1 The human body

Unit plan

Topic	Approx. number of learning hours	Outline of learning content	Resources
1.1 The circulatory system	4–5	• The parts of the circulatory system and their functions	**Learner's Book:** Activity 1: Compare circulatory systems of some vertebrates Think like a scientist 1: Measuring pulse rate Think like a scientist 2: How does exercise affect pulse rate? Activity 2: Identify other factors that affect pulse rate Think like a scientist 3: Ask and investigate a question **Workbook:** Topic 1.1 Worksheet 1.1 **Digital Classroom:** Activity – The human body Video – The circulatory system Video – How does exercise affect pulse rate? Manipulative – Heartbeat and exercise
1.2 The respiratory system	3–4	• The main parts of the respiratory system and their functions	**Learner's Book:** Activity 1: Investigate breathing Think like a scientist 1: Make a model to explain breathing Activity 2: Find out how other animals get oxygen Think like a scientist 2: Investigate breathing rate **Workbook:** Topic 1.2 Worksheet 1.2 **Digital Classroom:** Video – The respiratory system
1.3 The reproductive system	2–3	• Body changes in puberty; the main parts of the reproductive system and their functions	**Learner's Book:** Activity: What do you know or want to know about puberty? **Workbook:** Topic 1.3
1.4 Diseases	3–4	• Organisms that cause diseases; body defences against disease; ways to control the spread of diseases	**Learner's Book:** Activity 1: Find information about diseases Activity 2: Group methods to prevent diseases Think like a scientist: Analyse hygiene methods that people use **Workbook:** Topic 1.4 Worksheet 1.4 **Digital Classroom:** Video – Living things that cause disease

Across unit resources		
Learner's Book:	**Teacher's Resource:**	**Digital Classroom:**
Project: The circulatory system	Language worksheets 1 and 2	End-of-unit quiz
Check your progress quiz	Diagnostic test	
	Mid-year test	
	End-of-year test	
	End-of-unit test	

BACKGROUND KNOWLEDGE

Body systems

The human body consists of a number of different systems that work together so that we can survive. At all times different body systems work together on specific jobs. These different body systems depend on one another. This unit focuses on the circulatory system, respiratory system and reproductive system. The table summarises the main parts and functions of these systems. Diagrams of the body systems can be found in the Learner's Book.

System	Main parts	Functions
Circulatory	heart, blood and blood vessels (arteries, veins and capillaries)	transports food and oxygen to all body organs and tissues and removes wastes such as carbon dioxide
Respiratory	nose and mouth, trachea (windpipe) and other air passageways (bronchi), lungs and diaphragm muscle	carries air into and out of the lungs where gases (oxygen and carbon dioxide) are exchanged
Reproductive	ovaries, oviducts, uterus, birth canal (vagina) in females testes, sperm ducts, penis in males	forms sex cells (ova in females; sperm in males) which join during fertilisation to form a new individual

Puberty

Puberty is linked to the development of the reproductive system in boys and girls. Puberty happens to everyone, although it may occur at different ages, sometimes starting at the early age of 8 or 9 in girls or as late as 14 or 15 in boys. Puberty is caused by the action of hormones produced in the body.

Puberty is a time when a person's body, feelings and relationships change from those of a child to an adult's. These changes are physical, emotional and social. The physical changes that occur during puberty are discussed in the Learner's Book. It is also important to know that while the body is changing, so are the feelings and relationships a person has. Learners need to know that no matter when the changes of puberty happen to them, they are all normal.

Diseases

Infectious diseases are caused by micro-organisms that enter the body and grow and reproduce there. The micro-organisms that cause disease include bacteria, viruses, fungi and other parasitic organisms such as the malaria parasite. Disease-causing organisms are called pathogens.

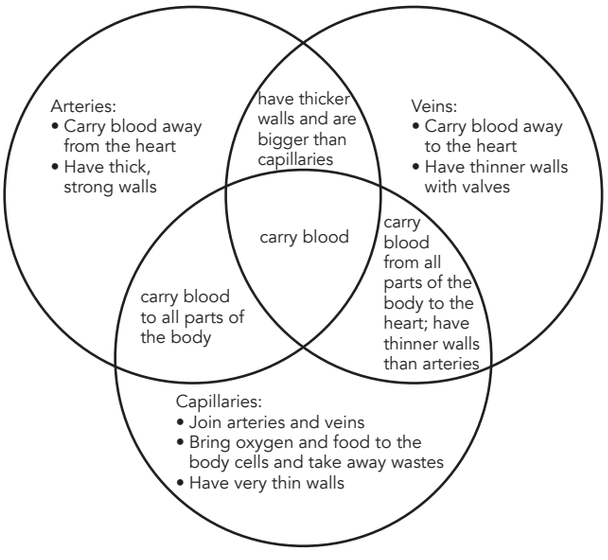
The body has a number of defence mechanisms to prevent infection by pathogens. This unit looks at the frontline defences, namely the skin, stomach and body secretions such as mucus and tears. The spread of diseases can be controlled by good hygiene and the prevention of bites by insects that spread disease.

