grown longer over many years, enabling them to reach the high leaves that elephants cannot reach.

d. Functional adaptation: Both penguins and birds have wings but birds use their wings to fly and penguins have adapted their wings to swim.

e. Behavioural adaptation: Many desert animals go underground during the day to avoid the hot sun. During the night they come out to feed.

f. Predators use their eyes in front of their heads to focus on a prey and estimate the distance to the prey. Their brains are also better developed to be able to select the right victim and plan a method of capture.

g. Prey have better sense organs so that they can detect predators early enough.

h. Water plants are flat so that they can float on the water and have breathing pores on top of their leaves so that they can photosynthesis.

i. Desert plants (succulents) store their water in their leaves and stems, which then become thick and fleshy.

j. Bears in cold regions have thicker coats than bears in warmer regions.

2. Ask the learners to complete the following task in their books. The first part deals with camels and polar bears that live in extreme conditions. Ask thee learners to answer questions regarding the adaptations undergone by these animals. For the second part, learners should find magazine pictures of animals that have adapted to their environment.

TASK

PART A

1. Read the following passage about a camel and identify its structural, functional and behavioural adaptations.

> A camel lives in a desert where few other animals can live. The desert is a sandy place. Therefore, the camel has nostrils that are closed tight and long eyelashes that the sand cannot get into. Its feet are also wide so the camel does not sink into the soft sand. The desert is very dry and camels rarely drink water. When they do drink at an oasis, which is a green area in a desert with water, they drink a huge amount of water. The fatty hump of a camel stores food, which can be changed into water when the food gets used up.

2. Read the following passage about a polar bear and identify its structural, functional and behavioural adaptations.

> The polar bear lives in very cold conditions. It lives on snow or floating ice. Therefore, it has a very thick, double-layered coat. It has a small tail and small ears so that it does not lose a lot of heat. A polar bear is white so that it can blend into its environment. The polar bear eats a lot of rich and fatty food, such as seals, that can last it for the whole winter. Polar bears store their fat under their skins so that they can stay warm and float in the water.

PART B

1. Use the given magazines to make a poster about animals that have adapted to their environment. Look out for the animals that have been discussed in this lesson or look for other animals. Stick the pictures you have found on the poster and write a small description next to the pictures. Present it to the class.

2. Give the learners enough time to complete the questions.
3. Provide the learners with the correct answers:
    1. *Structural: Closed nostrils, long eyelashes, wide feet*
       Functional: The function of the hump of a camel is not as a seat but to store food.
       Behavioural: A camel knows that it does not get water everyday, so when it gets to water, it drinks a great amount of water.
    2. *Structural: It has a double-layered coat and small ears and tail. A polar bear is also white, enabling it to blend in with its environment.*
       Functional: Polar bears store their fat under their skins.
       Behavioural: Polar bears eat a lot of fatty and rich food during summer so that the food can last them for the whole winter.
    3. *Let the learners show their posters to the other learners and explain the different adaptations of the animals on their poster.*

Checkpoint 2

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

a. How have giraffes adapted to reach leaves high up a tree?
b. How have desert plants adapted to survive where there is a permanent water shortage?

Answers to the checkpoint questions are as follows:

a. They have long necks.
b. They store water in their leaves and stems.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Interactions and interdependence within the environment	38-42
Top Class Natural Sciences	Interactions and interdependence within the environment	32-35
Via Africa Natural Sciences	Interactions and interdependence within the environment	32-35
Solutions for All Natural Science	Interactions and interdependence within the environment	44-46
Day-by-Day	Interactions and interdependence within the environment	30-31
Oxford	Interactions and interdependence within the environment	40
Spot On	Interactions and interdependence within the environment	29
Top Class	Interactions and interdependence within the environment	34-35
Sasol Inzalo Bk A	Interactions and interdependence within the environment	63-66

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=wNqiclBUxdY (5min 33sec) [Animals with insane survival adaptations]
2. https://www.youtube.com/watch?v=x1MUl8XSZGA (13min 13sec) [Adaptations]

7 A

Term 1, Week 7, Lesson A
Lesson Title: Adaptation strategies and extinction
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Adaptations
CAPS Page Number	38

Lesson Objectives

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

- explain the adaptation strategies mimicry and camouflage
- define variation
- explain how animals become extinct
- give examples of animals that are extinct.

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 41: Viceroy butterfly and Monarch butterfly	
Resource 42: Difference between Viceroy butterfly and Monarch butterfly	

C CLASSROOM MANAGEMENT

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

Can you name three ways in which animals can adapt to their 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.

Structural, functional and behavioural adaptation

D ACCESSING INFORMATION

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

ADAPTATION STRATEGIES

1. As environmental conditions change, species have to adapt to survive. Sometimes they change into new species.
2. Variations in a population means that, despite being the same species, there are differences in the characteristics between each individual. This is a result of adaptation.
3. Adaptation strategies include mimicry and camouflage.
4. Mimicry occurs when a harmless animal takes on the characteristics of a dangerous animal to scare off predators.
5. Camouflage means the ability to blend in with the surroundings.

Extinction

1. When a species is unable to adapt to changes over long periods of time in the environment, the species becomes extinct.
2. Species are extinct when the last individuals of the species on Earth die.
3. Extinction is a natural process.
4. Human interference is the biggest cause of extinction.

2. Explain this to the learners as follows:
    a. In an ecosystem there is a concanuous fight for Resources , such as food and water.
    b. The animals that are best adapted to the circumstances survive, grow and reproduce.
    c. When a change occurs in an environment, some species might have the characteristics to survive while other might not.
    d. Variation in a species might help them to survive and compete for food.
    e. Some harmless animals cannot defend themselves against predators. Thus they have changed their appearance to that of a dangerous animal which scares off predators.
    f. When animals blend in with their surroundings they are camouflaged. Predators and prey camouflage themselves.
    g. Organisms that are unable to adapt to changes in an environment die out or become extinct.
    h. Human activity is the biggest cause of extinction. Humans kill the animals and destroy their habitats.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. Humans are a species. Can you name one variation in humans?
b. When do animals become extinct?

Answers to the checkpoint questions are as follows:

a. Some have black hair and some have red hair. (There are many answers.)
b. Animals become extinct when they cannot adapt to the changes in their environment and cannot survive.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
    a. Plants and animals are adapted to the conditions of their environment in order to survive and reproduce.
    b. Characteristics help organisms to survive.
    c. In any population each individual is slightly different from another individual of the same population. This is called variation.
    d. Viceroy butterflies are non-toxic and food for many insectivores. However, the monarch butterfly is toxic and insectivores stay away from them. The viceroy mimics the monarch because it looks almost the same as the monarch. Therefore their predators stay away from them. This is called mimicry.
    e. Animals blend in with their surroundings to protect themselves from predators. But predators also blend in with the surroundings, enabling them to creep up on their prey.
    f. When no more individuals of a species are left on Earth, the species will be extinct.
    g. When there is a rapid change in an environment, usually due to human activity, animals are not able to adapt quickly and they can become extinct.
2. Show the learners the Viceroy butterfly and Monarch butterfly on Resource 41. Ask them to spot the differences between the two butterflies and answer the questions in their books.

TASK

Look at the picture that the teacher is showing you of the Viceroy butterfly and Monarch butterfly and answer the following questions in your book.

1. Can you spot the differences in the patterns of the two butterflies?
2. Why does the Viceroy butterfly look similar to the Monarch butterfly?
3. What do we call this adaptation strategy?

3. Give the learners enough time to complete the task.
4. Show the learners Resource 42.
    1. Indicate the difference in the patterns of the two butterflies.
    2. The Monarch butterfly is toxic. So, because the Viceroy butterfly, which is non-toxic, looks the same as the Monarch butterfly the predators will not catch it.
    3. Mimicry.

Checkpoint 2

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

a. Why are camels brown?
b. What is the adaptation strategy called?

Answers to the checkpoint questions are as follows:

a. Camels are brown so that they blend in with the sand of the desert.
b. Camouflage

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Interactions and interdependence within the environment	43
Top Class Natural Sciences	Interactions and interdependence within the environment	36
Via Africa Natural Sciences	Interactions and interdependence within the environment	36
Solutions for All Natural Science	Interactions and interdependence within the environment	44-46
Day-by-Day	Interactions and interdependence within the environment	30-31
Oxford	Interactions and interdependence within the environment	41
Spot On	Interactions and interdependence within the environment	29
Top Class	Interactions and interdependence within the environment	34-35
Sasol Inzalo Bk A	Interactions and interdependence within the environment	68-70

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.animals.mom.me › Wildlife and Exotic Animals [List of extinct animals in South Africa]
2. https://www.khanacademy.org/science/.../variation-in-a-species (19min 52sec) [Variation in species]

7 B

Term 1, Week 7, Lesson B
Lesson Title: Managing ecosystems
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Conservation of the ecosystem
CAPS Page Number	38

Lesson Objectives

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

- define conservation
- describe what a conservationist do
- explain how conservationists manage and conserve ecosystems.

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 24: Black wattle tree	A visit by a conservationist or environ-mentalist
Resource 25: The St Lucia Wetland	

C CLASSROOM MANAGEMENT

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

Why do animals become extinct or cease to exist?

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.

Animals cannot adapt to changes in an ecosystem. They are also killed by poachers and hunters.

