

"There are as many atoms in a single molecule of your DNA as there are stars in the typical galaxy. We are, each of us, a little universe."

**-Neil Degrasse Tyson**

# **NATURAL SCIENCES**

**LESSON PLAN  
GRADE 9 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](http://www.nect.org.za)

# CONTENTS

<b>PROGRAMME ORIENTATION</b>	4
<b>CAPS AND THE LESSON PLANS</b>	8
<b>TOPIC OVERVIEW CELLS AS THE BASIC UNITS OF LIFE 1A - 2C</b>	14-16
Week 1 Lesson 1A THE STRUCTURE OF THE CELL	17
Week 1 Lesson 1B THE FUNCTIONS OF THE PARTS OF THE CELL	24
Week 1 Lesson 1C PLANT AND ANIMAL CELLS	32
Week 2 Lesson 2A SPECIALISED ORGANELLES IN PLANT CELLS	38
Week 2 Lesson 2B DIFFERENT TYPES OF ANIMAL CELLS	44
Week 2 Lesson 2C CELLS ARE THE BASIC UNIT OF ALL LIVING ORGANISMS	50
<b>TOPIC OVERVIEW SYSTEMS IN THE HUMAN BODY 3A - 4C</b>	57-59
Week 3 Lesson 3A THE DIGESTIVE SYSTEM	60
Week 3 Lesson 3B THE CIRCULATORY SYSTEM	68
Week 3 Lesson 3C THE RESPIRATORY SYSTEM	75
Week 4 Lesson 4A THE MUSCULOSKELETAL SYSTEM	83
Week 4 Lesson 4B THE EXCRETORY SYSTEM	89
Week 4 Lesson 4C THE NERVOUS SYSTEM	96
<b>TOPIC OVERVIEW HUMAN REPRODUCTION 5A - 6C</b>	102-104
Week 5 Lesson 5A THE REPRODUCTIVE SYSTEM	105
Week 5 Lesson 5B PUBERTY	111
Week 5 Lesson 5C HORMONES RESPONSIBLE FOR PUBERTY	117
Week 6 Lesson 6A REPRODUCTIVE ORGANS	123
Week 6 Lesson 6B THE MENSTRUAL CYCLE	129
Week 6 Lesson 6C FORMATION OF THE FOETUS	135
<b>TOPIC OVERVIEW CIRCULATORY AND RESPIRATORY SYSTEMS 7A - 8B</b>	141-143
Week 7 Lesson 7A BREATHING - INHALATION	144
Week 7 Lesson 7B DOUBLE CIRCULATORY SYSTEM	151
Week 7 Lesson 7C BLOOD VESSELS	157
Week 8 Lesson 8A THE PROCESS OF RESPIRATION	164
Week 8 Lesson 8B BREATHING - EXHALATION	169
<b>TOPIC OVERVIEW DIGESTIVE SYSTEM 8C - 9C</b>	175-178
Week 8 Lesson 8C A HEALTHY DIET	179
Week 9 Lesson 9A STARCH AND FATS IN FOODS	186
Week 9 Lesson 9B THE ALIMENTARY CANAL	192
Week 9 Lesson 9C MECHANICAL AND CHEMICAL DIGESTION	198
<b>GRADE 9 ASSESSMENT</b>	204
Term 1 Assessment	205

# 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 3 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 page **TOPIC OVERVIEW**. The topic overview pages are grey, making them easy to identify. The topic overview can be used to introduce the topic to learners. The topic overview includes:
  - a. A **general introduction** to the topic that states how long the topic runs for, the value of the topic in the final exam and the number of lessons in the topic.
  - b. A table showing the **position of the topic** in the term.
  - c. A **sequential table** that shows the prior knowledge required for this topic, the current knowledge and skills that will be covered, and how this topic will be built on in future years. Use this table to give learners an informal quiz to test their prior knowledge. If learners are clearly lacking in the knowledge and skills required, you may need to take a lesson to cover some of the essential content and skills. It is also useful to see what you are preparing learners for next, by closely examining the 'looking forward' column.
  - d. A glossary of **scientific vocabulary**, together with an explanation of each word or phrase. It is a good idea to display these words and their definitions somewhere in the classroom, for the duration of the topic. It is also a good idea to allow learners some time to copy down these words into their personal dictionaries or science exercise books. You must explicitly teach the words and their meanings as and when you encounter these words in the topic. A good way to teach learners new vocabulary is to use 'PATS':

## PROGRAMME ORIENTATION

- POINT – if the word is a noun, point at the object or at a picture of the object as you say the word.
  - ACT – if the word is a verb, try to act out or gesture to explain the meaning of the word, as you say it.
  - TELL – if the word has a more abstract meaning, then tell the learners the meaning of the word. You may need to code switch at this point, but also try to provide a simple English explanation.
  - SAY – say the word in a sentence to reinforce the meaning.
- e. Understanding the uses / value of science.** It is very important to give learners a sense of how science applies to their daily lives, and of the value that science adds to their lives. Hold a brief discussion on this point when introducing the topic, and invite learners to elaborate on the uses and value that this topic will have to their lives.
- f. Personal reflection.** At the end of every topic, come back to the topic overview, and complete this table. In particular, it is important to note your challenges and ideas for future improvement, so that you can improve your teaching the next year.
- 3.** After the topic overview, you will find the **INDIVIDUAL LESSONS**. Every lesson is structured in exactly the same way. This helps you and the learners to anticipate what is coming next, so that you can focus on the content and skills. Together with the title, each lesson plan includes the following:
- a. Policy and Outcomes.** This provides you with the CAPS reference, and an overview of the skills that will be covered in the lesson. You can immediately see the science process skills that will be covered, and whether they are lower middle or higher order skills.
  - b. Possible Resources.** Here, you will see the resources that you should ideally have for the lesson. If you need to use the poster or pages from the resource pack, this will be listed here. There is also a space for improvised resources, and you are invited to add your own ideas here.
  - c. Classroom Management.** Every lesson starts in the same way. Before the lesson, you must write a question that relates to the previous lesson on the chalkboard. Train your learners to come in to the classroom, to take out their exercise books, and to immediately try to answer this question. This links your lesson to the previous lesson, and it effectively settles your learners.  
Once learners have had a few minutes to answer, read the question and discuss the answer. You may want to offer a small reward to the learner who answers first, or best. Get your learners used to this routine.  
Next, make sure that you are ready to begin your lesson, have all your resources ready, have notes written up on the chalkboard, and be fully prepared to start. Remember, learners will get restless and misbehave if you do not keep them busy and focussed.
  - d. Accessing Information.** This section contains the key content that you need to share with learners. Generally, it involves sharing some new information that is written on the chalkboard, explaining this information, and allowing learners some time to copy the information into their exercise books. Train learners to do this quickly and efficiently. Learners must anticipate this part of the lesson, and must have their books, pens, pencils and rulers ready.

# PROGRAMME ORIENTATION

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

# PROGRAMME ORIENTATION

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

## Lesson Plan Routine

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

*Remember, every Natural Sciences lesson follows this routine:*

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

## A vehicle to implement CAPS

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

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

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

## Content and Time Allocation

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

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

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



Grade 9			
Term 1	Term 2	Term 3	Term 4
NS Strand	NS Strand	NS Strand	NS Strand
<b>Life and Living</b>	<b>Matter and Materials</b>	<b>Energy and Change</b>	<b>Planet Earth and Beyond</b>
Cells as the basic units of life	Compounds	Forces	The Earth as a system
Systems in the human body	Chemical reactions	Electric cells as energy systems	Mining of mineral resources
Human Reproduction	Reactions of metals with oxygen	Resistance	Atmosphere
Circulatory and respiratory systems	Reactions of non-metals with oxygen	Series and parallel circuits	Birth, life and death of stars
Digestive system	Acids, bases and pH value	Safety with electricity	
	Reactions of acids with bases	Energy and the national electricity grid	
	Reactions of acids with metals	Cost of electrical power	

These lesson plans have been designed against the stipulated CAPS requirements with topics being allocated for the time prescribed by CAPS. (Remember that some slight changes have been incorporated to accommodate time for revision, tests and examinations).

# PROGRAMME ORIENTATION

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

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

	GRADE 7		GRADE 8		GRADE 9	
TERM	Topic	Time in weeks	Topic	Time in weeks	Topic	Time in weeks
<b>Term 1:</b> 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)
<b>Term 2:</b> 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	• Reactions of metals with oxygen
	• Introduction to the periodic table of the elements	2	• Chemical reactions	1	• Reactions of non-metals with oxygen	1
					• Acids, bases and pH value	1
					• Reactions of acids with bases (I)	½
					• Reactions of acids with bases (II)	1
					• Reactions of acids with bases (III)	½
				• Reactions of acids with metals	1	
		(8 wks)		(8 wks)		(8 wks)

# PROGRAMME ORIENTATION

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

# PROGRAMME ORIENTATION

## 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		
<b>Preparation</b>		
1.	What preparation was done?	
2.	Was preparation sufficient?	
3.	What could have been done better?	
4.	Were all of the necessary resources available?	
<b>Classroom Management</b>		
		<b>Yes</b>
		<b>No</b>
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?	

# PROGRAMME ORIENTATION

Accessing Information			
		Yes	No
9.	Was the text and/ or diagrams written on the chalkboard before the lesson started?		
10.	Was the work on the board neat and easy for the learners to read?		
11.	Was the explanation on the content easy to follow?		
12.	Was the information on the board used effectively to help with the explanations?		
13.	Was any new vocabulary taught effectively? (in context and using strategies like PATS)		
14.	Were the learners actively engaged? (asked questions, asked for their opinions and to give ideas or suggestions)		
15.	Were the checkpoint questions used effectively?		
16.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		
Conceptual Development			
		Yes	No
17.	Was the information taught in the 'Accessing Information' part of the lesson used to foreground the activity?		
18.	Were clear instructions given for the conceptual development activity?		
19.	Were the outcomes/answers to the activities explained to the learners?		
20.	Could the learners ask questions and were explanations given?		
21.	Was a model answer supplied to the learners? (written or drawn on the board)		
21.	Were the checkpoint questions used effectively?		
22.	At the end of the lesson, were the learners asked if they had questions or if they needed any explanations?		
23.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		

# TOPIC OVERVIEW:

## Cells as the basic units of life

### 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

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

#### B. SEQUENTIAL TABLE

GRADE 8	GRADE 9	GRADE 10 - 12
<b>LOOKING BACK</b>	<b>CURRENT</b>	<b>LOOKING FORWARD</b>
<ul style="list-style-type: none"> <li>• Interactions within an ecosystem are driven by the need for energy to sustain life.</li> <li>• Photosynthesis is the process whereby plants use carbon dioxide from the air, water from the soil and energy from the sun to produce glucose.</li> <li>• Respiration is the process by which energy is released from food in a series of reactions.</li> </ul>	<ul style="list-style-type: none"> <li>• The cell is the basic structural and functional unit of living organisms.</li> <li>• Plants and animal cells have a cell membrane, cytoplasm, nucleus and mitochondria.</li> <li>• Plant cells differ from animal cells.</li> </ul>	<ul style="list-style-type: none"> <li>• -</li> </ul>

## C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	cell	The basic unit of all living organisms
2.	organelles	Specialised structures found inside living cells that perform specific functions for the cell
3.	chlorophyll	The green pigment found in chloroplasts that gives plants their green colour and traps sunlight.
4.	chloroplast	Organelle found in plant cells that is responsible for photosynthesis
5.	ribosomes	Round structures in the cell responsible for creating proteins
6.	photosynthesis	The process that plants use to convert the energy from the sun into sugars
7.	unicellular	Organism consisting of a single cell
8.	Multicellular	Organisms consisting of many cells
9.	specialise	To take on a particular function and only perform that function
10.	microscope	An instrument used to view microscopic specimens
11.	nucleus	Organelle found in both plant and animal cells responsible for controlling all activities within the cell
12.	cytoplasm	Jelly-like liquid in the cell where reactions take place
13.	mitochondria	Organelles that act like a digestive system which takes in nutrients, breaks them down, and creates energy rich molecules for the cell
14.	vacuole	Organelle found in both plants and animal cells responsible for storage
15.	cell wall	Organelle found only in plant cells, gives the cell its rigid shape
16.	macroscopic	Large, viewed without a microscope.
17.	allergens	Substances that cause allergies

## D. UNDERSTANDING THE USES / VALUE OF SCIENCE

The value of knowing that the cell is the basic structural and functional unit of all living organisms. The value of knowing that plant and animal cells have a cell membrane, nucleus, mitochondria and cytoplasm. The value of understanding the differences between plant and animal cells. Plant cells have large vacuoles and chloroplasts. The value of knowing that different animal cells have different functions.

## E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:

Lesson successes:

Lesson challenges:

Notes for future improvement:



**1 A**

**Term 1, Week 1, Lesson A**

**Lesson Title: The Structure of the Cell**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Cell Structure		
<b>CAPS Page Number</b>	56		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>• explain that the cell is the basic unit of all living organisms</li> <li>• identify a microscope</li> <li>• describe the purpose of a microscope</li> <li>• identify the following organelles: cell membrane, nucleus, cytoplasm and mitochondria.</li> </ul>			
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: Diagram of an Animal Cell	
Projector and lap top with internet	
Microscope	

## **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 all animals, humans, bacteria and plants made up of?

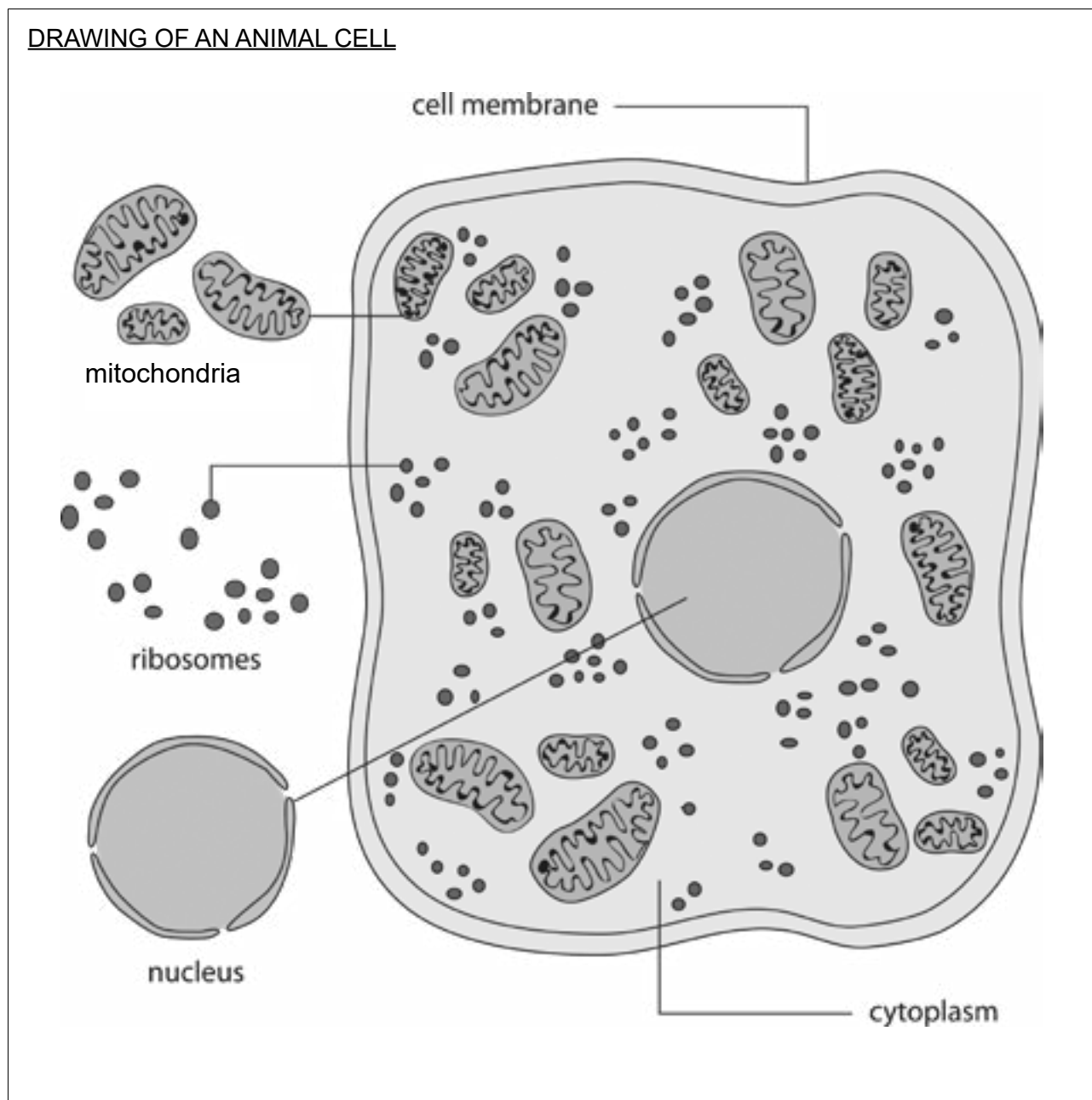
3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

*They are all made up of cells.*

**D** ACCESSING INFORMATION

1. Draw the following picture (or use Resource 1) and write the following information on the chalkboard (always try to do this before the lesson starts):

DRAWING OF AN ANIMAL CELL



2. Explain the following to the learners:
  - a. All animals, humans and plants are made up of very small structures called cells.
  - b. You can only see cells using a piece of equipment called a microscope.
  - c. Scientists use microscopes to learn about cells.
  - d. Humans are made up of many cells of different types.
  - e. All animal cells, including human cells, have the basic structure shown on the chalkboard.

## TOPIC: Cells as the basic units of life

- f. All cells have a cell membrane, a nucleus, cytoplasm and many mitochondria and many ribosomes.
  - g. Each one of these structures looks different because they all have different functions or jobs to do.
3. Ask the learners if they have any questions.
  4. Give the learners some time to draw and label the animal cell in their workbooks. Their drawing should take up one whole page.

### **Checkpoint 1**

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

- a. What is the smallest unit found in all organisms?
- b. Name five structures found inside cells.

Answers to the checkpoint questions are as follows:

- a. The cell.
- b. Cell membrane, cytoplasm, nucleus, ribosomes and mitochondria.

## **E**

### **CONCEPTUAL DEVELOPMENT**

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

Table to show the functions of the different structures found in animal cells

<b>Name</b>	<b>Description and Function</b>
	The thin layer that surrounds the cell
	Shaped like a sausage; creates energy for the cell
	Found towards the centre of the cell and controls ALL activities inside the cell
	The jelly-like liquid in cells where reactions take place
	Many round structures responsible for creating proteins

## TOPIC: Cells as the basic units of life

### TASK 1

1. Read the information in the column called Description and Function.
2. Draw the table in your workbooks.
3. Using your drawing, try to work out the structures missing in the first column of the table.

### TASK 2

1. Write the function of each structure next to the label in your drawing.
2. Explain Task 1 to the learners as follows:
  - a. The table drawn on the chalkboard has two columns.
  - b. The first column has the following heading: Name, and it is empty.
  - c. The second column has the following heading: Description and Function, and it is complete.
  - d. Working on your own, quietly read through the descriptions and functions.
  - e. Draw the table in your workbooks and leave the first column blank.
  - f. Using your drawing and the information given in the table, work out the missing names of the structures. Fill in the structures' name using a pencil.
3. Give learners some time to complete Task 1 in their workbooks.
4. Ask learners to share their answers to Task 1 with the class.
5. The completed table is shown below. Fill the missing names into the table on the chalkboard.

<b>Name</b>	<b>Description and Function</b>
cell membrane	The thin layer that surrounds the cell that controls what substances pass in and out of the cell
mitochondrion	Shaped like a sausage; creates energy for the cell
nucleus	Found towards the centre of the cell and controls ALL activities inside the cell
cytoplasm	The jelly-like liquid in cells where reactions take place
ribosomes	Many round structures responsible for creating proteins

## TOPIC: Cells as the basic units of life

6. When the learners have completed Task 1, do Task 2 below.
  - a. Read through the instructions on the chalkboard with the class.
7. Task 2
  - a. Give the learners some time to complete Task 2 in their workbooks.
  - b. Ask learners to write the function of each of the five structures next to the label in your drawing.
  - c. They should not write a description.
8. Answers to Task 2 are shown in the table below.

<b>Name</b>	<b>Function</b>
<i>cell membrane</i>	<i>Controls the substances that enter and leave the cell</i>
<i>mitochondria</i>	<i>Creates energy for the cell</i>
<i>nucleus</i>	<i>Controls ALL activities inside the cell</i>
<i>cytoplasm</i>	<i>Where reactions take place</i>
<i>ribosomes</i>	<i>Responsible for creating proteins</i>

9. Discuss the answers with the learners.

### **Checkpoint 2**

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

- a. What is the function of the nucleus?
- b. What is the main structural difference between the cell membrane and the mitochondria?

Answers to the checkpoint questions are as follows:

- a. To control all activities that happen inside the cell
- b. Cell membrane is thin and covers the entire area of the cell; the mitochondria are short and wide.

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

## **F** REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Step-by-Step	Cells as the basic units of life	3
Solutions for all	Cells as the basic units of life	2
Spot On	Cells as the basic units of life	2
Top Class	Cells as the basic units of life	2
Via Afrika	Cells as the basic units of life	7
Platinum	Cells as the basic units of life	2
Oxford Successful	Cells as the basic units of life	12
Pelican Natural Sciences	Cells as the basic units of life	4, 11-12, 14
Sasol Inzalo Bk A	Cells as the basic units of life	4

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. [http://www.bbc.co.uk/schools/gcsebitesize/science/add\\_aqa\\_pre\\_2011/cells/cells1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa_pre_2011/cells/cells1.shtml) [Interactive website on animal cells]
2. <https://www.youtube.com/watch?v=MfopLlIOeA> (4min 17sec) [Animals' cells structure and functions animation]

**1 B**

**Term 1, Week 1, Lesson B**

**Lesson Title: The functions of the parts of the cell**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	The concept of the biosphere	
<b>CAPS Page Number</b>	56	
<b>Lesson Objectives</b>		
By the end of the lesson, learners will be able to:		
<ul style="list-style-type: none"> <li>• explain the function of the microscope</li> <li>• describe the important part that each structure plays</li> <li>• identify important structures in different cells.</li> </ul>		
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	
A 3D model of the cell	<ul style="list-style-type: none"> <li>• Plastic bag (sandwich bag)</li> <li>• Newspaper (scrunch into a small ball)</li> <li>• Slightly runny dessert jelly</li> <li>• Cardboard box</li> <li>• String, sticky tape, elastic bands</li> <li>• Marbles</li> </ul>

## **C** CLASSROOM MANAGEMENT

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

Which structure in the cell controls all activities in the cell?

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.

*Nucleus*

## D

### ACCESSING INFORMATION

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

WHAT IS A MICROSCOPE?

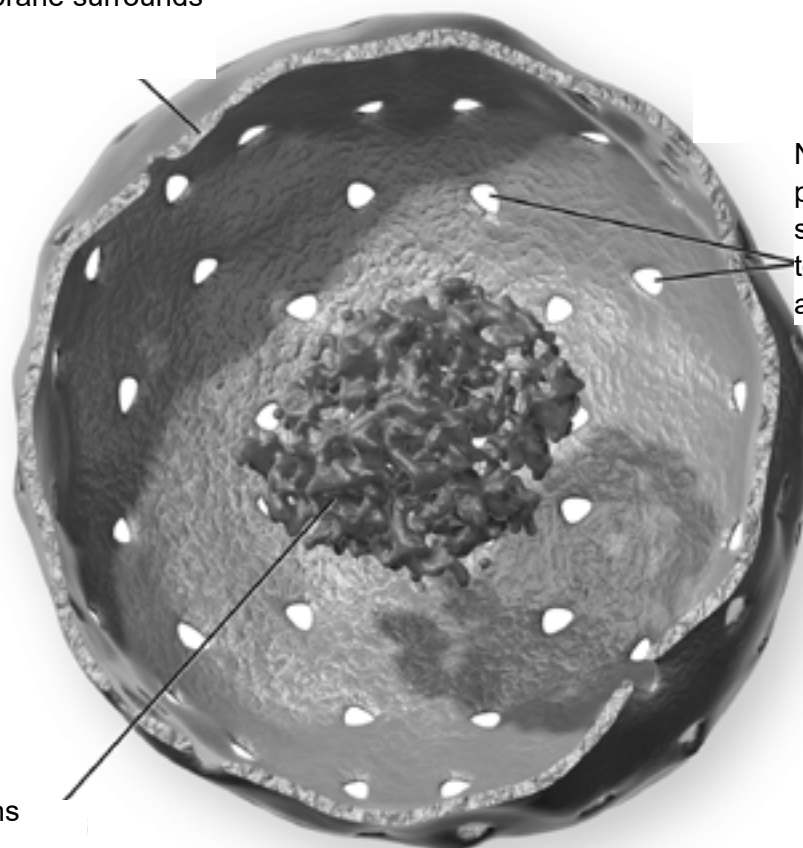
1. A microscope is an instrument that contains one or more magnifying lenses.
2. It allows us to look at things that are too small to see with the naked eye.
3. Biologists and scientists study the structure of plant and animal cells using a microscope.

HOW DOES A MICROSCOPE WORK?

Structure	Function
Eye piece	Lens that you look through
Body tube	Has the lenses that enlarge (magnify) the object to be studied
Revolving nosepiece	Moves to allow one of the magnifying lenses to be used to view the object
Three magnifying lenses	Low magnification, medium magnification and high magnification
Slide clips	Hold the object in place
Bottom LED	Provides light up through the microscope
Base	Supports the lenses
Stage	The place where the object is placed for observation
Fine adjustment knob	Changes the distance between the stage and the magnifying lenses
Arm	Connects the body tube to the base and is used to carry the microscope

### MICROSCOPIC VIEW OF THE NUCLEUS

Nuclear membrane surrounds nucleus



Nuclear pores allows substances to move in and out

Nucleolus contains DNA – contains characteristics passed on from your parents

2. Explain this drawing to the learners as follows (hold up Resource 2 while you go through the structures):
  - a. A microscope is an instrument that contains one or more magnifying lenses.
  - b. It allows us to look at things that are too small to see with the naked eye.
  - c. Microscopes are made up of many parts that work together to allow scientists to see large or magnified images of the object.
  - d. The eye piece is the lens that is closest to the eye when you look through the microscope.
  - e. The body tube contains the lenses to be used to view the object.
  - f. The revolving nosepiece rotates to allow one of the three different lenses to be used to view the object.
  - g. Magnifying lenses are attached to the rotating nosepiece. There are usually three lenses: low magnification, medium magnification and high magnification.

## TOPIC: Cells as the basic units of life

- h. Magnification means to make the object look larger. The object does not physically become bigger but the scientist sees it as larger.
  - i. Slide clips hold the object in place underneath the magnifying lenses.
  - j. Bottom LED provides light to the microscope.
  - k. The base supports the lenses and all the parts of the microscope.
  - l. The fine adjustment knob changes the distance between the stage and the magnifying lenses.
  - m. The arm connects the body tube to the base and is used to carry the microscope.  
Microscopes are very expensive and have to be looked after very carefully.
3. Now point to your drawing of the nucleus and explain this to the learners as follows:
    - a. The nucleus is responsible for controlling all activities in the cell.
    - b. The nucleus can do this because it contains a substance or a molecule called DNA.
    - c. DNA determines characteristics such as eye colour, height, weight, sporting ability, hair texture, right-handed or left-handed, allergens.
    - d. Each person has different DNA that is inherited from their parents.
  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 and the drawing on the chalkboard into their workbooks.
  7. Give the learners some time to complete this task.

### **Checkpoint 1**

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

- a. What is the function of a microscope?
- b. Name seven characteristics that are determined by DNA.

Answers to the checkpoint questions are as follows:

- a. A microscope looks at objects that cannot be viewed with the naked eye.
- b. Eye colour, height, weight, sporting ability, hair texture, right-handed or left-handed, allergens.

Divide the learners into groups of 6.

1. The learners will be making a 3D model of an animal cell for this activity.
2. For this activity you will need the items that have been collected to build the model. These could include: newspaper, clear plastic bags or scraps of plastic, small stones, dried beans, dried mielie seeds, string or wool, pieces of sticks, cardboard boxes, polystyrene trays, dough or clay or Prestik, cardboard offcuts, paper, marker pens, sheets of paper, glue, cellotape, scissors, etc.
3. Each group will also need a piece of cardboard on which to construct the model. This needs to be 30cm x 50 cm big. It can be a new sheet of cardboard or a piece of cardboard from a box.
4. Each group will also need a sheet of lined paper for Task 2. If this is not available, they can use their workbooks.
5. Write the following onto the chalkboard (always try to do this before the lesson starts):

#### PRACTICAL TASK

1. This task will be done in groups.
2. Each group is going to make a 3D (three dimensional) model of an animal cell.
3. The model is going to be made out of the materials that have been collected.
4. You will have to discuss, in your groups, what materials you are going to use to make your model.
5. You will need to think creatively and work neatly as a team.
6. You will be assessed as a group.

1. Read over the practical task with the learners.
2. Remind the learners that they looked at the structure of the animal cell in the previous lesson.
3. Have the learners open their workbooks to the drawing they did of the animal cell in the previous lesson.
4. Tell the learners that they are going to make a three dimensional model of the animal cell, in groups.
5. Explain what “ three dimensional” means that something that has height, width and depth.

#### Instructions:

- Using the materials available, make a 3D model of the animal cell.
- The model should be no smaller than 30cm x 50cm
- As a group, identify the parts of the cell that you need to make using your drawing from the previous lesson.
- Choose suitable materials and construct your model.
- Be sure that you look at sizes and shapes when doing construction.
- All learners names must be written on the back of the model AND on the answer sheet for Task 2.

## Task 1

1.1 Draw and cut out the shape of your basic animal cell.

1.2 Now add the cell membrane to the animal cell.

1.3 The next step is to add the following organelles:

- Mitochondria
- Ribosomes

1.4 Lastly label the following on your model:

- Cell membrane
- Cytoplasm
- Mitochondrion
- Ribosome
- Nucleus

13. Read through the task with the learners.

14. Ask the learners if they have any questions about what they need to do.

15. Tell the learners that they have 25 minutes to complete this task.

16. Tell learners to work neatly and to avoid wasting materials.

17. While the learners are working, supervise and answer any questions they may have.

18. After 25 minutes, call the learners to attention.

19. Tell the learners they will now do task 2.

20. This task will be a written task.

21. The group need only complete one set of answers together, and hand it in with their model.

22. Each group will need a piece of lined paper to complete the answers for Task 2.

23. Write the following on the chalkboard:

## Task 2

2.1 What is the function of the cell membrane?

2.2 What is the function of the mitochondrion?

2.3 What is the function of the nucleus?

2.4 Describe what cytoplasm looks like.

2.5. What happens in the cytoplasm of the animal cell?

2.6 What do the ribosomes of the animal cell do?

## TOPIC: Cells as the basic units of life

24. Read over the questions for Task 2 with the learners.
25. Tell the learners that they only need to hand in one set of answers per group.
26. The answers for Task 2 must be handed in with the model.
27. All learners in the group must have their names on the top of the page of answers for Task 2.
28. Ask the learners if they have any questions.
29. Tell the learners to complete the answers in their groups.
30. Have each group hand in the completed model (Task 1) and answers to Task 2.

### **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
Solutions for All	Cells as the basic units of life	2
Via Afrika	Cells as the basic units of life	10, 16-17
Oxford Successful	Cells as the basic units of life	14
Pearson: Spot On	Cells as the basic units of life	2-3, 7-8
Pearson: Platinum	Cells as the basic units of life	3, 7
Shuters Top Class	Cells as the basic units of life	4, 9
Step-by-Step	Cells as the basic units of life	7-9, 11, 19-22
Pelican Natural Sciences	Cells as the basic units of life	11
Sasol Inzalo Bk A	Cells as the basic units of life	4

### **G** ADDITIONAL ACTIVITIES/ READING

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

31. <https://www.youtube.com/watch?v=ePnbkNVdPio> (6min 38sec) [Seeing the invisible: van Leeuwenhoek's first glimpses of the microbial world]
32. <https://www.purposegames.com/game/a19f404ad4> [Microscope labelling game]

**1 C**

**Term 1, Week 1, Lesson C**

**Lesson Title: Plant and Animal Cells**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Cells as the basic units of life	
<b>CAPS Page Number</b>	56	
<b>Lesson Objectives</b>		
By the end of the lesson, learners will be able to:		
<ul style="list-style-type: none"> <li>differentiate between plant and animal cells</li> <li>identify the cell membrane and cell wall</li> <li>describe the function of the cell wall.</li> </ul>		
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
Projector, computer and internet	
Resource 3	

## **C** CLASSROOM MANAGEMENT

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

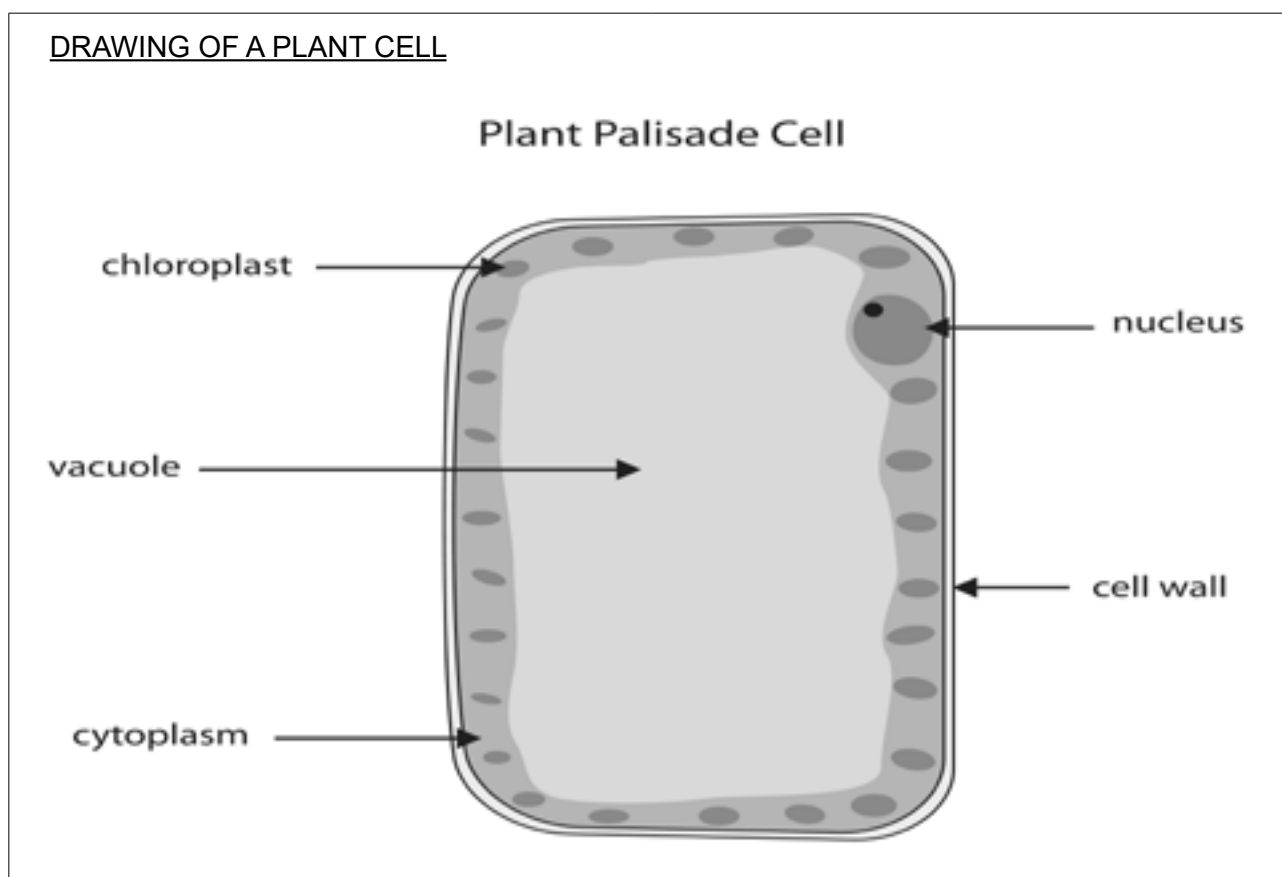
Which structure in the cell is responsible for controlling what enters and exits the cell?