TEACHING SKILLS FOCUS

Graphic organisers

Many learners find that using visual material, such as charts and diagrams, helps them to learn more effectively. Graphic organisers are visual illustrations of concepts and information. Graphic organisers provide a picture of key ideas and information on a topic and the relationship of the parts to one another and to the whole. Graphic organisers are also useful when brainstorming ideas, especially as part of a group project or planning activity. Flow charts, Venn diagrams and mind maps are examples of graphic organisers.

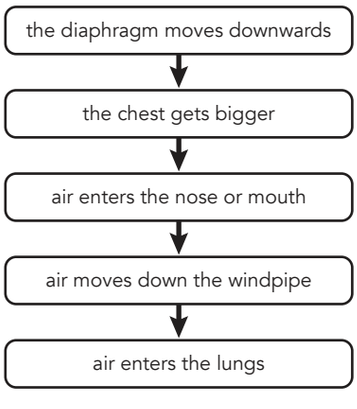
Venn diagrams consist of two or three overlapping labelled circles. Each circle has its own subject, written as a heading or title, e.g. type of blood vessel. Within the overlap area, learners write the things that the different subjects have in common, such as carry blood. Features that are not shared are placed where the circles do not overlap. Venn diagrams are useful for tasks which require making comparisons of features or properties.



K-W-L (Know, Want to Know, Learnt) charts are divided into three columns titled 'Know', 'Want to know' and 'Learnt'. The chart helps to guide learners through a lesson or topic. It helps you to establish learners' prior knowledge about the topic and to find out which aspects of the topic learners are most interested in. For example, for a lesson on the heart, learners would write what they know about the heart in the 'Know' column, e.g. 'I know the heart beats all the time. I know the heart is made of muscle'. In the 'Want to Know' column, learners write what they want to learn, e.g. 'Why does the heart beat? Does the heart ever rest?' Once the lesson is completed, learners write in the 'Learnt' column what they actually learnt about the heart

K-W-L chart		
What I know	What I want to know	What I learnt

Flow charts show the steps in a process using boxes connected with arrows. Flow charts can be used to plan the steps in an investigation or summarise the steps in process. Cycle diagrams can be used in the same way as flow charts to show processes that repeat themselves in a cycle.



Look for other opportunities in this unit to use various graphic organisers with your class.

1.1 The circulatory system

LEARNING PLAN

Learning objectives	Learning intentions	Success criteria
6Bs.01 Describe the human circulatory system in terms of the heart pumping blood through arteries, capillaries and veins, describe its function (limited to transporting oxygen, nutrients and waste) and know that many vertebrates have a similar circulatory system.	• Describe the parts of the circulatory system and their functions.	• Learners can describe the parts of the circulatory system and their functions.
Bs.01 Describe the human circulatory system in terms of the heart pumping blood through arteries, capillaries and veins, describe its function (limited to transporting oxygen, nutrients and waste) and know that many vertebrates have a similar circulatory system.	• Learn that the circulatory systems of other animals are similar to ours.	• Learners can say how the circulatory systems of other animals are similar to ours.
6TWSp.02 Know the features of the five main types of scientific enquiry	• To identify the type/s of scientific enquiry used in an investigation.	• Learners can say how the circulatory systems of other animals are similar to ours.
6TWSc.08 Collect and record observations and/or measurements in tables and diagrams appropriate to the type of scientific enquiry.	• To record results in tables.	• Learners can record results in tables.
6TWSp.04 Plan fair test investigations, identifying the independent, dependent and control variables.	• To plan a fair test on the effect of exercise on pulse rate.	• Learners can plan a fair test on the effect of exercise on pulse rate.
6TWSp.03 Make predictions, referring to relevant scientific knowledge and understanding within familiar and unfamiliar contexts.	• To make a prediction about how exercise affects pulse rate.	• Learners can make a prediction about how exercise affects pulse rate.
6TWSa.01 Describe the accuracy of predictions, based on results.	• To use results to say if the prediction was accurate.	• Learners can use results to say if the prediction was accurate.
6TWSa.02 Describe patterns in results, including identifying any anomalous results.	• To describe any patterns in results.	• Learners can describe any patterns in results.
6TWSa.03 Make a conclusion from results informed by scientific understanding.	• To use results to make a conclusion.	• Learners can use results to make a conclusion.