D ACCESSING INFORMATION

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

MANAGING ECOSYSTEMS

1. A Resource is sustainable if it is used in a way that does not destroy it.
2. The careful use and protection of natural Resources is called **conservation**.
3. We must manage our natural Resources.
4. It is important to conserve all living things to keep the biodiversity intact.
5. A conservationist is a person that is trained to conserve and manage an ecosystem.
6. Managing ecosystems include the control of **invasive** plants and the preservation of wetlands.

2. Explain this to the learners as follows:
   a. A Resource is sustainable if it is used in a way that does not destroy it.
   b. Conservation is about sharing Resources in an ecosystem fairly and using them sustainably so they are available for future generations to use.
   c. We must manage our natural Resources. This is called sustainable management.
   d. When we conserve all living things, we support biodiversity. Biodiversity is the different kinds of animals and plants on Earth.

e. A conservationist or environmentalist works hard to protect and manage ecosystems. He or she is concerned with human actions that upset the balance in an ecosystem.

f. **Invasive** or **alien** plants invade the space of indigenous plants. Indigenous plants are plants that have always existed in an ecosystem whereas alien plants come from other countries.

g. Wetlands are soil that is covered with a shallow layer of water. They are home to a variety of water-loving plants and animals.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What is conservation?

b. What is an alien plant?

Answers to the checkpoint questions are as follows:

a. Conservation is protecting our natural Resources for future generations.

b. It is a plant that does not grow naturally in an ecosystem. It comes from another country.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:

a. Conservation is about protecting biodiversity and not harming ecosystems or damaging habitats.

b. Conservationists work very hard to control alien vegetation in an attempt to conserve indigenous plants. Indigenous plants are better suited to the local ecosystem.

c. Alien plants invade the habitat of indigenous plants. They absorb more water and have no natural enemies.

d. Alien plants are brought into our local ecosystems from other parts of the world. Examples include the Australian black wattle tree and pine trees. Show the learners Resource 25 so that they can see what a black wattle tree looks like.

e. Wetlands are water-logged areas that are home to many plants, birds and other animals. Show the learners Resource 25, 'The St Lucia Wetland'.

f. Wetlands act like sponges that hold water. They are natural stores and also assist with flood control.

g. The preservation of wetlands is very important because they are natural filters that clean the water of toxic metals and chemicals.

2. Ask the learners to complete the following task in their books. Read them the case study or hand out copies of the case study and ask them to answer the questions that follow.

TASK

Read the following case study and answer the questions that follow.

Water Thieves (shortened)

Forty-four, that's the critical double-digit number that's come out of a small but significant study site at Two Streams in the misty grasslands of the KwaZulu-Natal Midlands. This study has confirmed what scientists have long suspected about many of the alien trees growing rampant in parts of the country.

Black wattle is one of numerous woody tree species introduced into South Africa to beautify gardens. Mostly from Australia, some alien species have found environmental conditions here ideal with no natural diseases or pests to keep their numbers in check. They have spread into the wild veld, becoming pesky weeds and then full-blown invaders.

To understand precisely how much water they use, researchers set up a thorough, long-term monitoring process.

After 13 years, the data was clear: dense thickets of mature black wattles drew 44% more water out of the catchment than grasslands, depriving the stream of that volume of water. This is significantly more water than indigenous grass or river-edge bush would use, and far too high a number in our water-scarce country.

But why do they use so much water? They grow much taller than indigenous bush and have extensive root systems. They grow deep into the underground water supply. Because they have wider canopies, with more leaves than many local species, they're transpiration factories, sucking water out of the soil and breathing it out into the surrounding air. This means that there is less moisture in the soil to maintain the health and well-being of indigenous species.

The environmental decay that comes with this sort of invasion is like a form of pollution. But unlike an oil spill or litter dumped in the veld, this form of pollution self-replicates.

Once these invasive species have gained enough momentum, they keep on spreading. Black wattle seeds, for instance, can remain viable in the soil for up to half a century.

Many of the invasive species change the chemical make-up of the soil. Black wattles, for instance, load the soil with nitrogen, impacting on threatened grassland species that thrive on low nitrogen soils and modifying the environment for other invaders. [https://www.sanbi.org/node/10660]

1. Why was the black wattle introduced into South Africa?
2. Where do most of the alien plants come from?
3. Why is a black wattle considered a weed?
4. How much more water do black wattle trees use than indigenous plants?
5. Why is it a problem that black wattles use more water?
6. Why does the black wattle use so much water?
7. Why are alien species considered 'a form of pollution that self-replicates?

3. Give the learners enough time to complete the questions.
4. Provide the learners with the correct answers:

1. *It was introduced to make gardens look beautiful.*
2. *They come from Australia.*
3. *With no natural diseases or pests, black wattles can grow very fast and spread in*
4. *the wild.*
5. *They use 44% more water than indigenous plants.*
6. *Our country is a water-scarce country. There is not a lot of water.*
7. *They grow much taller than indigenous bush and have extensive root systems.*
8. *They grow deep into the underground water supply and leave indigenous plants*
9. *without water.*
10. *When oil is spilled the oil does not multiply but alien species can grow and*
11. *spread rapidly.*

Checkpoint 2

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

a. What is the function of a wetland?

b. Why must alien plants be controlled?

Answers to the checkpoint questions are as follows:

a. It acts as a sponge that holds water, and as a filter to clean water from toxic materials.

b. They absorb all the water of indigenous plants and they spread very quickly because they have no natural enemies.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Interactions and interdependence within the environment	44-46
Top Class Natural Sciences	Interactions and interdependence within the environment	38-39
Via Africa Natural Sciences	Interactions and interdependence within the environment	36-38
Solutions for All Natural Science	Interactions and interdependence within the environment	38-39
Day-by-Day	Interactions and interdependence within the environment	32-24
Oxford	Interactions and interdependence within the environment	44-46
Spot On	Interactions and interdependence within the environment	30
Top Class	Interactions and interdependence within the environment	36
Sasol Inzalo Bk A	Interactions and interdependence within the environment	71-73

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.krugerpark.co.za [Conservation in action]
2. http://www.wetwin.eu/downloads/Wetwin_10.pdf [Case study: Ga-Mampa wetland]

TOPIC: Interactions and interdependence within the environment

7 C

Term 1, Week 7, Lesson C
Lesson Title: Ways to conserve ecosystems
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Conservation of the ecosystem
CAPS Page Number	38

Lesson Objectives

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

- explain why we need to help with the conservation of ecosystems
- list ways in which we can help to conserve ecosystems
- explain what reduce, reuse and recycle mean.

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:

Resource 26: Recycle quick guide	Different containers that can be used for recycling
Resource 27: Recyling	

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 conservation?

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.

D ACCESSING INFORMATION

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

WAYS TO CONSERVE ECOSYSTEMS

1. We share the planet with animals and plants. We must conserve ecosystems.
2. Water, wetlands, soil and air have to be conserved.

We can do our part by:

1. saving water
2. recycling, reusing, reducing
3. safely disposing of human waste and household waste
4. reducing energy consumption
5. planting trees.

2. Explain this to the learners as follows:
   a. All of us have to conserve the Earth's Resources so that there are enough Resources for humans, plants and animals.
   b. There is much that we can do.
   c. We can conserve water by closing taps properly.

d. Materials, such as plastic and paper, can be recycled. Containers can be reused and we can reduce the waste that we create.

e. When we reduce our energy consumption, we reduce the harmful gases that are released into the air, when coal is burned to generate electricity.

f. Carbon dioxide is a greenhouse gas. Trees use the carbon dioxide in the air during photosynthesis.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. Can you name one way in which we can conserve ecosystems?

b. How does planting trees help to conserve ecosystems?

Answers to the checkpoint questions are as follows:

a. We can reduce, reuse and recycle.

b. Trees use the greenhouse gas, carbon dioxide, during photosynthesis.

E CONCEPTUAL DEVELOPMENT

1. Divide the learners into groups of 6.
2. For this activity you will need:
   - to prepare a dustbin with as many of the following items inside as possible: cooldrink can, paper bag, plastic bottle, glass bottle polystyrene tray, paper, tinfoil, apple core, plastic bag, food can, cabbage leaf, banana peel, chicken bones, egg shells, cardboard
   - a few sheets of newspaper
3. This activity will take place in two parts: A classroom activity and an outside activity.
4. Write the following onto the chalkboard (always try to do this before the lesson starts):

PRACTICAL TASK

1. This task will be done individually.
2. You are going to do an environmental audit of some school and some home waste.
3. You must produce a set of written answers for assessment.

5. Explain to the learners that an environmental audit is an assessment of how well the school is looking after its environment.
6. Read through the practical task, as written on the board, with the learners.
7. Tell learners that the first task will be done outside the classroom.
8. The task will be to look at the school ground and identify all the areas that are affected by litter.

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

Task 1 (5 marks)

1.1 Are there areas around the school where there is litter lying around? If yes, name these areas.

1.2 Without touching the litter, can you identify what the litter is mostly made up of?

1.3 Are there dustbins in these areas?

1.4 Does your school have recycling bins of any sort? If yes, what does your school recycle?

1.5 Find a dustbin in the school grounds. Without putting your hands inside the dustbin, write down what seems to be the main source of waste in the dustbins?