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.

*Cell membrane*

## **D** ACCESSING INFORMATION

1. Draw the following picture and write the following information onto the chalkboard (always try to do this before the lesson starts):



## TOPIC: Cells as the basic units of life

2. Explain this to the learners as follows:
  - a. Plant cells are obviously different from animals and we can easily recognise if something is an animal or a plant.
  - b. Plant cells are different from animal cells in many important ways.
  - c. Plant cells always have a cell wall around the cell membrane.
  - d. The cell wall holds the plant cells more tightly together than animal cells.
  - e. The cell wall is very rigid and strong. Plant cells have a more regular rectangular shape than animal cells.
  - f. Many plants have a green substance called chlorophyll, found inside large structures called chloroplasts.
  - g. Plant cells also have a large watery bubble called the vacuole.
  - h. Each of these structures looks different because they all have different functions.
3. Ask the learners if they have any questions.
4. Tell the learners to copy the drawing written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. Is the cell wall found on the inside or outside of the cell membrane?
- b. Does an animal cell also have cytoplasm?

Answers to the checkpoint questions are as follows:

- a. Outside
- b. Yes, the structures float or are suspended in cytoplasm.

## E

### CONCEPTUAL DEVELOPMENT

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

TABLE SHOWING THE FUNCTIONS OF THE DIFFERENT STRUCTURES FOUND IN PLANT CELLS

Structure	Description and Function
	Large bubble pumped full of water to make the cell firm
	Found towards the centre of the cell and controls ALL activities inside the cell
	Thin layer with fairly straight edges that makes the plant cell strong and hard
	Green in colour and uses energy from the sun to produce food
	The jelly-like liquid in cells where reactions take place

#### TASK 1

- Read the information in the column called Description and Function.
- Draw the table in your workbooks.
- Using your table, try to work out the structures missing in the first column.

#### TASK 2

- Write the function of each structure next to the label in your drawing.

- Explain Task 1 to the learners as follows:
  - The table drawn on the chalkboard has two columns.
  - The first column has the following heading: Name, and it is empty.
  - The second column has the following heading: Description and Function, and it is complete.
  - Working on your own, quietly read through the descriptions and functions.
  - Draw the table in your workbooks and leave the first column blank.
  - Using the information given in the table, work out the missing names of the structures. Fill in the names of the structures using a pencil.

## TOPIC: Cells as the basic units of life

3. Give learners some time to complete Task 1 in their workbooks.
4. Ask learners to share their answers to Task 1 with the class.
5. The completed table is shown below. Write the missing names into the table on the chalkboard.

TABLE SHOWING THE FUNCTIONS OF THE DIFFERENT STRUCTURES FOUND IN PLANT CELLS

<b>Structure</b>	<b>Description and Function</b>
<i>vacuole</i>	Large bubble pumped full of water to make the cell firm
<i>nucleus</i>	Found towards the centre of the cell and controls ALL activities inside the cell
<i>cell wall</i>	Thin layer with fairly straight edges that makes the plant cell strong and hard
<i>chloroplast</i>	Green in colour and uses energy from the sun to produce food
<i>cytoplasm</i>	The jelly-like liquid in cells where reactions take place

6. When the learners have completed Task 1, do Task 2.
7. Task 2
  - a. Give the learners some time to complete Task 2 in their workbooks.
  - b. Ask learners to write the function of each of the five structures onto their drawing.
  - c. They should not write a description of the functions.
8. Answers to Task 2 are shown in the table below.

<b>Structure</b>	<b>Description and Function</b>
<i>vacuole</i>	Large bubble pumped full of water to make the cell firm
<i>nucleus</i>	Found towards the centre of the cell and controls ALL activities inside the cell
<i>cell wall</i>	Thin layer with fairly straight edges that makes the plant cell strong and hard
<i>chloroplast</i>	Green in colour and uses energy from the sun to produce food
<i>cytoplasm</i>	The jelly-like liquid in cells where reactions take place

## TOPIC: Cells as the basic units of life

9. Discuss the answers with the learners.

### **Checkpoint 2**

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

- a. What is the function of the chloroplast?
- b. What is the structural difference between the vacuole and the cell wall?

Answers to the checkpoint questions are as follows:

- a. To provide the plant cells with food
- b. A vacuole is large and round, and the cell wall is a thin layer that surrounds the whole cell.

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

## **F** REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Solutions for All	Cells as the basic units of life	10
Via Afrika	Cells as the basic units of life	10-12
Oxford Successful	Cells as the basic units of life	15
Pearson: Spot On	Cells as the basic units of life	4
Pearson: Platinum	Cells as the basic units of life	5-6
Shuters Top Class	Cells as the basic units of life	5
Step-by-Step	Cells as the basic units of life	10-12
Pelican Natural Sciences	Cells as the basic units of life	15-17
Sasol Inzalo Bk A	Cells as the basic units of life	7-11

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. <http://www.enchantedlearning.com/subjects/plants/cell/> [Interactive website on Plant Cell Anatomy]
2. <http://www.sparknotes.com/biology/cellstructure/celldifferences/section1.rhtml> [Interactive website on cell differences]

**2 A**

**Term 1, Week 2, Lesson A**

**Lesson Title: Specialised organelles in plant cells**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Cells as the basic units of life		
<b>CAPS Page Number</b>	56		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the structure of the chloroplast</li> <li>explain the function of the chloroplast</li> <li>describe the importance of photosynthesis and respiration</li> <li>differentiate between plant cells and animal cells.</li> </ul>			
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: Cells as the basic units of life

## B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Projector, computer and internet	
Resource 4	

## C CLASSROOM MANAGEMENT

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

Which structure takes up most of the space inside a plant cell?

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.

*Vacuole*

## D ACCESSING INFORMATION

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

### WHERE DO PLANTS GET THEIR FOOD?

1. Plants are producers because they make sugar and starch (food) from water and carbon dioxide.
2. They use energy from the sun to carry out this process.
3. The process is called photosynthesis.
4. Photosynthesis takes place inside the green chloroplasts.
5. Plants sometimes store the food they make underground, e.g. potatoes and carrots.

### WHERE DO ANIMALS GET THEIR FOOD?

1. Animals move around to look for food.
2. Animals eat plant material because it is healthy.
3. Animals use the mitochondria, found in their cells, to turn food into energy.
4. Energy is what allows you to perform all functions in your daily life, such as movement.

## TOPIC: Cells as the basic units of life

2. Explain this to the learners as follows:
  - a. Plants and animals get their food and energy in different ways.
  - b. Plants use energy from the sun to create food.
  - c. They are called producers.
  - d. The chloroplast is the name of the cell structure where photosynthesis takes place.
  - e. Animal cells are unable to make food. Because of this they are called consumers.
  - f. Animals are able to turn food that they have eaten into energy.
  - g. The mitochondrion is the name of the cell structure that performs this process. The process is called respiration. If a cell has more than one mitochondrion, these are called mitochondria.
3. Ask the learners if they have any questions.
4. Tell the learners to copy the drawing written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. What is photosynthesis?
- b. Which cell structures are responsible for respiration?

Answers to the checkpoint questions are as follows:

- a. Process that converts light energy from the sun into food
- b. Mitochondria.

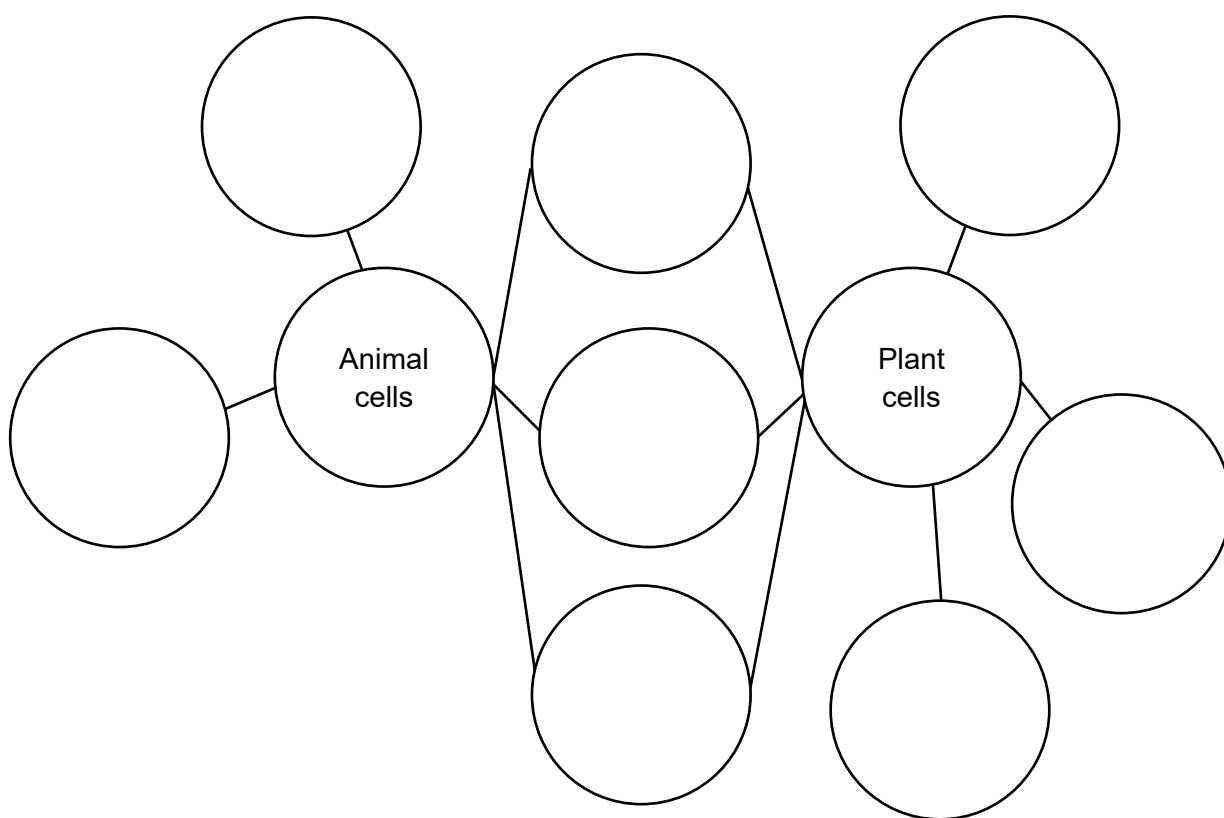


## E

### CONCEPTUAL DEVELOPMENT

1. Explain the following to the learners (always try to do this before the lesson starts):
  - a. The structure of plant and animal cells differs because of the different functions of the organisms.
  - b. One way that they differ is because plants are producers and animals are consumers.
  - c. Plants have strong cell walls to keep them upright and animals have skeletons to keep them upright.
  - d. As a result of the strong cell wall, plants are shaped more like a rectangle than animal cells.
  - e. As you have learnt, there are many differences between plant and animal cells.
2. Write and draw the following on the chalkboard (always try to do this before the lesson starts):

DOUBLE-BUBBLE MAP TO SHOW THE SIMILARITIES AND DIFFERENCES BETWEEN PLANT AND ANIMAL CELLS



TASK

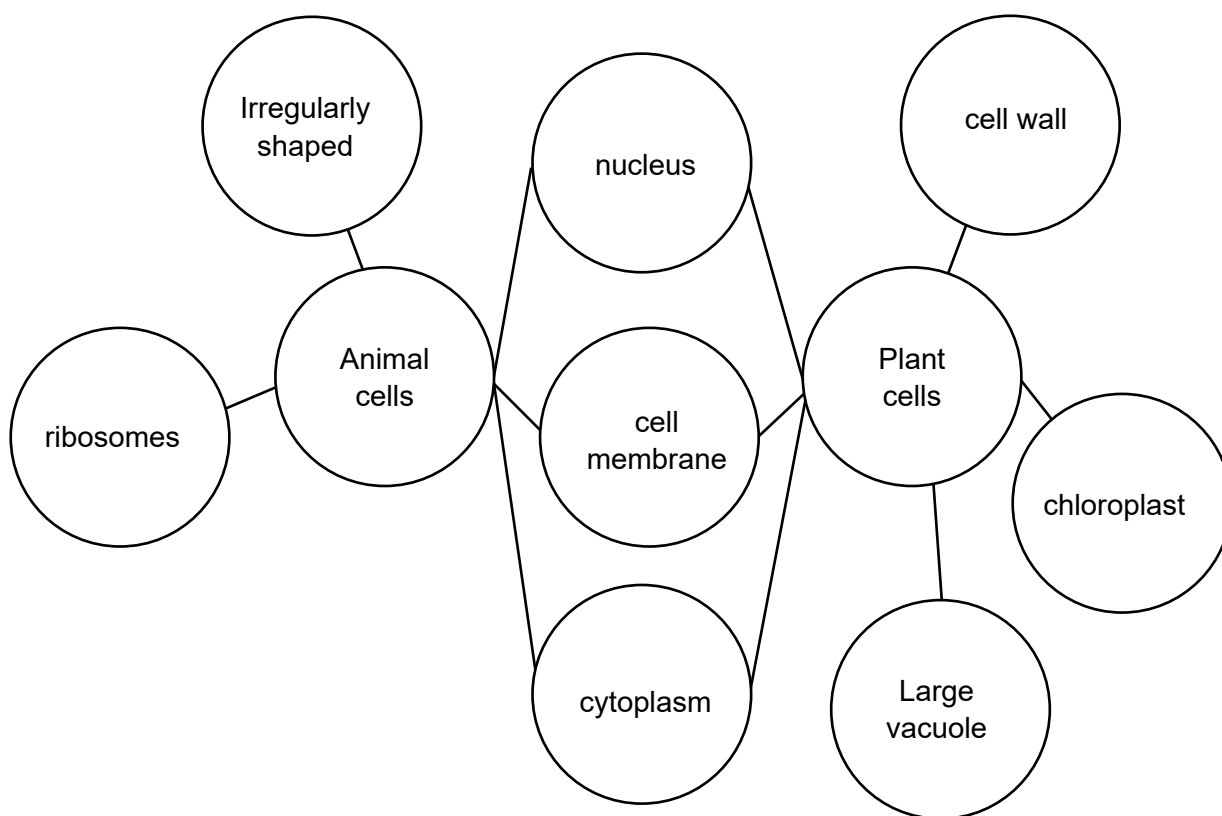
1. Draw a double-bubble map in your workbooks.
2. The bubbles in the middle of the map should be used to show the structures that are found in BOTH animal and plant cells.
3. The bubbles that are linked to plant cells should indicate the structures that are only found in plant cells.

## TOPIC: Cells as the basic units of life

4. The bubbles that are linked to animal cells should show the structures that are only found in animal cells.
5. Use your drawing and notes from the past few lessons to complete the double-bubble map.

3. Explain to the learners the activity as follows:
  - a. Draw a double-bubble map in your workbooks.
  - b. Learners must use the guidelines in the task above.
  - c. Show learners Resource 4. Ask them to carefully observe the photographs of animal and plant cells. They may use these photos to help them complete the double-bubble map.
4. Allow the learners some time to complete this task.
3. With the learners' input, complete the model answer on the chalkboard:

### DOUBLE-BUBBLE MAP TO SHOW THE SIMILARITIES AND DIFFERENCES BETWEEN PLANT AND ANIMAL CELLS



6. Discuss the answers with the learners.

## TOPIC: Cells as the basic units of life

### **Checkpoint 2**

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

- a. Which three cell structures do plant and animal cells have in common?
- b. Why are plants called producers?

Answers to the checkpoint questions are as follows:

- a. Nucleus, cytoplasm and cell membrane.
- b. They use photosynthesis to make their own food.

7. 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
Solutions for All	Cells as the basic units of life	10
Via Afrika	Cells as the basic units of life	10-12
Oxford Successful	Cells as the basic units of life	15
Pearson: Spot On	Cells as the basic units of life	4
Pearson: Platinum	Cells as the basic units of life	5-6
Shuters Top Class	Cells as the basic units of life	5-6
Step-by-Step	Cells as the basic units of life	10-12
Pelican Natural Sciences	Cells as the basic units of life	15-17
Sasol Inzalo Bk A	Cells as the basic units of life	12-13

## **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://ed.ted.com/on/eBXQdPys> (1min 33sec) [Plant Cells Vs. Animal Cells]
2. <https://www.thoughtco.com/what-is-a-plant-cell-373384> [Learn about plant cell structures and organelles]

**2 B**

**Term 1, Week 2, Lesson B**

**Lesson Title: Different types of animal cells**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Cells as the basic units of life	
<b>CAPS Page Number</b>	57	
<b>Lesson Objectives</b>		
By the end of the lesson, learners will be able to:		
<ul style="list-style-type: none"> <li>• explain why cells come in different shapes and sizes</li> <li>• describe the relationship between the structure and function of organelles</li> <li>• differentiate between muscle cells and cheek cells.</li> </ul>		
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
Projector, computer and internet	
Resource 4	

## **C** CLASSROOM MANAGEMENT

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

What shape do animal cells have?

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.

*Irregularly shaped or no specific shape*

## **D** ACCESSING INFORMATION

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

### WHY DO ANIMAL CELLS LOOK DIFFERENT?

1. Specialised cells come in different shapes and sizes.
2. Different body cells are adapted to perform specific functions.
3. Each specialised group of cells will have the same shape and structure.

### MUSCLE CELLS

1. Muscle cells are adapted for the special function of causing the body to move.
2. Each muscle cell contains tiny fibres that can contract and relax.
3. This process pulls on the bones and enables us to move.
4. There are over 350 different muscles in your body.
5. Muscle cells need lots of energy and so contain many mitochondria.
6. Mitochondria are responsible for producing energy.

## TOPIC: Cells as the basic units of life

2. Explain this to the learners as follows:
  - a. **Macroscopic** organisms, such as plants and animals, are made of millions of cells. Macroscopic is the opposite of microscopic. Macroscopic means large and so macroscopic organisms can be seen without a microscope.
  - b. We call them multi-cellular organisms because 'multi' means many.
  - c. In multicellular organisms, different cells specialise in doing different jobs.
  - d. Different cells work together to ensure that the animal survives.
  - e. For example, muscle cells are able to contract and relax to enable your body to move.
  - f. As a result, muscle cells have lots of mitochondria.
  - g. Mitochondria create energy.
  - h. Show the learners Resource 5. Ask them to look at the difference in shape of cheek cells compared to muscle cells.
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. What does multicellular mean?
- b. Why do muscle cells have lots of mitochondria?

Answers to the checkpoint questions are as follows:

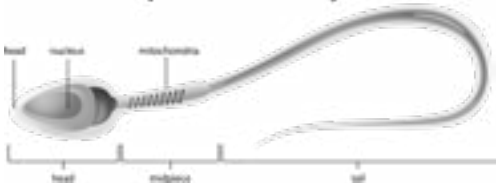

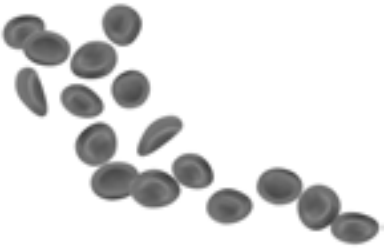
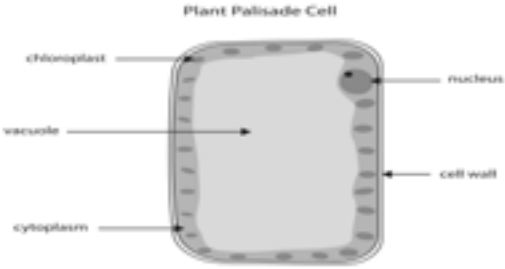
- a. Made up of many cells
- b. To create energy to help us to move.

**E**

**CONCEPTUAL DEVELOPMENT**

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

THE STRUCTURE AND FUNCTION OF SOME BODY CELLS

Name of cell	Function	How is its structure adapted to its function?
<p>Sperm cell (animal cell)</p> 	<p>Swims from male penis to the female egg cell for reproduction</p>	
<p>Root hair cell (plant cell)</p> 	<p>Takes up (absorbs) water and minerals for plant</p>	
<p>Red blood cell (animal cell)</p> 	<p>Carries oxygen from the lungs to body cells</p>	
<p>Palisade cell (cell found in leaves)</p> 	<p>Traps sunlight energy for photosynthesis</p>	

## TOPIC: Cells as the basic units of life

### TASK

1. Draw the table in your workbooks.
2. Look carefully at the drawings of the different cells.
3. Read the functions of each cell.
4. See if you can work out how the structure of the cell helps to carry out its function (job).

2. Explain the activity to the learners as follows:
  - a. You are going to complete the challenging task of working out how the structure of a cell allows it to carry out its function.
  - b. Function is another word for job or role.
  - c. You need to look very carefully at the drawing of each cell before filling in the third column.
  - d. You may use a pencil to write down what you see (observe) when you look at the drawing of the cell.
  - e. Read the function of the cell and try to work out how the structure allows it to perform its job.
  - f. Think of the muscle cell. Its function is to make you move by using energy. When you look at muscle cells, you will see that they have lots of mitochondria. Having lots of mitochondria allows muscle cells to do their job of moving your body.
  - g. You may work with a partner.
3. Allow the learners some time to complete this task.
4. With the learners' input, complete the model answer on the chalkboard:

<b>Name of cell</b>	<b>Function</b>	<b>How is its structure adapted to its function?</b>
Sperm cell (animal cell)	Swims from male penis to the female egg cell for reproduction	Tail allows it to swim to the egg. Many mitochondria give it energy to swim.
Root hair cell (plant cell)	Takes up (absorbs) water and minerals for plant	Long and thin so that it can reach far into the soil to search for far away water
Red blood cell (animal cell)	Carries oxygen from the lungs to body cells	Round flat shapes that have lots of space for oxygen to stick to the surface
Palisade cell (cell found in leaves)	Traps sunlight energy for photosynthesis	Many chloroplasts contain chlorophyll to trap sunlight.



## TOPIC: Cells as the basic units of life

5. Discuss the answers with the learners.

### **Checkpoint 2**

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

- a. Why do different animal cells have different structures?
- b. What does macroscopic mean?

Answers to the checkpoint questions are as follows:

- a. Different animal cells have different functions.
- b. Can be seen with the naked eye; you do not need a microscope to view organisms.

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
Solutions for All	Cells as the basic units of life	15-17
Via Afrika	Cells as the basic units of life	13-14
Oxford Successful	Cells as the basic units of life	16
Pearson: Spot On	Cells as the basic units of life	10-12
Pearson: Platinum	Cells as the basic units of life	12
Shuters Top Class	Cells as the basic units of life	7
Step-by-Step	Cells as the basic units of life	13-14
Pelican Natural Sciences	Cells as the basic units of life	16-17
Sasol Inzalo Bk A	Cells as the basic units of life	22-24

## **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://ed.ted.com/on/gyfZ8MW1> (4min 26sec) [Specialized Cells and Tissues]
2. [http://www.bbc.co.uk/schools/gcsebitesize/science/add\\_aqa\\_pre\\_2011/cells/cells2.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa_pre_2011/cells/cells2.shtml) [Interactive website on specialised cells]

**2 C**

**Term 1, Week 2, Lesson C**

**Lesson Title: Cells are the basic unit of all living organisms**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Cells as the basic units of life	
<b>CAPS Page Number</b>	57	
<b>Lesson Objectives</b>		
By the end of the lesson, learners will be able to:		
<ul style="list-style-type: none"> <li>differentiate between unicellular and multicellular organisms</li> <li>explain that a group of cells forms a tissue, a group of tissues makes up an organ, and organs working together make up an organism</li> <li>identify stem cells as cells that have the ability to divide and develop into many different cell types.</li> </ul>		
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
Projector, computer and internet	
Resource 6	

## **C** CLASSROOM MANAGEMENT

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

Why do sperm cells look different to muscle cells?

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.

*They have completely different jobs to perform. Sperm cells need to swim to the egg cell and muscle cells need to contract and relax to help us move.*

## **D** ACCESSING INFORMATION

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

TISSUES, ORGANS AND SYSTEMS

1. Similar cells group together to form tissues, such as nerve, blood or muscle tissues.
2. Different tissues form organs, such as the heart, brain and lungs.
3. These organs perform different roles in the human body.
4. Groups of organs work together to form systems within an animal and a plant.
5. Groups of systems working together form an organism, such as an animal or plant.
6. The body of any multicellular organism is made up of a number of systems.

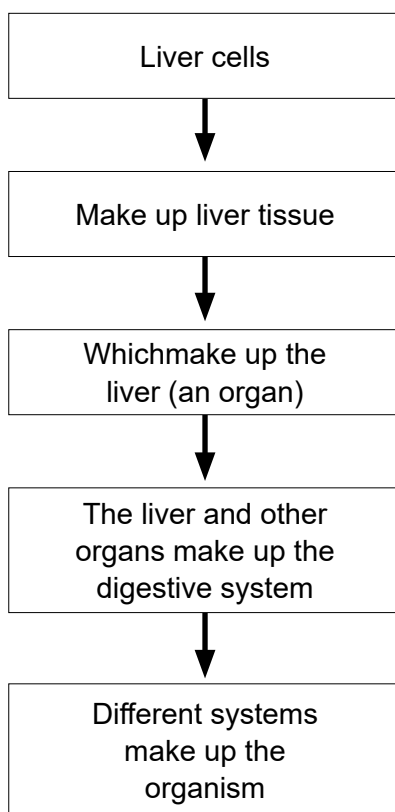
## D

### ACCESSING INFORMATION

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6. The body of any multicellular organism is made up of a number of systems.



#### STEM CELLS

1. Stem cells are special cells found in humans, which are not specialised.
2. They have the ability to become many different cells, such as muscle or nerve cells.

## TOPIC: Cells as the basic units of life

2. Explain this to the learners as follows:
  - a. Cells are specialised such that they perform certain functions and work together to keep the organism alive.
  - b. Examples of organisms include plants and animals.
  - c. Muscle cells must work together to keep the muscles alive.
  - d. A group of similar cells doing a specific function forms tissue.
  - e. Different tissues form an organ.
  - f. Several organs that work together form a system.
  - g. Organ systems all work together to form an organism.
  - h. In the next topic, we will look at seven systems in humans: the digestive system, circulatory system, respiratory system, musculoskeletal system, excretory system, nervous system and reproductive system.
  - i. Stem cells are groups of cells that are not specialised but can become many different cells.
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks

### **Checkpoint 1**

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

- a. What are stem cells?
- b. What is an organ made up of?

Answers to the checkpoint questions are as follows:

- a. A group of cells that are not specialised or the same
- b. A group of tissues that perform the same function.

## E

### CONCEPTUAL DEVELOPMENT

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

FROM CELL TO SYSTEM

leaf, kidney, heart, digestive system, stomach, rose tree, giraffe, blood, muscle cell, leg muscle, bone, brain, excretory system, nose, cartilage, white blood cell, bee

Cell	Tissue	Organ	System	Organism

2. Explain to the learners the activity as follows:
  - a. Draw the table in your workbooks.
  - b. Study the list of structures given above the table and place them in the correct columns in your table in your workbook.
  - c. Not every single block will be filled.
  - d. If you would like a challenge, you could try to fill in all the blocks.
  - e. Work on your own.
3. Allow the learners some time to complete this task.
4. With the learners' input, complete the model answer on the chalkboard:

FROM CELL TO SYSTEM

Cell	Tissue	Organ	System	Organism
		leaf		rose tree
		kidney	excretory system	giraffe
		stomach	digestive system	
white blood cell	blood	heart		bee
muscle cell	leg muscle			
	bone			
		brain		

5. Discuss the answers with the learners.

## TOPIC: Cells as the basic units of life

### **Checkpoint 2**

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

- a. Name the seven systems in the human body.
- b. What unit makes up a system?

Answers to the checkpoint questions are as follows:

- a. Excretory system, digestive system, circulatory system, musculoskeletal system, nervous system, reproductive system, respiratory system
- b. A group of organs working together.

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

## **F** REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Solutions for All	Cells as the basic units of life	17
Via Afrika	Cells as the basic units of life	15, 19
Oxford Successful	Cells as the basic units of life	17-18
Pearson: Spot On	Cells as the basic units of life	13-14
Pearson: Platinum	Cells as the basic units of life	13
Shuters Top Class	Cells as the basic units of life	7-8
Step-by-Step	Cells as the basic units of life	13-14
Pelican Natural Sciences	Cells as the basic units of life	-
Sasol Inzalo Bk A	Cells as the basic units of life	25-26

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. <http://www.bbc.co.uk/education/guides/zgcxsbk/revision> [Interactive website on Levels of Organisation]
2. <http://www.bbc.co.uk/education/guides/zgcxsbk/revision> (2min 3sec) [Cell to organism]

# TOPIC OVERVIEW:

## Systems in the human body

### Term 1, Weeks 3A – 4C

#### A. TOPIC OVERVIEW

##### Term 1, Weeks 3a – 4c

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

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

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

#### B. SEQUENTIAL TABLE

GRADE 8	GRADE 9	GRADE 10 - 12
<b>LOOKING BACK</b>	<b>CURRENT</b>	<b>LOOKING FORWARD</b>
<ul style="list-style-type: none"> <li>• Food contains energy that can be released through a series of chemical reactions in the process of respiration.</li> </ul>	<ul style="list-style-type: none"> <li>• The human body consists of several integrated systems working together.</li> <li>• The digestive system breaks down food into nutrients that can be absorbed by the body.</li> <li>• The circulatory system brings nutrients and oxygen to cells and removes waste.</li> <li>• The respiratory system supplies oxygen to body and removes carbon dioxide.</li> <li>• The musculoskeletal system produces body movement.</li> <li>• The excretory system removes waste.</li> </ul>	<ul style="list-style-type: none"> <li>• -</li> </ul>



- The nervous system helps body respond to stimuli.
- The reproductive system produces sex cells.

- -

## C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	ingestion	taking food into the mouth.
2.	digestion	breaking food into smaller and simpler substances.
3.	egestion	getting rid of waste products from the body.
4.	oesophagus	the tube that connects the mouth to the stomach.
5.	arteries	blood vessels that transport blood away from the heart.
6.	veins	blood vessels that transport blood to heart.
7.	capillaries	very small blood vessels that take blood to all the body cells.
8.	high blood pressure	Force at which blood is being pushed through the veins and arteries is too high.
9.	heart attack	A blood clot blocks the flow of blood, heart muscle cells do not receive oxygen and the heart can be damaged.
10.	stroke	Blood flow to the brain is stopped and the brain cells start to die because of lack of oxygen.
11.	asthma	Disorder that causes airways of lungs to swell that leads to shortness of breath and coughing.
12.	lung Cancer	Disease where lung cells have grown uncontrollably, often caused by smoking.
13.	bronchitis	Swelling of the bronchial tubes that causes people to breathe in less oxygen.
14.	asbestosis	Disease caused by asbestos fibres going into lungs during breathing.
15.	inhalation	Breathing in through the mouth and nose.
16.	exhalation	Breathing out through the mouth and nose.
17.	trachea	The windpipe that transports air between mouth and nose and the bronchi.
18.	bronchi	The tubes that transport air to the lungs.
19.	gaseous exchange	The process that occurs when oxygen diffuses out of the blood and carbon dioxide diffuses into the blood.

20.	alveolus	The tiny air sacs found inside the lungs that are the site of gaseous exchange
21.	respiration	The process that uses oxygen to convert food into energy.
22.	skeleton	The frame of the body made of many bones.
23.	ligaments	They attach bone to bone.
24.	tendons	They attach muscle to bone.
25.	cartilage	Covers bones to prevent friction when two bones meet.
26.	rickets	Disease when bones are soft and weak.
27.	osteoporosis	Swelling in between bones, at the ligaments.
28.	arthritis	Bones start to break down and snap easily.
29.	metabolism	The chemical reactions that take place in the body.
30.	filtration	Waste, water and glucose taken out of blood.
31.	absorption	Movement of water and glucose into the blood system.
32.	diffusion	Any waste still left in blood is removed.
33.	excreted	When waste leaves the body.
34.	kidney failure	Kidneys are unable to remove waste from the body.
35.	bladder infections	Infection of urinary system caused by bacteria.
36.	kidney stones	Solid pieces of salt form in the kidneys, causing pain.
37.	deafness	Loss of hearing.
38.	blindness	Total loss of sight (cannot see).
39.	short-sightedness	A person only sees the object when they he or she are close to it.
40.	effect of drugs and alcohol	Slows down nervous system.
41.	spinal cord	Long, bundle of nervous tissue that extends from brain right down the back of a person; it sends messages to muscles causing them to move.

## D. UNDERSTANDING THE USES / VALUE OF SCIENCE

The value of knowing that the human body consists of seven integrated systems that work together. Each system is made up of many organs that all work together to perform a particular function. Without any one of the systems, the human body would not function properly.