CONTINUED

Learning objectives	Learning intentions	Success criteria
6TWSc.07 Use a range of secondary information sources to research and select relevant evidence to answer questions.	• To find information to answer a scientific question.	• Learners can find information to answer a scientific question.
6TWSp.01 Ask scientific questions and select appropriate scientific enquiries to use.	• To ask a question to investigate and find the answer.	• Learners can ask a question to investigate and find the answer.
6TWSm.02 Use models, including diagrams, to represent and describe scientific phenomena and ideas.	• To make a model to demonstrate how the heart works.	• Learners can make a model to demonstrate how the heart works.

LANGUAGE SUPPORT

Learners will use the following words:

blood: a red liquid that carries food and oxygen to all parts of the body

blood vessels: special tubes that carry the blood

carbon dioxide: a waste gas that the body must get rid of

circulation: the pumping of blood all around the body

circulatory system: the system formed by the heart, blood vessels and blood to carry food and oxygen around the body

heart: the special muscle that pumps blood around the body

oxygen: a gas in the air that the body uses

pulse: a small beat felt under the skin due to the pressure of blood as the heart pumps it around the body

pressure: the force that is exerted on or against an object by something in contact with it, for example, when we squeeze water out of a sponge, we exert pressure on the sponge

Where possible, use familiar examples or contexts to explain the words. For example, learners will know that a circle is round. Explain that when blood circulates, it moves round and round the body in a certain pathway.

Explain that a vessel is a container for something, usually a liquid, for example a jug. The blood vessels contain the liquid blood. Vessel is also used to describe a sailing ship.

Common misconceptions

Misconception	How to identify	How to overcome
Blood in the veins is blue, due to diagrams of the circulatory system showing the veins in blue.	Ask learners how the blood in the arteries and veins is different and why they think so.	Explain that the blood in both the arteries and veins is red but the blood in the veins is darker red as it carries very little oxygen. (The exception is the pulmonary veins from the lungs.)

Starter ideas

1 Getting started (10–15 minutes)

Resources: Learner's Book; Digital Classroom: Activity: The human body (optional) or a human body outline per pair

Description: This activity draws on learners' existing knowledge about body organs from Stages 3 and 4.

Tell learners to work in pairs to read and answer the questions in the Learner's Book.

Give each pair an outline of the human body. Ask them to draw in and label on the outline the organs they named in the questions.

You can ask them to put up their hands to volunteer to share their answers and show their filled-in body outlines.

Ask the class to give their opinions of the answers given. Do they agree with the answers? Would they like to share any of their own ideas about the answers?

› **Digital Classroom:** If you have access to the Digital Classroom component, use the activity 'The human body' to revise and establish learners' knowledge of organs in the body. The i button will explain how to use the activity.

2 What can you hear? (10–15 minutes)

Resources: Each pair of learners will need the inner cardboard tube of a roll of kitchen paper towel (or toilet paper roll or paper cup with the bottom cut out)

Plastic washing-up liquid bottle filled with water.

Description: Have learners work in same gender pairs and put the inner cardboard tube of kitchen paper towel on the chest of their partner and listen. Tell them that they may move the tube around until they hear something. Ask learners what they hear and where they think the sound is coming from. Explain that the sound is the heart beating.

You can bring in the Science in Context strand of the curriculum by telling learners that the first stethoscope that was ever used to listen to the heart beating was a wooden tube. It was used in the same way as learners' card tubes. If possible, show the class what a modern stethoscope looks like or refer to the picture in the project for this unit in the Learner's Book.

Talk about what the heart does and how it does it.

Main teaching ideas

1 How the heart works (10 minutes)

Learning intention: To demonstrate how the heart works.

Resources: Plastic washing-up liquid bottle filled with water, red food colouring, dropper, basin

Description: This activity demonstrates how the heart works like a pump to push the blood all the way round the body. It is not found in the Learner's Book.

Learners will make a simple model from a plastic washing-up liquid bottle filled with water which they squeeze to simulate the pumping action of the heart.

Explain that by squeezing the bottle you put pressure on the water which makes it squirt out of the bottle. The heart works in the same way.

Challenge learners to squeeze the bottle as many times as they can in one minute. Are they able to squeeze it more than 70 times? Explain that this is how hard the heart has to work all the time.