10. Read through the task with the learners.
11. Tell the learners to write the questions down in their workbooks.
12. Ask the learners if they have any questions about what they need to do.
13. Tell the learners that they have 10 minutes to complete this task outside.
14. Allow the learners out of the classroom to complete the task.
15. While the learners are outside, supervise and answer any questions they may have.
16. After 10 minutes, call the learners back into the classroom.
17. Tell the learners they will now do task 2.
18. This task will be an analysis of the contents of a dustbin.
19. Write the following on the chalkboard:

Waste product decomposition time:	
Waste item	Time to break down in a landfill
Aluminium can (Coke)	250-500 years
Paper bag	1 month
Plastic bottle	450+ years
Glass bottle	1-2 million years
Polystyrene	Never
Paper	6 weeks
Tinfoil	Never
Apple core	1 month
Plastic bag	20-1000 years
Tin can (food)	50 years
Cabbage leaf	2 months
Banana peel	2 months
Chicken bones	6 months
Egg shells	4 months
Cardboard	2 months

20. Explain the following to the learners
    a. A landfill is the place where the rubbish or garbage trucks take the rubbish from our homes and schools.
    b. The rubbish is buried and left to decompose.
    c. Ask the learners if they can remember what the word “decompose” means?
    (Answer: To breakdown or rot.)
    d. Ask the learners if they can remember what the word “recycle” means.
    (Answer: Re-use waste materials or change waste materials into something that can be used again.)
21. Clear a large area in the front of the class. (If this is not possible, you may need to do this activity outside.)
22. Put down some sheets of newspaper and then empty your prepared bin onto the paper.
23. Use a stick to spread the items out so that they can be easily seen.
24. Tell the learners that this is the contents of a home dustbin.
25. Write the following task onto the chalkboard (try to do this before the lesson starts):

Task 2

2.1 Write down a list of the items that are in this home dustbin. (1)

2.2 Which 2 these items are not biodegradable? (2)

2.3 Name 4 items that will take more than 100 years to break down in a landfill? (4)

2.4 Which item in this bin will take the shortest amount of time to breakdown in a landfill?(1)

2.5 Name 4 items that can be recycled? (4)

2.6 Name 2 recyclable items that you have thrown away in the last day. (2)

26. Read through the task with the learners.
27. Ask the learners if they have any questions.
28. Tell the learners to complete the answers in their workbooks.
29. Write the following task on the chalkboard:

Task 3 (1 marks)

Imagine you are the head of the recycling committee for the school. Think of a slogan that you could put on a poster to to encourage learners to recycle instead of littering, wasting or unnecessarily throwing away.

30. Read through the task with the learners.
31. Remind them that a slogan is a “short and memorable phrase that is used to advertise something.”
32. Allow learners time to complete task 3 in their workbooks.

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:

Successful Natural Sciences	Interactions and interdependence within the environment	47
Top Class Natural Sciences	Interactions and interdependence within the environment	39-41
Via Africa Natural Sciences	Interactions and interdependence within the environment	39-41
Solutions for All Natural Science	Interactions and interdependence within the environment	38-39
Day-by-Day	Interactions and interdependence within the environment	34-35
Oxford	Interactions and interdependence within the environment	47
Spot On	Interactions and interdependence within the environment	30
Top Class	Interactions and interdependence within the environment	36
Sasol Inzalo Bk A	Interactions and interdependence within the environment	72-74

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=b7GMpjx2jDQ (8min 53sec) [How recycling works]
2. https://www.rodalesorganiclife.com/garden/how-compost [How to build a compost heap]

TOPIC OVERVIEW:
Micro-organisms
Term 1, Weeks 8A – 9C

A. TOPIC OVERVIEW

Term 1, Weeks 8a – 9c

- 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 7	GRADE 8	GRADE 9
LOOKING BACK	**CURRENT**	**LOOKING FORWARD**
• There are many different kinds of living things, including plants, animals and micro-organisms. • Plants, animals and micro-organisms, and their habitats make up the total biodiversity of the Earth. • The five main groups of living organisms include Bacteria, Protista, Fungi, Plants and Animals.	• Micro-organisms are living things. • They are too small to see with the naked eye. • There are a variety of micro-organisms. • Some micro-organisms cause diseases. • Waterborne diseases cause child deaths. • The spread of diseases can be prevented through hand washing and sterlizing. • Scientists play a role in developing cures for diseases.	• N/A

	• Decomposers play an essential role in ecosystems. • Micro-organisms are used for making foods and medicine.	

C. SCIENTIFIC VOCABULARY

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

	TERM	EXPLANATION
1.	Micro-organisms	They are living organisms that are too small to see with the naked eye.
2.	Virus	A very simple micro-organism that is dependent on a host for survival.
3.	Bacteria	Micro-organisms made up of one cell only
4.	Sterilizing	The killing of micro-organisms with heat or chemicals
5.	Pasteurization	The process of heating food or a liquid to kill any disease-causing micro-organisms that may be in it

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Learners will learn about the different types of micro-organisms and how small these micro-organisms actually are. They will also understand how micro-organisms impact on our lives in a positive or negative way. Lastly, the learners will learn how to prevent the spread of diseases.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

TOPIC: Micro-organisms

8 A

Term 1, Week 8, Lesson A
Lesson Title: The real size of micro-organisms
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Micro-organisms
CAPS Page Number	39

Lesson Objectives

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

- explain what micro-organisms are
- convert micrometers to millimetres
- use a scale to determine the real size of a micro-organism
- use a scale to determine the magnification of a micrograph.

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

SCIENCE PROCESS SKILLS

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

TOPIC: Micro-organisms

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 28: The micrograph	Bread mould, mushroom, hand lens

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 can we do to conserve the ecosystem?

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 can recycle all our unwanted plastic, glass and paper.

D ACCESSING INFORMATION

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

FACTS ABOUT MICRO-ORGANISMS

Micro-organisms:

1. Are the smallest living things.
2. Are also called microbes.
3. Carry out the life processes.
4. Are found and can survive in all habitats, including soil, water, air, human and animal bodies.
5. Are too small to be seen with the naked eye.
6. Are measured in micrometres.

2. Explain this to the learners as follows:
   a. Micro-organisms except for viruses are living things because they can feed, grow, reproduce, excrete waste, move, breathe and are sensitive to the environment.
   b. Micro-organisms are so small that we cannot see them with the naked eye or even a magnifying glass. We can only see them with a microscope or an electron microscope.
   c. If we do not have a microscope we can look at the micrograph of a micro-organism. It is a magnified image of a micro-organism.
   d. We can use a scale to determine the actual size of a micro-organism.

Checkpoint 1

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

a. How do we know that micro-organisms are living creatures?

b. How big is a micro-organism?

Answers to the checkpoint questions are as follows:

a. Micro-organisms can carry out the life processes. They can feed, grow, move, breathe, excrete waste, reproduce and can respond to the environment.

b. A micro-organism is smaller than 1 millimetre.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners

   a. Micro-organisms feed in different ways. Some are producers and can make their own food through the process of photosynthesis. Other micro-organisms are consumers and feed on other organisms.

   b. Micro-organisms can grow very fast in good conditions. They can double their mass in just half an hour. Many micro-organisms simply divide when they reproduce. They do not need a male and a female.

   c. Some of the harmful micro-organisms excrete waste that are poisonous and can cause diseases.

   d. Micro-organisms always move towards light, food and warmth as these are favourable conditions for them to survive.

   e. We can only see micro-organisms with a microscope. A microscope is an instrument that uses lenses that increase the size of the micro-organism and make it look bigger than it is. We say the microscope magnifies the micro-organism.

   f. We cannot measure the size of a micro-organism in cm or mm. They are too small. We measure their size in micrometres (μm). There are 1000 micrometres in a millimeter.

2. Write the following onto the chalkboard. Try to do this before the class starts. Explain to the learners how to convert millimetres to micrometres and micrometres to millimetres. Learners can use calculators to make the conversions.

A millimetre is equal to 1000 micrometres: 1 mm = 1000µm

To convert micrometres to millimetres you divide by 1000:

÷ 1000

1 µm ⟶ 0,001 mm

To convert millimetres to micrometres you multiply by 1000.

×1000

1 mm ⟶ 1000 µm

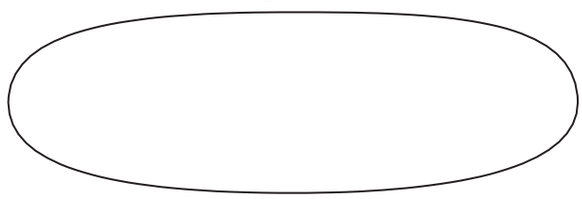
To determine the actual size of a micro-organism, use the following formula

$$Actual\ size = \frac{Drawing\ size}{Magnification}$$

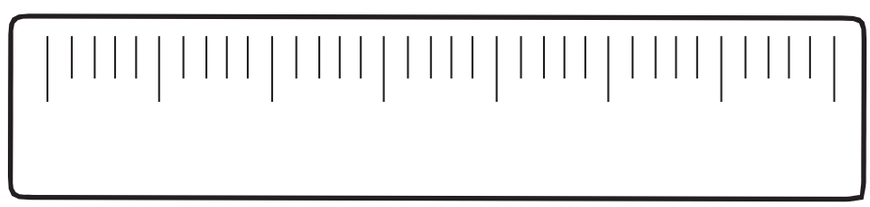
3. Explain that when we look at a micrograph of a micro-organism, it is difficult to imagine the actual size. We use a scale to determine the actual size of a micro-organism.
4. Do the following example with the learners to determine the actual size of a micro-organism. Draw the following onto the chalkboard. You will have to choose your own scale bar as well as the size of the image on the chalkboard. Make this drawing beforehand and calculate the real size of the micro-organism according to your own drawing.