## E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:

Lesson successes:

Lesson challenges:

Notes for future improvement:

**3 A**

**Term 1, Week 3, Lesson A**

**Lesson Title: The Digestive System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Digestive system		
<b>CAPS Page Number</b>	57		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main processes such as ingestion, digestion, absorption and egestion</li> <li>explain the importance of the mouth, oesophagus, stomach, intestines and liver in the digestive system</li> <li>discuss the health issues associated with the digestive system.</li> </ul>			
Specific Aims	1. DOING SCIENCE		
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of digestive system	Resource 7
Projector and lap top with internet	6m string or wool or rope

## **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 role of the mitochondria in the cell?

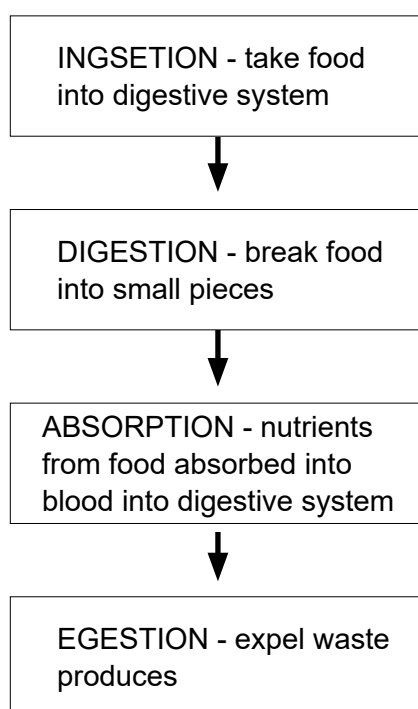
3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

*To produce energy*

## **D** ACCESSING INFORMATION

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

### PROCESSES OF THE DIGESTIVE SYSTEM



## TOPIC: Systems in the human body

### HEALTH ISSUES OF THE DIGESTIVE SYSTEM

Name	Description
ulcers	Breaks in the skin of the mouth, stomach or intestines, caused by bacteria.
anorexia nervosa	An eating disorder where people fear gaining weight so they starve themselves.
diarrhoea	A person has an unusual number of bowel movements per day, caused by drinking water that has bacteria in it.
liver cirrhosis	Diseases where liver tissue is replaced with abnormal lumps caused by drinking too much alcohol.

2. Explain the following to the learners:
  - a. The digestive system is structured so that it can change the food we eat into smaller and simpler molecules that are absorbed into the bloodstream.
  - b. These nutrients are transported to all the body cells where they are used to create energy.
  - c. The digestive system consists of a long tube, from the mouth to the anus.
  - d. The process of taking food into the mouth is called **ingestion**.
  - e. The mouth is specifically structured for helping with **digestion**. The teeth chew food into small pieces and the saliva also helps this process.
  - f. The **oesophagus** pushes food from the mouth to the stomach.
  - g. The stomach mixes food with a liquid that helps break down the food even more.
  - h. The intestines measure about 6m and are structured to absorb nutrients from food into the bloodstream. Hold up the string/wool/rope to show the learners how long 6m is.
  - i. The liver also helps with digestion. It produces a special liquid that breaks down the fat in food.
  - j. Show the learner Resource 7 (or a model of digestive system). Ask the learners to look carefully at the organs of the digestive system.
  - k. The table on the chalkboard gives information on four different health issues associated with the digestive system.
3. Ask the learners if they have any questions.
4. Give the learners some time to write the information in their workbooks.

# TOPIC: Systems in the human body

## **Checkpoint 1**

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

- a. What is the difference between ingestion and digestion?
- b. What function does the stomach have?

Answers to the checkpoint questions are as follows:

- a. Ingestion is taking food into the mouth and digestion is breaking down the food.
- b. Digestion

## **E**

## **CONCEPTUAL DEVELOPMENT**

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

### **TASK 1**

1. Read through the description and function column of the table below.
2. Match one of the organs in the following list to the correct description and function: intestines, mouth, anus, oesophagus, stomach, liver.
3. Write the organ name into the first column.

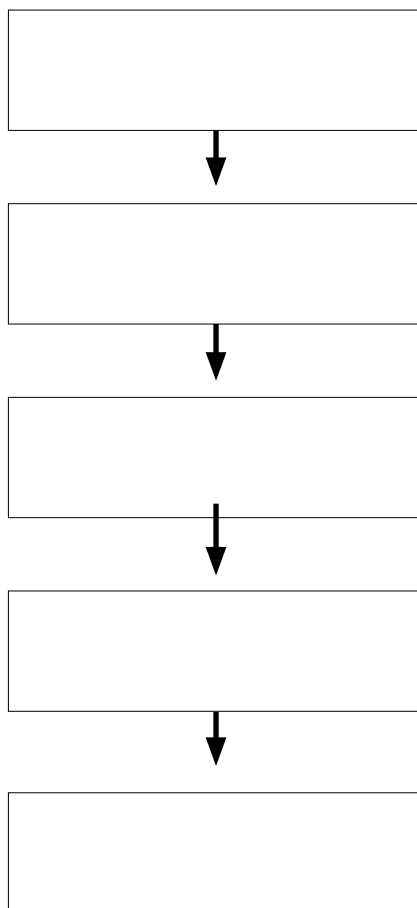
**TABLE SHOWING THE FUNCTIONS OF THE STRUCTURES OF THE DIGESTIVE SYSTEM**

<b>Name of organ</b>	<b>Description and Function</b>
	Entry point of digestion system; digestion starts with chewing and saliva
	Large organ that produces liquid to break down fats
	Organ after oesophagus, large, contains liquid to chemically digest food and strong muscles to further break down food
	Long organ where absorption of nutrients into bloodstream takes place
	Long tube, connects mouth to stomach
	Exit point of digestive system, faeces pass through

## TASK 2

1. Draw a flow map to show the order of the organs (given in the above table) of the digestive system.

### FLOW MAP TO SHOW MOVEMENT OF FOOD THROUGH ORGANS OF DIGESTIVE SYSTEM



2. Explain Task 1 to the learners as follows:
  - a. The table drawn on the chalkboard has two columns.
  - b. The first column has the following heading: Name of organ, and is empty.
  - c. The second column has the following heading: Description and Function and is complete.
  - d. Working on your own, quietly read through the descriptions and functions.
  - e. Draw the table in your workbooks and leave the first column blank.
  - f. Using the information given in the table and information given verbally at the beginning of the lesson, work out the missing names of the organs. Fill in the organ name.
3. Give learners some time to complete Task 1 in their workbooks.
4. Ask learners to share their answers to Task 1 with the class.



## TOPIC: Systems in the human body

5. Explain Task 2 to the learners as follows:
  - a. Each organ that you have mentioned in the table in Task 1 is found in the human digestive system in a very special order.
  - b. Work out the order of the organs that food would move through from ingestion to egestion.
6. The completed table and flow map are shown below. Fill the missing names into the table on the chalkboard.

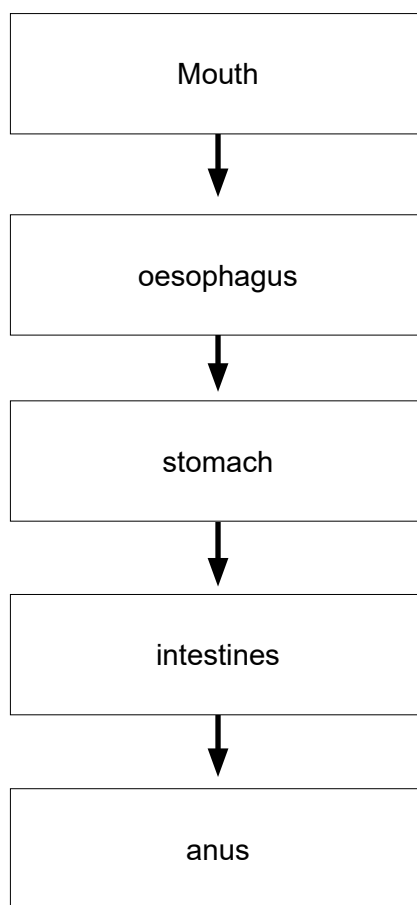
### TASK 1

#### TABLE SHOWING THE FUNCTIONS OF THE STRUCTURES OF THE DIGESTIVE SYSTEM

<b>Name of organ</b>	<b>Description and Function</b>
mouth	Entry point of digestion system; digestion starts with chewing and saliva
liver	Large organ that produces liquid to break down fats
stomach	Organ after oesophagus, large, contains liquid to chemically digest food and strong muscles to further break down food
intestine	Long organ where absorption of nutrients into bloodstream takes place
oesophagus	Long tube, connects mouth to stomach
anus	Exit point of digestive system, faeces pass through

## TASK 2

### FLOW MAP TO SHOW MOVEMENT OF FOOD THROUGH ORGANS OF DIGESTIVE SYSTEM



7. If you have time, show the learners the videos and the website that have been given at the end of the lesson.

### **Checkpoint 2**

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

- a. Which process happens in the stomach?
- b. Name the disease that is caused when a person starves himself or herself.

Answers to the checkpoint questions are as follows:

- a. Digestion
- b. Anorexia nervosa

## **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
Step-by-Step	Systems in the human body	29-31
Solutions for all	Systems in the human body	25-27
Spot On	Systems in the human body	16-18
Top Class	Systems in the human body	18-20
Via Afrika	Systems in the human body	24-25
Platinum	Systems in the human body	20-21
Oxford Successful	Systems in the human body	25-27
Pelican Natural Sciences	Systems in the human body	25-28
Sasol Inzalo Bk A	Systems in the human body	35-38

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. <http://www.bbc.co.uk/education/guides/z9pv34j/revision> [Interactive website on the digestive system]
2. <https://ed.ted.com/featured/b2umD1Ay> (3min 43sec) [How does digestion work?]

**3 B**

**Term 1, Week 3, Lesson B**

**Lesson Title: The Circulatory System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Systems in the human body		
<b>CAPS Page Number</b>	57		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main processes involving the circulation of blood between the heart and lungs, and the circulation of blood between the heart and rest of the body</li> <li>explain the importance of the heart, blood vessels and blood in this system</li> <li>discuss the health issues associated with the circulatory system.</li> </ul>			
Specific Aims	1. DOING SCIENCE		
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the circulatory system	Resource 8
Projector, computer and internet	

## **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 purpose of the digestive system?

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

*To break down the food we eat into small substances that can be absorbed into the blood stream*

## **D** ACCESSING INFORMATION

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

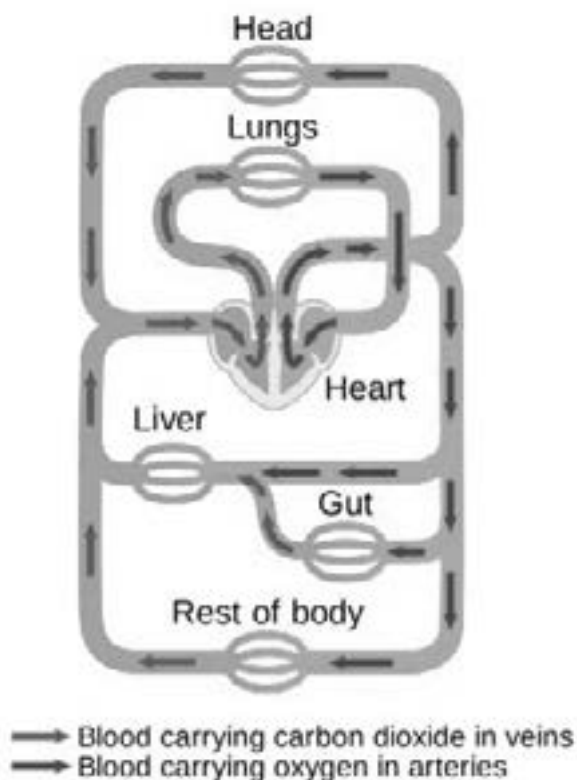
THE CIRCULATORY SYSTEM

**FUNCTION:**

Transports oxygen to cells and removes carbon dioxide and other waste from cells.

**STRUCTURE:**

Heart, blood vessels made of veins, arteries and capillaries, blood and lungs



## HEALTH ISSUES OF THE CIRCULATORY SYSTEM

Name	Description
High blood pressure	Force at which blood is being pushed through the veins and arteries is too high.
Heart attack	A blood clot blocks the flow of blood and heart muscle cells do not receive oxygen.
Stroke	Blood flow to the brain is stopped and the brain cells start to die because of lack of oxygen.

2. Explain this to the learners as follows:
  - a. The circulatory system transports substances around the body.
  - b. Blood carries nutrients and oxygen to cells and removes carbon dioxide and other waste products from cells.
  - c. The heart pumps the blood around the body.
  - d. The blood flows through blood vessels such as **arteries**, **veins** or **capillaries**.
  - e. The main processes include the circulation of blood between the heart and lungs.
  - f. The blood that goes from the heart to the lungs is low in oxygen but high in carbon dioxide.
  - g. The blood that goes from the lungs to the heart is high in oxygen.

## TOPIC: Systems in the human body

- h. For example, the heart pumps blood high in oxygen to the gut, which is another name for the digestive system.
  - i. Show the learners Resource 8 (model of circulatory system) and ask them to look at where each of the organs are found.
  - j. There are three health conditions you ought to know that are associated with the circulatory system:
    - a. **High blood pressure**
    - b. **Heart attack**
    - c. **Stroke**
3. Ask the learners if they have any questions.
  4. Tell the learners to copy the information written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. What job does the heart have?
- b. Which gas is removed from the cells?

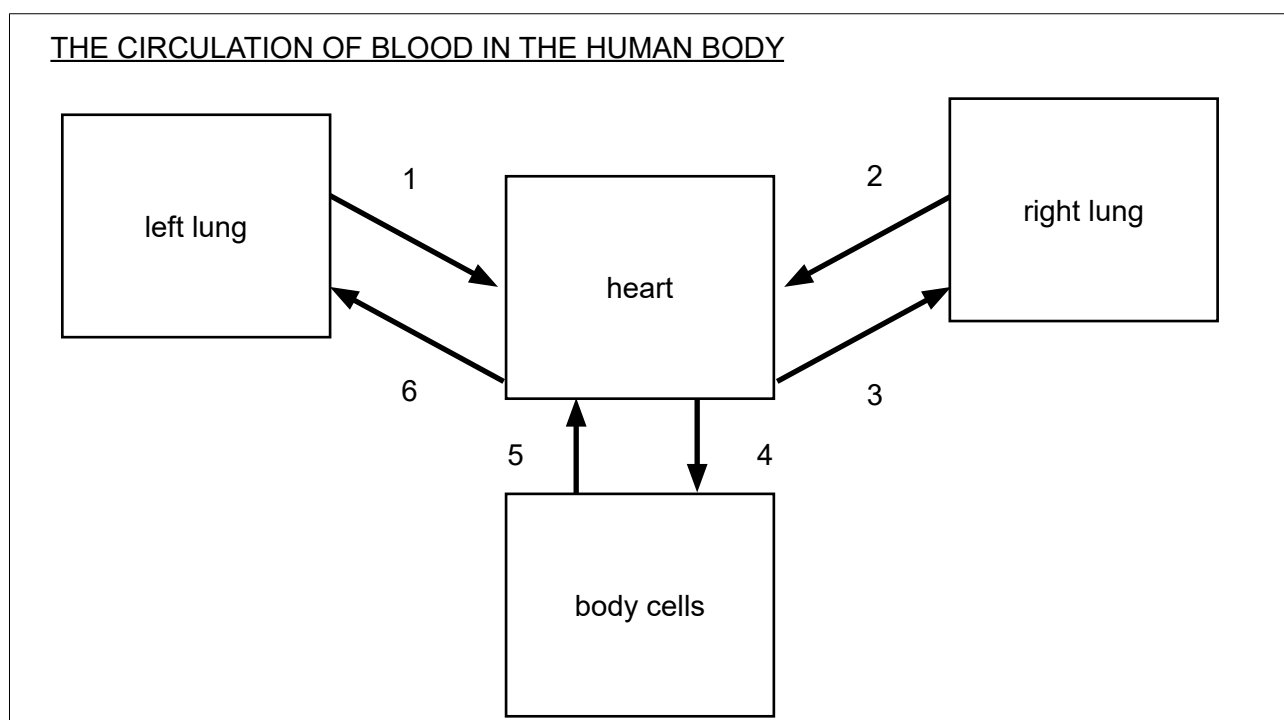
Answers to the checkpoint questions are as follows:

- a. The heart pumps blood around the circulatory system.
- b. Carbon dioxide

## **E**

### **CONCEPTUAL DEVELOPMENT**

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



## TOPIC: Systems in the human body

### TASK 1

1. Draw the diagram in your workbooks.
2. Next to each number, state whether the blood will contain a high amount of oxygen OR a high amount of carbon dioxide.
3. The lungs have the job of taking carbon dioxide out of the blood and putting oxygen into the blood.
4. The heart has the job of pumping blood to the body cells and to the lungs.
5. Body cells use oxygen from the heart and put carbon dioxide into the blood as a waste product.

### TASK 2

1. Arteries are blood vessels that take blood away from the heart.
2. Veins are blood vessels that take blood to the heart.
3. Next to each number on the diagram, state whether it is an artery or a vein.

2. Explain to the learners the activity as follows:
  - a. Draw the diagram in your workbooks.
  - b. The arrows on the diagram show the movement of blood between the lungs, heart and body cells.
  - c. Body cells need oxygen in order to create energy. As they create energy, they give off carbon dioxide. Carbon dioxide must be taken to the lungs so that it can be released from the body.
  - d. Below the diagram, write the numbers 1 to 6.
  - e. Next to each number, write either high oxygen or high carbon dioxide.
  - f. Complete the task on your own.
3. Allow the learners some time to complete Task 1.
4. Once the learners have completed Task 1, explain Task 2 as follows:
  - a. Blood travels in tubes or pipes called blood vessels.
  - b. There are two types of blood vessels. Arteries and veins.
  - c. Arteries carry blood away from the heart and veins carry blood to the heart.
  - d. Write the numbers 1-6 in your workbook again.
  - e. Next to each number, write either artery or vein. Look carefully at the direction of the arrow.
5. With the learners' input, complete the model answer on the chalkboard:



### TASK 1

1. *high oxygen (blood coming from lungs where it received oxygen)*
2. *high oxygen (blood coming from lungs where it received oxygen)*
3. *high carbon dioxide (blood going to lungs to get rid of carbon dioxide and pick up oxygen)*
4. *high oxygen (blood going to body cells)*
5. *high carbon dioxide (blood coming from body cells)*
6. *high carbon dioxide (blood going to lungs to get rid of carbon dioxide and pick up oxygen)*

### TASK 2

1. *vein*
2. *vein*
3. *artery*
4. *artery*
5. *vein*
6. *vein*

6. Discuss the answers with the learners.

7. If there is time available, show the learners the videos listed at the end of the lesson.

### **Checkpoint 2**

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

- a. What is the function of the lungs?
- b. Do body cells release oxygen or carbon dioxide?

Answers to the checkpoint questions are as follows:

- a. To remove carbon dioxide from blood and give oxygen to the blood
- b. Carbon dioxide

8. 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
Solutions for All	Systems in the human body	28-30
Via Afrika	Systems in the human body	26-28
Oxford Successful	Systems in the human body	29-32
Pearson: Spot On	Systems in the human body	19-21
Pearson: Platinum	Systems in the human body	22-23
Shuters Top Class	Systems in the human body	21-25
Step-by-Step	Systems in the human body	33-38
Pelican Natural Sciences	Systems in the human body	28-32
Sasol Inzalo Bk A	Systems in the human body	38-41

## **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.innerbody.com/image/cardov.html> [Interactive website with 3D view of human circulation system]
2. <https://www.youtube.com/watch?v=ruM4Xhx32U> (4min 27sec) [How the heart actually pumps blood]

**3 C**

**Term 1, Week 3, Lesson C**

**Lesson Title: The Respiratory System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Systems in the human body		
<b>CAPS Page Number</b>	58		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main processes of respiration, including, breathing, gaseous exchange and respiration</li> <li>explain the importance of the nose, mouth, trachea and other air passageways, lungs and blood in the system</li> <li>discuss the health issues associated with the respiratory system.</li> </ul>			
Specific Aims	1. DOING SCIENCE		
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the respiratory system	Resource 9
Projector, computer and internet	

## **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 purpose of the circulatory system?

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

*To transport blood containing oxygen to the body cells and to transport carbon dioxide away from the body cells*

## **D** ACCESSING INFORMATION

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

### THE RESPIRATORY SECTION

FUNCTION: Supply oxygen to the body and remove carbon dioxide

MAIN PROCESSES:

1. Breathing: **inhalation** occurs when air is taken into the mouth and nose, and **exhalation** occurs when air is breathed out of the mouth and nose.
2. **Gaseous exchange**: oxygen moves from the lungs into the blood and carbon dioxide moves from the blood into the lungs.
3. **Respiration**: oxygen is used to turn food into energy, and carbon dioxide, water and energy are released.

MOVEMENT OF AIR FROM MOUTH TO LUNGS

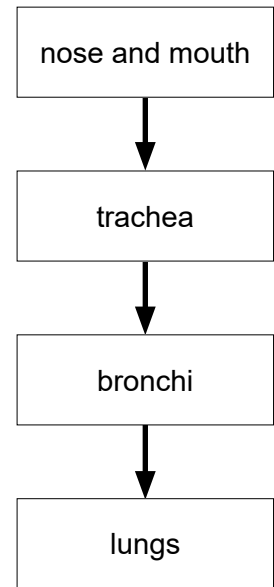
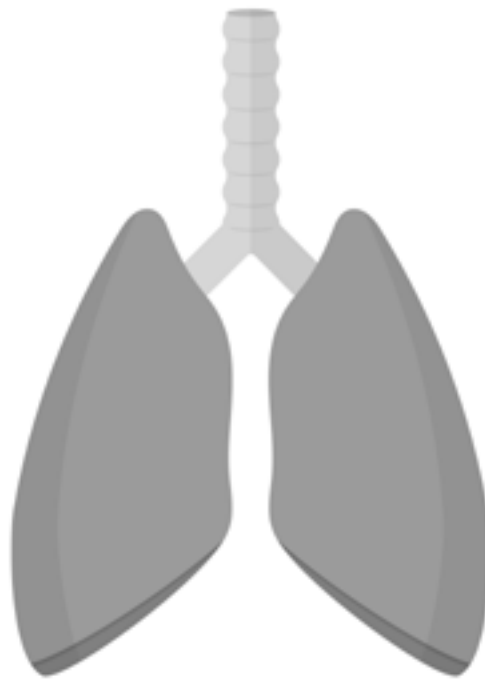
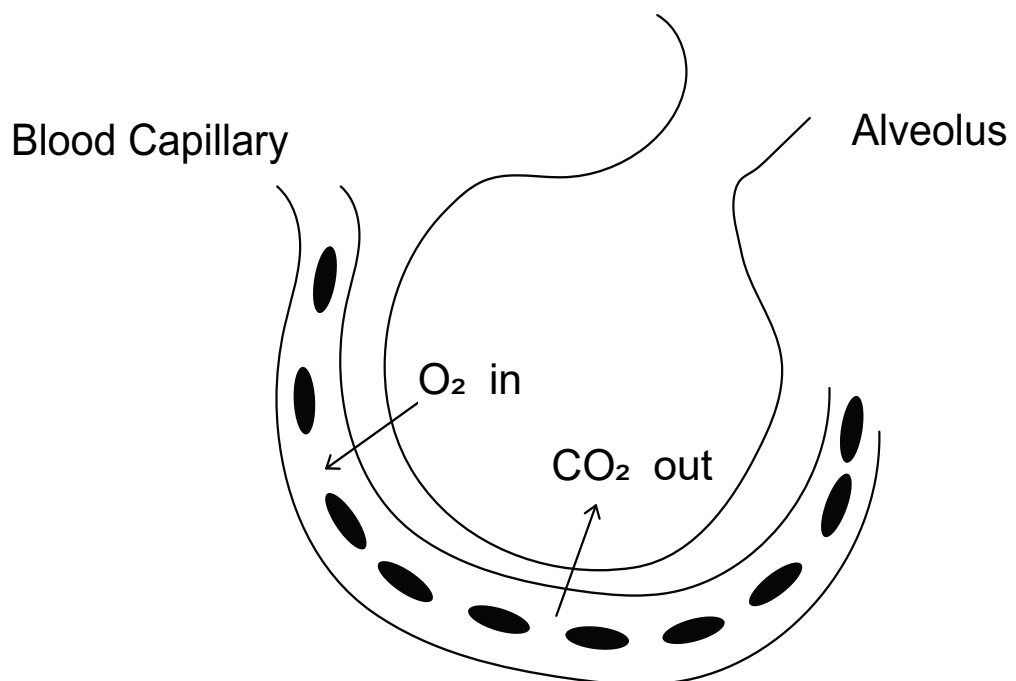


DIAGRAM TO SHOW GASEOUS EXCHANGE THAT OCCURS IN THE ALVEOLUS OF THE LUNGS



## TOPIC: Systems in the human body

### HEALTH ISSUES OF THE RESPIRATORY SYSTEM

Name	Description
Asthma	Disorder that causes airways of lungs to swell, leading to shortness of breath and coughing
Lung Cancer	Disease where lung cells have grown uncontrollably, often caused by smoking
Bronchitis	Swelling of the bronchial tubes that causes people to breathe in less oxygen
Asbestosis	Disease caused by asbestos fibres going into lungs during breathing

2. Explain this to the learners as follows:
  - a. The respiratory system is responsible for supplying oxygen to the body and for removing carbon dioxide.
  - b. Breathing involves inhalation and exhalation.
  - c. Ask the learners to take a deep breath in. Explain that this is called inhalation.
  - d. Ask the learners to place their right hand 10cm away from their mouth and feel the air coming out of their mouths as they breathe out. This is called exhalation.
  - e. Once the air has travelled into your mouth, in inhalation, it moves down a pipe called the trachea (point to the trachea on the chalkboard), through the smaller pipes called bronchi and then into the lungs (point to each structure on the chalkboard).
  - f. At the lungs, oxygen moves into the blood and the carbon dioxide moves from the blood into the lungs. This is called gaseous exchange.
  - g. Point to the diagram on the board. The alveolus is the name given to the structures inside the lungs. The blood capillary is a type of blood vessel that carries blood.
  - h. Oxygen goes to the body cells so that respiration can take place. Respiration occurs when oxygen is used to change sugars into energy. You use energy to move.
  - i. Show the learners Resource 9. Ask them to look carefully at where the lungs are found in the body.
  - j. There are three important health conditions that the learners should know:
    - i. **Asthma**
    - ii. **Lung cancer**
    - iii. **Bronchitis**
    - iv. **Asbestosis**
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.
5. If there is time available, use the computer and projector to show the videos given at the end of the lesson.

## Checkpoint 1

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

- a. Which two processes are involved in breathing?
- b. Why does oxygen need to be taken to the body cells?

Answers to the checkpoint questions are as follows:

- a. Inhalation and exhalation
- b. To create energy through respiration

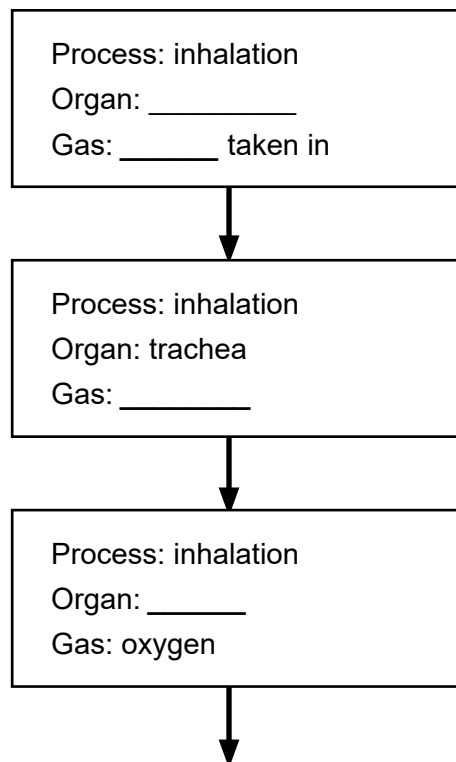
## **E**

## CONCEPTUAL DEVELOPMENT

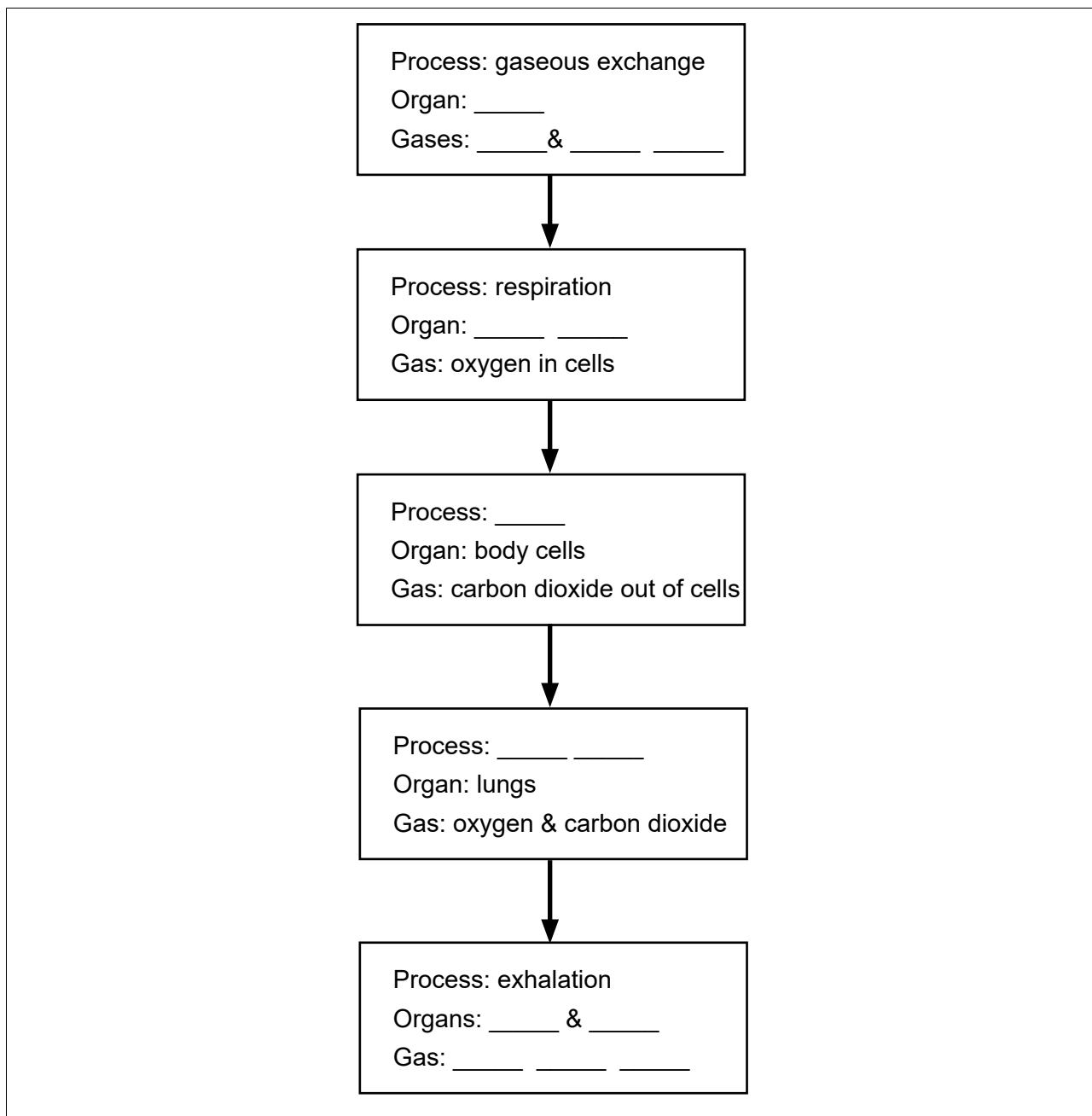
1. Before the lesson, collect leaves of different types (colour, shape, edges and size).
2. Write the following onto the chalkboard:

### TASK

Complete the flow map that shows all processes, organs and gases that are used in the respiratory system.



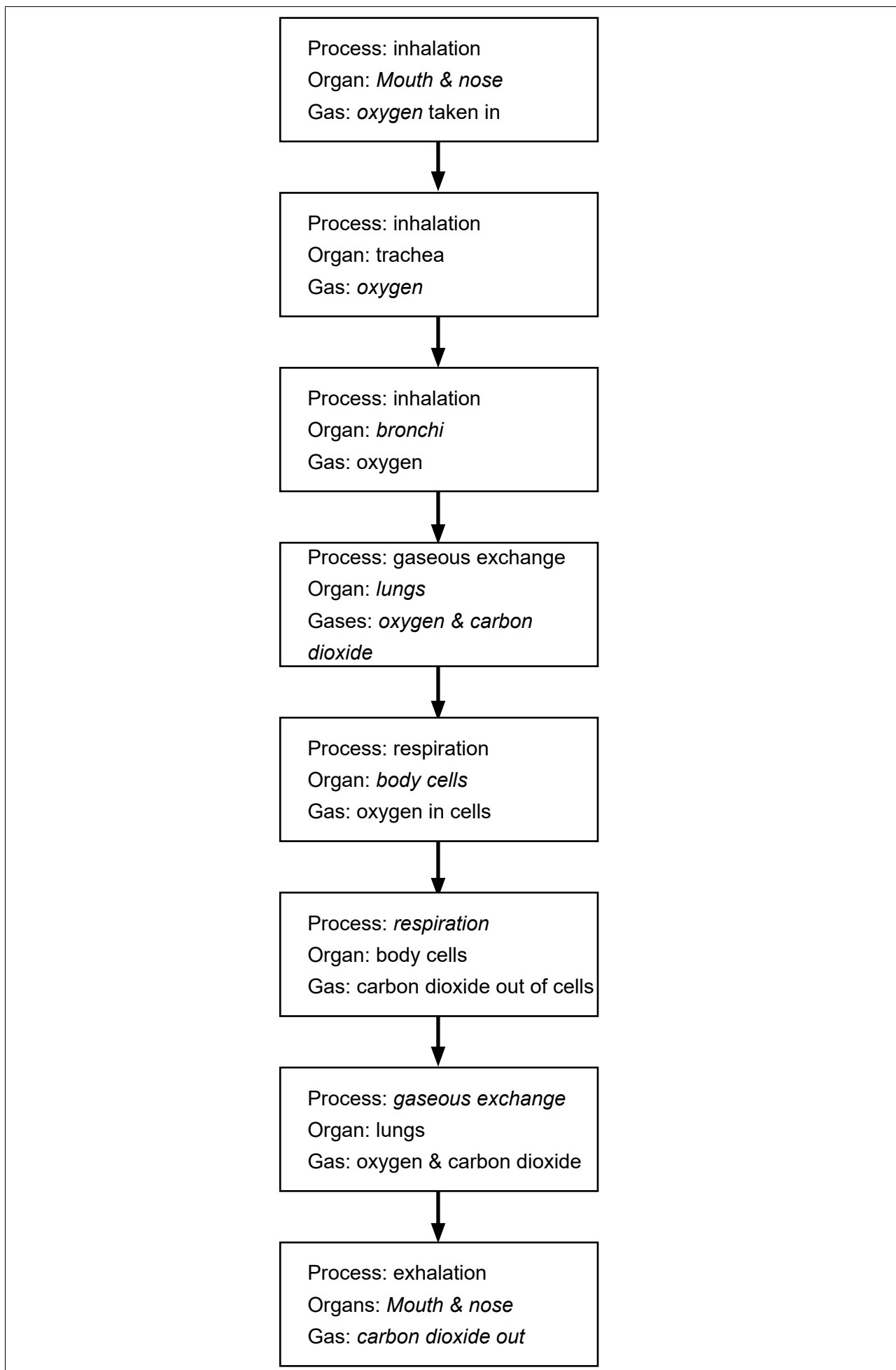
## TOPIC: Systems in the human body



2. Explain to the learners the activity as follows:
  - a. Draw the flow map into your workbooks.
  - b. Read through the flow map before filling in the missing words.
  - c. Fill in the missing words.
  - d. Use the information that you wrote down at the beginning of the lesson.
  - e. You may draw pictures next to the boxes, if you wish.
3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:



## TOPIC: Systems in the human body



## TOPIC: Systems in the human body

5. Discuss the answers with the learners.

### **Checkpoint 2**

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

- a. Why is it important to breathe out (exhale)?
- b. What is the purpose of the trachea?