› **Practical guidance:** Learners should work in pairs or small groups. They should fill a plastic washing-up liquid bottle with water. They can add a drop of red food colouring into the water to give it the same colour as blood.

Learners should squeeze the bottle to simulate the pumping action of the heart. They should do this over the basin to avoid spilling water on the desk. They should not point the bottle at another learner when they squeeze it. Learners will observe that the water is pushed out of the bottle with force.

› **Differentiation ideas:** More confident learners can do some research to find out why we can hear our heart beating. They should find out that the sound of the heartbeat is made by the pressure of the blood being squeezed out the heart when the muscle contracts.

2 Activity 1: Compare the circulatory systems of some vertebrates (20 minutes)

Learning intention: To learn that the circulatory systems of other animals are similar to ours.

Resources: Learner's Book; Worksheet 1.1 (optional)

› **Digital Classroom:** Video: The circulatory system (optional) or internet video clip on the circulatory system

Description: If you have access to the Digital Classroom component, show the video 'The circulatory system', which shows clips of the heart beating and blood flowing in the human circulatory system.

Alternatively, do an internet search for a video clip on the human heart and circulatory system. You can use search terms such as 'how your heart works' or 'the

heart and circulatory system'. Show the video clip and discuss the way the circulatory system works.

Then let learners work in pairs to look carefully at the drawings of the circulatory systems of the fish, frog and bird in the Learner's Book.

Remind them to look for both similarities and differences in the circulatory systems compared to the human circulatory system.

Learners could then complete Worksheet 1.1 to consolidate their knowledge of the differences in heartbeats for different animals.

› **Differentiation ideas:** More confident learners could draw a Venn diagram to compare the different circulatory systems.

› **Assessment ideas:** Learners can answer the self-assessment questions at the end of the activity in the Learner's Book.

3 Think like a scientist 1: Measuring pulse rate (20–30 minutes)

Learning intentions: To measure pulse rate.

To identify the type of scientific enquiry used in an investigation.

Resources: Per group: a timer or a watch with a second hand or stopwatch

Description: Explain what pulse rate is. To link with the Science in Context strand of the curriculum, explain that doctors and other healthcare workers use pulse rate as a sign of illness. For example, a very fast pulse can be a sign of heart disease.

Tell learners to read through the instructions for the activity in the Learner's Book.

Ask learners to predict what they think their pulse rate will be. Don't expect answers to be accurate. Learners can compare their prediction with the actual measurements later on.

Learners' tables should record pulse rates of group members as well. They will be using the observing over time type of scientific enquiry.

› **Practical guidance:** Demonstrate to the class how to find their pulse.

Measure and record your own pulse rate on the board. Then measure a volunteer learner's pulse rate and record it too. Point out that the pulse rates are not the same. Various factors affect pulse rate. Age is one of them. Children have faster pulse rates at rest than adults. There is also normal variation between individuals of the same age, as learners will observe when they measure their own pulse rates.

› **Differentiation ideas:** You may need to assist some learners in calculating the group's average pulse rate. Explain that they should add up all the pulse rates they measured and then divide the total by the number of members in the group. Do an example on the board to aid your explanation.

4 Think like a scientist 2: How does exercise affect pulse rate? (45–60 minutes)

Learning intentions: To plan a fair test on the effect of exercise on pulse rate.

To make a prediction about how exercise affects pulse rate. To record results in a table. To use results to say if the prediction was accurate. To describe any patterns in results. To use results to make a conclusion. To identify the type/s of scientific enquiry used in an investigation.

Resources: Learner's Book

Per group: a timer or a watch with a second hand or stopwatch

› **Digital classroom:** Video: How does exercise affect pulse rate? (optional); Digital Classroom manipulative: Heartbeat and exercise (optional)

Description:

› **Digital classroom:** If you have access to the Digital Classroom component, show the video 'How does exercise affect pulse rate?' to help learners make their predictions. The i button will explain how to use the video. Ask learners if all the children in the screens will have the same pulse rates. Why or why not? Ask which person they think will have the highest pulse rate (child skipping) which person will have the lowest pulse rate (child sleeping) and why. Ask learners to rank the activities in the slides from the one resulting in highest pulse rate to the one resulting in lowest pulse rate (skipping, walking, writing, sleeping).

Alternatively, you can look for similar pictures in magazines or on the internet of people (preferably children) being active to use as a stimulus for the discussion.