EXAMPLE

Determine the actual size of the micro-organism.



Scale bar



a. Measure the length of the scale bar with a ruler.
   The length of the scale bar is 10 mm.
b. Measure the length of the micro-organism with the ruler.
   The length of the micro-organism is 80 mm.
c. Determine the magnification of the microscope.
   The actual length of the scale bar is 0,25 µm. We have to convert the value to millimetres: 0,25 µm ÷ 1000 = 0,00025 mm
   The drawing length of the scale bar is 10 mm.

Use the formula to calculate the magnification:

= 40 000

This means that the microscope magnified the micro-organism 40 000 times. It is actually 40 000 times smaller.

d. Measure the length of the micro-organism with the ruler.
The length of the micro-organism is 75 mm.

e. Calculate the actual size of the micro-organism using the formula:

$$Actual\ size = \frac{Drawing\ size}{Magnification}$$

$$= \frac{75}{40000}$$

$$= 0{,}001875 \text{ mm}$$

5. Make copies of the micrograph on Resource 28. Divide the class into groups. Hand out a copy of the micrograph to each group. Ask them to determine the actual size of the bacterium that is indicated with a red arrow. The answer to this question is shown below.

Determine the magnification of the microscope.
The actual length of the scale bar is 2 µm. We have to convert the value to millimetres.
µm ÷ 1000 = 0,002 mm
The drawing length of the scale bar is 20 mm.
Use the formula to calculate the magnification.

$$Actual\ size = \frac{Drawing\ size}{Magnification} \cdot 0{,}002 = \frac{20}{Magnification} \cdot Magnification = \frac{20}{0{,}002}$$

$$= 10\ 000$$

When measured with a ruler, the length of the bacterium is 20 mm.

$$Actual\ size = \frac{Drawing\ size}{Magnification} = \frac{20}{10\ 000} = 0{,}002 \text{ mm}$$

Note: These values may change according to the size of the image of the micrograph.

6. Give the learners sufficient time to complete the calculations. Choose a group to present their calculations on the board. Discuss the answers with the class.

Checkpoint *2*

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

a. Determine the actual size of a micro-organism if its magnified size on a micrograph is 32,5 mm and the magnification is 2 000.
b. Determine the magnification of a microscope if the actual size of a micro-organism is 71,5 μm and its magnified size is 7,15 mm

Answers to the checkpoint questions are as follows:

a. $Actual\ size = \frac{Drawing\ size}{Magnification}$

$= \frac{32,5}{2000}$

$= 0,001625$ mm

$= 1,625$ μm

b. 71,5 μm ÷ 1000 = 0,0715 mm

$Actual\ size = \frac{Drawing\ size}{Magnification}$ $\qquad$ $Magnification = \frac{Drawing\ size}{Actual\ size}$

$= \frac{7,15}{0,0715}$

$= 100$

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
Successful Natural Sciences	Micro-organisms	48-51
Top Class Natural Sciences	Micro-organisms	45-50
Via Africa Natural Sciences	Micro-organisms	42-45
Solutions for All: Natural Science	Micro-organisms	57-63
Spot on Natural Sciences	Micro-organisms	37-40
Platinum Natural Sciences	Micro-organisms	56-59
Step-by-step	Micro-organisms	31
Natural Sciences	Micro-organisms	42
Sasol Inzalo Bk A	Micro-organisms	86-88

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.explainthatstuff.com/microscopes.html [How a microscope works]

8 B

Term 1, Week 8, Lesson B
Lesson Title: Types of micro-organisms
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Micro-organisms
CAPS Page Number	39

Lesson Objectives

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

- list the different types of micro-organisms
- describe each type of micro-organism
- distinguish between the different types of micro-organisms.

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:

Resource 29: Influenza virus	Bread mould, mushroom, hand lens
Resource 31: Bacteria	
Resource 33: Protista	
Resource 35: Fungi	

C CLASSROOM MANAGEMENT

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

Do you know any types of micro-organisms?

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.

There are four types of micro-organisms. They are Viruses, Bacteria, Fungi and Protista.

D ACCESSING INFORMATION

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

TYPES OF MICRO-ORGANISMS

1. There ae four groups of Micro-organisms.
2. **Viruses**, such as colds and flu viruses, are the smallest micro-organisms and are sometimes considered non-living. They can only reproduce.
3. **Bacteria** are larger than viruses. Bacteria, such as the TB bacteria, consist of one cell only.
4. **Protista**, such as algae, are more complex micro-organisms, although they consist of one cell only. They are like microscopic animals that swim in water and feed on other micro-organisms.
5. **Fungi** can be as small as mould or as big as mushrooms and toadstools. They are decomposers that feed on dead plants.

2. Explain this to the learners as follows:
    a. There are millions of micro-organisms. We cannot see them. There are even more micro-organisms than the living organisms that we can see. Show the learners bread mould or mushrooms.
    b. We do not always realise that we use everyday terminology that refers to micro-organisms. For example, viruses cause colds and flu, bacteria are responsible for Tuberculosis (TB), red algae (Protista) cause red tides in the sea and we try to clean our showers of mildew (fungus).
    c. The different types of micro-organisms have different sizes and function on different trophic levels. Protista are larger than bacteria, which are larger than viruses. Algae can make their own food, bacteria are consumers that feed on other organisms and fungi are decomposers.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. Can you name the four types of micro-organisms?
b. Can you order Viruses, Bacteria and Protista from biggest to smallest?

Answers to the checkpoint questions are as follows:

a. Viruses, Bacteria, Protista and Fungi
b. Protista, Bacteria, Viruses.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners
    a. Viruses are so small they can only be seen with an electron microscope. They are considered non-living because the only life process that they can perform is reproduction. However, they consist of the same chemical substances that living organisms are made of. They are parasites that rely on other organisms, called host cells, for food and shelter. They cause disease and eventually destroy the host cell. Viral diseases include chicken pox, measles and polio.
    b. Bacteria are the plural form of bacterium. They are cany, but bigger than a virus, and consist of one cell only. Bacteria are considered neither a plant nor an animal. They multiply quickly in warm and moist conditions and can double in number every half an hour. Bacteria can have various shapes, such as rods, spheres (circles) and spirals. They feed on dead material and substances in living organisms. Bacteria are responsible for TB, cholera and food poisoning.

c. Protista are complex single-cell micro-organisms that are found in environments with water. They are plant-like and animal-like and swim in water. In one drop of dam water there can be hundreds of Protista. They form small, invisible communities. Protista, such as malaria, live in the bodies of animals and humans. Other examples of Protista include the amoeba and algae. Algae can produce their own food by photosynthesis. Other Protista feed on bacteria.

d. Fungi, such as mushrooms, toadstools, mildew and mould, can take on different sizes and shapes. However, they all share a structure that is a web of cany threads too small to see with a microscope. Fungi are useful decomposers that feed on dead plants. They simply grow on their food.

2. Stick the four Resources with Prestik onto the chalkboard. Label them as follows:

   A Resource 29: Influenza virus
   B Resource 31: Bacteria
   C Resource 33: Protista **D**
   Resource 35: Fungi
   Now ask the learners to complete the following task in their books by referring to the pictures on the chalkboard.

TASK

Look at the different types of micro-organisms on the chalkboard and answer the following questions in your books.

1. Identify the different types of micro-organisms in the micrographs and write down their names.
2. Explain each micrograph in terms of the shape and size of the micro-organisms.

Write your answers into the table below:

	Type of micro-organism	**Explanation**
A		
B		
C		
D		

3. Give the learners enough time to complete the questions.
4. Draw a table on the chalkboard to show the type of micro-organism as well as its structure. Try to draw the table before the lesson starts but leave the table empty. Let learners come to the chalkboard and write down the answers. If there is time, they can copy the table in their books.

	Type of micro-organism	Explanation
A	Virus	Very small and consist of one cell
B	Bacteria	One cell in the shape of a rod, spiral or sphere
C	Protista	One cell with complex structure
D	Fungi	Web of cany threats

Checkpoint 2

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

a. Can you name one similarity between Bacteria and Viruses?

b. Can you name one difference between Protista and Fungi?

Answers to the checkpoint questions are as follows:

a. Both Bacteria and Viruses live in living organisms. Both can cause diseases.

b. Fungi are mainly decomposers that feed on dead materials while Protista can either produce their own food or feed on living bacteria. Protista are usually found in water environments while fungi grow on their food.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Micro-organisms	48-51
Top Class Natural Sciences	Micro-organisms	45-50
Via Africa Natural Sciences	Micro-organisms	44-45
Solutions for All: Natural Science	Micro-organisms	58-60
Spot on Natural Sciences	Micro-organisms	38-39
Platinum Natural Sciences	Micro-organisms	52-55
Step-by-step	Micro-organisms	31
Natural Sciences	Micro-organisms	43-48
Sasol Inzalo Bk A	Micro-organisms	86-88

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=NqFkmBs_20A (25sec) [The movement of micro-organisms]

8 C

Term 1, Week 8, Lesson C
Lesson Title: Harmful micro-organisms
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Micro-organisms
CAPS Page Number	39

Lesson Objectives

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

- list the diseases that are caused by micro-organisms
- describe the diseases that are caused by micro-organisms
- distinguish between the ways in which micro-organisms are harmful.