Answers to the checkpoint questions are as follows:

- a. To get rid of carbon dioxide
- b. To take oxygen to the lungs, and carbon dioxide to the mouth to be exhaled

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

## **F** REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Solutions for All	Systems in the human body	30-32
Via Afrika	Systems in the human body	28-30
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Pearson: Spot On	Systems in the human body	22-24
Pearson: Platinum	Systems in the human body	24-25
Shuters Top Class	Systems in the human body	25-29
Step-by-Step	Systems in the human body	39-42
Pelican Natural Sciences	Systems in the human body	32-35
Sasol Inzalo Bk A	Systems in the human body	42-44

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. [https://www.youtube.com/watch?v=8NUxvJS-\\_0k](https://www.youtube.com/watch?v=8NUxvJS-_0k) (3min 21sec) [Ted Ed: How do lungs work?]
2. <http://www.bbc.co.uk/education/guides/z6h4jxs/revision> [Interactive website on respiratory system]

**4 A**

**Term 1, Week 4, Lesson A**

**Lesson Title: The Musculoskeletal System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Systems in the human body		
<b>CAPS Page Number</b>	58		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main processes of contraction and relaxation of muscles, locomotion and movement</li> <li>explain the importance of the muscles, bones, cartilage, tendons, ligaments</li> <li>discuss the health issues associated with the musculoskeletal system.</li> </ul>			
Specific Aims	1. DOING SCIENCE		
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the skeleton	
Projector, computer and internet	
Resource 10	

## **C** CLASSROOM MANAGEMENT

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

What is the purpose of the respiratory system?

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

*To produce energy through inhaling oxygen*

## **D** ACCESSING INFORMATION

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

### THE MUSCULOSKELETAL SYSTEM

#### FUNCTION:

1. The skeleton protects body and enables movement.
2. Muscles make the skeleton move.
3. The skeleton and muscles work together to create body movement.

#### STRUCTURE:

1. Ligaments attach bones to bones.
2. Cartilage covers bones.
3. Tendons attach muscles to bones.

#### MAIN PROCESSES:

1. Contraction and relaxation of muscles
2. Movement

# TOPIC: Systems in the human body

## HEALTH ISSUES OF THE MUSCULOSKELETAL SYSTEM

Name	Description
Rickets	Disease when bones are soft and weak
Arthritis	Swelling in between bones, at the ligaments
Osteoporosis	Bones start to break down and snap easily

2. Explain this to the learners as follows:
  - a. The **skeleton** protects the body, provides support and enables movement.
  - b. Show the learners Resource 10.1.
  - c. But bones cannot move, so they need muscles to attach to them.
  - d. Muscles and bones work together to help you move.
  - e. To keep the skeleton stuck together, there are extra structures attached to the skeleton.
  - f. Bones are attached to bones by structures called **ligaments**.
  - g. Muscles are attached to bones by structures called **tendons**.
  - h. The places where bones meet are covered with **cartilage**.
  - i. Ask the learners to bend their arms so that their biceps are flexed as in Resource 10.2.
  - j. Point to the bicep and explain that this muscle is contracted and working to pull your hand to your shoulder.
  - k. There are three health conditions that you ought to know. They are associated with the musculoskeletal system:
    1. **rickets**
    2. **osteoporosis**
    3. **arthritis**
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.

### Checkpoint 1

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

- a. Why does the skeleton need ligaments?
- b. Why do you have muscles in your legs?

Answers to the checkpoint questions are as follows:

- a. The skeleton needs ligaments to attach bones to bones.
- b. To move the leg bones so that you can walk

## E

### CONCEPTUAL DEVELOPMENT

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

TASK 1

1. Work in groups of three.
2. Select five movements, for example, star jumps, kicking a ball, throwing a ball, dancing, moving, running, skipping.
3. Each person must do each movement.
4. While you do the movement, work out which muscles are involved and describe if the muscle is working (contracting) or relaxing, for example, front of leg or top of arm.
5. Complete the table below.

Movement	Muscles contracting and relaxing

2. Explain to the learners the activity as follows:
  - a. Draw the table in your workbooks.
  - b. You will complete this activity in groups of three outside the classroom.
  - c. Find five movements that are quite different from each other which make you use both your arms and legs.
  - d. Each person must do each movement
  - e. While you do the movement, think about which part of your body is helping you to dance or skip or kick a ball.
  - f. Write down which muscles are relaxed and which are contracted, and those which are working to help you move.
3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:

## TOPIC: Systems in the human body

<b>Movement</b>	<b>Muscles contracting and relaxing</b>
<i>Handstand</i>	<i>Arm muscles contracting and legs relaxing</i>
<i>Kicking a ball</i>	<i>Legs muscles contracting, arm muscles contracting to help balance you</i>
<i>Dancing</i>	<i>Leg and arm muscles contracting</i>
<i>Running</i>	<i>Leg muscles contracting</i>
<i>Star jumps</i>	<i>Arm and leg muscles contracting</i>

5. Discuss the answers with the learners.
6. If you have time, show the learners the video and the game that are included at the end of the lesson.

### **Checkpoint 2**

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

- a. What do muscles allow you to do?
- b. What are tendons used for?

Answers to the checkpoint questions are as follows:

- a. Move, dance, run, skip
- b. Attach muscles to bones

7. 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
Solutions for All	Systems in the human body	32-34
Via Afrika	Systems in the human body	30-32
Oxford Successful	Systems in the human body	33-34
Pearson: Spot On	Systems in the human body	25-27
Pearson: Platinum	Systems in the human body	26-27
Shuters Top Class	Systems in the human body	29-33
Step-by-Step	Systems in the human body	43-46
Pelican Natural Sciences	Systems in the human body	35-37
Sasol Inzalo Bk A	Systems in the human body	44-46

## **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://ed.ted.com/on/9hidGx6i> (7min 7sec) [Ted Ed: Muscular System]
2. [http://www.abcya.com/skeletal\\_system.htm](http://www.abcya.com/skeletal_system.htm) [Game to show understanding of skeletal system]



**4 B**

**Term 1, Week 4, Lesson B**

**Lesson Title: The Excretory System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Systems in the human body		
<b>CAPS Page Number</b>	58		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main processes of filtration, absorption, diffusion, excretion</li> <li>explain the importance of the kidneys, bladder and ureters</li> <li>discuss the health issues associated with the excretory system.</li> </ul>			
Specific Aims	1. DOING SCIENCE		
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the excretory system	Resource 11
Projector, computer and internet	
Kitchen sieve, cup, some stones, sand	

## **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 purpose of the musculoskeletal system?

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

*Muscles produce body movement.*

## **D** ACCESSING INFORMATION

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

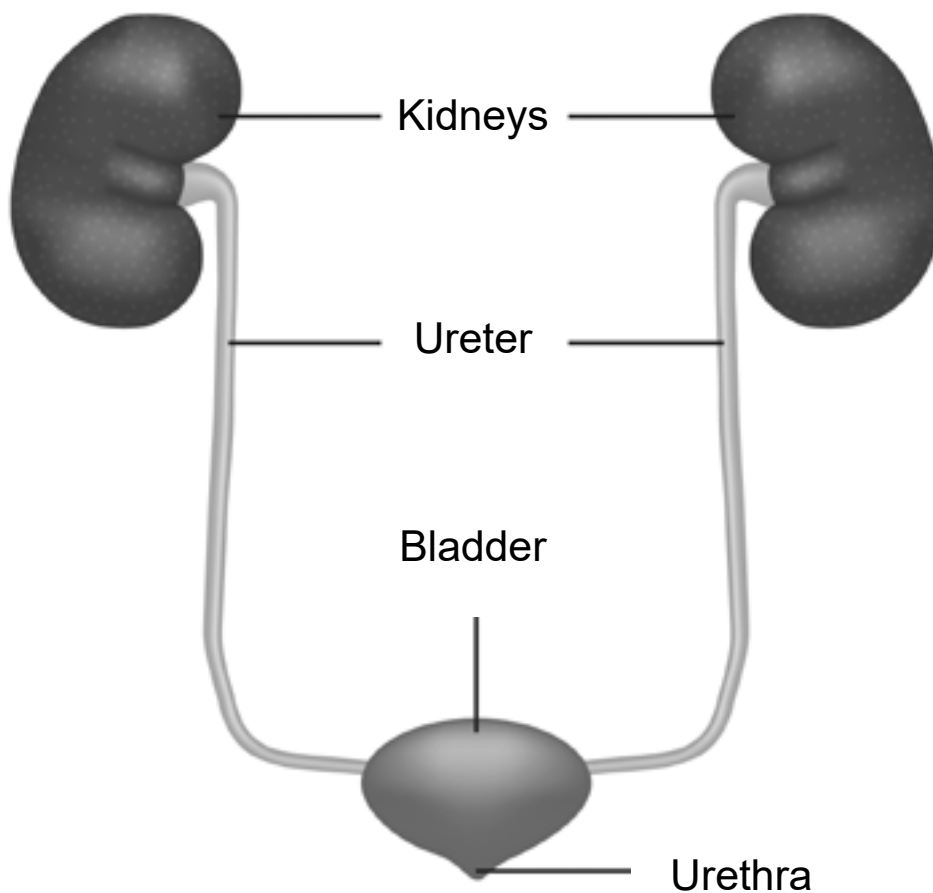
### THE EXCRETORY SYSTEM

FUNCTIONS: Remove waste and regulate body fluids.

MAIN PROCESSES:

1. Filtration – waste, water and glucose is taken out of blood.
2. Absorption – water and glucose goes back into the blood.
3. Diffusion – any waste still left in blood is removed.
4. Excretion – urine is formed from waste and leaves the body.

STRUCTURE:



Kidneys: filter out waste products

Ureter: takes urine to the bladder

Bladder: stores urine

Urethra: takes urine out of the body

HEALTH ISSUES OF THE EXCRETORY SYSTEM

Name	Description
Kidney failure	Kidneys are unable to remove waste from the body.
Bladder infections	An infection of the urinary system is caused by bacteria.
Kidney stones	Hard mineral deposits form in the kidneys, causing pain.

## TOPIC: Systems in the human body

2. Explain this to the learners as follows:
  - a. In order for the body to work properly, it has to carry out certain chemical processes. These processes are called metabolism.
  - b. The waste products from these processes must be taken out of the body.
  - c. The excretory system removes waste from the blood.
  - d. Four processes occur in order to create urine.
  - e. Filtration occurs when filters separate waste, some glucose (food) and some water from the blood.
  - f. Show the learners a kitchen sieve. Pour the cup of sand with different stones into the sieve. Tell the learners that the sand that moves through the sieve is like the blood and the stones left in the sieve are like the waste.
  - g. The second process is absorption. Now, glucose and water go back into the blood.
  - h. Diffusion happens next. Any waste that was not removed is taken out of the blood.
  - i. After these three processes have happened, the waste forms urine and is ready to be excreted and leave the body.
3. Ask the learners if they have any questions.
  - a. Now explain that there are four important structures that are needed in these processes.
  - b. The kidneys filter out waste products. Hold up the sieve to act as the kidneys.
  - c. The ureter takes urine to the bladder.
  - d. The bladder holds the urine until you go to the toilet.
  - e. The urethra transports the urine out of the body.
  - f. Show the learners Resource 11 (or a model of the excretory system) and ask the learners to look at where the excretory system is found in the body.
4. Now write the following onto the chalkboard:

**1. High blood pressure**

**2. Heart attack**

**3. Stroke**

5. Now explain that there are three health conditions that you ought to know. They are associated with the circulatory system:
  - High blood pressure
  - Heart attack
  - Stroke
6. Ask the learners if they have any questions.
7. Tell the learners to copy the information written on the chalkboard into their workbooks.

## Checkpoint 1

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

- a. What job do the kidneys have?
- b. What does excretion mean?

Answers to the checkpoint questions are as follows:

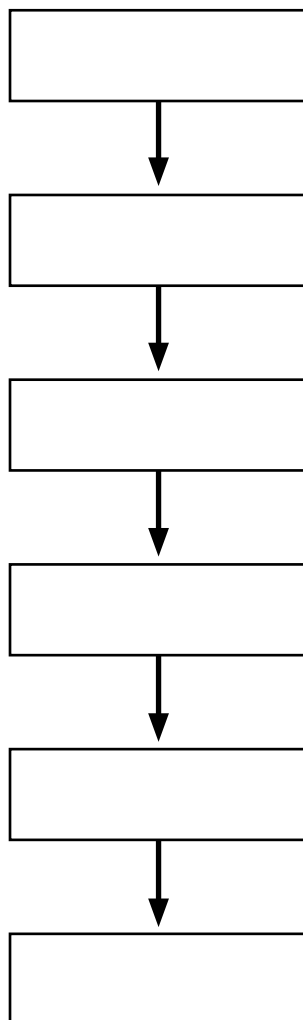
- a. To filter out waste
- b. The process whereby urine leaves the body

## **E**

### CONCEPTUAL DEVELOPMENT

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

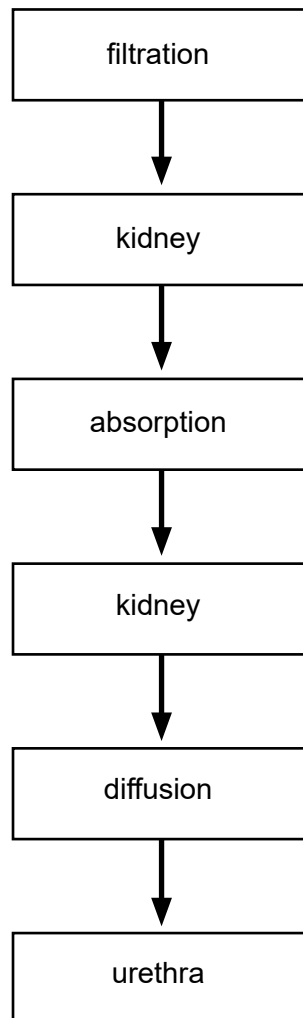
#### TASK



## TOPIC: Systems in the human body

2. Explain the activity to the learners as follows:
  - a. Draw the flow map in your workbooks.
  - b. In each block write filtration, absorption, kidney, diffusion, excretion, bladder, urethra and ureter in the correct order.
  - c. Remember to use what you wrote in your workbooks at the start of the lesson.
  - d. Complete the task on your own.
3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:

### TASK



5. Discuss the answers with the learners.
6. If there is time available, show the learners the video and website listed at the end of this lesson.

## TOPIC: Systems in the human body

### Checkpoint 2

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

- a. Why is the process of absorption important?
- b. Which organ does the ureter take urine to?

Answers to the checkpoint questions are as follows:

- a. Glucose must not leave the body - it must return to the body cells via the blood.
- b. Bladder

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
Solutions for All	Systems in the human body	35-37
Via Afrika	Systems in the human body	32-33
Oxford Successful	Systems in the human body	35-36
Pearson: Spot On	Systems in the human body	28-29
Pearson: Platinum	Systems in the human body	26-27
Shuters Top Class	Systems in the human body	33-36
Step-by-Step	Systems in the human body	47-49
Pelican Natural Sciences	Systems in the human body	37-38
Sasol Inzalo Bk A	Systems in the human body	44-46

## 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=FN3MFhYPWWo> (3min 54sec) [Ted Ed: How do your kidneys work?]
2. [http://www.kidsbiology.com/human\\_biology/excretory-system.php](http://www.kidsbiology.com/human_biology/excretory-system.php) [Interactive website on excretory system]

**4 C**

**Term 1, Week 4, Lesson C**

**Lesson Title: The Nervous System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Systems in the human body		
<b>CAPS Page Number</b>	58		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main processes of hearing, seeing, feeling, tasting, smelling, sending and receiving impulses, regulating temperature</li> <li>explain the importance of the brain, spinal cord, nerves, ears, nose, eyes, skin, tongue</li> <li>discuss the health issues associated with the nervous system.</li> </ul>			
Specific Aims	1. DOING SCIENCE		
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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



## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the nervous system	
Projector, computer and internet	
Resource 12	

## **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 purpose of the excretory system?

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

*Remove waste from the blood*

## **D** ACCESSING INFORMATION

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

### THE NERVOUS SYSTEM

**FUNCTION:** Receives messages from the environment and then tells the body how to respond to these messages.

#### **STRUCTURE:**

1. Senses organs such as eyes, ears, nose, skin, tongue and sends messages to the brain and spinal cord.
2. Brain and spinal cord read the message and send a new message to the muscles.
3. Muscles receive messages and enable movement.

**MAIN PROCESSES:** Hearing, seeing, feeling, tasting, smelling, temperature control

## TOPIC: Systems in the human body

### HEALTH ISSUES OF THE NERVOUS SYSTEM

Name	Description
Deafness	Hearing loss.
Blindness	Total loss of sight (cannot see).
Short-sightedness	Person only sees the object when he or she are close to it.
Effect of drugs and alcohol	Slows down nervous system

2. Explain this to the learners as follows:
  - a. The nervous system receives and helps the body to respond to changes in the environment.
  - b. Ask the learners the following question: “What do you do when you touch a hot stove?”  
*Quickly move your hand away so that you do not get burnt.*
  - c. Your hand feels the heat and your brain responds by telling your muscles to move your hand away from the hot stove.
  - d. The eyes, ears, tongue, nose and skin are called sense organs.
  - e. The sense organs send messages to the brain and **spinal cord**.
  - f. The brain and spinal cord are able to read the message and then tell the muscles what to do.
  - g. Show the learners Resource 12. Tell them that the blue lines are the paths that the messages travel on.
  - h. There are four health conditions you should know that are associated with the nervous system:
    1. **Deafness**
    2. **Blindness**
    3. **Short-sightedness**
    4. **Effect of drugs and alcohol**
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.

## **Checkpoint 1**

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

- a. Name the five sense organs.
- b. What is the function muscles perform?

Answers to the checkpoint questions are as follows:

- a. Eyes, ears, nose, tongue and skin
- b. Move the body parts the way the brain tells it to

## E

## CONCEPTUAL DEVELOPMENT

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

### SITUATIONS WHEN THE NERVOUS SYSTEM HELPS YOU

Situation	Sense organs	Process	Response
Teacher tells you what to write in your workbook	ears eyes	hearing seeing	Muscles in hands and arms allow you to write.
Kicking a soccer ball to a friend			
Stopping a soccer ball from a friend			
Getting to the end of the page in a book			
Eating supper			
1.			
2.			
3.			

### TASK 1

1. Draw the table in your workbooks.
2. Read each situation carefully.
3. Fill in the table. The first one has been done for you.

### TASK 2

1. Working in pairs, think up three more examples to add to the bottom of the table.

## TOPIC: Systems in the human body

2. Explain to the learners the activity as follows:
  - a. Draw the table in your workbooks.
  - b. You have been given five situations when you use your sense organs.
  - c. The first example is writing notes when your teacher asks you to. The sense organs involved are eyes and ears. The processes involved are seeing and hearing. The next response is that your hand muscles move your hand to help you write.
  - d. Do the same for the rest of the examples.
  - e. Complete the task on your own.
3. Allow the learners some time to complete Task 1.
4. Once the learners have completed Task 1, explain Task 2 as follows:
  - a. Work with a partner.
  - b. Come up with three more examples of your sense organs helping you to do something.
5. With the learners' input, complete the model answer on the chalkboard:

<u>TASK 1</u>			
<b>Situation</b>	<b>Sense organs</b>	<b>Process</b>	<b>Response</b>
<i>Teacher tells you what to write in your workbook</i>	<i>ears eyes</i>	<i>hearing seeing</i>	<i>Muscles in hands and arms allow you to write.</i>
<i>Kicking a soccer ball to a friend</i>	<i>ears eyes</i>	<i>hearing seeing</i>	<i>Muscles in your leg kick.</i>
<i>Stopping a soccer ball from a friend</i>	<i>eyes ears skin</i>	<i>Seeing hearing feeling</i>	<i>Muscles in your legs stop the ball.</i>
<i>Getting to the end of the page in a book</i>	<i>eyes skin</i>	<i>seeing feeling</i>	<i>Muscles in your fingers turn the page.</i>
<i>Eating supper</i>	<i>eyes nose tongue</i>	<i>seeing smelling tasting</i>	<i>Muscles in your arms keep putting food in your mouth OR muscles in your jaw chew food.</i>
<i>Baking a cake and the cake is burning</i>	<i>eyes nose</i>	<i>seeing smelling</i>	<i>Muscles in your arms switch off the oven.</i>
<i>Running after your friend</i>	<i>eyes ears</i>	<i>seeing hearing</i>	<i>Muscles in legs move you to sit under a tree when it is hot on your skin.</i>
<i>Sitting under a tree on a hot day</i>	<i>skin eye</i>	<i>feeling seeing</i>	<i>Muscles in legs move you to sit under a tree when it is hot on your skin.</i>

## TOPIC: Systems in the human body

6. Discuss the answers with the learners.

### **Checkpoint 2**

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

- a. What function does the sense organ, the skin, perform?
- b. What job does the brain have?

Answers to the checkpoint questions are as follows:

- a. Feeling
- b. Reading messages from sense organs and then telling muscles what to do next.

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

8. If there is time, show the learners the video and website listed at the end of the lesson.

## **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
Solutions for All	Systems in the human body	37-40
Via Afrika	Systems in the human body	33-35
Oxford Successful	Systems in the human body	36-37
Pearson: Spot On	Systems in the human body	30-32
Pearson: Platinum	Systems in the human body	30-31
Shuters Top Class	Systems in the human body	36-41
Step-by-Step	Systems in the human body	50-53
Pelican Natural Sciences	Systems in the human body	38-41
Sasol Inzalo Bk A	Systems in the human body	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. <http://www.bbc.co.uk/education/guides/zkdnb9q/revision> [Interactive website on the nervous system]
2. <https://ed.ted.com/on/tQhnSiEu> (5min 0sec) [Ted Ed: The Wonderful Nervous System]

# TOPIC OVERVIEW:

## Human Reproduction

### Term 1, Weeks 5A – 6C

#### A. TOPIC OVERVIEW

##### Term 1, Weeks 5a – 6c

- 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 & 8	GRADE 9	GRADE 10 - 12
<b>LOOKING BACK</b>	<b>CURRENT</b>	<b>LOOKING FORWARD</b>
<ul style="list-style-type: none"> <li>• Sexual reproduction in angiosperms</li> <li>• Physical and emotional changes during puberty</li> <li>• Menstruation takes place if the egg does not become fertilised</li> <li>• Pregnancy can be prevented by using contraceptives such as condoms</li> </ul>	<ul style="list-style-type: none"> <li>• Main purpose of reproduction is for gametes to combine for the continuation of the species.</li> <li>• Testosterone and oestrogen cause secondary sexual characteristics.</li> <li>• The male reproductive organs include the penis, sperm duct, testes, scrotum and urethra</li> <li>• The female reproductive organs include the vagina, uterus, ovaries and oviducts</li> <li>• The stages of reproduction from ovulation to pregnancy and birth</li> </ul>	<p>GRADE 10</p> <p>The unique human characteristics of some aspects of reproduction:</p> <ul style="list-style-type: none"> <li>o Puberty</li> <li>o Gametogenesis: relate briefly to meiosis</li> <li>o Menstrual cycle with an emphasis on hormonal control</li> <li>o Fertilisation and development of zygote to blastocyst</li> <li>o Gestation</li> <li>o Implantation and development, the role of the placenta</li> </ul>

## C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	maturation	process of becoming mature (developing or growing)
2.	copulation	process where penis is placed into the vagina
3.	ejaculation	rapid release of <b>semen</b> from penis
4.	offspring	children
5.	ovulation	the release of a ripe egg from the ovary
6.	menstruation	breakdown of the lining of the uterus
7.	fertilisation	the fusion of the egg and sperm
8.	implantation	embryo sinks into the lining of the uterus
9.	infertility	unable to produce a baby
10.	foetal alcohol syndrome	birth defect caused by mothers drinking alcohol while pregnant
11.	STDs	sexually transmitted diseases
12.	gamete	sex cells such as egg cells and sperm cells
13.	puberty	stage in human life when the sexual organs mature for reproduction
14.	semen	mixture of sperm and fluid
15.	testes	male sex organs where sperm cells are produced
16.	ovaries	female sex organs where egg cells are produced
17.	testosterone	male hormone released by the testes
18.	oestrogen	hormone released into a female's blood from ovaries
19.	penis	male organ that places sperm inside the female
20.	sperm	male reproductive cells
21.	sperm cells	carried out of the body in semen
22.	egg cells	female reproductive cells
23.	sperm duct	tube that carries sperm from testes to penis

24.	scrotum	a bag of skin that holds the testes outside the male body
25.	vagina	elastic, muscular opening of female genitals
26.	uterus	place where baby grows
27.	oviduct	tube that carries the egg from the ovary to the uterus
28.	urethra	a tube that carries semen and urine but never at the same time
29.	puberty	stage in the human life cycle when the sexual organs mature for reproduction
30.	pituitary gland	structure found at the base of the brain which starts to make hormones
31.	secondary sexual characteristics	changes in the bodies of males and females that happen during puberty
32.	hormones	chemicals that are made by glands which speed up or slow down the activities of an organ
33.	placenta	organ that provides food and takes away waste from baby inside uterus
34.	zygote	a cell that is formed when an egg is fertilised
35.	contraceptive	prevents pregnancy
36.	condom	contraceptive device that prevents pregnancy and / or STDs

#### D. UNDERSTANDING THE USES / VALUE OF SCIENCE

The value of knowing that reproduction is the formation of new individuals. All living things reproduce so that they do not become extinct. The reproductive system is the most important system for the continuation of a species.

#### E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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



**5 A**

**Term 1, Week 5, Lesson A**

**Lesson Title: The Reproductive System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Reproductive system		
<b>CAPS Page Number</b>	59		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main processes of growth, cell division, maturation, copulation, ejaculation, ovulation, menstruation, fertilisation, implantation</li> <li>explain the importance of the testes, ovaries and uterus</li> <li>discuss the health issues associated with the reproduct</li> </ul>			
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
Projector and lap top with internet	
Resource 13	

## **C** CLASSROOM MANAGEMENT

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

Why is sexual reproduction important?

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.

*To produce children to ensure the survival of humans*

## **D** ACCESSING INFORMATION

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

THE REPRODUCTIVE SYSTEM

FUNCTION:

1. Produces sex cells (sperm and egg cells)
2. Creation of babies

STRUCTURES:

1. Males – testes that produce sperm cells
2. Females – ovaries that produce egg cells and a uterus where the baby grows

# TOPIC: Human reproduction

## PROCESSES:

1. Copulation – penis placed inside vagina
2. Ejaculation – penis releases sperm
3. Ovulation – egg released from ovary
4. Menstruation – uterus lining breaks down (known as a period)
5. Fertilisation – fusion of egg and sperm
6. Implantation – egg and sperm sink into uterus
7. Growth – foetus grows over a 40 week period
8. Cell division – baby develops organs
9. Maturation – baby becomes fully formed and is then born

## HEALTH ISSUES OF THE REPRODUCTIVE SYSTEM

Name	Description
infertility	person is unable to produce a baby
foetal alcohol syndrome	birth defect caused by a mother drinking alcohol while she is pregnant
STDs	sexually transmitted diseases caused by bacteria or viruses

2. Explain the following to the learners:
  - a. The reproductive system has the main role of producing **offspring**, another word for children.
  - b. Males are responsible for producing **sperm cells** and females are responsible for producing **egg cells**.
  - c. When an egg cell and a sperm cell fuse and become one cell, a baby is formed.
  - d. Males and females have special structures that help them to produce egg and sperm cells.
  - e. Females have **ovaries** and a **uterus**. The ovaries create eggs and the uterus is the place where a baby develops.
  - f. Show the learners Resource 13. Tell them to look at where the ovaries and uterus are found.
3. Ask the learners if they have any questions. Provide explanations where necessary.
4. Now explain the following:
  - a. Males have **testes** which create sperm cells.
  - b. Males also have a **penis** which is used during **copulation**. Copulation is when the penis is put inside the **vagina**.
  - c. The penis then releases lots of sperm cells into the female. This is called **ejaculation**.

## TOPIC: Human reproduction

- d. The sperm cells move to the egg cell. The egg cell is released from the ovaries during **ovulation**.
  - e. If the sperm does not get to the egg cell, then a female has her period. Menstruation occurs when a female bleeds from her vagina.
  - f. If the sperm cell fuses with the egg cell, this is called **fertilisation**.
  - g. The fertilised cell divides into many cells, by **cell division**.
  - h. Cell division leads to cells growing.
  - i. The fertilised egg cell then moves to the uterus and sinks into the uterus; this is called **implantation**.
5. Again, ask the learners if they have any questions.
  6. Now explain that:
    - a. When an egg is implanted, we say that a woman is pregnant.
    - b. Humans are pregnant for 40 weeks or nine months, called gestation.
    - c. The baby is born 40 weeks later. While the baby grows, it **matures** inside the uterus.
    - d. The table on the chalkboard gives information on three different health issues linked to the reproductive system.
  7. Ask the learners if they have any questions.
  8. Give the learners some time to write the information in their workbooks.

### **Checkpoint 1**

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

- a. How long is a female human pregnant for?
- b. What does ovulation mean?

Answers to the checkpoint questions are as follows:

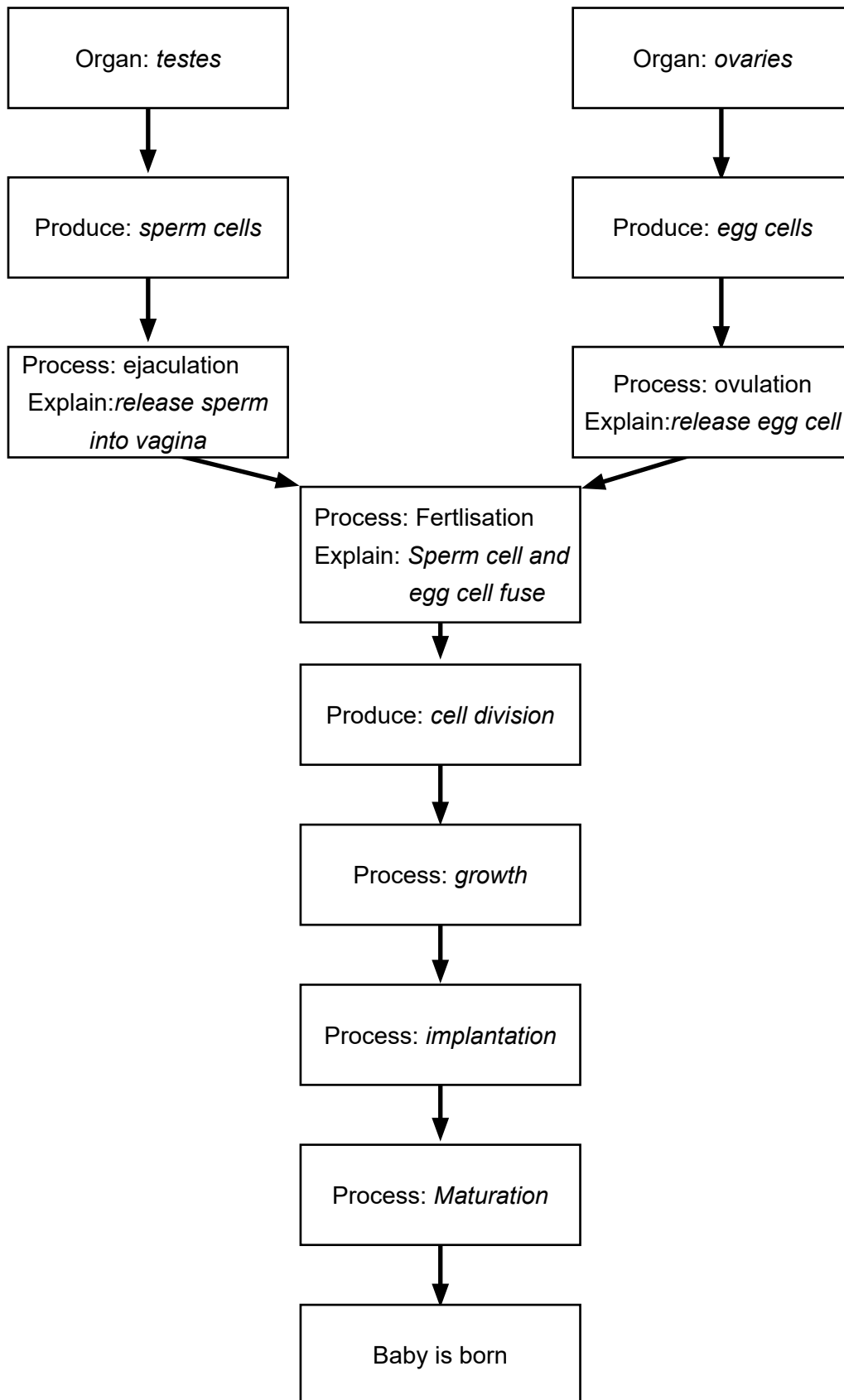
- a. 40 weeks
- b. Ovaries release an egg cell

## E

### CONCEPTUAL DEVELOPMENT

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

#### TASK 1



## TOPIC: Human reproduction

- If you have time, show the learners the videos and discuss the website that has been given at the end of the lesson.

### **Checkpoint 2**

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

- Why is copulation important?
- Name the process when the fertilised eggs sink into the uterus.