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:

Resource 30: HIV virus	
Resource 32: TB bacteria	
Resource 34: Malaria parasite	

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 two types of micro-organisms

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.

Virus, bacteria, Protista, Fungi.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard. Always try to do this before the lesson starts. Take out Resources 30, 32 and 34 from the Resource Pack and keep them handy.

HARMFUL MICRO-ORGANISMS

1. Harmful micro-organisms are called pathogens and they cause diseases inside the bodies of humans.
2. When the pathogen enters the body it quickly multiplies and destroys the body cells.

DISEASES CAUSED BY HARMFUL MICRO-ORGANISMS

1. AIDS is a disease that attacks the immune system of a person and is caused by the virus HIV (Human Immunodeficiency Virus).
2. A person with AIDS dies of diseases, such as pneumonia, because his or her immune system cannot defend the body.
3. Antiretroviral (ARV) medication can stop the reproduction of the HIV virus but AIDS cannot be cured.
4. TB (tuberculosis) is a disease that is caused by a bacterium that attacks and damages the lung cells.

5. The TB bacterium is spread when mucous or saliva containing the bacterium is coughed into the air and inhaled by others.
6. TB can be treated with a long course of antibiotics.
7. Malaria is a disease that is caused by a Protista parasite that is carried by a female mosquito. It injects the parasite into a person while sucking the person's blood.
8. A person with malaria gets a high fever, headaches and jaundice, because of a damaged liver.
9. A treatment for malaria is anti-malaria medication that contains quinine which interrupts the life cycle of the parasite. Other medications are available.
10. Harmful fungi can cause diseases, such as ringworm and athlete's foot.

2. Explain this to the learners as follows:
   a. Some micro-organisms are harmful to humans. When they invade the human body, they attack the body cells and cause diseases.
   b. Harmful viruses, bacteria, fungi and Protista can cause diseases.
   c. The HIV virus causes AIDS. It attacks the cells of the immune system. There is no cure for the virus. It can only be stopped from reproducing. Show the learners Resource 30.
   d. TB is caused by a bacterium that attacks the cells of the lungs and causes a person to cough and struggle to breathe. Show the learners Resource 32.
   e. TB can be treated with a long course of antibiotics. People must complete the treatment even if they feel better.
   f. Malaria kills millions of people a year in sub-tropical areas. It is caused by a Protista parasite that feeds on the red blood cells in the liver. The liver is damaged in the process. Show the learners Resource 34.
   g. Malaria can only be treated by stopping the life cycle of the parasite.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.
6. Send the Resources around so that learners can see what the HIV virus, TB bacterium and the Protista parasite look like.

Checkpoint 1

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

a. What is a harmful micro-organism called?
b. Can you name four diseases that are caused by harmful micro-organisms?

Answers to the checkpoint questions are as follows:

a. Pathogen
b. AIDS, TB, malaria, athlete's foot.

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners. It is important to focus on the sequence of contracting a disease: Contact with micro-organism → contract micro-organism → micro-organism attacks cells → causes disease.
   a. Harmful micro-organisms cause diseases.
   b. When people come into contact with a harmful micro-organism they contract the micro-organism. There are various ways in which this happens.
2. Explain the following diseases and how micro-organisms cause them:
   a. The HIV virus is contracted through bodily fluids when people have unprotected sex; HIV positive mothers breast feed babies; and when people come into contact with needles that are contaminated with blood containing the HIV virus.
   b. The TB bacterium is spread when a person with TB coughs or sneezes and droplets of mucous or saliva containing the bacterium are inhaled by other people.
   c. Malaria is contracted when a person is bitten by a mosquito that carries the malaria parasite. When a mosquito bites a person with malaria, it sucks up the blood that contains the malaria parasite. It will then inject the parasite into someone else.
   d. A ringworm is spread by contact with another person who has ringworm.
3. Ask the learners if they have any questions and provide answers for clarity.
4. Explain how micro-organisms attack the body:
   a. Once inside a human body, the micro-organisms attack the cells of the body. Different micro-organisms will attack different cells in the body.
   b. The HIV virus attacks the white blood cells of the immune system.
   c. The HIV virus can only be stopped from reproducing but no cure is yet available to kill the virus.
   d. The TB bacterium primarily attacks the cells of the lungs.
   e. The TB bacteria can be killed by a long course of antibiotics as the bacterium is very strong.

f. The malaria parasite feeds on the red blood cells that are in human blood. It lays its eggs in the red blood cells that are produced in the liver. When the eggs have hatched they move into the blood stream.

g. Anti-malarial treatment can interrupt the life cycle of the parasite and prevent the parasite from reproducing and staying alive.

h. The ringworm fungus attacks the cells of the skin and nails in a circle-like manner.

i. Fungi are treated with topical cream that prevents them from spreading and this will decrease its feeding ground.

5. Copy the following task and empty table onto the chalkboard. Try to do this before the lesson starts. Ask the learners to do the task. Explain the headings: 'How contracted' means how a person can get the micro-organism; 'Cells attacked' are the cells that the micro-organism attacks and destroys; 'Symptoms' are the effects a person experiences. Learners do not need to know the names of the micro-organisms.

TASK

Copy the table on the chalkboard in your book. Use the information that you copied from the chalkboard to complete the table.

Disease	**Type of micro-organism**	**How contracted**	**Cells attacked**
Malaria			
TB			
AIDS			
Ringworm			

5. Allow the learners to complete the table. Then give each learner a chance to write an answer in the table. Discuss each entry with the learners to decide whether it is correct.

6. Write the model answer onto the chalkboard and check the answers with the learners.

Disease	Type of micro-organism	How contracted	Cells attacked
Malaria	Protista parasite	Female mosquito	Blood cells
TB	Bacterium	Inhale air that contains bacteria	Lung and other organ cells
AIDS	HIV virus	Body fluids	Immune cells (white blood cells)
Ringworm	Fungus	Infected person	Skin and nail cells

Checkpoint 2

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

a. What is necessary for a person to contract a disease?

b. How does a micro-organism cause disease in a human body?

Answers to the checkpoint questions are as follows:

a. A person needs contact with a micro-organism in order for it enter the body.

b. A micro-organism causes disease because it attacks the cells in the human body**.**

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
Successful Natural Sciences	Micro-organisms	52-53
Top Class Natural Sciences	Micro-organisms	50-54
Via Africa Natural Sciences	Micro-organisms	47-52
Solutions for All: Natural Science	Micro-organisms	64-68
Spot on Natural Sciences	Micro-organisms	42-43
Platinum Natural Sciences	Micro-organisms	60-61
Step-by-step	Micro-organisms	34-38
Natural Sciences	Micro-organisms	50-52
Sasol Inzalo Bk A	Micro-organisms	86-88

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=plFnRYYREXU (3min 7sec) [Plasmodium, the malaria parasite]

9 A

Term 1, Week 9, Lesson A
Lesson Title: Preventing the spread of diseases
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Micro-organisms
CAPS Page Number	39

Lesson Objectives

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

- list the places where disease-causing micro-organisms are found
- explain what waterborne diseases are
- list ways to prevent the spread of diseases
- explain the important discoveries that scientists made to prevent the spread of diseases.

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:

	Objects that can carry micro-organisms, such as cellphones, money, etc.

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 have you touched so far today that might contain micro-organisms?

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.

Surfaces, such as hand rails, door handles, trolleys at supermarkets, ATM machines, cell-phones, money, desks and toilets.

D ACCESSING INFORMATION

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

PLACES WHERE MICRO-ORGANISMS ARE FOUND

1. Micro-organisms are found everywhere: in water, the air and public places.
2. Most micro-organisms around us are not harmful or disease-causing.

WATERBORNE DISEASES

1. Micro-organisms that are found in untreated water in dams and rivers can cause waterborne diseases.
2. When people drink untreated water, the harmful micro-organisms enter the intescanes where they multiply and cause diseases.
3. Cholera is a waterborne disease that causes diarrhoea and vomiting, which results in dehydration.
4. Antibiotics and saline solutions treat waterborne diseases to replace lost electrolytes.

WAYS TO PREVENT THE SPREADING OF DISEASES

1. Wash your hands with soap after a visit to the toilet.
2. Wash your hands before eating food.
3. Wash raw fruit and vegetables before eating them.
4. Sterilise the water from streams before you drink.
5. When you have a cold, cover your mouth when you cough or sneeze.
6. Do not have unprotected sex.
7. Vaccinate against diseases.
8. Practise good hygiene. Do not share personal things.
9. Wear gloves when helping people who are bleeding.

PASTEURISATION

1. Louis Pasteur was a French chemist and micro-biologist who invented the process of pasteurisation. This process prevents the spread of diseases in food.

2. Explain this to the learners as follows:
   a. We find micro-organisms everywhere around us. Everything that we touch is covered with micro-organisms.
   b. If someone with a disease touches a surface, the harmful micro-organisms are spread to that surface.
   c. Water contains many micro-organisms that can cause diseases. When we drink the water, the micro-organisms enter our bodies.
   d. Luckily there are many ways in which we can prevent diseases from spreading. There are even more ways than those written on the chalkboard.
   e. Scientists are always trying to find ways to kill harmful micro-organisms and prevent the spreading of diseases.
   f. Louis Pasteur found a way to kill the bacteria that spoil food. The process is called pasturisation. The food is heated to a point where the bacteria are killed.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions or if they want to add to the list of ways to prevent the spreading of diseases.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. Name a waterborne disease.

b. What is the process called where the bacteria in milk are killed so that the milk can last longer?

Answers to the checkpoint questions are as follows:

a. Cholera

b. Pasteurisation

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Diseases can spread from one person to another when they make contact with infected skin, mucus droplets released by sneezing and coughing or infected blood.
   b. They can be prevented by covering your mouth and nose when sneezing or coughing. Wash your hands after using the bathroom so that you do not spread germs when you touch other people. Avoid people who are sick.
   c. Diseases can spread through animals, such as insects and pets.
   d. Dogs might have rabies and should never lick you on the face. You can use bed netting and insect repellant to avoid mosquitoes biting you.
2. Ask the learners if they have any questions.
3. Now explain the following:
   a. Food can spread diseases when it is contaminated with harmful micro-organisms that release toxins into the food. This can lead to food poisoning and typhoid fever.
   b. Raw food, such as fruit and vegetables, should be washed before being eaten.
   c. Some diseases, such as cholera, are caused by bacteria from faeces that spread through contact with contaminated water. These are called waterborne diseases.
4. Write the following onto the chalkboard and ask the learners to do the task.

TASK

Look at the nine points on 'Ways to prevent the spreading of disease'; that you wrote down from the chalkboard at the beginning of the lesson. Write next to each point the name of the disease that you will prevent from spreading. Use a different colour pen or pencil to write this down.

5. Allow the learners to complete the task. Give learners the chance to write the name of the disease next to each prevention. Discuss each answer with the learners to decide whether it is correct. The answers are:

WAYS TO PREVENT THE SPREADING OF DISEASES

a. Wash your hands with soap after a visit to the toilet. *Cholera*

b. Wash your hands before eating food. *Diarrhoea*

c. Wash raw fruit and vegetables before eating it. *Food poisoning*

d. Sterilise the water from streams before you drink. *Cholera*

e. When you have a cold, cover your mouth when you cough or sneeze. *Tuberculosis*

f. Do not have unprotected sex. *AIDS*

g. Vaccinate against diseases. Flu, *chickenpox*

h. Practise good hygiene. Do not share personal things. *Ringworm*

i. Wear gloves when helping people who are bleeding. *AIDS*

Checkpoint 2

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

a. What is necessary for a person to contract a disease?

b. How does a micro-organism cause disease in a human body?

Answers to the checkpoint questions are as follows:

a. A person needs to have contact with a micro-organism so that it can enter the body.

b. A micro-organism causes disease because it attacks the cells in the human body**.**

6. Ask 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
Successful Natural Sciences	Micro-organisms	53-55
Top Class Natural Sciences	Micro-organisms	52-58
Via Africa Natural Sciences	Micro-organisms	52
Solutions for All: Natural Science	Micro-organisms	69-70
Spot on Natural Sciences	Micro-organisms	43-45
Platinum Natural Sciences	Micro-organisms	62-65
Step-by-step	Micro-organisms	39-40
Natural Sciences	Micro-organisms	53-55
Sasol Inzalo Bk A	Micro-organisms	93-102

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.britannica.com/topic/pasteurization [The process of pasteurisation]

9 B

Term 1, Week 9, Lesson B
Lesson Title: Useful micro-organisms
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Micro-organisms
CAPS Page Number	39

Lesson Objectives

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

- identify the micro-organisms that are useful in ecosystems
- explain how micro-organisms are used to make certain foods
- explain how micro-organisms are applied in medicine.

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:

Resource 37: Penicillin	Cheese, yoghurt, medicine containing penicillin, antibiotics, packet of yeast, old magazines
Resource 36: Mushrooms	

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 do micro-organisms help us in our everyday life?

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.

Micro-organisms are used to make food, such as bread and cheese. They are also used in medicine, such as penicillin and antibiotics.

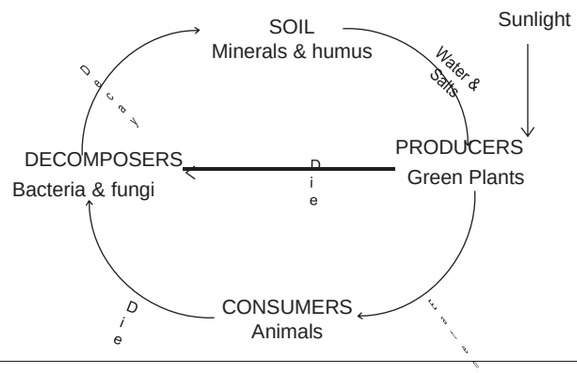
D ACCESSING INFORMATION

1. Write the following onto the chalkboard and copy the diagram onto the chalkboard as well. Always try to do this before the lesson starts.

MICRO-ORGANISMS AND ECOSYSTEMS

1. Micro-organisms are very important to us no matter how small they are.
2. In an ecosystem bacteria and fungi act as decomposers.
3. Decomposers break down dead plant and animal matter.
4. Protista produce food and oxygen for the rest of the ecosystem.

Recycling and the role of decomposers



MICRO-ORGANISMS AND FOOD

1. Bacteria are used to make wine, beer, and yoghurt. This process is called fermentation.
2. Cheese, such as brie, needs moulds to ripen and mature.

MICRO-ORGANISMS AND MEDICINE

1. Vaccines prevent the spreading of diseases, such as TB, rabies and smallpox.
2. Penicillin, a fungus, is the first antibiotic that was discovered

2. Explain this to the learners as follows:
   a. When bacteria and fungi break down dead animal and plant matter, they recycle the nutrients back into the ecosystem. The plants feed on these nutrients. Show Resource 36.
   b. Bacteria can change grape juice to wine, milk to yoghurt and can also let bread rise.
   c. Louis Pasteur is a French chemist who discovered the role of bacteria in the process of fermentation.
   d. Louis Pasteur also invented the vaccine. Today babies and children get vaccines for chicken pox, rubella, measles, etc.
   e. Penicillin, an antibiotic, was discovered by Alexander Fleming when he saw how the penicillin killed bacteria that he was growing. Show Resource 37.
3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information and diagram on the chalkboard into their workbooks.

Checkpoint 1

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

a. What does a decomposer do?
b. What is the process called where bacteria change grape juice to wine?

Answers to the checkpoint questions are as follows:

a. A decomposer breaks down dead animal and plant matter and returns the nutrients back into the soil.
b. Fermentation

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:
   a. Decomposers complete the feeding cycle in an ecosystem. They produce nutrients in the soil when they feed on the dead plant and animal matter. The plants can use these nutrients.
   b. Yeast is a bacterium that cannot make its own food. It feeds on the sugars in food and produces alcohol, acids and carbon dioxide: yeast + sugar in grape juice → alcohol + carbon dioxide.
   c. When yeast releases carbon dioxide in bread, the bread rises.
   d. A vaccine contains a small amount of a bacteria or virus in a harmless form. When it is injected, the body makes antibodies that provide protection against infections caused by these bacteria or viruses.
   e. Penicillin is able to kill bacteria and is used as a natural antibiotic. Many soldiers were saved by penicillin during World War II.
2. Hand out the old magazines. Ask the learners to do the following task.

TASK

Find pictures where micro-organisms have been used to make food, compost or medicine. Cut out the pictures. Turn to a new page in your workbook and make a collage of useful micro-organisms.

3. When learners have completed the collage, divide them into groups and let them discuss the role of micro-organisms in their pictures.
4. Let each group give feedback to the rest of the class. Use the opportunity to consolidate content knowledge.

Checkpoint 2

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

a. Why does bread rise when we leave the dough in a warm place?
b. Why is the discovery of penicillin so important?

Answers to the checkpoint questions are as follows:

a. The yeast in the bread releases carbon dioxide bubbles that let the dough rise.
b. Penicillin can kill bacteria in wounds and can save lives.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

Successful Natural Sciences	Micro-organisms	53-55
Top Class Natural Sciences	Micro-organisms	52-58
Via Africa Natural Sciences	Micro-organisms	52
Solutions for All Natural Science	Micro-organisms	69-70
Spot on Natural Sciences	Micro-organisms	43-45
Placanum Natural Sciences	Micro-organisms	62-65
Step-by-step	Micro-organisms	39-40
Natural Sciences	Micro-organisms	53-55
Sasol Inzalo Bk A	Micro-organisms	93-102

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.youtube.com/watch?v=IxyvVkeW7Nk (2:34) [Algae to Fuels]

9 C

Term 1, Week 9, Lesson C
Lesson Title: The Growth of micro-organisms
Time for lesson: 1 hour

A POLICY AND OUTCOMES

Sub-Topic	Micro-organisms
CAPS Page Number	39

Lesson Objectives

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

- list the factors that influence the growth of micro-organisms
- describe the factors that influence the growth of micro-organisms
- explain ways in which the growth of micro-organisms can be inhibited
- investigate the favourable conditions for the growth of mould.