Answers to the checkpoint questions are as follows:

- Copulation releases sperm cells into the vagina.
- Implantation

## **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
Step-by-Step	Systems in the human body	54-57
Solutions for all	Systems in the human body	40-42
Spot On	Systems in the human body	33-35
Top Class	Systems in the human body	41-45
Via Afrika	Systems in the human body	36-37
Platinum	Systems in the human body	32-33
Oxford Successful	Systems in the human body	38-39
Pelican Natural Sciences	Systems in the human body	42-43
Sasol Inzalo Bk A	Systems in the human body	52-54

## **G** ADDITIONAL ACTIVITIES/ READING

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

- <https://ed.ted.com/on/uNT3AKcO> (12min 1sec) [The Reproductive System: How Gonads Go]
- <http://www.bbc.co.uk/education/guides/z7mbkqt/revision> [Interactive website on human reproductive system]

**5 B**

**Term 1, Week 5, Lesson B**

**Lesson Title: Puberty**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Human reproduction		
<b>CAPS Page Number</b>	59		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the main purpose of reproduction, that is, for the gametes (male and female sex cells) to combine to ensure the continuation of the species.</li> <li>explain the reason for the development of secondary sexual characteristics.</li> <li>describe the changes that occur to male and female bodies during puberty.</li> </ul>			
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
Projector, computer and internet	
Resource 14	

## **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 fertilisation?

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 fusion of the sperm cell and the egg cell to initiate the development of a new individual organism.*

## **D** ACCESSING INFORMATION

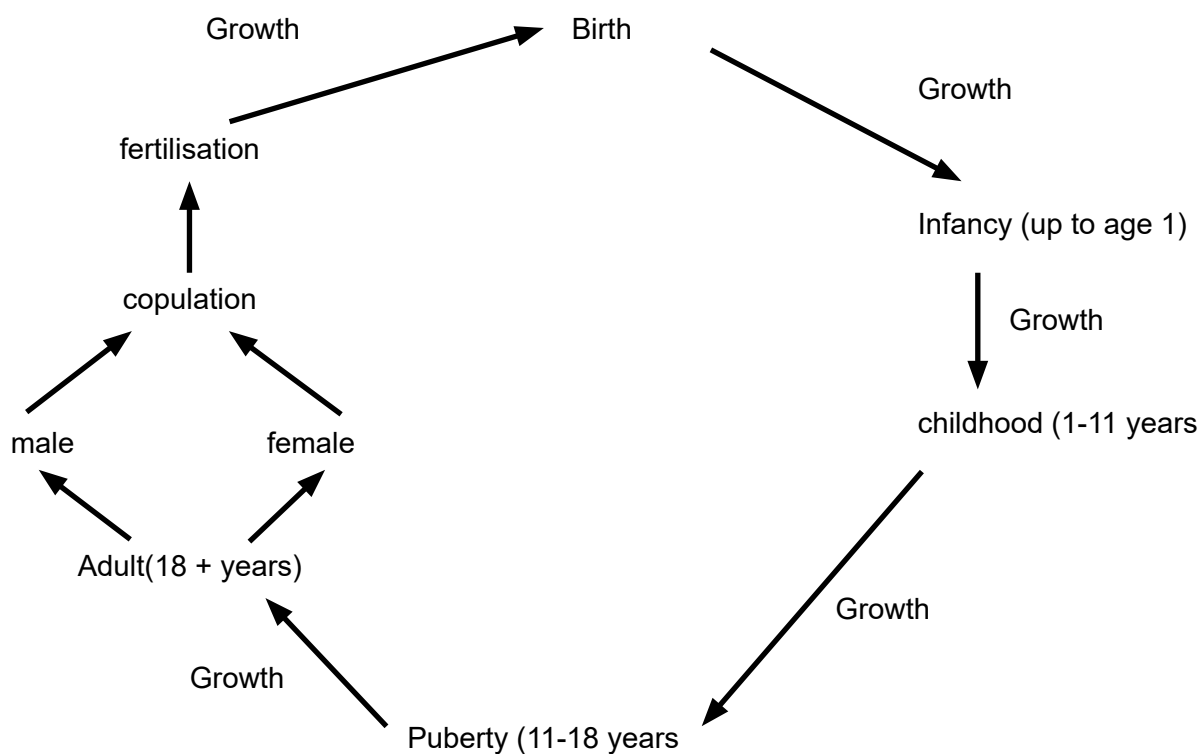
1. Write the following onto the chalkboard (always try to do this before the lesson starts):

### PUBERTY

1. Sex organs (ovaries and testes) mature and become ready for sexual reproduction.
2. Girls: puberty starts between the ages of 8 and 13.
3. Boys: puberty starts between the ages of 9 and 14.
4. The pituitary gland releases hormones (testosterone and oestrogen) which bring
5. about changes in the body.
6. Girls: wider hips, more fat, menstruation (period) starts, underarm and pubic hair grows
7. Boys: grow taller, facial hair, underarm and pubic hair grows, voice deepens



## THE STAGES OF THE HUMAN LIFE CYCLE



2. Explain this to the learners as follows:

- a. Reproduction is needed to produce offspring to continue the survival of human beings.
- b. If organisms did not reproduce, then they would become extinct.
- c. Humans reproduce by having children.
- d. A sperm and egg cell have to fuse in order to create a baby.
- e. You need to learn how reproduction takes place so that you can make choices about whether you want to have a baby or not.
- f. **Puberty** is the time of your life when the sexual organs mature for reproduction.
- g. For boys, puberty starts between the ages of 9 and 14, and for girls puberty starts between the ages of 8 and 13.
- h. The changes that happen in your body occur because of hormones.
- i. The **pituitary gland**, found in the brain, has the job of releasing the **hormones** into the blood.
- j. **Testosterone** is released from testes in males and **oestrogen** is released from ovaries in females.
- k. These hormones bring about the changes that happen in your body. Girls and boys start to grow hair under their arms, girls and boys also start to grow taller, skin may become oily and pimples may happen.

3. Ask the learners if they have any questions.

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

# TOPIC: Human reproduction

## Checkpoint 1

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

- a. What does adolescence mean?
- b. At what age does a boy start to go through puberty?

Answers to the checkpoint questions are as follows:

- a. The body goes through changes at puberty.
- b. Between 9 and 14 years old

## **E**

## CONCEPTUAL DEVELOPMENT

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

### TASK 1

<b>Males</b>	<b>Females</b>

Place the changes that occur during puberty into the correct column of the table:

- voice deepens,
- breasts get bigger,
- body stores extra fat,
- muscles get bigger and stronger,
- sperm is made,
- egg cells start to be released from ovaries,
- menstruation starts,
- hair grows on the face and under the arms and pubic area,
- egg cells start to be released from ovaries,
- testes and penis get bigger.

### TASK 2

Write either testosterone or oestrogen next to each change in your table.

## TOPIC: Human reproduction

2. Explain to the learners the activity as follows:
  - a. Draw the table in your workbooks.
  - b. Girls and boys go through different changes when they get to puberty.
  - c. Some of the changes are written in a list below the table.
  - d. Work out whether the change happens to a girl or a boy and then write them in the table under the heading 'Males' or 'Females'.
  - e. Complete the task on your own.
3. Allow the learners some time to complete Task 1.
4. Explain Task 2 to the learners as follows:
  - a. Hormones control each of the changes that happen in the body.
  - b. Write testosterone or oestrogen next to each change.
5. Allow the learners some time to complete Task 2.
6. With the learners' input, complete the model answer on the chalkboard.

### TASKS 1 AND TASK 2

<b>Males</b>	<b>Females</b>
<i>voice deepens (testosterone)</i>	<i>body stores extra fat (oestrogen)</i>
<i>muscles get bigger and stronger (testosterone)</i>	<i>breasts get bigger (oestrogen)</i>
<i>hair grows on the face, under the arms and pubic area (testosterone)</i>	<i>hair grows under the arms and in the pubic area (oestrogen)</i>
<i>testes and penis get bigger (testosterone)</i>	<i>menstruation starts (oestrogen)</i>
<i>sperm is made (testosterone)</i>	<i>egg cells start to be released from ovaries (oestrogen)</i>

7. Discuss the answers with the learners.
8. If there is time left over, show the learners the videos given at the end of the lesson.

### **Checkpoint 2**

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

- a. Why does a woman's body need to store more fat than men?
- b. What is menstruation a sign of?

Answers to the checkpoint questions are as follows:

- a. To store energy that may be used to nurture a baby
- b. The ovaries have started released egg cells.

## TOPIC: Human reproduction

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

### **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
Solutions for All	Human reproduction	48-49
Via Afrika	Human reproduction	38-39
Oxford Successful	Human reproduction	
Pearson: Spot On	Human reproduction	38
Pearson: Platinum	Human reproduction	36-37
Shuters Top Class	Human reproduction	48-49
Step-by-Step	Human reproduction	63
Pelican Natural Sciences	Human reproduction	50-51
Sasol Inzalo Bk A	Human reproduction	62-63

### **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://ed.ted.com/on/vgsNu9pY> (4min 30sec) [Ted Ed: Decoding Puberty in Girls]
2. <https://ed.ted.com/on/FMAwYI39> (5min 0sec) [Ted Ed: All About Boys Puberty]

**5 C**

**Term 1, Week 5, Lesson C**

**Lesson Title: Hormones responsible for puberty**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Human reproduction		
<b>CAPS Page Number</b>	59		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>explain the role of the pituitary gland in initiating the maturation of the sex organs</li> <li>describe the role of oestrogen and testosterone in development of the sex organs</li> </ul>			
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
Projector, computer and internet	
Resource 15	

## **C** CLASSROOM MANAGEMENT

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

What is the purpose of sexual reproduction?

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.

*Fertilisation of sperm and egg cells to continue the survival of the species.*

## **D** ACCESSING INFORMATION

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

THE PITUITARY GLAND AND HORMONES

1. PITUITARY GLAND – found at the bottom of the brain, makes hormones that tell organs what to do
2. HORMONES – chemicals made by glands, speed up or slow down activities of an organ
3. Hormones, released by pituitary gland into the blood, make the ovaries and testes release oestrogen and testosterone.
4. Testosterone and oestrogen cause changes to happen in the body.
5. Examples of change are: menstruation, facial hair, pubic hair, growing taller.
6. Emotional changes also happen such as mood changes, low self-esteem, aggression and depression.

2. Explain this to the learners as follows:
  - a. The pituitary gland is a structure found at the base of the brain. Show the learners Resource 15.
  - b. It makes hormones that tell different organs what to do.
  - c. Hormones are chemicals that are made by different glands.

## TOPIC: Human reproduction

- d. Hormones either speed up or slow down the activities of an organ.
  - e. Hormones are released from the pituitary gland into the bloodstream.
  - f. They then travel through the blood to the testes of a boy and the ovaries of a girl.
  - g. As a result of these hormones, the testes begin to make testosterone and the ovaries make oestrogen.
  - h. Testosterone and oestrogen then cause changes to happen to the bodies of girls and boys.
  - i. Testosterone causes boys to grow taller, grow facial hair and pubic hair, and muscles become bigger and stronger.
  - j. Oestrogen causes girls to grow taller, to menstruate or have their period, grow pubic hair, and hips become wider for childbirth.
3. Ask the learners if they have any questions.
  4. Now explain that:
    - a. These changes in boys and girls are called secondary sexual characteristics.
    - b. During puberty, you may also go through some changes in your emotions.
    - c. Emotions are strong feelings about something or somebody.
    - d. These changes could be unexplained mood changes, low self-esteem when you do not believe in yourself, aggression and depression.
    - e. These feelings are normal during puberty. If they start to make you feel really sad and not like yourself, then you should talk to either your parents or a close relative.
  5. Tell the learners to copy the information written on the chalkboard into their workbooks.
  6. If there is time left, use the computer and projector to show the videos given at the end of the lesson.

### **Checkpoint 1**

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

- a. Which gland tells the ovaries to release oestrogen?
- b. What are hormones?

Answers to the checkpoint questions are as follows:

- a. Pituitary gland
- b. Chemicals that are made by glands. They speed up or slow down activities of an organ.

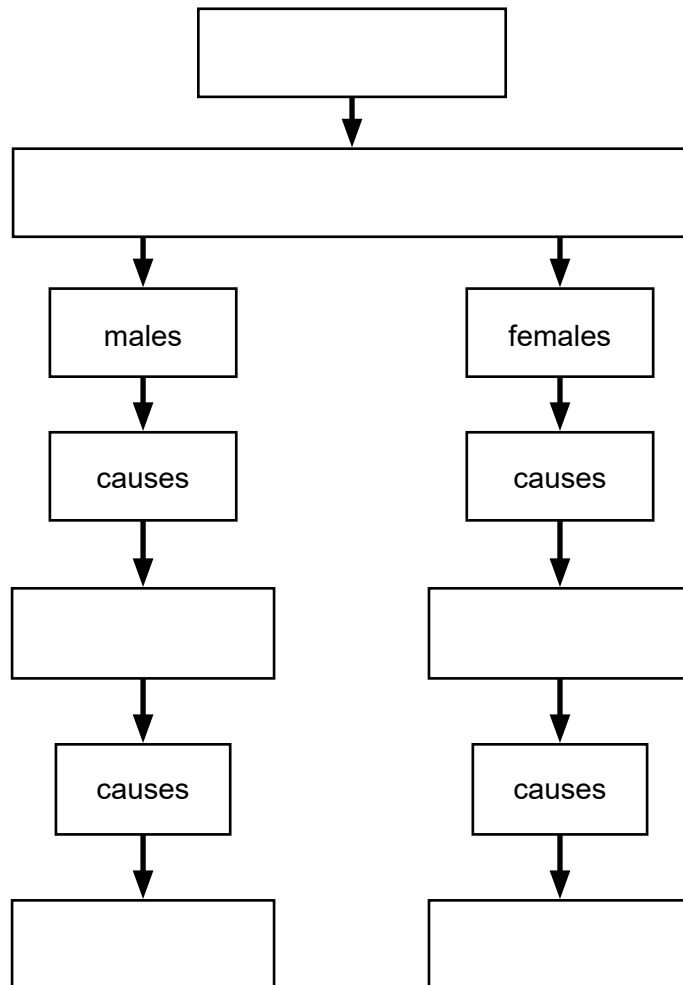
## E

### CONCEPTUAL DEVELOPMENT

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

#### TASK 1

1. Explain the meaning of puberty, hormones and pituitary gland.
2. Describe how puberty is started and controlled by hormones.
3. Show the process listed in 2 in a flow map.



Complete the following sentences:

4. \_\_\_\_\_ is the method by which continuity of life is maintained.
5. \_\_\_\_\_ is the onset of the period of sexual maturity.
6. Puberty in males is controlled by the \_\_\_\_\_ hormone.
7. Puberty in female is controlled by the \_\_\_\_\_ hormone.

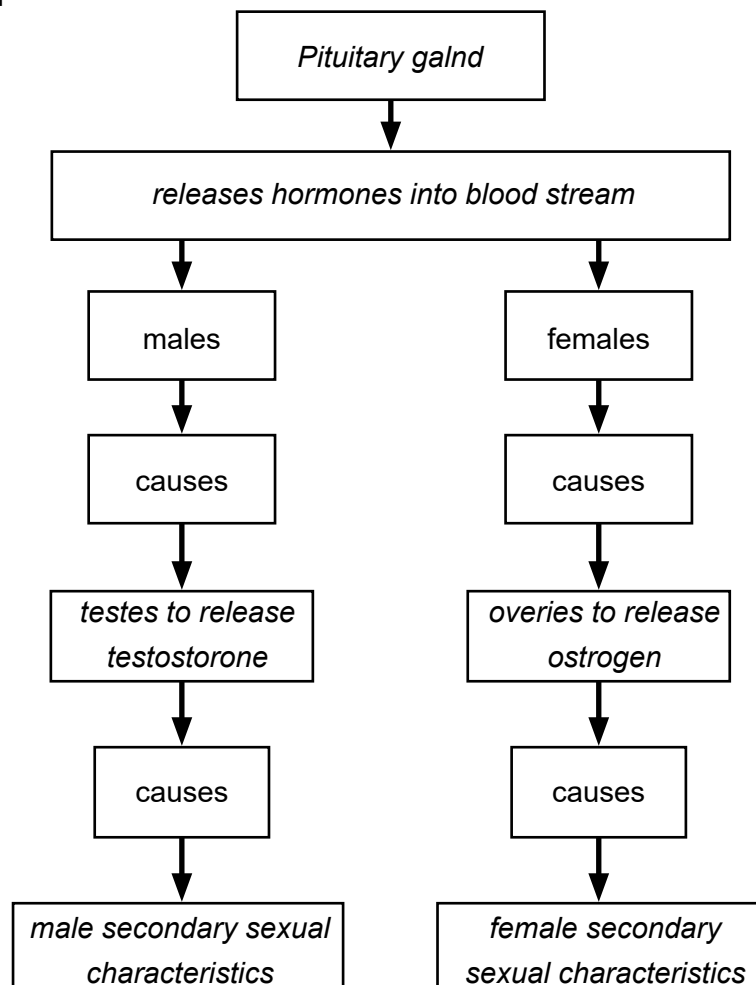


# TOPIC: Human reproduction

2. Explain to the learners the activity as follows:
  - a. Answer the questions in your workbook.
  - b. Try to write as much information as you can to make sure you understand puberty.
  - c. Draw a flow map to show how the pituitary gland works.
  - d. Complete the sentences. Write the whole sentence in your workbooks and underline the missing word.
  - e. Use the information that you wrote down at the beginning of the lesson.
  - f. Work on your own.
3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:

## TASK 1

1. Puberty – sexual organs (testes and ovaries) mature for sexual reproduction  
hormones – chemicals that are made by glands to speed up or slow down activities of organs.  
pituitary gland – structure found at the base of the brain which releases hormones.
2. Pituitary gland releases hormones into the blood. Ovaries and testes are told to release oestrogen and testosterone.
3. Flow map:



## TOPIC: Human reproduction

5. Sexual reproduction is the method by which continuity of life is maintained.
6. Puberty is the onset of the period of sexual maturity.
7. Puberty in males is controlled by the testosterone hormone.
8. Puberty in females is controlled by the oestrogen hormone.

5. Discuss the answers with the learners.

### **Checkpoint 2**

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

- a. Are the emotional changes that happen during puberty normal?
- b. Do girls and boys both grow pubic hair during puberty?

Answers to the checkpoint questions are as follows:

- a. Yes
- b. Yes

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

## **F** REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Solutions for All	Human reproduction	48-49
Via Afrika	Human reproduction	39
Oxford Successful	Human reproduction	40-41
Pearson: Spot On	Human reproduction	38
Pearson: Platinum	Human reproduction	38-39
Shuters Top Class	Human reproduction	49
Step-by-Step	Human reproduction	63
Pelican Natural Sciences	Human reproduction	51
Sasol Inzalo Bk A	Human reproduction	62-64

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. <http://kidshealth.org/en/kids/puberty.html> [Interactive website on puberty]
2. <https://www.plannedparenthood.org/learn/teens/puberty> [Informative website on puberty]

**6 A**

**Term 1, Week 6, Lesson A**

**Lesson Title: Reproductive organs**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Human reproduction	
<b>CAPS Page Number</b>	59	
<b>Lesson Objectives</b>		
By the end of the lesson, learners will be able to:		
<ul style="list-style-type: none"> <li>describe the structures that make up the male reproductive system</li> <li>explain how the structures allow the functioning of the male reproductive system</li> <li>describe the structures that make up the female reproductive system</li> <li>explain how the structures allow the functioning of the female reproductive system</li> </ul>		
Specific Aims	1. DOING SCIENCE	
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the male and female reproductive systems	
Projector, computer and internet	
Resource 16	

## **C** CLASSROOM MANAGEMENT

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

What is the purpose of the testes?

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 testes produce testosterone and sperm.*

## **D** ACCESSING INFORMATION

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

### MALE REPRODUCTIVE SYSTEM

Organs: penis, sperm duct, testes, scrotum and urethra

Function: make and store sperm, and place the sperm in the female

Organ	Function
Penis	Place sperm inside female using ejaculation.
Sperm duct	Tube that carries sperm from testes to penis
Testes	Makes sperm and testosterone
Scrotum	Bag of skin that holds testes outside the body
Urethra	Tube that carries both <b>semen</b> and urine but never at the same time

# TOPIC: Human reproduction

## FEMALE REPRODUCTIVE SYSTEM

Organs: vagina, uterus, ovaries and oviducts

Function: make egg cells and provide place for growth of a baby

Organ	Function
Vagina	Muscular tube that opens to outside of the body
Uterus	Hollow with a thick muscular wall for growth of baby
Ovaries	Make egg cells and oestrogen
Oviducts	Carry egg from ovary to uterus

2. Explain this to the learners as follows:
  - a. The male reproductive organs include the penis, sperm duct, scrotum and urethra.
  - b. The functions are making and storing sperm, and placing sperm inside the female.
  - c. The penis places the sperm inside the female. Ejaculation is the process where sperm is released from the penis.
  - d. The sperm duct is a tube that carries sperm from the testes to the penis.
  - e. The testes make sperm and testosterone.
  - f. The scrotum is a bag of skin that holds the testes outside the body. This keeps them at the right temperature.
  - g. The urethra is a tube that carries semen and urine but never at the same time.
  - h. Show the learners Resource 16.
  - i. The female reproductive organs include the vagina, uterus, ovaries and the oviducts.
  - j. Their functions are to make egg cells and to provide a place for a baby to grow before it is born.
  - k. The vagina is a muscular tube that opens to the outside of the body. The penis is placed here during copulation and it is the birth canal, the place through which the baby is born.
  - l. The uterus is hollow with a thick muscular wall because this is where the baby grows when a woman is pregnant.
  - m. The ovaries make egg cells and oestrogen.
  - n. The oviducts carry the egg from the ovary to the uterus.
  - o. Show the learners Resource 16.
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.

## **Checkpoint 1**

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

- a. Why is the uterus such an important organ in reproduction?
- b. Does the urethra carry sperm or urine?

Answers to the checkpoint questions are as follows:

- a. This is where the baby grows until it is ready to be born.
- b. It carries both but never at the same time.

## **E**

## **CONCEPTUAL DEVELOPMENT**

1. Write and draw the following on the chalkboard:

### TASK 1

Draw a flow map to show the path the sperm travels from the testes to the vagina, and include the names of the processes that are involved.

### TASK 2

Draw a flow map to show the path the egg travels from the ovary to the uterus, and include the names of the processes that are involved.

2. Explain to the learners the activity as follows:

You have learnt about the reproductive systems of males and females and also about their functions.

In order to understand how the process works, you will draw two flow maps.

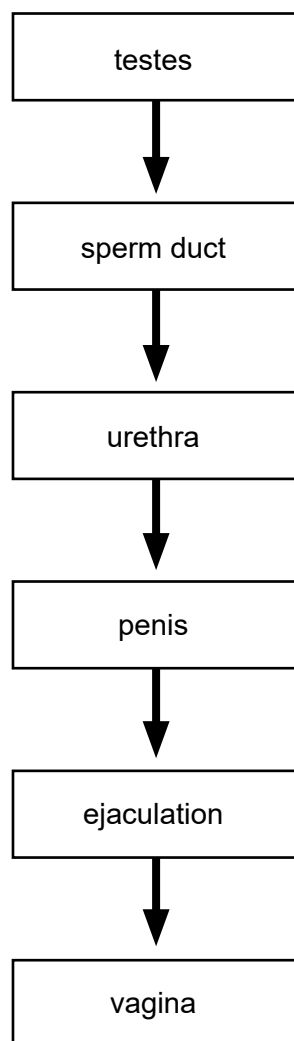
One flow map will show the path the sperm travels from the testes to the vagina.

The second flow map will show the path the egg travels from the ovaries to the uterus.

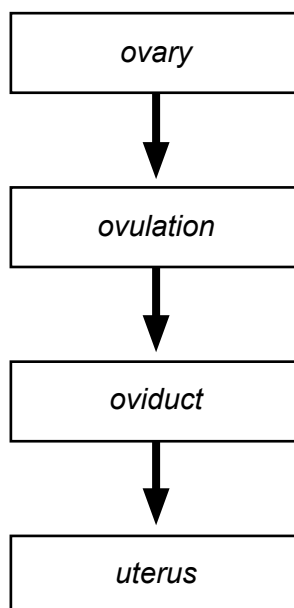
Complete the tasks on your own.

3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:

## TASK 1



## TASK 2



5. Discuss the answers with the learners.
6. If you have time, show the learners the video that is included at the end of the lesson.

# TOPIC: Human reproduction

## Checkpoint 2

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

- a. What is the difference between the sperm duct and the urethra?
- b. What two functions does the vagina have?

Answers to the checkpoint questions are as follows:

- a. The sperm duct only carries sperm from the testes to the penis and the urethra carries both sperm and urine but never at the same time.
- b. The vagina is the place where the penis is inserted during copulation. It is also the birth canal for the baby which leaves the body when it is born.

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
Solutions for All	Human reproduction	50-52
Via Afrika	Human reproduction	40-41
Oxford Successful	Human reproduction	42-43
Pearson: Spot On	Human reproduction	39
Pearson: Platinum	Human reproduction	40-42
Shuters Top Class	Human reproduction	50-51
Step-by-Step	Human reproduction	64-67
Pelican Natural Sciences	Human reproduction	52-56
Sasol Inzalo Bk A	Human reproduction	65-67

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. <https://www.youtube.com/watch?v=CqmW9CL80q0> (3min 51sec) [The reproductive system] Educational Video for kids]
2. [http://www.bbc.co.uk/bitesize/ks3/science/organisms\\_behaviour\\_health/reproduction/rev-ision/2/](http://www.bbc.co.uk/bitesize/ks3/science/organisms_behaviour_health/reproduction/rev-ision/2/) [Interactive website on human sex organs]



**6 B**

**Term 1, Week 6, Lesson B**

**Lesson Title: The Menstrual Cycle**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Human reproduction		
<b>CAPS Page Number</b>	60		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe what happens during ovulation</li> <li>explain why the uterus develops a thicker layer at a certain time of the month</li> <li>differentiate between what happens to the endometrium when fertilisation happens and when it does not happen</li> <li>list the steps of the menstrual cycle.</li> </ul>			
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
Menstrual cycle charts	
Projector, computer and internet	
Resource 17	

## **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 the uterus?

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 uterus is the place where the baby grows before being born.*

## **D** ACCESSING INFORMATION

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

### THE MENSTRUAL CYCLE

Menstrual cycle – a series of changes that happen in the female reproductive organs

It is a 28-day cycle to prepare the uterus for possible pregnancy

Menstruation – breakdown of the lining of the uterus, the ‘period’

Days 1-5: Bleeding – uterus wall breaks down and passes out through the vagina

Days 6-13: Lining of the uterus builds up and becomes thicker

Days 14-16: Ovary releases egg (ovulation)

Days 17-28: Lining of uterus stays thick while it waits for a fertilised egg to arrive.

If fertilisation does not happen, then the female will bleed again on days 1-5.

2. Explain this to the learners as follows:
  - a. Each month, a new egg is released from the ovary. This is called ovulation.
  - b. If sperm is released into the vagina and fuses with the egg, fertilisation happens.
  - c. At the same time that ovulation happens, the wall of the uterus thickens.

## TOPIC: Human reproduction

- d. This occurs so that a baby can grow in the wall of the uterus.
  - e. If no sperm is released into the vagina, then the wall of the uterus will break down and a woman will bleed through her vagina.
  - f. The menstrual cycle lasts for about 28 days.
  - g. The first stage is the bleeding and this usually lasts for five days. When you are a teenager, you could have your period for three days or even eight days. As you get older, it will start to become more regular.
  - h. Once a female has had her period, the wall of the uterus starts to get thicker. This happens from day six to day 28.
  - i. An egg is usually released between days 14 and 16.
  - j. Females can experience lots of pain while they are menstruating. This is because the blood is pulling off the uterus walls. A hot water bottle may help with the pain.
  - k. Show the learners Resource 17. Point to the uterus.
3. Tell the learners to copy the information written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. Does a woman menstruate at the beginning or the end of the menstrual cycle?
- b. How long does the menstrual cycle usually last?

Answers to the checkpoint questions are as follows:

- a. At the beginning, first 5 days
- b. 28 days

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

### TASK 1

Explain the difference between the menstrual cycle and menstruation.

### TASK 2

Use these words when you do the questions below: ovulation, menstruation, uterus lining thickens, day 1, day 14, egg cell, days 7-13, fertilisation, no fertilisation (some words can be used more than once).

1. Draw a flow map to show the order that the female body prepares for reproduction, if fertilisation occurs.
2. Draw a flow map to show the order that the female body prepares for reproduction, if fertilisation does NOT occur.

2. Explain to the learners the activity as follows:
  - a. Explain the difference between the menstrual cycle and menstruation.
  - b. Use the words given on the chalkboard to draw two flow maps.
  - c. The first flow map must show what happens to the female reproductive organs if fertilisation occurs.
  - d. The second flow map must show what happens to the female reproductive organs if fertilisation does not occur.
  - e. Complete the task with a partner.
3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:

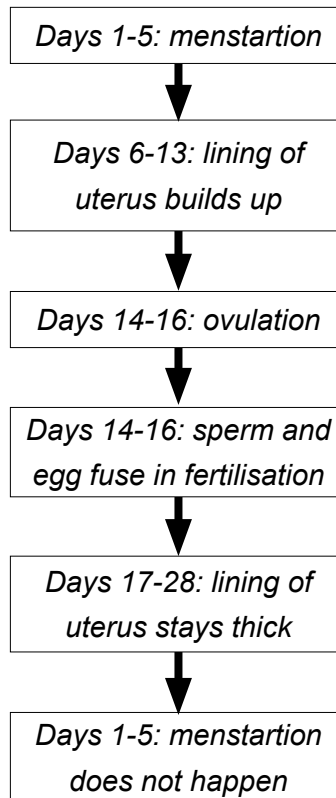
### TASK 1

Menstrual cycle – a series of changes that happen in the female reproductive organs

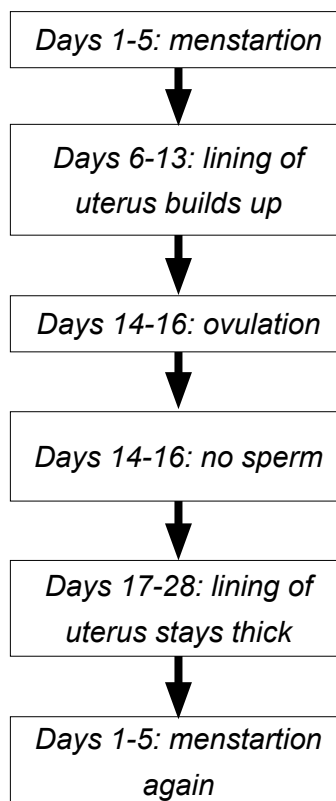
Menstruation – breakdown of the lining of the uterus, the 'period'

## TASK 2

### 1. Fertilisation OCCURS



### 2. Fertilisation DOES NOT occur



## TOPIC: Human reproduction

5. Discuss the answers with the learners.
6. If there is time left over, show the learners the video and website given at the end of this lesson.

### **Checkpoint 2**

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

- a. Give the definition of fertilisation.
- b. What happens during ovulation?

Answers to the checkpoint questions are as follows:

- a. The sperm cell and the egg cell fuse.
- b. The egg cell is released from the ovary.

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
Solutions for All	Human reproduction	53-55
Via Afrika	Human reproduction	42
Oxford Successful	Human reproduction	44-45
Pearson: Spot On	Human reproduction	40
Pearson: Platinum	Human reproduction	44-45
Shuters Top Class	Human reproduction	52-53
Step-by-Step	Human reproduction	-
Pelican Natural Sciences	Human reproduction	56-57
Sasol Inzalo Bk A	Human reproduction	67-69

## **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=ayzN5f3qN8g> (4min 11 sec) [How menstruation works]
2. [http://www.bbc.co.uk/schools/gcsebitesize/science/aqa\\_pre\\_2011/human/hormonesrev3.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/aqa_pre_2011/human/hormonesrev3.shtml) [Interactive website on the menstrual cycle]

**6 C**

**Term 1, Week 6, Lesson C**

**Lesson Title: Formation of a foetus**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Human reproduction		
<b>CAPS Page Number</b>	60		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>• explain the process of implantation to the creation of a foetus</li> <li>• describe the role of the placenta</li> <li>• describe what happens during pregnancy</li> <li>• discuss the use of condoms as contraceptives and measures to prevent spread of STDs.</li> </ul>			
Specific Aims	1. DOING SCIENCE		
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of reproductive system	
Projector, computer and internet	
Resource 18	

## **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 during implantation?

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 fertilised egg sinks into the uterus lining.*

## **D** ACCESSING INFORMATION

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

### STAGES OF REPRODUCTION

1. Copulation – penis placed inside vagina
2. Ejaculation – penis releases sperm into vagina
3. Fertilisation – sperm cell fuses with egg cell
4. Conception – fertilisation occurs
5. Implantation – fertilised egg cells sinks into uterus wall
6. Maturation – fertilised egg grows and develops
7. Placenta – provides food to the growing baby
8. Pregnancy – lasts up to 40 weeks

### CONTRACEPTION

1. Sexually active people can control when they want to have a baby.
2. Contraception can prevent pregnancy in teenagers or people who are unable to care for a child.
3. A condom is placed over the penis before copulation and thrown away immediately afterwards. It also protects against STDs (e.g HIV/AIDS).



## TOPIC: Human reproduction

2. Explain this to the learners as follows:
  - a. Sexual reproduction involves various stages.
  - b. You have learnt about most of the stages through our lessons.
  - c. Fertilisation is the fusion of the sperm cell and the egg cell.
  - d. The fertilised egg cell sinks into the wall of the uterus during the process of implantation.
  - e. As the fertilised egg cell grows and matures, it becomes a zygote.
  - f. At the same time, an organ called the placenta is made. This gives the growing foetus food.
  - g. Pregnancy is 40 weeks long.
  - h. Some people want to be able to have intercourse but are unable to care for a baby. They may be too young or may not have enough money to feed themselves and a baby.
  - i. These people must use contraceptives.
  - j. A condom is a very good contraceptive. It is placed over the erect penis before copulation. Condoms will trap the sperm so that it does not travel into the vagina.
  - k. Condoms must be thrown away straight after they have been used. They cannot be used more than once.
  - l. Condoms also stop the spread of STDs (HIV/AIDS).
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. What does the placenta do?
- b. What does contraception mean?

Answers to the checkpoint questions are as follows:

- a. Gives the growing foetus food nutrients
- b. Stops women from becoming pregnant

## E

### CONCEPTUAL DEVELOPMENT

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

#### TASK 1

Provide a definition for each word:

1. copulation
2. implantation
3. menstruation
4. fertilisation
5. pregnancy
6. ovulation.

#### TASK 2

Draw a flow map to show the stages during reproduction of a baby. Use the answers in Task 1 to help you.

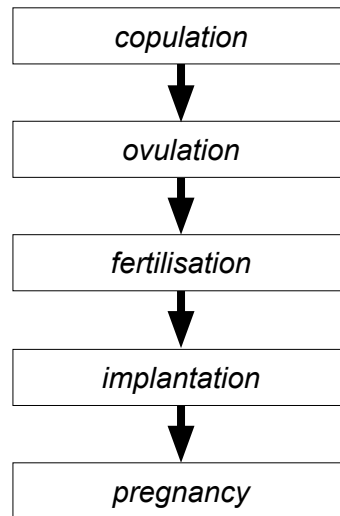
2. Explain the activity as follows:
3. Explain to the learners the activity as follows:
  - a. Provide a definition for each of the 6 words given. Try to write in your own words.
  - b. Complete the task on your own.
4. Allow the learners some time to complete Task 1.
5. Once the learners have completed Task 1, explain Task 2 as follows:
  - a. Draw a flow map to show the order of the stages during the reproduction of a baby.
  - b. You may use the answers in task 1 to help you.
6. You do not need to re-write the definitions, only give the term.
7. With the learners' input, complete the model answer on the chalkboard:

#### TASK 1

1. *Copulation – erect penis is placed in the vagina*
2. *Implantation – fertilised egg sinks into uterus wall*
3. *Menstruation – the breakdown of the lining of the uterus wall (having a period)*
4. *Fertilisation – fusion of egg cell and sperm cell*
5. *Pregnancy – woman carries a growing baby in her uterus*
6. *Ovulation – ovary releases egg cell*

## TASK 2

(Ovulation could come before or after copulation; fertilisation must be after copulation)



8. Discuss the answers with the learners.

## **Checkpoint 2**

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

- a. Why is it VERY important to wear a condom during sex?
- b. How long is a woman pregnant for?

Answers to the checkpoint questions are as follows:

- a. To prevent STDs such as HIV/Aids and to stop a woman from falling pregnant
- b. 40 weeks

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

10. If there is time, show the learners the video and website given at the end of the lesson.

## **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
Solutions for All	Human reproduction	56-65
Via Afrika	Human reproduction	43-48
Oxford Successful	Human reproduction	46-48
Pearson: Spot On	Human reproduction	41-43
Pearson: Platinum	Human reproduction	46-47
Shuters Top Class	Human reproduction	53-56
Step-by-Step	Human reproduction	68-70
Pelican Natural Sciences	Human reproduction	58-61
Sasol Inzalo Bk A	Human reproduction	71-77

## **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.ted.com/talks/alexander\\_tsiaras\\_conception\\_to\\_birth\\_visualized](https://www.ted.com/talks/alexander_tsiaras_conception_to_birth_visualized) (9min 37sec) [Conception to birth – visualised]
2. <https://ed.ted.com/lessons/how-do-contraceptives-work-nwhunter> (4min 21sec) [How do contraceptives work?]

# TOPIC OVERVIEW:

## Circulatory and respiratory systems

### Term 1, Weeks 7A – 8B

#### A. TOPIC OVERVIEW

##### Term 1, Weeks 7a – 8b

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

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

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

#### B. SEQUENTIAL TABLE

GRADE 8	GRADE 9	GRADE 10 - 12
<b>LOOKING BACK</b>	<b>CURRENT</b>	<b>LOOKING FORWARD</b>
<ul style="list-style-type: none"> <li>• Photosynthesis requires carbon dioxide to produce food and releases oxygen as a waste product</li> <li>• Respiration uses oxygen to convert food into energy and releases carbon dioxide as a waste product</li> </ul>	<ul style="list-style-type: none"> <li>• Breathing is inhalation of oxygen and exhalation of carbon dioxide</li> <li>• Gaseous exchange occurs at the lungs and at the body cells</li> <li>• Circulation of oxygen around the body is maintained by the beating of the heart</li> <li>• Respiration occurs in the mitochondria of all living cells and is necessary for the production of energy</li> </ul>	<ul style="list-style-type: none"> <li>• Pulmonary and systemic circulatory systems</li> <li>• Direction of blood flow: the difference between oxygenated and deoxygenated blood in different parts of the system</li> <li>• Mechanisms for controlling the cardiac cycle and heart rate</li> <li>• The relationship between the blood system and lymphatic system.</li> <li>• Diseases of the heart and circulatory system</li> <li>• Causes, symptoms and treatment of tuberculosis (TB) in South Africa</li> </ul>

## C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	inhalation	active process that brings air into the body
2.	gaseous exchange	transfer of oxygen and carbon dioxide between an organism and its environment
3.	arteries	transports blood away from the heart
4.	oxygenated blood	blood that is rich in oxygen
5.	deoxygenated blood	blood that is rich in carbon dioxide
6.	veins	transport blood to the heart
7.	diffusion	movement of gases from a high concentration to a low concentration
8.	respiration	process that uses oxygen to convert glucose into energy
9.	circulation	flow of blood through the body cell and organs of an animal
10.	mitochondria	organelles responsible for respiration
11.	capillaries	smallest of the blood vessels that surrounds all body cells
12.	oxygen	reactant required in respiration
13.	carbon dioxide	waste product of respiration that is exhaled
14.	diaphragm	muscular plate that divides chest from abdomen
15.	muscles contract	requires energy as muscles shorten to bring bones closer to each other
16.	intercostal muscles	muscles between ribs, used to lift the rib cage
17.	breathing	inflow and outflow of air in the lungs
18.	exhalation	passive process that expels air from body
19.	alveoli	tiny air sacs found in the lungs
20.	intercostal muscles	muscles between the ribs which assist with breathing

## D. UNDERSTANDING THE USES / VALUE OF SCIENCE

The value of knowing that the respiratory and circulatory systems are linked. The respiratory system gets oxygen into the body and removes carbon dioxide from the body. The circulatory system carries oxygen to the cells for respiration and carries carbon dioxide away from the cells. Without these two systems, humans would not create energy and would not carry out their daily functions.

## E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

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

## TOPIC: Circulatory and respiratory systems

# 7 A

### Term 1, Week 7, Lesson A

### Lesson Title: Breathing – inhalation

### Time for lesson: 1 hour

## A POLICY AND OUTCOMES

<b>Sub-Topic</b>	Respiratory system		
<b>CAPS Page Number</b>	60		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>• describe how the downward movement of the diaphragm and the upward movement of the ribs allows for inhalation.</li> <li>• explain the need for inhalation to bring oxygen into the respiratory system.</li> <li>• explain that the lungs are the site of gaseous exchange.</li> </ul>			
<b>Specific Aims</b>	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

## SCIENCE PROCESS SKILLS

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



## B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of respiratory system	2 litre cold drink bottle, cling film, elastic band, straw, Prestik, balloon
Projector and lap top with internet	
Resource 19: Structure of diaphragm	

## C CLASSROOM MANAGEMENT

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

Which two processes are involved in 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.

*Inhalation and exhalation*

## D ACCESSING INFORMATION

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

### BREATHING

1. Air enters the lungs through inhalation.
2. Air contains a mixture of gases including oxygen and carbon dioxide.
3. Air flows into the lungs because of a change in air pressure.

### INHALATION

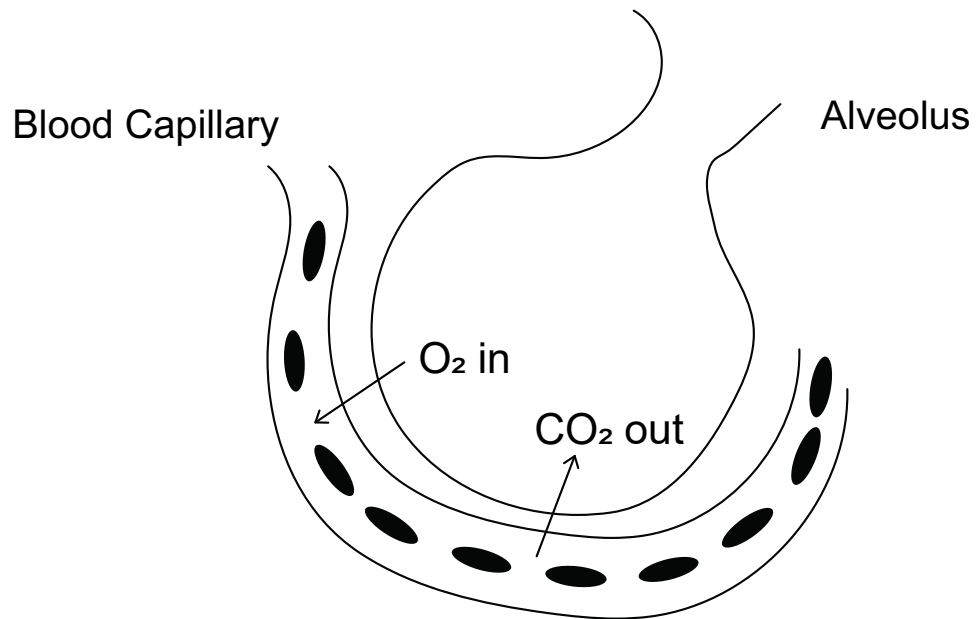
An active process that is caused by muscle contraction:

1. Muscles of the diaphragm contract, and the diaphragm moves downwards.
2. Intercostal muscles contract and the rib cage moves upwards and outwards.
3. Volume of thoracic cavity increases.
4. Air pressure in the thoracic cavity decreases.
5. Air rushes into the air passages and into the lungs.
6. Air travels into the lungs and into the **alveoli**.

## GASEOUS EXCHANGE AT THE LUNGS

Gaseous exchange - transfer of oxygen and carbon dioxide

1. Oxygen gas moves from an area of high concentration in the alveolus to an area of low concentration in the blood capillary.
2. Carbon dioxide moves from an area of high concentration in the blood capillary to an area of low concentration in the alveolus.



2. Explain the following to the learners:
  - a. The respiratory system and the circulatory system work together to take gases to and from all the cells in the body.
  - b. The first step is **inhalation** or breathing in.
  - c. Ask the learners to place their hands on their chests; they should be able to feel the bumps of their ribs.
  - d. Ask the learners to take a deep breath in. They should feel their hands move upwards and outwards.
  - e. Inhalation is an active process that needs energy.
3. Ask learners if they have any questions.

## TOPIC: Circulatory and respiratory systems

4. Now explain the following to the learners:
  - a. The muscles of the **diaphragm** contract which causes it to move downwards.
  - b. Show the learners Resource 19 and point to the structure labelled 'Diaphragm'.
  - c. At the same time as the diaphragm contracts, the **intercostal muscles** found between the ribs also contract, which makes the rib cage lift upwards.
  - d. This makes the volume (the space) inside the **thoracic cavity** increase.
  - e. Air pressure in the thoracic cavity decreases and air rushes into the mouth and nose and into the air passages.
  - f. The lungs are made up of tiny air sacs called **alveoli**.
  - g. This is where **gaseous exchange** takes place.
5. Again, ask the learners if they have any questions and then explain the following:
  - a. Oxygen moves from the alveoli into the blood capillary because of **diffusion**.
  - b. Diffusion is the movement of gases from a high concentration to a low concentration.
  - c. The concentration of oxygen is high in the alveoli because the person has just inhaled, so the oxygen moves into the blood capillary where there is a low concentration of oxygen.
  - d. Carbon dioxide moves in the opposite direction.
  - e. There is a low concentration of carbon dioxide in the alveoli compared to the blood capillary so the carbon dioxide moves from the blood capillary into the alveolus.
6. Ask the learners if they have any questions.
7. Give the learners some time to write the information in their workbooks.

### **Checkpoint 1**

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

- a. What are alveoli?
- b. Is inhalation an active or passive process?

Answers to the checkpoint questions are as follows:

- a. Tiny air sacs inside the lungs
- b. Active process because energy is needed to contract muscles

## E

### CONCEPTUAL DEVELOPMENT

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

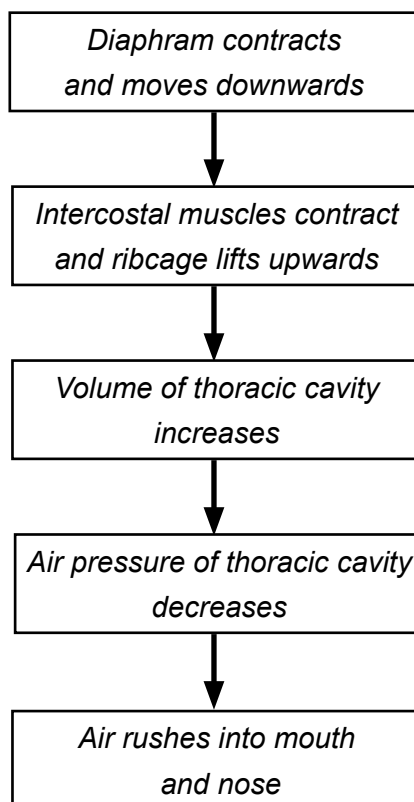
#### TASK

1. Draw a flow map to show how air comes into the body.
2. Design a model to show how air rushes into the body due to pressure changes using the equipment at the front of the classroom. Make a labelled drawing of your model.

2. Explain the task to the learners as follows:
  - a. Draw a flow map to show the changes that happen in the body when we breathe in. Place your hands on your chest to remind you of what you were told at the beginning of the lesson.
  - b. Working in pairs, design a model to show how air rushes into the body due to pressure changes.
  - c. You must draw your design in your workbooks.
  - d. The equipment that must be used consists of a 2 litre cold drink bottle, cling film, elastic band, Prestik, straw, and balloon.
3. Give learners some time to complete Task 1 in their workbooks.
4. Ask learners to share their answers to Task 1 with the class.
5. The completed flow map and design are shown below. Write the answer on the chalkboard.

#### TASK

1.



## TOPIC: Circulatory and respiratory systems

### 2. Resources

*2 litre cold drink bottle = thoracic cavity*

*Bottom of cold drink bottle must be cut*

*Straw = mouth, nose, trachea, bronchi*

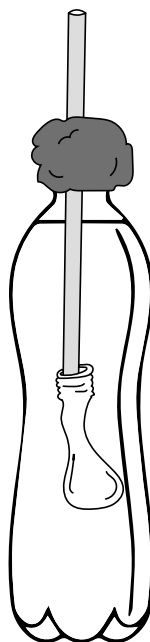
*Prestik = ensure no air escapes other than through straw*

*Cling film = diaphragm*

*Balloon = lung*

*Elastic band = keep cling film attached to bottle*

*If you pull down on the cling film, the balloon should inflate*



6. If you have time, show the learners the videos and the website that have been listed at the end of the lesson.

### **Checkpoint 2**

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

- Why does air rush into the respiratory pathways during inhalation?
- Why does oxygen move from the alveolus to blood capillaries?
- 

Answers to the checkpoint questions are as follows:

- Because of an air pressure decrease in thoracic cavity
- Because of diffusion from the high concentration in alveolus to low concentration in blood capillaries.

## **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
Step-by-Step	Circulatory and respiratory systems	71-73
Solutions for all	Circulatory and respiratory systems	69-75
Spot On	Circulatory and respiratory systems	46-47
Top Class	Circulatory and respiratory systems	60-61
Via Afrika	Circulatory and respiratory systems	51-52
Platinum	Circulatory and respiratory systems	50-51
Oxford Successful	Circulatory and respiratory systems	48-49
Pelican Natural Sciences	Circulatory and respiratory systems	68-70
Sasol Inzalo Bk A	Circulatory and respiratory systems	84-86, 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://ed.ted.com/lessons/how-breathing-works-nirvair-kaur> (5min 18sec) [How breathing works]
2. [http://www.bbc.co.uk/schools/gcsebitesize/pe/appliedanatomy/1\\_anatomy\\_respiratorysys\\_rev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/pe/appliedanatomy/1_anatomy_respiratorysys_rev1.shtml) [Interactive website on breathing]

**7 B**

**Term 1, Week 7, Lesson B**

**Lesson Title: Double Circulatory System**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Circulatory and respiratory systems		
<b>CAPS Page Number</b>	61		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the movement of oxygenated blood from the lungs to the body cells</li> <li>explain the importance of oxygenated blood traveling to the heart before going to the body cells.</li> </ul>			
Specific Aims	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the circulatory system	
Projector, computer and internet	
Resource 20: Beating of the heart	

## **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 at the alveoli in the lungs?

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.

*Gaseous exchange between oxygen and carbon dioxide*

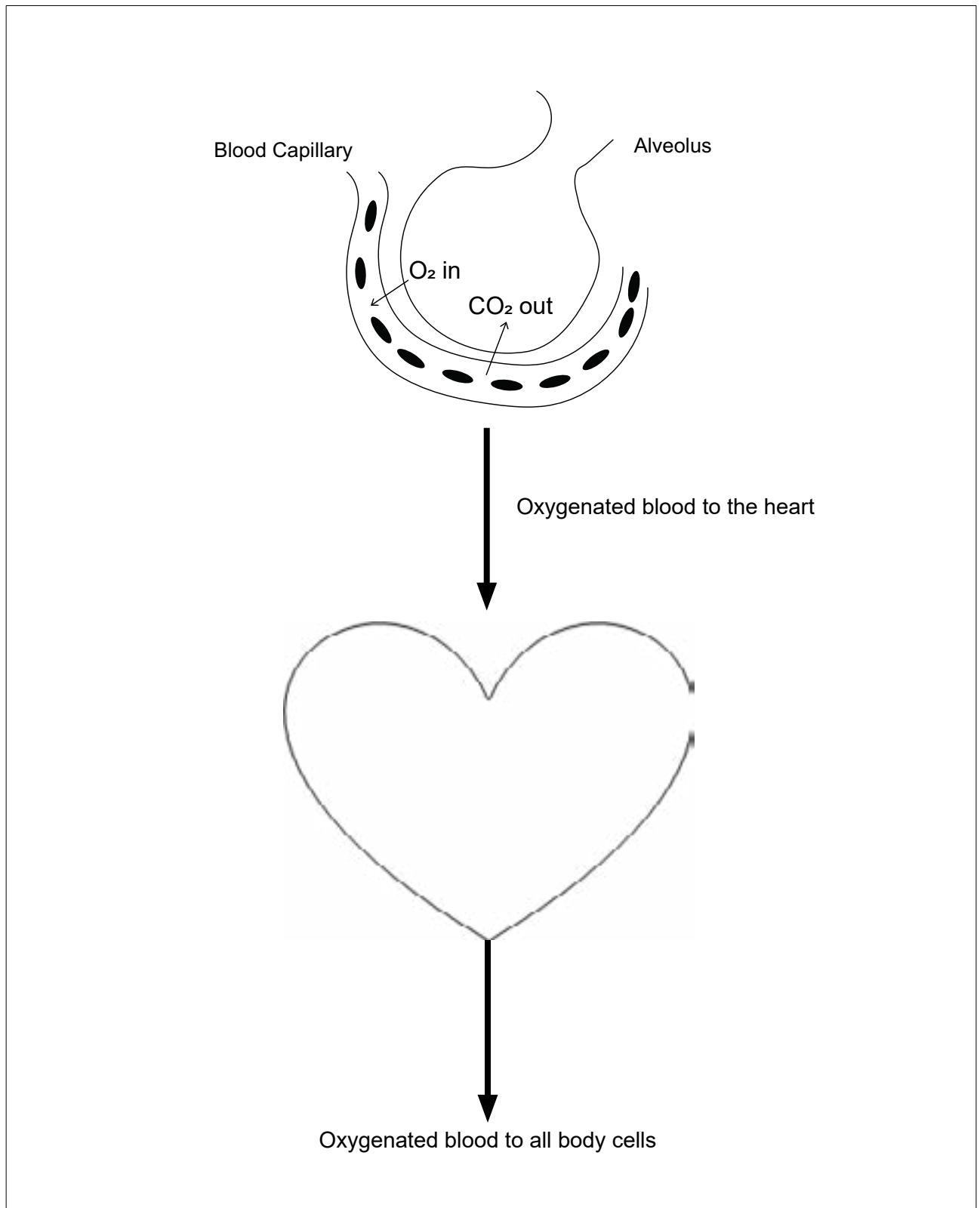
## **D** ACCESSING INFORMATION

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

WHAT HAPPENS AFTER GASEOUS EXCHANGE AT THE LUNGS?

1. Oxygenated blood (blood that has more oxygen than carbon dioxide) goes from the alveoli of the lungs to the heart.
2. Oxygenated blood comes into the left-hand side of the heart.
3. Heart pumps the blood under high pressure through the arteries.
4. Arteries take oxygenated blood from the heart to the body cells.





2. Explain this to the learners as follows:

- Air that is inhaled through the mouth and nose, travels into the lungs and into the tiny air sacs called alveoli.
- Gaseous exchange happens at the alveoli and oxygen moves into the blood-stream and carbon dioxide moves from the bloodstream into the alveoli.
- The blood is now **oxygenated** because it has more oxygen than carbon dioxide.

## TOPIC: Circulatory and respiratory systems

- d. Oxygenated blood goes to the left-and side of the heart and is then pumped at high pressure to all cells of the body.
  - e. The heart is made up of lots of muscles so that it can pump blood all the way to your toes.
  - f. **Arteries** are blood vessels or tubes that carry blood away from the heart and deliver it to the body cells.
  - g. You can feel your heart beating in different parts of your body. Ask the learners to place their second and third fingers on the wrist to try to feel the beating of their heart.
3. Ask the learners if they have any questions.
  4. Tell the learners to copy the information written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. What job does the heart have?
- b. Which gas travels in the arteries?

Answers to the checkpoint questions are as follows:

- a. Pumps blood around the circulatory system
- b. Oxygen

## **E**

### **CONCEPTUAL DEVELOPMENT**

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

#### **TASK 1**

1. Describe how blood gets from the alveoli to the cells of your fingers.
2. Why is it important for blood to transport oxygen to the body cells?
3. Which gases are exchanged in your lungs?

#### **TASK 2**

1. In pairs, write down three different activities that you think would make your heart beat more quickly.
2. Go outside and take turns.
3. Partner one counts to 50 while partner two does the first activity.
4. Then, partner one counts 10 seconds and partner two counts how many times their heartbeats.
5. Do this for all three activities and make sure both partners get a turn.

## TOPIC: Circulatory and respiratory systems

2. Explain the activity to the learners as follows:
  - a. Answer the questions in Task 1 before you can go outside and do Task 2.
  - b. Read through the questions on the chalkboard with the learners.
  - c. Ask the learners to complete the task on their own.
3. Allow the learners some time to complete Task 1.
4. Once the learners have completed Task 1, explain Task 2 as follows:
  - a. Your heart always beats to make sure that your body cells receive oxygen.
  - b. When you do different activities or sports, your heart will beat faster.
  - c. With your partner, select three activities that you can do outside to see the effect on your heartbeat.
  - d. You could jog on the spot, run up and down stairs, do jumping jacks, dance or skip.
  - e. Partner one must count to 50 while partner two does one activity. Straight afterwards, partner one must count to 10 while partner two 2 counts his or her heartbeat.
  - f. Do this for all three activities and write down your heartbeat in a table.
5. With the learners' input, complete the model answer on the chalkboard:

### TASK 1

1. *Oxygen diffuses from the alveoli into the bloodstream making the blood oxygenated. Oxygenated blood travels to the heart and then the heart pumps the oxygenated blood to the body cells via arteries.*
2. *For the process of respiration so that cells can make energy from oxygen*
3. *Carbon dioxide and oxygen*

### TASK 2

<b>Activity</b>	<b>Partner One Name and number of heartbeats</b>	<b>Partner Two Name and number of heartbeats</b>
<i>Jogging on the spot</i>		
<i>Skipping</i>		
<i>Dancing</i>		

Ask the learners how many times their activity made both partners' hearts beat faster. The answers will vary from learner to learner but all numbers should be about seven to 12 heartbeats in 10 seconds.

6. Discuss the answers with the learners.
7. If there is time left over, show the learners the videos listed at the end of the lesson.

## TOPIC: Circulatory and respiratory systems

### **Checkpoint 2**

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

- a. Does exercise make your heart beat faster?
- b. What is blood that is rich in oxygen called?

Answers to the checkpoint questions are as follows:

- a. Yes
- b. Oxygenated blood

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
Solutions for All	Circulatory and respiratory systems	70, 75, 77
Via Afrika	Circulatory and respiratory systems	51
Oxford Successful	Circulatory and respiratory systems	49-51
Pearson: Spot On	Circulatory and respiratory systems	46-48
Pearson: Platinum	Circulatory and respiratory systems	53
Shuters Top Class	Circulatory and respiratory systems	62-63
Step-by-Step	Circulatory and respiratory systems	72-75
Pelican Natural Sciences	Circulatory and respiratory systems	70-74
Sasol Inzalo Bk A	Circulatory and respiratory systems	92

## **G** ADDITIONAL ACTIVITIES/ READING

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

1. [http://www.bbc.co.uk/schools/gcsebitesize/science/triple\\_ocr\\_21c/further\\_biology/movement\\_and\\_exercise/revision/4/](http://www.bbc.co.uk/schools/gcsebitesize/science/triple_ocr_21c/further_biology/movement_and_exercise/revision/4/) [Interactive website on heart rate]
2. [http://www.bbc.co.uk/schools/gcsebitesize/pe/appliedanatomy/0\\_anatomy\\_circulatorysys\\_rev2.shtml](http://www.bbc.co.uk/schools/gcsebitesize/pe/appliedanatomy/0_anatomy_circulatorysys_rev2.shtml) [Interactive website on the heart]

**7 C**

**Term 1, Week 7, Lesson C**

**Lesson Title: Blood vessels**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Circulatory and respiratory systems		
<b>CAPS Page Number</b>	61		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>differentiate between gaseous exchange that occurs at the lungs and in the body cells</li> <li>explain the structural differences between arteries and blood capillaries</li> </ul>			
Specific Aims	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the respiratory system	Straws, skewer sticks
Projector, computer and internet	
Resource 21	

## C CLASSROOM MANAGEMENT

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

Why does oxygenated blood go to the heart before going to the body cells?

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.

*So that the heart can pump it at high pressure to all the body cells*

## D ACCESSING INFORMATION

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

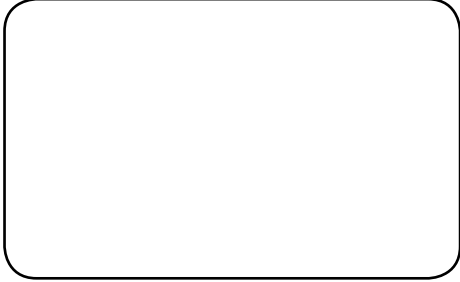

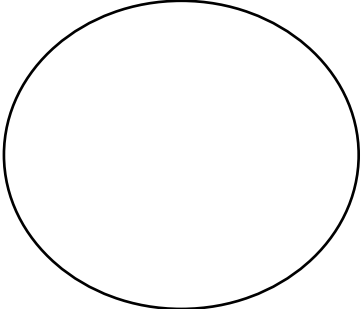
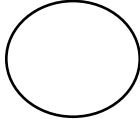
### GASEOUS EXCHANGE HAPPENS IN THE BODY CELLS

1. Gaseous exchange happens in the alveoli of the lungs to make the blood oxygenated.
2. Gaseous exchange also happens at the body cells.
3. Oxygen moves from the bloodstream into body cells, by diffusion.
4. Carbon dioxide moves from body cells to the bloodstream, by diffusion.

### BLOOD VESSELS

1. Arteries become blood capillaries at the body cells.
2. Body cells are tiny. Blood capillaries must reach every single cell.
3. Arteries are much bigger than blood capillaries.

## TOPIC: Circulatory and respiratory systems

	<b>Arteries</b>	<b>Capillaries</b>
<b>Side view</b>	Much wider  	Much narrower  
<b>Cut view</b>	Much wider and larger  	Much smaller  

2. Explain this to the learners as follows:

- a. You have learnt that gaseous exchange happens at the alveoli of the lungs. Oxygen diffuses from the alveoli into the bloodstream and carbon dioxide diffuses from the bloodstream into the alveoli.
- b. Oxygenated blood then travels to the heart so that the heart can pump oxygenated blood to all the cells of the body.
- c. Oxygenated blood travels away from the heart through arteries.
- d. As it gets to the body cells, the arteries subdivide to become hundreds of tiny **blood capillaries**.
- e. Blood capillaries are so small that they can gain access to all the body cells.
- f. Gaseous exchange happens again. The oxygen moves from the bloodstream into the body cells and carbon dioxide moves from the cells into the blood- stream.
- g. Look at the difference in size of the arteries and capillaries. Arteries are much larger and wider, while blood capillaries are much smaller.
- h. Show the learners Resource 21.

3. Ask the learners if they have any questions.

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

5. If there is time left, use the computer and projector to show the videos given at the end of the lesson.

## TOPIC: Circulatory and respiratory systems

### Checkpoint 1

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

- a. What is diffusion?
- b. Why are blood capillaries so tiny?

Answers to the checkpoint questions are as follows:

- a. Movement of gases from a high concentration to a low concentration
- b. So that they can reach all the body cells to deliver oxygen and take away carbon dioxide

## E

### CONCEPTUAL DEVELOPMENT

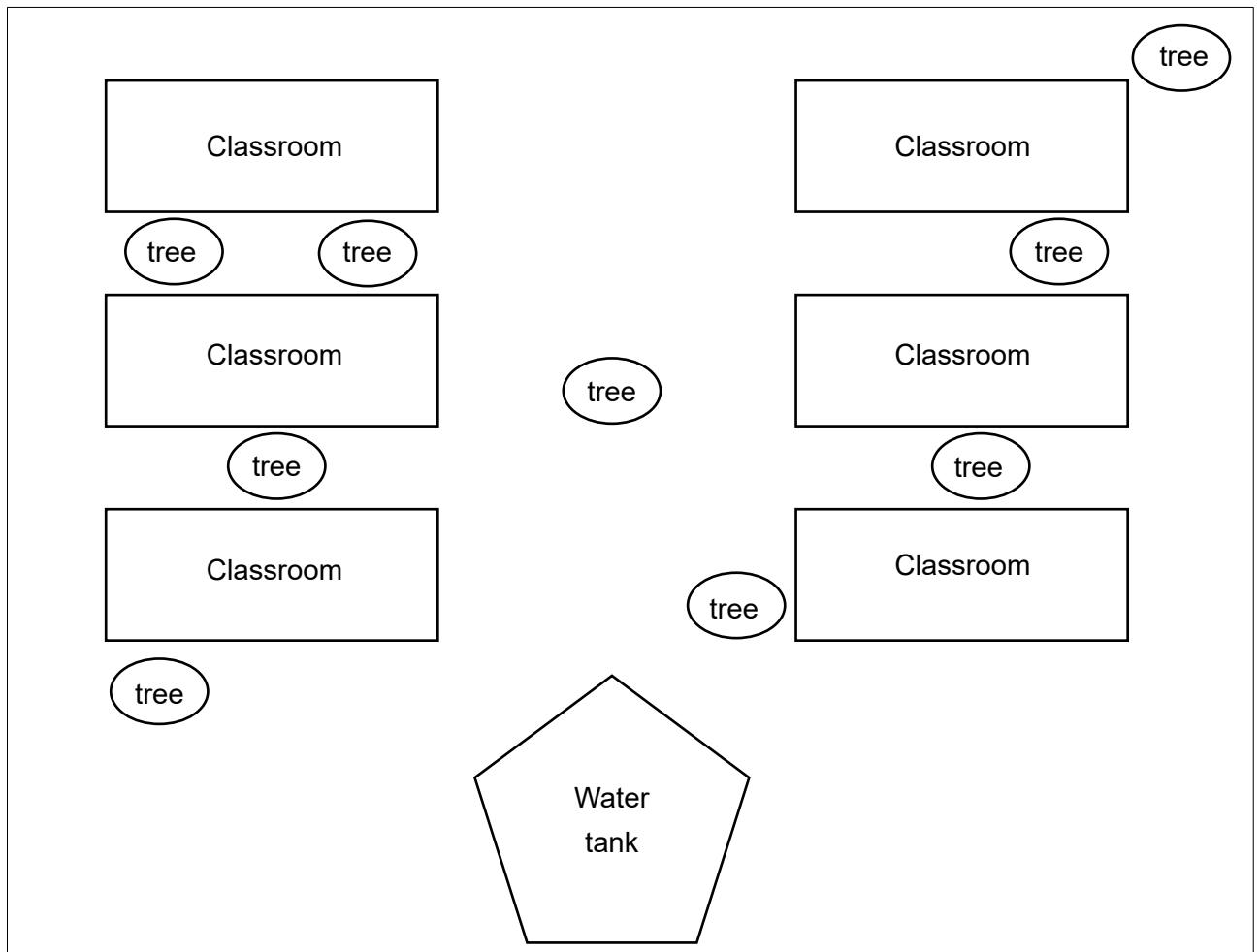
1. Write and draw the following on the chalkboard (always try to do this before the lesson starts):

#### TASK

1. You have been given the map of a school that has classrooms, and trees that need water.
2. The school has a water tank.
3. They do not have any pipes or plumbing to take water to the buildings or trees.
4. You need to draw in big pipes that split into narrower pipes to ensure that all buildings and trees receive water.
5. Label the water tank as the heart.
6. Label the wider pipes as arteries and the narrow pipes as blood capillaries.

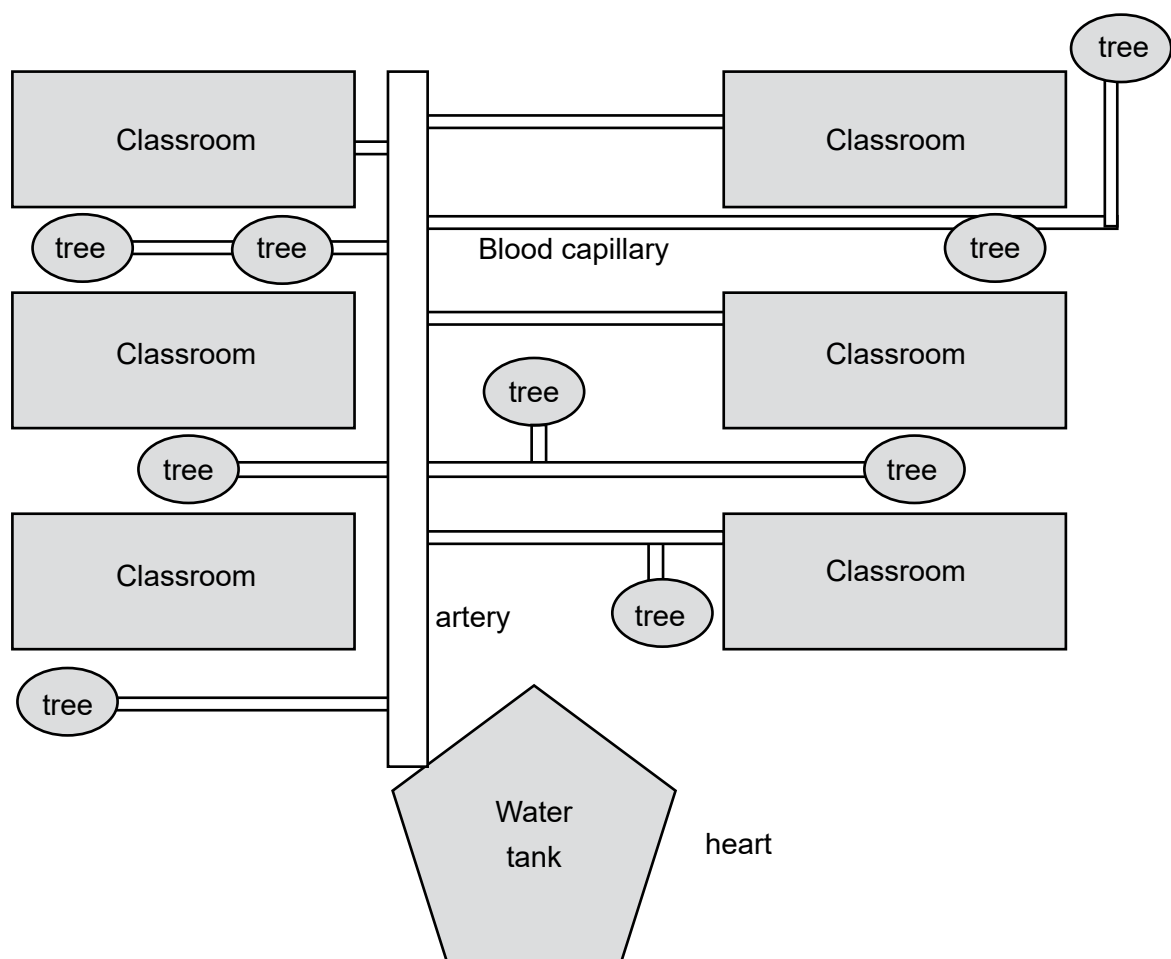


## TOPIC: Circulatory and respiratory systems



2. Explain to the learners the activity as follows:
  - a. Draw the map of the school into your workbooks; draw the classrooms, trees and water tank.
  - b. You need to draw the pipes that would give water to the classrooms and trees. Draw one large main pipe with smaller, narrow pipes coming off it.
  - c. Label the water tank as the heart, the main wide pipes as the arteries and the narrow pipes as the blood capillaries.
4. Allow the learners some time to complete the task.
5. With the learners' input, complete the model answer on the chalkboard:

## TOPIC: Circulatory and respiratory systems



*Maps may look slightly different but the most important thing is that the blood capillaries are thin and reach all classrooms and trees.*

2. Explain to the learners the activity as follows:
  - a. Draw the map of the school into your workbooks; draw the classrooms, trees and water tank.
  - b. You need to draw the pipes that would give water to the classrooms and trees. Draw one large main pipe with smaller, narrow pipes coming off it.
  - c. Label the water tank as the heart, the main wide pipes as the arteries and the narrow pipes as the blood capillaries.
4. Allow the learners some time to complete the task.
5. With the learners' input, complete the model answer on the chalkboard:

## TOPIC: Circulatory and respiratory systems

### **Checkpoint 2**

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

- a. What is the main structural difference between arteries and capillaries?
- b. Name two places where gaseous exchange happens?