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:

Resource 38: Bread covered with mould	A slice of bread, water and a container
Resource 39: Mould growth on wall	
Resource 40: Yeast	

C CLASSROOM MANAGEMENT

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

Give an example of a decomposer in an ecosystem that is a micro-organism.

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.

Fungi or some bacteria

D ACCESSING INFORMATION

1. Write the following onto the chalkboard and copy the diagram onto the chalkboard as well. Always try to do this before the lesson starts.

CONDITIONS FOR THE GROWTH OF MICRO-ORGANISMS

1. Micro-organisms can be found everywhere on Earth.
2. This means that micro-organisms can grow in almost any environment.
3. Micro-organisms grow better when the conditions in the environment are favourable.
4. Favourable conditions include warmth, moisture, oxygen and food.
5. Bacterial infections and food poisoning can be reduced by taking away the ideal growing conditions of micro-organisms.
6. When micro-organisms grow they do not increase in size, they increase in numbers.

2. Explain this to the learners as follows:
   a. Micro-organisms can grow anywhere, even in human and animal bodies.
   b. Most disease-causing bacteria thrive in warm temperatures, such as the temperature of a human body. Show Resource 40.
   c. Micro-organisms need water to grow and will die without a water source. Show Resource 39.
   d. Many micro-organisms grow well in an oxygen-rich environment.

e. Micro-organisms need energy to grow and will grow on any food source.

f. When we remove water, food and oxygen from a growing area of micro-organisms, we can decrease their growth.

g. In addition, when we decrease the temperature, the micro-organisms will struggle to grow.

3. Read through the information written on the chalkboard with the learners.
4. Ask the learners if they have any questions.
5. Tell the learners to copy the information on the chalkboard into their workbooks.

Checkpoint 1

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

a. What are good growing conditions for micro-organisms?

b. When micro-organisms grow they increase in_____, not in_____.

Answers to the checkpoint questions are as follows:

a. Moisture, oxygen, warmth, food

b. numbers, size

E CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners:

a. Because of its temperature, the human body provides an ideal environment for many types of bacteria to grow.

b. Food is easily spoiled when left in a warm place. It must be handled appropriately to avoid rotting and food poisoning. Refrigerating or freezing food can reduce the growth of harmful micro-organisms.

c. Moist areas, such as bathrooms and kitchens, are very favourable for the growth of micro-organisms. Food with a high water content also provides an excellent environment for micro-organisms to grow. Resource 39.

d. Protista only grow in water environments.

e. Foods can be dehydrated or dried to remove most of the water.

f. Moisture in the body, such as the mouth and nose, provides enough moisture for micro-organisms to grow.

g. Many types of disease-causing bacteria require oxygen to grow. This is why many foods are vacuum-sealed. Vacuum-sealed means that all the air is sucked out of a container or bag.

h. Micro-organisms need food to grow. Many micro-organisms are found on food such as bread, raw meat or fruit.

2. Ask the learners to do the following experiment. They have to determine what are good growing conditions for mould on bread. This experiment does take a few days. Keep the bread in the classroom and let the learners write down their observations at the beginning of each lesson. Learners can work in groups. Let the learners complete the worksheet after one week and then discuss the results in the classroom. Show the learners Resource 38 so that they know what bread mould looks like.

TASK

Do the following experiment to test what are the best conditions in which mould grows best. Each learner/ group will do one sample. The teacher will tell you what sample to do.

WHAT YOU NEED:

- four slices of bread
- water
- cling wrap (or some other air tight covering)
- plastic lunchbox or containers
- optional: magnifying glass.

Note: Some people are allergic to moulds. Do not handle mould with your bare hands.

WHAT YOU MUST DO:

- SAMPLE 1: Take a slice of bread and slice it in half. Seal one half in cling wrap and leave the other half in an open container.
- SAMPLE 2: Take a slice of bread and slice it in half. Put each piece in a separate open container. Leave one container in a dark cupboard and the other in sunlight.
- SAMPLE 3: Take a slice of bread and slice it in half. Put each half in a separate open container. Keep one half very dry and put one teaspoon of water on the other half. Wet the latter slice every day with a few drops of water.
- SAMPLE 4: Take a slice of bread and slice it in half. Put each piece in a separate open container. Put one container in a warm, dark place and the other container in a cold dark place.
- Write down what you predict will happen and what you will see.
- Examine the samples each day with your naked eye or a magnifying glass and record any changes in appearance.
- Draw the following table in your book and record your observations in the table each day.
- Answer the questions below after a week.

SAMPLE _____

PREDICTION FOR YOUR SAMPLE:

_____

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Date						
Observation						

Result: _____

Conclusion: _____

Questions

1. Where and how should bread be stored to keep it free of mould?
2. What other foods do you think might grow mould if left exposed?
3. What are some ways that people use to preserve their food?

ANSWERS TO TASK

PREDICTION FOR YOUR SAMPLE:

a. Answers will vary depending on what you decided to do with the bread.
b. Mould will grow on some of the samples.
c. Mould grows best in warm, dark and moist conditions.

SAMPLE 1

Result: In the sealed container, bread should develop mould more slowly than the unsealed bread.

Conclusion: The mould needs oxygen to grow.

SAMPLE 2

Result: The bread kept in darkness should develop mould more quickly than bread kept in the light.

Conclusion: The mould grows better in darkness.

SAMPLE 3

Result: The moist bread will develop mould more quickly than the dry bread.

Conclusion: The mould needs water to grow.

SAMPLE 4

Result: The mould in the warm place develops more quickly than the bread in the cold place.

Conclusion: The mould needs warmth to grow.

3. Answers to the questions:

    1. Some place that is sealed; in the refrigerator; in the light; some place that is dry;
    2. some place that is cool
       Cheese, oranges, tomatoes, lemons, onions, used coffee grounds, potatoes
    3. Refrigerator, artificial preservatives, natural preservatives like vinegar and salt, Tupperware.

Checkpoint 2

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

a. In what conditions will food go bad?
b. How can we decrease the growth of micro-organisms on food?

Answers to the checkpoint questions are as follows:

a. In a warm, moist area where the food is exposed to oxygen.
b. Vacuum-sealed food or dehydrated food.

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

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Successful Natural Sciences	Micro-organisms	56-59
Top Class Natural Sciences	Micro-organisms	62-66
Via Africa Natural Sciences	Micro-organisms	53-55
Solutions for All: Natural Science	Micro-organisms	72-73
Spot on Natural Sciences	Micro-organisms	46-48
Platinum Natural Sciences	Micro-organisms	66-67
Step-by-step	Micro-organisms	40-41
Natural Sciences	Micro-organisms	56-58
Sasol Inzalo Bk A	Micro-organisms	103

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=OJ8SgvOmgYM (54sec) [Mould growing time lapse]

NATURAL SCIENCES

ASSESSMENT
GRADE 8 TERM 1

GRADE 8 ASSESSMENT

- This section presents the CAPS assessment requirements for this grade for this term.
- See your prescribed textbooks for examples of the required assessments.
- A example of a practical task and test has been included.

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. ***Project***

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 8 ASSESSMENT

Grade 8					
Programme of Formal Assessment					
Formal Assessments	**Term 1**	**Term 2**	**Term 3**	**Term 4**	**Total % For The Year**
School-based assessments	Test 1 [35 marks] Practical task/ investigation 1 [20 marks]	Test 2 [35 marks] Practical task/ investigation 2 [20 marks]	Test 3 [35 marks] Practical task/ investigation 3 [20 marks]	Practical task/ investigation 4 [20 marks] Project [30 marks]	40%
Exams [60 minutes]		Exam 1 on work from terms 1 and 2 [70 marks]		Exam 2 on work from terms 3 and 4 [70 marks]	60%
Number of formal assessments	2	3	2	3	Total: 100%
Refer to CAPS on the processes for converting marks to percentages and to the 7-point scale.					

GRADE 8 ASSESSMENT

PRACTICAL TASK - INTRODUCTION

NS
GRADE 8
PRACTICAL TASK
TERM 1

20 MARKS

Time allocation: 60 minutes

NOTE TO THE TEACHER

1. This practical activity will be completed as part of Section E of lesson 7C.
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. You will need to prepare a dustbin with as many of the following items inside as possible: cooldrink can, paper bag, plastic bottle, glass bottle polystyrene tray, paper, tinfoil, apple core, plastic bag, food can, cabbage leaf, banana peel, chicken bones, egg shells, cardboard.
6. You will also need a few sheets of newspaper.
7. The instructions and content of the practical task should be written on the chalkboard for the learners.
8. The memorandum for assessing the practical task is provided.
9. The learners should complete the drawings and graphs with a sharp pencil and the written answers should be completed in pen.