Answers to the checkpoint questions are as follows:

- a. Arteries are much wider
- b. Alveoli of lungs and body cells

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

## **F** REFERENCE POINTS FOR FURTHER DEVELOPMENT

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

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Solutions for All	Circulatory and respiratory systems	78
Via Afrika	Circulatory and respiratory systems	52
Oxford Successful	Circulatory and respiratory systems	54-56
Pearson: Spot On	Circulatory and respiratory systems	47-48
Pearson: Platinum	Circulatory and respiratory systems	55
Shuters Top Class	Circulatory and respiratory systems	63-64
Step-by-Step	Circulatory and respiratory systems	75-76, 80
Pelican Natural Sciences	Circulatory and respiratory systems	74
Sasol Inzalo Bk A	Circulatory and respiratory systems	98-99

## **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://ed.ted.com/on/Qo9k1Kmf> (1min 32sec) [Gaseous exchange between alveoli and blood capillaries]
2. <https://ed.ted.com/lessons/oxygen-s-surprisingly-complex-journey-through-your-body-enda-butler> (5min 10sec) [Oxygen's surprisingly complex journey through your body]

**8 A**

**Term 1, Week 8, Lesson A**

**Lesson Title: The Process of Respiration**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Circulatory and respiratory systems		
<b>CAPS Page Number</b>	61		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the process of respiration</li> <li>explain the need for respiration in all cells.</li> </ul>			
Specific Aims	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of a mitochondrion	
Projector, computer and internet	
Resource 22	

## **C** CLASSROOM MANAGEMENT

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

Which blood vessel transports oxygenated blood away from the heart?

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.

*Artery*

## **D** ACCESSING INFORMATION

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

### RESPIRATION

1. Respiration occurs in the mitochondrion of cells.
2. The heart pumps oxygenated blood and glucose to body cells.
3. During respiration, oxygen reacts with glucose and energy is released.
4. Energy is used to fuel all body processes.
5. Carbon dioxide is produced as a waste product.
6. Equation:

glucose + oxygen → carbon dioxide + water + energy

### WHAT HAPPENS TO THE CARBON DIOXIDE?

1. Carbon dioxide is taken back to the heart to be pumped to the lungs.
2. Gaseous exchange occurs at the lungs and carbon dioxide diffuses into the alveoli.
3. Carbon dioxide escapes through the mouth and nose.

## TOPIC: Circulatory and respiratory systems

2. Explain this to the learners as follows:
  - a. Respiration occurs within the mitochondria of all body cells. We say one mitochondrion and many mitochondria.
  - b. The heart pumps the oxygen and glucose required for respiration to all the body cells.
  - c. Arteries transport oxygen and glucose, taken from food, to all the body cells.
  - d. During respiration, a chemical reaction takes place when oxygen and glucose react, energy is released to fuel all the body processes.
  - e. The equation for respiration is written on the chalkboard. Glucose plus oxygen gives you carbon dioxide and water and energy.
  - f. Carbon dioxide is poisonous to our body cells and needs to be taken out of the body.
  - g. Carbon dioxide diffuses into the bloodstream and is transported to the heart where it is pumped to the lungs.
  - h. Gaseous exchange takes place at the lungs and carbon dioxide diffuses from the bloodstream into the alveoli.
3. Ask the learners if they have any questions.
4. Tell the learners to copy the information written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. Which structure of the cell is the site of respiration?
- b. What is the purpose of respiration?

Answers to the checkpoint questions are as follows:

- a. Mitochondrion
- b. To provide energy so that all body processes can take place

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

TASK

1. Write down the equation for respiration.
2. Name the products of this equation.
3. Explain where the glucose in the bloodstream comes from.
4. Explain why respiration is important for life.
5. Write down five different activities that you do that need energy.
6. List the five activities in the order of needing most energy to least energy.
7. Do you think reading needs more or less energy than walking to school? Give a reason for your answer.

2. Explain the activity to the learners as follows:
  - a. Answer the questions written on the chalkboard.
  - b. Question 5 asks you to write down five different activities that you do that require energy.
  - c. For example, running, sleeping, reading, eating, dancing.
  - d. Write the activities in the order of needing most energy to least energy.
  - e. Question 7 asks you whether reading or walking to school needs more energy. Give a reason for your answer.
  - f. Work on your own.
3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:

TASK

1. *Glucose + oxygen → carbon dioxide + water + energy*
2. *Glucose and oxygen*
3. *From the food we eat going into the bloodstream*
4. *Gives energy to all body processes*
5. *Sleeping, reading, running, jogging, walking to school, going to the shops, eating*
6. *Running, jogging, walking to school, going to the shops, eating, reading, sleeping*
7. *Less energy. When you walk to school you have to use all the muscles in your legs to move while reading only needs your eyes and brain and your fingers as you turn the page. Walking to school also needs your eyes and brain.*

## TOPIC: Circulatory and respiratory systems

5. Discuss the answers with the learners.
6. If you have time, show the learners the video and the website that are included at the end of the lesson.

### **Checkpoint 2**

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

- a. What are the raw requirements of respiration?
- b. How does carbon dioxide leave the body?

Answers to the checkpoint questions are as follows:

- a. Oxygen and glucose
- b. Through the mouth and nose

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
Solutions for All	Circulatory and respiratory systems	78
Via Afrika	Circulatory and respiratory systems	52
Oxford Successful	Circulatory and respiratory systems	56-57
Pearson: Spot On	Circulatory and respiratory systems	-
Pearson: Platinum	Circulatory and respiratory systems	56
Shuters Top Class	Circulatory and respiratory systems	65
Step-by-Step	Circulatory and respiratory systems	76
Pelican Natural Sciences	Circulatory and respiratory systems	69
Sasol Inzalo Bk A	Circulatory and respiratory systems	99

## **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://ed.ted.com/on/5Zw0w2EY> (13min 25sec) [Cellular respiration]
2. [https://www.youtube.com/watch?v=RPdGQ-A\\_yM4](https://www.youtube.com/watch?v=RPdGQ-A_yM4) (4min 52sec) [Respiratory system]



**8 B**

**Term 1, Week 8, Lesson B**

**Lesson Title: Breathing – exhalation**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Circulatory and respiratory systems		
<b>CAPS Page Number</b>	61		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe how carbon dioxide leaves the body</li> <li>differentiate between oxygenated and deoxygenated blood</li> <li>describe how the upward movement of the diaphragm and the downward movement of the ribs allow for exhalation.</li> </ul>			
Specific Aims	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the respiratory process	
Projector, computer and internet	
Resource 23	

## **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 waste product of 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.

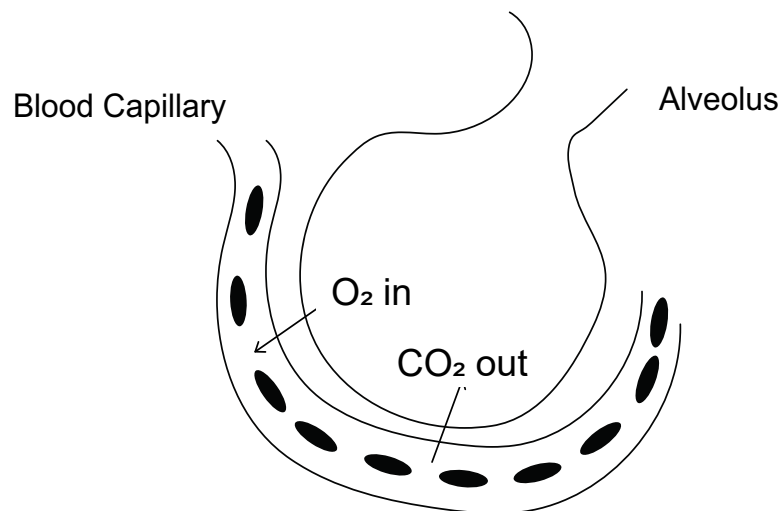
*Carbon dioxide*

## **D** ACCESSING INFORMATION

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

HOW DOES CARBON DIOXIDE LEAVE THE BODY?

1. Carbon dioxide diffuses out of body cell into blood capillaries and then into veins.
2. Veins transport deoxygenated blood to the heart.
3. The heart pumps deoxygenated blood to the lungs.
4. Gaseous exchange occurs at the alveoli and carbon dioxide diffuses into the alveoli from the blood capillary.
5. Carbon dioxide is then exhaled through air passageways.



## EXHALATION

This is a passive process that does not require muscle contraction.

1. The muscles of the diaphragm relax and the diaphragm moves upwards to its original position.
2. Intercostal muscles relax and the rib cage moves downwards and inwards.
3. The volume of the thoracic cavity decreases.
4. Air pressure in the thoracic cavity increases.
5. Air is forced out of the lungs and out of mouth and nose.

## 2. Explain this to the learners as follows:

- a. Carbon dioxide is released as a waste product of respiration and diffuses from the cells into the blood capillaries that surround the body cells.
- b. The blood capillaries now combine and form veins.
- c. The blood is deoxygenated because it contains more carbon dioxide than oxygen.
- d. The veins transport deoxygenated blood to the heart.
- e. The heart pumps the deoxygenated blood to the lungs.
- f. Gaseous exchange takes place in the alveoli and carbon dioxide diffuses from the blood capillaries into alveoli.
- g. Carbon dioxide is breathed out of the nose and mouth.
- h. Tell the learners to place their hands on their rib cage. They should take a deep breath in and feel the ribcage move upwards and outwards. Now ask them to breathe out and to feel their rib cage going inwards and downwards.
- i. The diaphragm relaxes and decreases the volume of the thoracic cavity.
- j. This increases the air pressure and forces air out of the body.
- k. Show the learners Resource 23.

## TOPIC: Circulatory and respiratory systems

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

### **Checkpoint 1**

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

- a. What do we call blood that is rich in carbon dioxide?
- b. Does exhalation use energy?

Answers to the checkpoint questions are as follows:

- a. Deoxygenated blood
- b. No, it is a passive process

## **E**

### **CONCEPTUAL DEVELOPMENT**

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

#### **TASK 1**

Complete the table of differences between arteries and veins:

	<b>Arteries</b>	<b>Veins</b>
Direction of flow		
Oxygenated or deoxygenated blood		

#### **TASK 2**

Ask the learners to answer the question based on the table below. The table shows different gases found in air that is breathed in and breathed out.

<b>Name of gas in the air</b>	<b>% of gas in air breathed in</b>	<b>% of gas in air breathed out</b>
Oxygen	21	16
Carbon dioxide	0,03	4
Nitrogen	78	78
Other gases	1	2

## TOPIC: Circulatory and respiratory systems

1. What is the percentage of oxygen in inhaled air?
2. What is the percentage of oxygen in exhaled air?
3. Explain the reason for the difference between Question 1 and Question 2.
4. What is the percentage of carbon dioxide in inhaled air?
5. What is the percentage of carbon dioxide in exhaled air?
6. Where does the extra carbon dioxide come from?
7. Why is there the same percentage of nitrogen in both inhaled and exhaled air?

2. Explain to the learners the activity as follows:
  - a. Complete the table of differences between arteries and veins in your workbooks.
  - b. Decide whether arteries and veins take blood away from the heart or to the heart.
  - c. Complete the task on your own.
3. Allow the learners some time to complete Task 1.
4. Once the learners have completed Task 1, explain Task 2 as follows:
  - a. Study the table that has been drawn on the chalkboard. It shows the composition of air that is breathed in and air that is breathed out.
  - b. Answer the seven questions underneath the table.
  - c. Complete Task 2 with a partner.
5. With the learners' input, complete the model answer on the chalkboard:

### TASK 1

	<b>Arteries</b>	<b>Veins</b>
Direction of flow	<i>Away from the heart</i>	<i>To the heart</i>
Oxygenated or deoxygenated blood	<i>oxygenated</i>	<i>deoxygenated</i>

### TASK 2

1. 21%
2. 16%
3. *Used for respiration*
4. 0,03%
5. 4%
6. *Waste product of respiration*
7. *Nitrogen is not needed in respiration or for any other body process so it is exhaled straight after it has been inhaled.*

6. Discuss the answers with the learners.
7. If there is time left over, show the learners the video and quiz listed at the end of the lesson.

## TOPIC: Circulatory and respiratory systems

### **Checkpoint 2**

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

- a. Why does the decrease in volume of the thoracic cavity force air out of the body?
- b. Name the blood vessels that carry deoxygenated blood to the heart.

Answers to the checkpoint questions are as follows:

- a. The decrease in volume increases pressure and air rushes out of the body
- b. Veins

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
Solutions for All	Circulatory and respiratory systems	76, 83
Via Afrika	Circulatory and respiratory systems	53
Oxford Successful	Circulatory and respiratory systems	
Pearson: Spot On	Circulatory and respiratory systems	46
Pearson: Platinum	Circulatory and respiratory systems	56
Shuters Top Class	Circulatory and respiratory systems	66
Step-by-Step	Circulatory and respiratory systems	72, 80
Pelican Natural Sciences	Circulatory and respiratory systems	72-73
Sasol Inzalo Bk A	Circulatory and respiratory systems	99-100

## **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=f-u4-xSqGBA> (46sec) [Inhalation and Exhalation]
2. <https://quizlet.com/14981755/respiratory-system-flash-cards/> [Quiz on respiratory system]

# TOPIC OVERVIEW:

## Digestive System

### Term 1, Weeks 8C – 9C

#### A. TOPIC OVERVIEW

##### Term 1, Weeks 8c – 9c

- This topic runs for 1 weeks.
- It is presented over 4 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 8	GRADE 9	GRADE 10 - 12
<b>LOOKING BACK</b>	<b>CURRENT</b>	<b>LOOKING FORWARD</b>
<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• An eating plan requires proteins, carbohydrates, fats and oils, vitamins and minerals, fibre and water</li> <li>• Disorders of the digestive system can be related to inappropriate eating plans</li> <li>• The alimentary canal is composed of the mouth, oesophagus, stomach, small intestine, rectum and anus</li> <li>• Digestion is the breakdown of food into a useable dissolved form</li> </ul>	<p>GRADE 11</p> <ul style="list-style-type: none"> <li>• Macro-structure of the alimentary canal and associated organs and the functions of the different parts</li> <li>• Processes of ingestion, digestion, absorption, assimilation and egestion</li> <li>• Hormonal control of blood sugar levels with a link to diabetes</li> <li>• Relationships between food intake, energy, growth and health.</li> <li>• Different diets due to cultural, religious, personal and health choices</li> </ul>

- Tooth decay related to diet
- Effects of alcohol and drug abuse and the dangers associated with their misuse

### C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

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

	TERM	EXPLANATION
1.	ingestion	taking food into the mouth
2.	healthy diet	healthy eating plan that contains a balance of all the necessary nutrients required for growth
3.	balanced diet	diet that contains adequate amounts of all the necessary nutrients from all the food groups required for healthy growth
4.	malnutrition	a condition resulting from a lack of nutrients that are required for healthy growth
5.	proteins	are nutrients essential for growth and repair of cells
6.	carbohydrates	sugars and starch are the main sources of energy for the body
7.	fats and oils	help with the absorption of vitamins, are part of cell membranes, are stored as reserve energy sources, are insulating material under the skin and protect organs such as the eyes and kidneys
8.	vitamins	every vitamin has a different function in the human body; Vitamin A is important for eyesight, Vitamin C is important for the immune system and Vitamin E protects cells
9.	minerals	every mineral has a different function in the human body; calcium builds strong bones and teeth and iron is needed for production of red blood cells
10.	fibre	promotes the movement of food through alimentary canal and promotes regular bowel movements
11.	digestive system / alimentary canal	a series of organs joined in a long tube from the mouth to the anus; each organ is responsible for aiding the process of digestion
12.	mouth	ingestion takes place here; teeth and saliva help to digest food
13.	tongue	muscular organ in the mouth, used for moving food under teeth for chewing or moving food to the back of the mouth for swallowing
14.	oesophagus	organ connecting mouth with stomach
15.	peristalsis	the rhythmic contraction of the muscle layers in the digestive canal that push the food forwards



16.	stomach	thick muscular walls contract and churn stomach contents
17.	small intestine	walls of small intestine lined with villi (finger-like structures) that absorb nutrients
18.	large intestine	absorbs water from wastes back into blood
19.	rectum	place where stools are temporarily stored before being excreted
20.	anus	end opening of the digestive system through which wastes are egested
21.	digestion	the breakdown of food into a form that can be absorbed by the body
22.	mechanical digestion	involves the physical breaking, crushing and mashing of food
23.	chemical digestion	involves the mixing of food with digestive enzymes and hydrochloric acid
24.	enzymes	catalyst proteins that speed up the rate of a chemical reaction
25.	hydrochloric acid	a very strong acid found in the stomach, responsible for chemical digestion of food
26.	swallowing	causes or allows food to pass from the mouth to the oesophagus
27.	hypothesis	A prediction of what you expect will happen in an experiment/ investigation
28.	egestion	Expelling waste products from the body

## D. UNDERSTANDING THE USES / VALUE OF SCIENCE

The value of knowing that a healthy diet or an eating plan requires different components. These components include proteins, carbohydrates, fats and oils, vitamins and minerals, fibre and water. Inappropriate eating plans can lead to disorders of the digestive system. The alimentary canal is composed of different organs and each organ is adapted to carry out its function. Without the digestive system, food would not be broken down into glucose molecules. Without glucose molecules, respiration would not take place and energy would not be made to fuel all biological processes.

## E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:

Lesson successes:

Lesson challenges:

Notes for future improvement:

**8 C**

**Term 1, Week 8, Lesson C**

**Lesson Title: A healthy diet**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Circulatory and respiratory systems		
<b>CAPS Page Number</b>	61		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>describe the nutrients required for a healthy diet</li> <li>explain the function of carbohydrates, proteins, fats and oils, vitamins and minerals and fibre in the diet</li> <li>explain which foods contain carbohydrates, proteins, fats and oils, vitamins and minerals and fibre in the diet.</li> </ul>			
Specific Aims	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		✓

**SCIENCE PROCESS SKILLS**

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

## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of digestive system	
Projector and laptop with internet	
Resource 24: A healthy diet	

## **C** CLASSROOM MANAGEMENT

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

Which two molecules are needed for 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.

*Oxygen and glucose*

## **D** ACCESSING INFORMATION

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

<u>WHAT IS FOUND IN A HEALTHY DIET?</u>		
Nutrient	Function	Foods that contain nutrient
Carbohydrates	Main source of energy	Fruit, vegetables, pasta, rice, corn, potatoes
Proteins	For growth and to repair cells Part of cell membrane	Fish, eggs, milk, meat, nuts, yoghurt and cheese
Fats and oils	For absorption of vitamins Part of cell membranes Stored as reserve energy sources Insulating material under the skin Protect organs such as eyes and kidneys	Oil, nuts, butter and margarine

## TOPIC: Digestive system

Vitamins	Vitamin A – good eyesight Vitamin C – healthy immune system Vitamin E – protects cells	Carrots, liver, butter Fruit, tomatoes and vegetables Spinach, eggs, bread, avocado
Minerals	Calcium – strong bones and teeth Iron – production of red blood cells	Milk, cheese, spinach Red meats, fish, chicken
Fibre	Promotes movement of food through body and keeps body regular; prevents constipation.	Whole-wheat bread, cereals, fruit and vegetables
Water	Transports nutrients and waste products, helps with digestion	

2. Explain the following to the learners:
  - a. We get our energy from the food that we eat because food contains nutrients that nourish our bodies.
  - b. A **healthy diet** consists of a balance of different components.
  - c. **Proteins** are used for growth and can be found in fish, eggs, milk, meat and cheese.
  - d. **Carbohydrates** are the main source of energy and are found in fruit, pasta, rice, potatoes and corn.
  - e. **Fats and oils** are important for many reasons. They help us to absorb **vitamins**, they form part of cell membranes, are used as energy storage, they keep us warm with a fat layer under our skin and protect organs such as eyes and kidneys.
  - f. Vitamins are needed in small amounts and each vitamin has a different function. Vitamin A is important for eyesight and found in carrots and chicken liver; Vitamin C is important for a healthy immune system and found in fruit and tomatoes, and Vitamin E helps protect cells and is found in spinach and eggs.
  - g. **Minerals** are also needed in small amounts. **Calcium** for strong bones and teeth is found in milk and **iron** is needed in the blood.
  - h. **Fibre** helps food move through the body and keeps you going to the toilet regularly. Fibre is found in bread, cereal and vegetables.
  - i. Water is not a type of food but it is very important in the digestive system because it helps transport nutrients and wastes.
3. Ask the learners if they have any questions.
4. Show the learners Resource 24 - a healthy diet.
5. Give the learners some time to write the information in their workbooks.

# TOPIC: Digestive system

## Checkpoint 1

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

- a. Which nutrient is the main source of energy?
- b. What functions do proteins have in the body?

Answers to the checkpoint questions are as follows:

- a. Carbohydrates
- b. Growth, and repair of cells

## E

### CONCEPTUAL DEVELOPMENT

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

#### TASK

The table shows the food eaten at three different meals.

KOSHER MEAL	HALAAL MEAL	TRADITIONAL SOUTH AFRICAN MEAL
<ul style="list-style-type: none"> <li>• Egg bread</li> <li>• Fish</li> <li>• Chicken soup</li> <li>• Chicken</li> <li>• Potatoes</li> <li>• Asparagus</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetable soup</li> <li>• Whole-wheat bread</li> <li>• Chicken</li> <li>• Salad</li> <li>• Yoghurt</li> </ul>	<ul style="list-style-type: none"> <li>• Uputu (maize)</li> <li>• Morogo (plant leaves and spinach)</li> <li>• Imyama yenkomo (beef stew)</li> <li>• Tshwala (sorghum)</li> <li>• Amasi (sour milk)</li> </ul>

1. List the foods in each meal and state whether each contains carbohydrates, proteins or fats and oils.
2. Compare the three menus according to the five food groups you need to eat every day. Complete the table below. Tick if the meal contains the nutrient

MEAL	KOSHER	HALAAL MEAL	TRADITIONAL SOUTH AFRICAN MEAL
Dairy products			
Meat, fish, chicken			
Vegetables			
Fats			

## TOPIC: Digestive system

3. Which of the meals would you choose? Give a reason for your answer.
4. Write down the food you traditionally eat at celebrations such as coming of age, weddings and religious holidays or festivals.

2. Explain the task to the learners as follows:
  - a. The table drawn on the chalkboard shows the menu for three different South African meals.
  - b. Write down three lists in your workbooks of the food that is in each meal.
  - c. Next to each food, write down whether carbohydrates, proteins or fats and oils are found in the food.
  - d. Draw the second table into your workbooks.
  - e. Tick in the block if the menu contains dairy products, meat, fish, chicken, vegetables and fats.
  - f. Then decide which meal you would choose and give a reason for your answer.
  - g. The last question asks you to write down the food that you eat on special occasions.
3. Give learners some time to complete the task in their workbooks.
4. The completed table is shown below. Fill the missing names into the table on the chalkboard.

### TASK

#### 1. KOSHER

- Egg bread *protein*
- Fish *protein*
- Chicken soup *protein*
- Chicken *protein*
- Potatoes *carbohydrate*
- Asparagus *carbohydrate*

#### HALAAL

- Vegetable soup *carbohydrate*
- Whole-wheat bread *carbohydrate*
- Chicken *protein*
- Salad *carbohydrate*
- Yoghurt *protein*

#### AFRICAN TRADITIONAL MEAL

- Uputu (maize) *carbohydrate*
- Morogo (plant leaves and spinach) *carbohydrate*
- Imyama yenkomo (beef stew) *protein*
- Tshwala (sorghum) *carbohydrate*
- Amasi (sour milk) *protein*

2.

MEAL	KOSHER	HALAAL MEAL	TRADITIONAL SOUTH AFRICAN MEAL
Dairy products			✓
Meat, fish, chicken	✓	✓	✓
Vegetables	✓	✓	✓
Fats			

3. *African traditional meal because it has more of a variety of foods and contains some vitamins and fibre.*

**Checkpoint 2**

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

- a. What is calcium needed for in the body?
- b. What happens if a person does not eat enough fibre?

Answers to the checkpoint questions are as follows:

- a. Strong bones and teeth
- b. They become constipated.



## **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
Step-by-Step	Digestive system	84
Solutions for all	Digestive system	87
Spot On	Digestive system	51-52
Top Class	Digestive system	72-75
Via Afrika	Digestive system	56
Platinum	Digestive system	63
Oxford Successful	Digestive system	58-59
Pelican Natural Sciences	Digestive system	80-86
Sasol Inzalo Bk A	Digestive system	114-120

## **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://ed.ted.com/lessons/how-do-carbohydrates-impact-your-health-richard-j-wood> (5min 11sec) [How do carbohydrates impact your health?]
2. <https://ed.ted.com/lessons/how-the-food-you-eat-affects-your-gut-shilpa-ravella> (5min 10sec) [How the food you eat affects your gut]

**9 A**

**Term 1, Week 9, Lesson A**

**Lesson Title: Starch and fats in food**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Digestive system		
<b>CAPS Page Number</b>	59		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>explain the scientific method required to test food for the presence of starch</li> <li>explain the scientific method required to test food for the presence of fats and oils.</li> </ul>			
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
glass beaker	polystyrene cup
funnel	kitchen funnel
white filter paper	white paper
ceramic mortar and pestle	wooden kitchen spoon
ethanol	pure alcohol
iodine solution	iodine
dropper	
bread, peanuts, chicken liver	
three test tubes	

**C CLASSROOM MANAGEMENT**

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

Which nutrient is found in chicken liver?

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.

*Protein*

**D ACCESSING INFORMATION**

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

INVESTIGATE THE PRESENCE OF STARCH AND FATS AND OILS IN FOOD

DETERMINE WHETHER A FOOD CONTAINS STARCH

1. Grind the food sample into a paste.
2. Add the paste to a test tube.
3. Add a teaspoon of ethanol to the test tube to make a mixture.
4. Add a few drops of light brown iodine to the test tube. It turns blue-black in the presence of starch.

## TOPIC: Digestive system

### DETERMINE WHETHER A FOOD CONTAINS FATS OR OILS

1. If food is solid, grind it into a paste using a pestle and mortar.
2. Add a teaspoon of ethanol to the food sample.
3. Pour the mixture through filter paper into the glass beaker.
4. Place a drop of the liquid onto blank white paper.
5. Let the ethanol evaporate.
6. After a few minutes, hold the paper in front of a window or light and observe if the sample left a grease spot. If there is a grease spot, then the sample contains fats and oils.

2. Explain this to the learners as follows:
  - a. There are two tests that can be done to see whether food contains starch or whether it contains fats and oils.
  - b. The starch test involves grinding food up, mixing it with ethanol and then adding iodine to the solution.
  - c. If the light brown iodine turns blue-black, then it means that the food contains starch, or carbohydrates.
  - d. The fats and oils test also involves grinding food up and mixing it with ethanol.
  - e. The next step requires pouring the liquid over filter paper.
  - f. The filter paper is left for a few minutes to dry and is then held up to the window or to a light.
  - g. If a light yellow grease mark is left on the paper, then the food contains fats and oils.
3. Tell the learners to copy the information written on the chalkboard into their workbooks.

### **Checkpoint 1**

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

- a. When does iodine turn blue-black?
- b. How do you know if a piece of food contains fats and oils?

Answers to the checkpoint questions are as follows:

- a. When starch is present in food
- b. A grease mark is left on the filter paper once the alcohol has evaporated.

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

PRACTICAL TASK

You are going to plan and carry out an investigation. You need to determine whether bread, peanuts and chicken liver contain starch or fats and oils or neither.

1. Write a hypothesis for your investigation. (6 marks)
2. Write down the variables that will affect the results of your investigation. (2 marks)
3. Perform the test for starch on the three foods and record your observations. (3 marks)
4. Perform the test for fats and oils on the three foods and record your observations. (3 marks)
5. Write a conclusion for your investigations. (3 marks)
6. How do your conclusions compare with your hypothesis? (3 marks)

TOTAL = 20 marks

2. Explain the practical task to the learners as follows:
  - a. You are going to design and conduct an experiment to determine whether bread, peanuts and chicken liver contain starch, fats and oils or neither.
  - b. You will write a hypothesis in which you will predict what each food contains.
  - c. Next, you will write down the variables that will affect the results of your investigation.
  - d. You are now ready to conduct the experiment and you may now work in pairs.
  - e. Perform the test for starch on all three foods and record your observations.
  - f. Perform the test for fats and oils on all three foods and record your observations.
  - g. Write a conclusion for your investigations. Remember to look at your notes in your workbook to help you.
  - h. Compare your actual results with your hypothesis.
3. Allow the learners some time to complete Task 1.
4. With the learners' input, complete the model answer on the chalkboard:

### PRACTICAL TASK

1. Bread ✓ will contain starch ✓ , peanuts ✓ will contain fats and oils ✓ and chicken liver ✓ will contain fats and oils, but less than peanuts ✓ .
2. Presence of starch ✓ and presence of fats and oils ✓
3. Bread turns blue-black ✓ , peanuts remain brown ✓ , chicken livers remain brown ✓ .
4. Bread does not leave a grease spot, ✓ peanuts do leave a grease spot ✓ and chicken livers leave a grease spot. ✓
5. Bread contains starch but not fats and oils. ✓ Peanuts do not contain starch but do contain fats and oils. ✓ Chicken livers do not contain starch but contain a small amount of fats and oils. ✓
6. The conclusion matched the hypothesis. Bread does contain starch, ✓ peanuts do contain fats and oils ✓ and chicken liver contains a small amount of fats and oils. ✓

5. Discuss the answers with the learners.
6. If there is time left over, show the learners the videos given at the end of the lesson.

### Checkpoint 2

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

- a. What is a hypothesis?
- b. Which steps are similar between the two food tests?

Answers to the checkpoint questions are as follows:

- a. A prediction of what you expect will happen in an experiment/investigation
- b. Both need food to be ground and added to ethanol.

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
Solutions for All	Digestive system	88-89
Via Afrika	Digestive system	57-58
Oxford Successful	Digestive system	60-61
Pearson: Spot On	Digestive system	53
Pearson: Platinum	Digestive system	66-67
Shuters Top Class	Digestive system	80-81
Step-by-Step	Digestive system	85
Pelican Natural Sciences	Digestive system	-
Sasol Inzalo Bk A	Digestive system	121-124

## **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://brilliantbiologystudent.weebly.com/iodine-test-for-starch.html> [Interactive website on testing food for starch]
2. <http://www.bbc.co.uk/bitesize/standard/chemistry/plasticsandothermaterials/carbohydrates/revision/3/> [Interactive website on testing food for starch]
3. <http://amrita.olabs.edu.in/?sub=79&brch=15&sim=121&cnt=1> [Interactive website on testing food for starch]
4. <http://brilliantbiologystudent.weebly.com/ethanol-emulsion-test-for-lipids.html> [Interactive website on testing foods for fat]

**9 B**

**Term 1, Week 9, Lesson B**

**Lesson Title: The Alimentary Canal**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Digestive system		
<b>CAPS Page Number</b>	62		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>differentiate between ingestion and egestion</li> <li>describe the movement of food from the mouth to the anus</li> <li>explain the function of each organ of the digestive system.</li> </ul>			
Specific Aims	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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



## **B** POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the digestive system	A leg of stocking with foot cut off, newspaper tightly rolled up
Projector, computer and internet	6m string/wool
Resource 26: The process of swallowing	

## **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 purpose of the digestive system?

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

*To break down the food we eat into small substances that can be absorbed into the blood stream*

## **D** ACCESSING INFORMATION

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

### THE ALIMENTARY CANAL

Mouth – ingestion and the start of digestion:

- teeth and tongue mash food
- saliva helps to break down food
- tongue pushes food to back of mouth to swallow

Oesophagus – peristalsis

- pushes food to stomach

Stomach – digestion

- muscular walls churn food
- enzymes break down food

## TOPIC: Digestive system

### Small intestine – absorption

- enzymes break down food further
- food broken down to be absorbed by lining

### Large intestine – water absorption

- water from waste is absorbed
- faeces are created

### Rectum – storage of faeces

### Anus – egestion

- end opening through which waste is egested

## 2. Explain this to the learners as follows:

- a. When you eat, you put food into your mouth. This is called **ingestion**. In the mouth, the teeth chew food until it is mashed into pieces small enough to be swallowed. Show learners Resource 26 to see the process of **swallowing**.
- b. Food then moves into the oesophagus, a long tube that reaches to the stomach.
- c. Show the learners the stocking and place the rolled-up newspaper in one end. Then, place your right hand above the newspaper ball and your left hand below the newspaper ball. Tighten your right hand and relax your left hand and watch the ball move down the stocking. Shuffle your hands down so that they are in the same position as at the start. Tighten your right hand again.
- d. Explain that the process you have demonstrated is called **peristalsis**.
- e. Once food enters the **stomach**, it mixes with **enzymes** that break food down even more. Digestion occurs in the stomach.
- f. Food is now liquid as it moves into the **small intestine**, where all the nutrients are absorbed into the blood stream. Hold up the 6m piece of wool and tell the learners that this is the length of the small intestine. Explain that the small intestine is very tightly packed inside the body.
- g. Waste products move into the **large intestine** and nutrients, water are absorbed..
- h. Faeces are stored for a short time in the **rectum** before being egested out of the **anus**.

## 3. Ask the learners if they have any questions.

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

## Checkpoint 1

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

- a. What process moves food through the oesophagus?
- b. Which organ temporarily stores faeces?