GRADE 8 ASSESSMENT

PRACTICAL – MEMORANDUM
NS **GRADE 8** **PRACTICAL TASK** **TERM 1** **20 MARKS**

(see Section E of Lesson 7C for instructions and questions)

Topic	Task	Expected answer/outcome	Marks
	1		
Interactions and interdependence with the environment	1.1	Answers may vary but could include playground, corridors, against the fence✓	1
Interactions and interdependence with the environment	1.2	Answers may vary but could be paper/ plastic✓	1
Interactions and interdependence with the environment	1.3	Answers may vary: Yes/no✓	1
Interactions and interdependence with the environment	1.4	Answers may vary✓	1
Interactions and interdependence with the environment	1.5	Answers may vary but could be paper/plastic/ food waste✓	1
	2		
Interactions and interdependence with the environment	2.1	This will depend on what you have provided for your learners to look at.✓	1
Interactions and interdependence with the environment	2.2	polystyrene✓ tin foil✓	2
Interactions and interdependence with the environment	2.3	Glass bottle✓ Plastic bag✓ Aluminium can✓ Plastic bottle✓	4
Interactions and interdependence with the environment	2.4	Apple core✓	1

Interactions and interdependence with the environment	2.5	(Any 4) Aluminium can/ paper bag/ plastic bag/ plastic bottle/ cardboard/ tin can/ paper ✓✓✓✓	4
Interactions and interdependence with the environment	2.6	Answers will vary ✓✓	2
	3		
Interactions and interdependence with the environment	3	Any suitable slogan to encourage recycling✓	1
		TOTAL	**20**

GRADE 8 ASSESSMENT

TERM TEST

NS
GRADE 8
TEST
TERM 1

35 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 THE LEARNERS

1. Answer all questions in blue or black ink.
2. Read each question carefully before answering it.
3. Pay attention to the mark allocations.
4. Plan your time carefully.
5. Write your answers in the spaces provided.
6. Write neatly.

Practice Question

Read the question and circle the letter that shows the correct answer.

An example of a simple sugar?

A. carbohydrate
B. glucose
C. starch
D. chlorophyll

You have answered correctly if you have circled (B)

GRADE 8 ASSESSMENT

NS
GRADE 8
TERM 1
TEST

35 MARKS

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 needed in the process of photosynthesis? A. Energy from the Sun B. Oxygen C. Water D. Carbon dioxide	
1.2 Which of these statements is <u>false</u>? A. Oxygen is released as a by-product during the process of photosynthesis. B. The green colour in leaves is made up of chlorophyll. C. Carbon dioxide is released as by-product during the process of photosynthesis. D. Plants absorb minerals from the soil through the roots.	
1.3 Which of these statements is <u>true</u>? A. Living organisms obtain energy from oxygen. B. Oxygen and water are released during human respiration. C. Respiration occurs in every cell of a living organism. D. Carbon dioxide and water are released during plant respiration.	
1.4 Which one of these group of words is the result and by-product of respiration in humans? A. Glucose + carbon dioxide + water B. Energy+ oxygen + carbon dioxide C. Glucose + oxygen + water D. Energy + carbon dioxide + water	

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	Cell walls of the plant	A. Water
2.1.	O_2	B. Oxygen
2.2.	H_2O	C. Carbon dioxide
2.3.	Source of energy	D. Glucose
2.4.	CO_2	E. Cellulose

Question 3 **[5]**

Write the word that is being described in the sentence.

Only write the answer.

3.1 Living organisms that break down the remains of dead plants and animals.

_____

3.2 The larvae of flies that feed on dead matter.

_____

3.3 A harmless animal takes on the characteristics of a dangerous animal to scare off predators.

_____

3.4 Example of small decomposer that is not visible to the naked eye.

_____

3.5 Example of a big decomposer (plant or animal) that can be seen easily.

_____

Question 4 **[5]**

4.1 Explain the following statement:

"Living organisms are arranged into groups according to the way in which they obtain their food."

_____

_____ (2)

4.2 Explain, using an example, the difference between producers and consumers,

_____

_____

_____

_____ (3)

Question 5 **[6]**

Read the following passage and answer the questions that follow:

Did you know that the praying mantis is a very good hunter? They kill small insects such as flies before eating them. Eagles are good hunters with sharp eyesight. They fly over large areas and catch rabbits and other small animals. Termites are a delicious meal for the aardvark. Lions will hunt for animals like zebras, warthogs and kudu. Hyenas will gladly eat the left-over meat and bones after the lions have finished. Vultures circle overhead looking for dead animals to eat.

Answer the following questions using examples from the passage:

5.1 Name one example of a herbivore.

_____

5.2 Name one example of a carnivore.

_____

5.3 Name one example of a predator.

_____

5.4 Name one examples of a scavenger.

_____

5.5 Name one example of an insectivore.

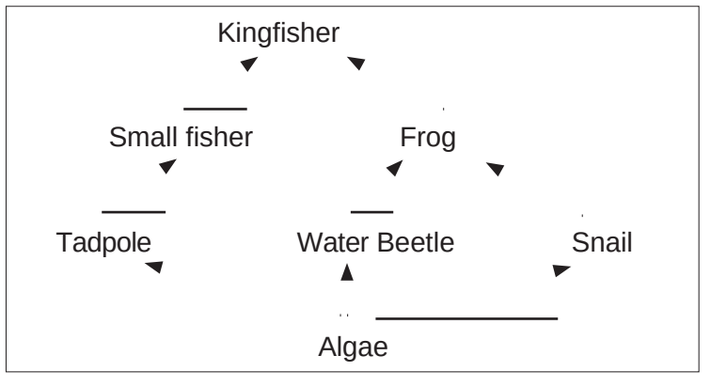
_____

5.6 Name on example of an omnivore.

_____

Question 6 **[8]**

Look at the following food web:



Answer the following questions:

6.1 What ecosystem is shown in this food web?

_____

6.2 Name one factor that can disturb the balance in a wetland ecosystem.

_____

6.3 Give a function of a wetland.

_____

6.4 Frogs are coloured so that they blend in with their surroundings. What is this type of adaption called?

_____

6.5 Write down one food chain from this food web.

_____

6.6 Where would the decomposers fit in on this food web?

_____

6.7 What is transferred through the feeding levels?

_____

6.8 What is energy measured in?

_____

Question 7 **[2]**

Read the words and phrases in the box below:

human interference, unable to adapt, last of the species, change in environment

Using these words, write 2 sentences explaining what you understand about extinction of a species.

_____

_____

_____

Question 8 **[1]**

Write down two ways to reduce your chances of being infected with HIV

_____

_____

TOTAL: [35]

GRADE 8 ASSESSMENT

TERM 1 TEST – MEMORANDUM
NS **GRADE 8** **MEMORANDUM** **TERM 1** **35 MARKS** **60 MINUTES**

CAPS TOPIC	Questions	Expected answer(s)	Marks
	1		
Photosynthesis and respiration	1.1	B✓	1
Photosynthesis and respiration	1.2	C✓	1
Photosynthesis and respiration	1.3	C✓	1
Photosynthesis and respiration	1.4	D✓	1
	2		
Photosynthesis and respiration	2.1	B✓	1
Photosynthesis and respiration	2.2	A✓	1
Photosynthesis and respiration	2.3	D✓	1
Photosynthesis and respiration	2.4	C✓	1
	3		
Interactions and interdependence with the environment	3.1	Decomposers ✓	1
Interactions and interdependence with the environment	3.2	Maggots ✓	1
Interactions and interdependence with the environment	3.3	Mimicry ✓	1
Interactions and interdependence with the environment	3.4	Bacteria/mould✓	1
Interactions and interdependence with the environment	3.5	Mushroom/earthworm/dung beetle✓	1

	4		
Interactions and interdependence with the environment	4.1	Organisms either make their own food✓ or have to get their food from a somewhere✓	2
Interactions and interdependence with the environment	4.2	Producers, like plants,✓make their own food✓ and consumers, like animals,✓need to eat plants or other animals to get food✓	3
	5		
Interactions and interdependence with the environment	5.1	rabbit/kudu/zebra✓	1
Interactions and interdependence with the environment	5.2	lion/hyena/vulture/eagle✓	1
Interactions and interdependence with the environment	5.3	praying mantis/lion/eagle✓	1
Interactions and interdependence with the environment	5.4	hyena/vulture✓	1
Interactions and interdependence with the environment	5.5	aardvark✓	1
Interactions and interdependence with the environment	5.6	warthog✓	1

	6		
Interactions and interdependence with the environment	6.1	a wetland✓	1
Interactions and interdependence with the environment	6.2	flood/drought✓	1
Interactions and interdependence with the environment	6.3	A wetland acts as a sponge that releases water slowly/ A wetland acts as a sponge that helps with flooding/ A wetland acts as a filter that removes toxins from the water✓	1
Interactions and interdependence with the environment	6.4	camouflage✓	1
Interactions and interdependence with the environment	6.5	Any one: algae➔water beetle➔ frog➔ kingfisher/ algae➔ tadpole➔ small fish➔ kingfisher/ algae➔ snail ➔frog➔ kingfisher ✓	1
Interactions and interdependence with the environment	6.6	At all points on the food web✓	1
Interactions and interdependence with the environment	6.7	Energy✓	1
Interactions and interdependence with the environment	6.8	Kilojoules✓	1
	7		
Interactions and interdependence with the environment	7	Any two: Extinction of a species happens when the last of that species has died out.✓ If there have been big changes to the environment✓ and the species is unable to adapt, ✓it can become extinct. Human interference ✓in the environment is very often responsible for a species becoming extinct.✓	2

	8		
Micro-organisms	8	(Any 2 - half mark each) Abstain from sexual activity Use a condom during sexual activity Use gloves when touching another person's blood Do not use share needles with another person ✓✓	1
		TOTAL	**35**