Answers to the checkpoint questions are as follows:

- a. Peristalsis
- b. Rectum

## E

### CONCEPTUAL DEVELOPMENT

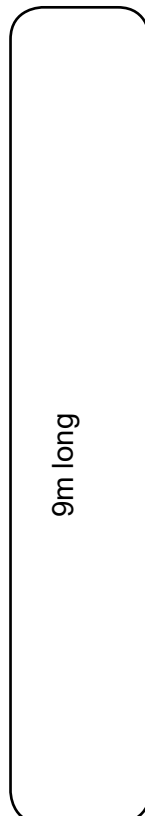
1. Write and draw the following on the chalkboard (always try to do this before the lesson starts):

#### TASK

1. If we stretch the alimentary canal out, it is 9m long!
2. Draw a tube the length of one page in the centre of your workbooks.
3. On the left-hand side of the tube, write the name of the organ.
4. On the right-hand side of the tube, write the function of the organ.
5. Underneath the function, write down any special structures that allow the organ to perform its function.

ORGAN

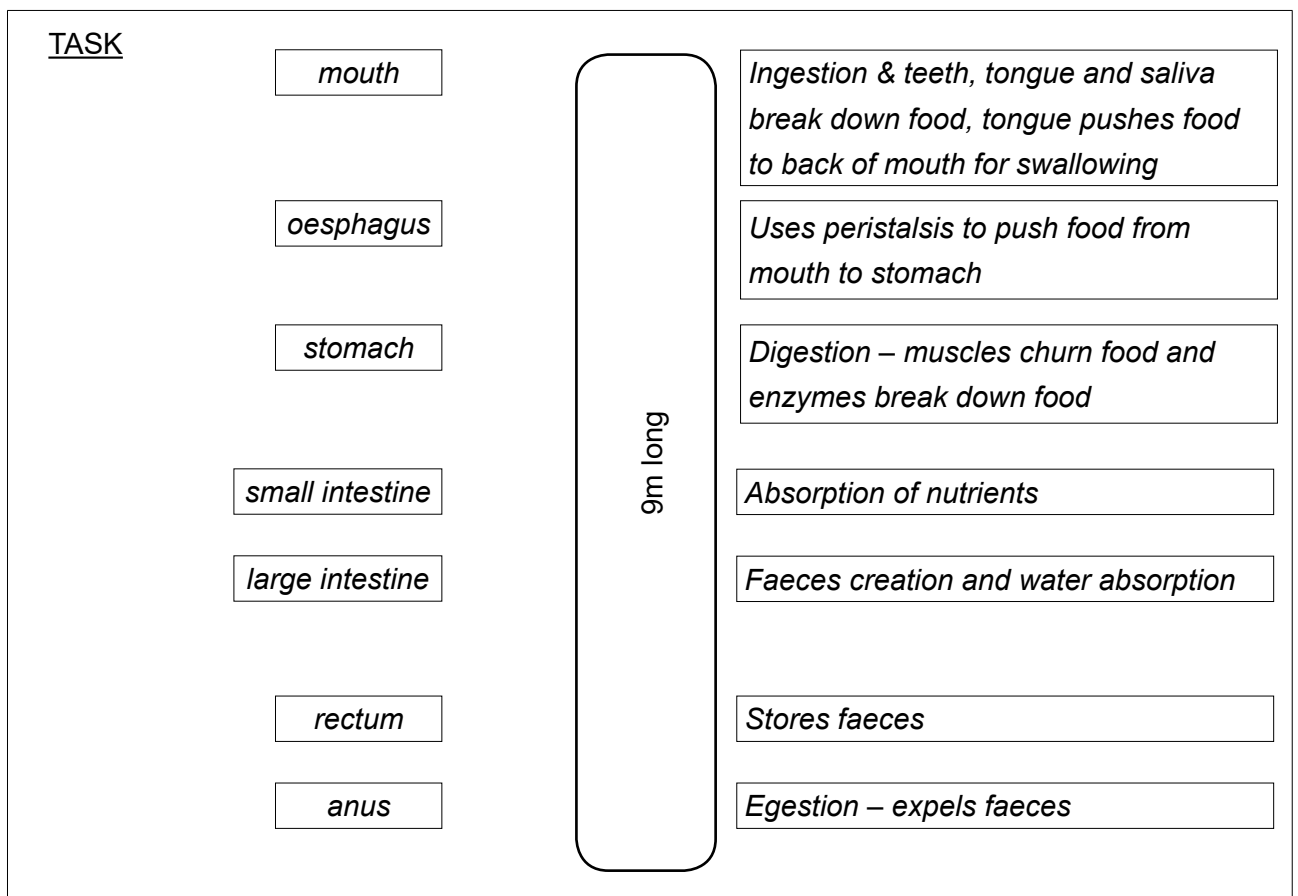
mouth



FUNCTION

## TOPIC: Digestive system

2. Explain to the learners the activity as follows:
  - a. If the alimentary canal was to be taken out of the body and stretched out, it would measure 9m long.
  - b. Turn to a new page in your workbook and draw a long narrow tube down the middle of the page.
  - c. On the left-hand side of the tube write the heading ORGAN and on the right-hand side, write the word FUNCTION.
  - d. Write the organs of the digestive system in the order that food would flow move through and give the processes and functions that each organ is responsible for on the right-hand side
3. Allow the learners some time to complete the task.
4. With the learners' input, complete the model answer on the chalkboard:



5. Discuss the answers with the learners.
6. If there is time left over, show the learners the videos listed at the end of the lesson.

## TOPIC: Digestive system

### **Checkpoint 2**

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

- a. What is the difference between ingestion and egestion?
- b. Which process happens in the stomach?

Answers to the checkpoint questions are as follows:

- a. Ingestion brings food into the mouth and egestion is when waste is excreted through the anus.
- b. Digestion

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
Solutions for All	Digestive system	94-95
Via Afrika	Digestive system	64-65
Oxford Successful	Digestive system	63-64
Pearson: Spot On	Digestive system	55
Pearson: Platinum	Digestive system	68-69
Shuters Top Class	Digestive system	78-80
Step-by-Step	Digestive system	86-87
Pelican Natural Sciences	Digestive system	91-92
Sasol Inzalo Bk A	Digestive system	128-131

## **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.google.com/search?client=safari&rls=en&q=digestion+simulation&ie=UTF-8&oe=UTF-8> [Interactive simulation of the digestive system]
2. <https://www.youtube.com/watch?v=dR1jFf3Ur2E> (2min 34sec) [The digestion process: what happens to your food as it travels through your body until it exists]

**9 C**

**Term 1, Week 9, Lesson C**

**Lesson Title: Mechanical and chemical digestion**

**Time for lesson: 1 hour**

**A POLICY AND OUTCOMES**

<b>Sub-Topic</b>	Digestive system		
<b>CAPS Page Number</b>	62		
<b>Lesson Objectives</b>			
By the end of the lesson, learners will be able to:			
<ul style="list-style-type: none"> <li>• name the 3 components of the biosphere</li> <li>• describe the important part that each component plays</li> <li>• classify living organisms according to their biosphere.</li> </ul>			
Specific Aims	1. DOING SCIENCE		✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS		✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE		

**SCIENCE PROCESS SKILLS**

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

## B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Model of the digestive system	
Projector, computer and internet	
Resource 27: Oesophagus, stomach and small intestine	

## C CLASSROOM MANAGEMENT

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

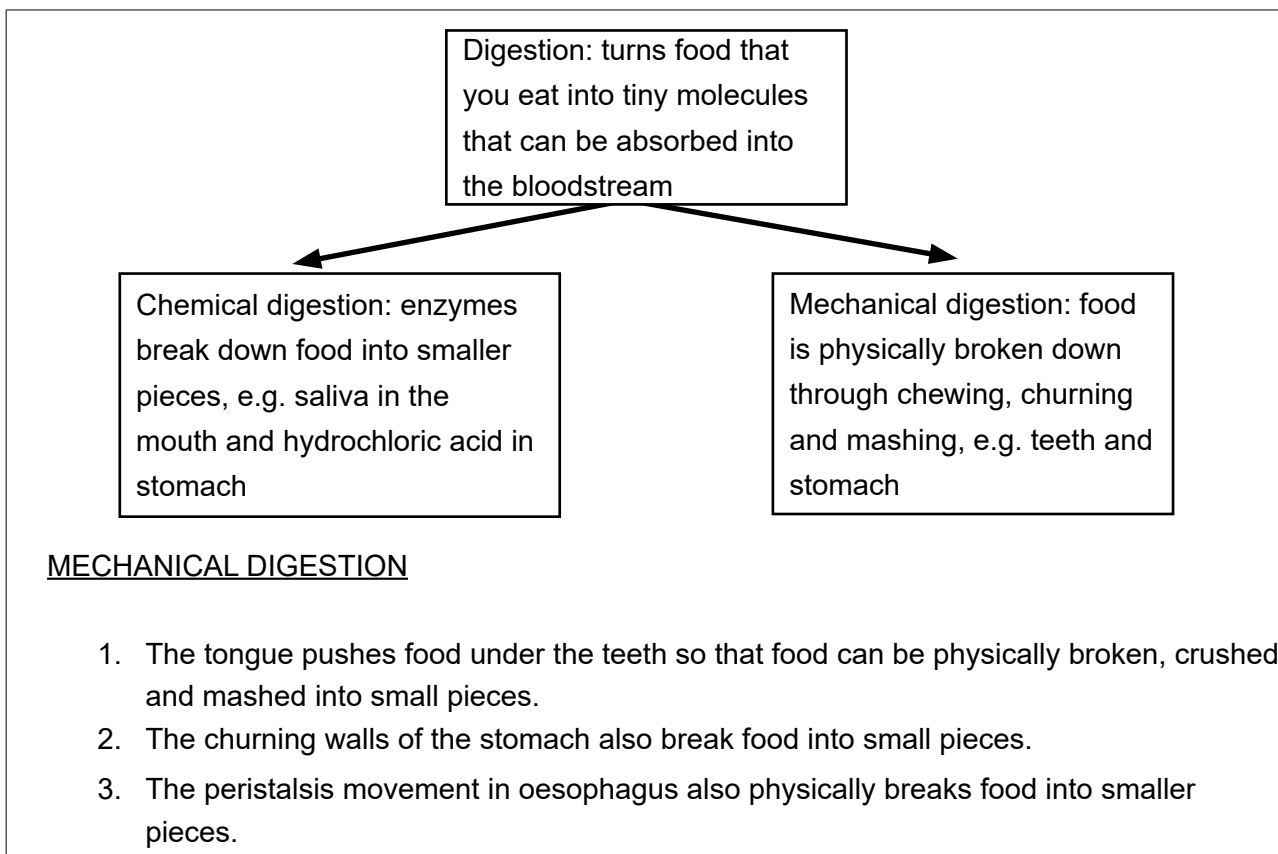
What do the teeth and saliva do to food that is ingested?

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.

*Break food into smaller pieces*

## D ACCESSING INFORMATION

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



## CHEMICAL DIGESTION

1. Saliva in the mouth has enzymes that break down food into smaller pieces.
2. Hydrochloric acid found in the stomach contains enzymes, which chemically change the structure of food so that it can be absorbed into the bloodstream.
3. Enzymes in the small intestine also break down food.

2. Explain this to the learners as follows:

- a. We tend to put rather large pieces of food into our mouths when we eat. These pieces are not small enough to go through tiny blood capillaries.
- b. Digestion helps break food into tiny pieces so that it can be absorbed by the bloodstream and taken to all the body cells for respiration.
- c. There are two types of digestion, chemical and mechanical digestion.
- d. Mechanical digestion takes place when the teeth chew, mash and grind food into small pieces before swallowing.
- e. The oesophagus helps with mechanical digestion as the peristaltic waves also physically break down food.
- f. Food reaches the stomach where food is churned up even more.
- g. Chemical digestion is when enzymes change the structure of the food to make it more easily absorbed.
- h. Saliva in the mouth and hydrochloric acid in the stomach break down food into even smaller pieces.

3. Ask the learners if they have any questions.

4. Show the learners Resource 27 to remind them of the location of the oesophagus, stomach and small intestine.

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

6. If there is time left, use the computer and projector to show the videos given at the end of the lesson.

### **Checkpoint 1**

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

- a. What are the teeth responsible for?
- b. How is the stomach structurally suited to perform both mechanical and chemical digestion?

Answers to the checkpoint questions are as follows:

- a. Mechanical digestion
- b. Muscular walls do mechanical digestion and hydrochloric acid is responsible for chemical digestion'



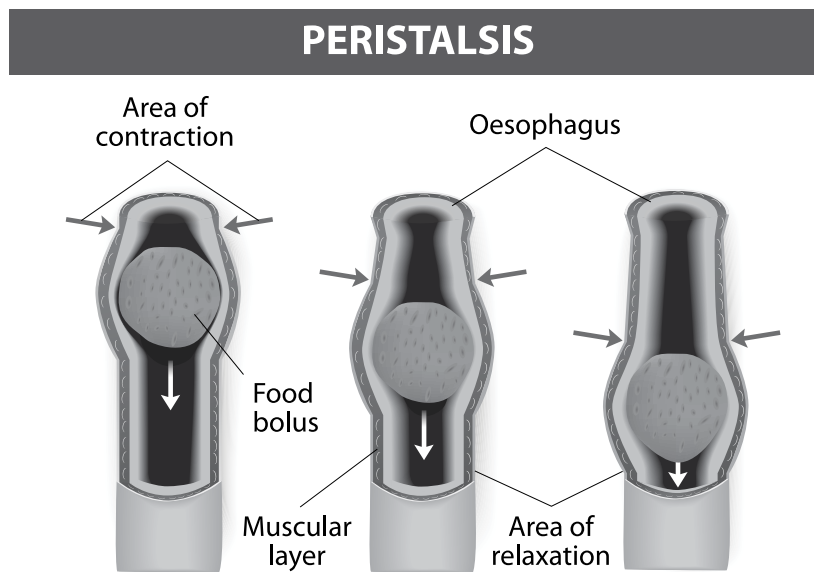
## E

### CONCEPTUAL DEVELOPMENT

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

#### TASK

1. Name the main processes that take place in the digestive system.
2. State how chemical digestion takes place and give examples of where it happens.
3. Explain what mechanical digestion is.
4. Draw and label the diagram below:



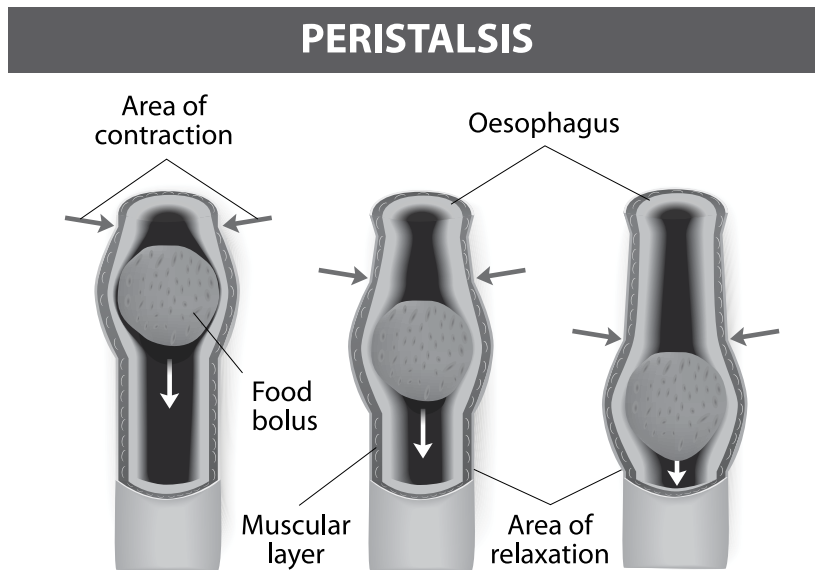
5. In your own words explain what peristalsis is.

2. Allow the learners some time to complete the task.
3. With the learners' input, complete the model answer on the chalkboard:

#### Model Answers:

1. *Chemical and mechanical digestion.*
2. *Chemical digestion: enzymes break down food into smaller pieces, e.g. saliva in the mouth and hydrochloric acid in stomach.*
3. *Mechanical digestion: food is physically broken down through chewing, churning and mashing, e.g. teeth and stomach*

4. As below:



4. Discuss the answers with the learners.

## **Checkpoint 2**

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

- Which type of digestion takes place in the mouth?
- What does digestion mean?

Answers to the checkpoint questions are as follows:

- Chemical + mechanical digestion
- Break food into small pieces to be absorbed into blood.

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
Solutions for All	Digestive system	94
Via Afrika	Digestive system	64-65
Oxford Successful	Digestive system	64
Pearson: Spot On	Digestive system	55
Pearson: Platinum	Digestive system	70
Shuters Top Class	Digestive system	78
Step-by-Step	Digestive system	-
Pelican Natural Sciences	Digestive system	90-91
Sasol Inzalo Bk A	Digestive system	126

## **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://ed.ted.com/on/w5Dn3af5> (3min 32sec) [Mechanical v Chemical digestion]
2. [https://www.youtube.com/watch?v=\\_jop60qu8bo](https://www.youtube.com/watch?v=_jop60qu8bo) (3min 23sec) [Mechanical Digestion Vs Chemical Digestion]
3. <http://www.bbc.co.uk/education/guides/zwqycdm/revision/4> [Interactive website on digestive system]

**NATURAL  
SCIENCES**  
ASSESSMENT  
GRADE 9 TERM 1



- This section presents the CAPS assessment requirements for this grade for this term.
- See your prescribed textbooks for examples of the required assessments.

## **CAPS Assessment**

Assessment is a continuous planned process that involves identifying, gathering, interpreting and diagnosing information about the performance of learners.

Assessment involves generating and collecting evidence of learner achievement and progress, and using this information to understand and provide assistance to the learner during the process of teaching and learning.

Assessment should be both *formal* and *informal*:

- a. Informal Assessment** involves regular checking of learners' class work and practical tasks; asking questions; discussions; informal classroom interactions; and giving constructive feedback. Informal assessment marks do not need to be recorded, but the teacher can make notes for future reference.
  - b. Formal Assessment** provides teachers with a systematic way of evaluating how well learners are progressing. Formal Assessment consists of selected assessment tasks. These tasks are stipulated by CAPS and the marks need to be recorded. These tasks are done throughout the year, and include practical / investigations, project, tests and examinations.
- i. Tests and Examinations**

The weighting of the marks should reflect the time allocated to each section in the curriculum content. Tests and exams should consist of a range of questions that cover different cognitive levels: recall; understanding; application; evaluation; analysis; and

# GRADE 9 ASSESSMENT

Grade 9					
Programme of Formal Assessment					
Formal Assessments	TERM 1	TERM 2	TERM 3	TERM 4	TOTAL % FOR THE YEAR
<b>School-based assessments</b>	Test 1 [40 marks]  Practical task/ investigation 1 [20 marks]	Test 2 [40 marks]  Practical task/ investigation 2 [20 marks]	Test 3 [40 marks]  Practical task/ investigation 3 [20 marks]	Practical task/ investigation 4 [20 marks]  Project [50 marks]	40%
<b>Exams [60 minutes]</b>		Exam 1 on work from terms 1 and 2 [80 marks]		Exam 2 on work from terms 3 and 4 [80 marks]	60%
<b>Number of formal assessments</b>	2	3	2	3	Total: 100%
Refer to CAPS on the processes for converting marks to percentages and to the 7-point scale.					

## PRACTICAL TASK - INTRODUCTION

**NS**

**GRADE 9**

**PRACTICAL TASK**

**TERM 1**

**20 MARKS**

Time allocation: 60 minutes (20 minutes preparation, 40 minutes task time)

### **NOTE TO THE TEACHER**

1. This practical activity will be completed as part of Section E of lesson 1B.
2. This practical will take place during the lesson after the teaching component in Section D, "Accessing Information".
3. The first 20 minutes will be used to teach section D and prepare learners for the practical task.
4. The next 40 minutes will be used to complete the practical activity as outlined in Section E.
5. The learners will be working in groups and constructing a model of an animal cell. Some materials will need to be collected in advance.
6. Try and collect as many of these materials as possible.
7. Suggested materials are: newspaper, clear plastic bags or scraps, small stones, dried beans, dried mielie seeds, string or wool, lengths of sticks, cardboard boxes, polystyrene trays, dough or clay or Prestik, cardboard offcuts, paper, marker pens, sheets of paper, glue, cellotape, scissors
8. Each group will also need a piece of cardboard 30cm x 50cm big. This can be a new sheet or from a cardboard box.
9. Each group will also need a sheet of lined paper for Task 2. If this is not available, the task can be done in their workbooks.
10. The instructions and content of the practical task should be written on the chalkboard for the learners.
11. The memorandum for assessing the practical task is provided.
12. The learners should complete the drawings and graphs with a sharp pencil and the written answers should be completed in pen.

# GRADE 9 ASSESSMENT

## PRACTICAL – MEMORANDUM

**NS  
GRADE 9  
PRACTICAL TASK  
TERM 1**

**20 MARKS**

(see Section E of Lesson 1B for instructions and questions)

Topic	Task	Expected answer/outcome	Marks
	<b>1</b>		
Cells as the basic unit of life	1.1	<ul style="list-style-type: none"> <li>• The animal cell is a suitable shape and size✓</li> <li>• The cell membrane is in the correct place and surrounds the cell✓</li> <li>• The cell membrane is labelled✓</li> </ul>	3
Cells as the basic unit of life	1.2	<ul style="list-style-type: none"> <li>• The nucleus is a suitable shape and size✓</li> <li>• The nucleus is in the centre of the cell✓The nucleus is labelled✓</li> </ul>	3
Cells as the basic unit of life	1.3	<ul style="list-style-type: none"> <li>• The mitochondria are a suitable shape and varied in size✓</li> <li>• The mitochondria are scattered in the cell✓</li> <li>• A mitochondrion is labelled✓</li> </ul>	3
Cells as the basic unit of life	1.4	<ul style="list-style-type: none"> <li>• The ribosomes are a suitable shape and varied in size✓</li> <li>• The ribosomes are scattered in the cell✓</li> <li>• There are more ribosomes than mitochondrion✓</li> <li>• A ribosome is labelled✓</li> </ul>	4
Cells as the basic unit of life	1.5	<ul style="list-style-type: none"> <li>• The cytoplasm is labelled in the correct place in the cell✓</li> </ul>	1



## GRADE 9 ASSESSMENT

	2		
Cells as the basic unit of life	2.1	Controls which substances pass in and out of the cell✓	1
Cells as the basic unit of life	2.2	Creates energy for the cell✓	1
Cells as the basic unit of life	2.3	Controls all activity in the cell✓	1
Cells as the basic unit of life	2.4	It is a jelly-like liquid found in the cells✓	1
Cells as the basic unit of life	2.5	All reactions take place in the cytoplasm✓	1
Cells as the basic unit of life	2.6	They are responsible for creating proteins✓	1
<b>TOTAL</b>			<b>20</b>

# GRADE 9 ASSESSMENT

## TERM TEST

**NS  
GRADE 9  
TEST  
TERM 1**

**80 MARKS  
90 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.

Controls all activities inside the animal cell?

- A. cytoplasm
- B. nucleus
- C. mitochondrion
- D. cell membrane

You have answered correctly if you have circled **(B.)**

# GRADE 9 ASSESSMENT

**NS  
GRADE 9  
TERM 1  
TEST**

**80 MARKS**

## Question 1: Multiple choice

Which one of these is NOT common to both plant and animal cells?

- A. Nucleus
- B. Cytoplasm
- C. Cell membrane
- D. Ribosomes

Read each question and circle the letter that shows the correct answer.

Which of these statements is false?

- A. Plants are producers.
- B. Photosynthesis takes place in the large vacuoles.
- C. Animals are consumers.
- D. Mitochondria are the cell structures responsible for respiration.

Which of these statements is true?

- A. Palisade cells in plants take up minerals and water from the soil.
- B. The root hair cell in plants holds the plant to the ground.
- C. Red blood cells in animals carry oxygen from the lungs to the body cells.
- D. Stem cells are specialised cells that can never change.

Which one of these group of words describe an animal cell?

- A. Nucleus, ribosomes, cell membrane, mitochondria, cytoplasm
- B. Nucleus, vacuole, cell membrane, ribosomes, mitochondria, chloroplast
- C. Cell wall, cell membrane, ribosomes, mitochondria, cytoplasm
- D. Nucleus, ribosomes, vacuole, mitochondria,

# GRADE 9 ASSESSMENT

## 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	Organ	Blood	
2.1.	Tissue	B. Respiration	
2.2.	Trachea	C. Metabolism	
2.3.	Process of converting food into energy	D. Windpipe	
2.4.	The chemical reactions that take place in the body	E. Kidney	

## Question 3

[8]

Complete the following sentences using words in the block below:

oesophagus, capillaries, anus, chemical, heart, bloodstream, chemical, stomach, large intestine, liver, peristalsis, carbon dioxide, oxygen.

Rewrite the sentences and underline your answers.

- 3.1 The \_\_\_\_\_ is the large organ that produces liquid to break down fats.
- 3.2 The saliva in the mouth is responsible for \_\_\_\_\_ digestion.
- 3.3 Food moves from the mouth, down the \_\_\_\_\_ and into the stomach by process of \_\_\_\_\_.
- 3.4 Food that has been broken down is absorbed into the \_\_\_\_\_ from the small intestine.
- 3.5 The \_\_\_\_\_ pumps blood around the body.
- 3.6 The blood that goes from the heart to the lungs is low in \_\_\_\_\_ and high in \_\_\_\_\_.

## Question 4

[6]

Write the word that is being described in the sentence.

Only write the answer.

4.1 The structures that attach one bone to another bone on the skeleton.

---

4.2 The structures that assist the skeleton to move.

---

4.3 The structures that attach muscles to bones on the skeleton.

---

4.4 A disease often suffered by the elderly where bones start to break easily.

---

4.5 The process of taking waste, water and glucose out of the blood.

---

4.6 The process of removing urine and faeces from the body.

---

---

5.1 Explain the following statement:

“The respiratory system does three important processes: breathing, gaseous exchange and respiration.”

---



---



---



---



---

5.2 Write down a word equation for respiration.

---

Look at the information on this table and answer the questions that follow:

Name of gas in the air	% of gas in air breathed in	% of gas in air breathed out
Oxygen	21	16
Carbon dioxide	0,03	4
Nitrogen	78	78
Other gases	1	2

5.3 What is the percentage of oxygen in inhaled air? \_\_\_\_\_

5.4 What is the percentage of oxygen in exhaled air? \_\_\_\_\_

5.5 What is the percentage of carbon dioxide in inhaled air? \_\_\_\_\_

5.6 What is the percentage of carbon dioxide in exhaled air? \_\_\_\_\_

5.7 Why is there more carbon dioxide in exhaled air than in inhaled air? \_\_\_\_\_

---

5.8 Where does the gaseous exchange take place in the lungs? \_\_\_\_\_

5.9 How does oxygenated blood get from the lungs to the heart? \_\_\_\_\_

5.10 Why is there the same percentage of nitrogen in both inhaled and exhaled air?

---



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# GRADE 9 ASSESSMENT

## Question 6

[8]

Read the following passage and answer the questions that follow:

It may seem as if your brain is always busy. And that is because it is. The brain controls what you think and feel, how you learn and remember, and the way you move and talk. It also controls many things that you don't even think about like your heart beat and digestion. You can think of the brain as a super-fast computer. When a message comes into the brain from one of the sense organs, the brain reacts with super-fast speed to tell the body what to do.

Answer the following questions using examples from the passage:

6.1 What is the main function of the nervous system?

\_\_\_\_\_

6.2 Name three of the sense organs.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6.3 The brain controls all that we do. Can you name three of the human activities that the brain controls?

\_\_\_\_\_

6.4 How do the sense organs send a message to the brain?

\_\_\_\_\_

## Question 7

[8]

Complete the following table:

Nutrient	Function	Example of food that contains nutrient
Carbohydrate		
	Prevents constipation	
		Oils, nuts, butter
Mineral: Calcium		

# GRADE 9 ASSESSMENT

## Question 8

[9]

Read the words and phrases in the box below.:

puberty, sexual organs mature, testosterone, oestrogen, pituitary gland, testes, ovaries, hormones, reproduction, body changes, hair, voice, pimples, menstruation

Using these words to write 5-8 sentences explaining what you understand about puberty.

---

---

---

---

---

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---

---

## Question 9

[5]

Read the following sentences. In the brackets are two words. One word in the brackets will make the sentence true. Write tdown the correct word only.

Example: A girl's breasts get bigger during (puberty/menstuation).

Answer: puberty.

9.1 The (testes/scrotum) produce sperm in the mature male body.

---

9.2 The (urethra/ovaries) produce egg cells in the mature female body.

---

9.3 When the penis releases sperm into the vagina, this is known as (ejaculation/ pregnancy.)

---

9.4 A (condom/STD) is a form of contraception.

---

9.5 An organ called the (zygote/placenta) gives the growing foetus food from the mother during pregnancy.

---



# GRADE 9 ASSESSMENT

## Question 10

[4]

Explain the 4 stages of the menstrual cycle:

Days 1-5: \_\_\_\_\_

Days 6-13 \_\_\_\_\_

Days 14-16 \_\_\_\_\_

Days 17-28 \_\_\_\_\_

## Question 11

[7]

Read the following statements and say whether each one is true or false:

10.1 A full term pregnancy is usually 40 weeks. \_\_\_\_\_

10.2 Copulation is the last stage of human reproduction. \_\_\_\_\_

10.3 During pregnancy the ovary releases the egg cell. \_\_\_\_\_

10.4 Fertilization occurs when the egg cell and sperm cell fuse. \_\_\_\_\_

10.5 Condoms can help prevent the spread of HIV. \_\_\_\_\_

10.6 Oviducts carry the egg from the ovary to the uterus.. \_\_\_\_\_

10.7 The urethra can carry semen and urine at the same time. \_\_\_\_\_

## Question 12

[2]

Write down two ways to reduce your chances of becoming pregnant or causing a pregnancy

\_\_\_\_\_

\_\_\_\_\_

**TOTAL: [80]**

# GRADE 9 ASSESSMENT

## TERM 1 TEST – MEMORANDUM

**NS  
GRADE 9  
MEMORANDUM  
TERM 1**

**80 MARKS  
60 MINUTES**

CAPS TOPIC	Questions	Expected answer(s)	Marks
	<b>1</b>		
Cells as the basic units of life	1.1	D✓	1
Cells as the basic units of life	1.2	B✓	1
Cells as the basic units of life	1.3	C✓	1
Cells as the basic units of life	1.4	A	1
	<b>2</b>		
Systems in the human body	2.1	A✓	1
Systems in the human body	2.2	D✓	1
Cells as the basic units of life	2.3	B✓	1
Systems in the human body	2.4	C✓	1
	<b>3</b>		
Systems in the human body	3.1	liver✓	1
Systems in the human body	3.2	chemical✓	1
Systems in the human body	3.3	oesophagus✓ peristalsis✓	2
Systems in the human body	3.4	bloodstream✓	1
Systems in the human body	3.5	heart✓	1
Systems in the human body	3.6	oxygen✓ carbon dioxide✓	2

## GRADE 9 ASSESSMENT

4			
Systems in the human body	4.1	ligaments✓	1
Systems in the human body	4.2	muscles✓	1
Systems in the human body	4.3	tendons✓	1
Systems in the human body	4.4	osteoporosis✓	1
Systems in the human body	4.5	filtration✓	1
Systems in the human body	4.6	excretion✓	1
5			
Circulatory and respiratory systems	5.1	(Any 6 marks) The respiratory process starts with breathing. ✓ Breathing is inhalation✓here air is taken in through the mouth and nose ✓into the lungs.✓ Gaseous exchange takes place here ✓where oxygen moves from the lungs into the blood✓and carbon dioxide moves from the blood into the lungs✓.This carbon dioxide is breathed out through the mouth and nose.✓ During respiration, oxygen is used✓to turn food into energy✓	6
Circulatory and respiratory systems	5.2	Oxygen + glucose→energy + carbon dioxide✓	1
Circulatory and respiratory systems	5.3	21%✓	1
Circulatory and respiratory systems	5.4	16%✓	1
Circulatory and respiratory systems	5.5	0,03%✓	1
Circulatory and respiratory systems	5.6	4%✓	1
Circulatory and respiratory systems	5.7	Because carbon dioxide is produced during respiration and is then breathed out✓	1
Circulatory and respiratory systems	5.8	In the alveoli✓	1
Circulatory and respiratory systems	5.9	In the blood carried in the arteries	1
Circulatory and respiratory systems	5.10	Nitrogen is not used by the body during respiration. It is just breathed in and breathed straight out✓	1

# GRADE 9 ASSESSMENT

		<b>6</b>			
The nervous system	6.1	Receives messages from the environment and tells the body how to react✓		1	
The nervous system	6.2	(Any 3) Eyes/ears/skin/tongue/nose ✓✓✓		3	
The nervous system	6.3	(Any 3) Speech/learning/movement/body functions/remembering/feelings (there may be other correct answers) ✓✓✓		3	
The nervous system	6.4	Through the spinal cord✓		1	
		<b>7</b>			
Digestive system	7	Nutrient	Function	Example	8
		Carbo- hydrate	Energy✓	Pasta/pap /rice /potatoes/ Mielies ✓	
		Fibre✓	Prevents constipation	Cereal/fruit /vegetables / whole wheat bread✓	
		Fats and oils✓	Protects organs/ ✓stored energy/ part of cell membrane ✓	Oils, nuts butter	
		Mineral: Calcium	Strong bones and teeth✓	Milk/ cheese ✓	

## GRADE 9 ASSESSMENT

	8		
Human reproduction	8	(Any 9) Puberty is the time when the sexual organs have matured✓ They are now ready for reproduction.✓ Boys usually start between 9 and 14✓ Girls start between 8 and 13✓ The pituitary gland has the job of releasing hormones.✓ Testosterone is the male hormone ✓ It is released from the testes.✓ Oestrogen is the female hormone✓ It is released from the ovaries.✓ Girls will start to menstruate.✓ Other body changes like hair growth pimples, voice changes and growing breasts start to happen.✓	9
	<b>9</b>		
Human reproduction	9.1	testes✓	1
Human reproduction	9.2	ovaries✓	1
Human reproduction	9.3	ejaculation✓	1
Human reproduction	9.4	condom✓	1
Human reproduction	9.5	placenta✓	1
	<b>10</b>		
Human reproduction	10	Day 1-5: Bleeding-uterus walls break down and pass through vagina✓ Day 6-13 Lining of uterus becomes thicker✓ Day 14-16 Ovulation✓ Day 17-28 Lining of uterus stays thick waiting for fertilized egg✓	4

## GRADE 9 ASSESSMENT

	<b>11</b>		
Human reproduction	11.1	true✓	1
Human reproduction	11.2	false✓	1
Human reproduction	11.3	false✓	1
Human reproduction	11.4	true✓	1
Human reproduction	11.5	true✓	1
Human reproduction	11.6	false✓	1
	<b>12</b>		
Human reproduction	12	Abstain from sexual activity✓ Use contraception✓	2
		<b>TOTAL</b>	<b>80</b>