Tell learners to read the instructions in the Learner's Book. Recap on the role of dependent, independent and control variables in a fair test investigation if you feel learners will need help with this. Refer to the 'Working like a scientist' section at the start of the Learner's Book. Learners will also be observing and measuring changes over time.

Remind learners that a conclusion is what we find out from the results of an investigation. Guide them by asking questions such as:

- What did you observe or measure?
- Why did this happen?
- What did you find out from your observations or results?

› **Digital Classroom:** If you have access to the Digital Classroom component, use the manipulative 'Heartbeat and exercise' to consolidate learners understanding at the end of the investigation. The i button will explain how to use the manipulative. As a follow up, you could ask learners to think about ways in which they could improve their investigation. They should explain why their suggestions would improve the investigation. For example, they could measure the pulse rates of more people to make their results more reliable. Some suggestions will depend on the design of the investigation.

› **Practical guidance:** This is a learner-led practical.

Divide learners into groups of 4–5.

Allow about 15 minutes planning time. Ask the groups to show their plans to you. Guide them if their plans do not seem suitable.

› **Differentiation ideas:** Group learners in mixed-ability groups so that less confident learners can be encouraged and helped by more confident learners.

› **Assessment ideas:** You could use the following checklist to assess learners' investigations.

Assessment criteria	Well	Quite well	Needed help
How well did the learners…			
Make a prediction with reasons?			
Identify dependent, independent and control variables?			
Choose and use tables or diagrams to record results?			
Use the results to make a conclusion?			

Plenary ideas

1 What have you learnt? (5–10 minutes)

Description: Let learners stand and quickly say one thing that have learnt in the topic before sitting down.

› **Assessment ideas:** Learners' answers should give you a quick overview of how well the class has understood the work covered in the topic.

2 Exit tickets (5–10 minutes)

Resources: Exit tickets (see below)

Description: Make a set of 'exit' tickets to give to learners. Each card should have a question or sentence to complete on it. Learners have to hand you back a 'ticket' with an answer. Some examples are:

- Today I learnt…
- I would have liked…
- Now I understand… .

Reflection ideas: Learners can answer the Reflection questions at the end of the topic in the Learner's Book.

CROSS-CURRICULAR LINKS

Recording data in tables and drawing graphs in Main teaching ideas 2 and 3 links with data handling and graphing in Maths.

Investigating the effect of exercise on pulse rate in Main teaching idea 3 can be linked with Physical Education.

Reading and following written instructions and writing answer sentences can be linked with comprehension skills and sentence construction in English.

Homework ideas

1 Learners can make a mind map about what they have learnt about the circulatory system. In the next lesson, learners can explain their mind map to a partner. The partner can rate the mind map and explanation with one, two or three stars and say what they liked and what they think could be done better.

2 Learners could complete the Focus, Practice and / or Challenge Workbook exercises for the topic, depending on their progress.

In the next lesson, discuss answers in class. Allow learners to check their own work.

Topic Worksheet

Worksheet 1.1: Compare heartbeats

This worksheet is intended to help learners practise their skills in finding patterns in results and, for more confident learners, in making predictions based on the pattern identified.

All learners should be able to answer questions 1–4. Give the Help sheet to learners who need support in identifying patterns in results. More confident learners can attempt the additional questions on the Stretch sheet. They will need to do research to find and confirm answers.

1.2 The respiratory system

LEARNING PLAN

Learning objectives	Learning intentions	Success criteria
6Bs.02 Describe the human respiratory system in terms of oxygen from the air moving into the blood in the lungs, and know that many vertebrates have a similar respiratory system.	• To describe how the respiratory system works. • To show that breathing involves two different stages, breathing in and breathing out.	• Learners can describe how the respiratory system works. • Learners can show that breathing involves two different stages, breathing in and breathing out.
6TWSm.02 Use models, including diagrams, to represent and describe scientific phenomena and ideas.	• To make a model to explain breathing.	• Learners can make a model to explain breathing.
6TWSc.06 Carry out practical work safely.	• To do practical work safely.	• Learners can do practical work safely.
6TWSc.05 Take appropriately accurate measurements.	• To meas ure breathing rate.	• Learners can measure breathing rate.
6TWSc.08 Collect and record observations and/or measurements in tables and diagrams appropriate to the type of scientific enquiry.	• To record results in tables.	• Learners can record results in tables.
6TWSa.05 Present and interpret results using tables, bar charts, dot plots, line graphs and scatter graphs.	• To draw a line graph of results.	• Learners can draw a line graph of results.
6TWSa.03 Make a conclusion from results informed by scientific understanding.	• Use results to make a conclusion.	• Learners can use results to make a conclusion
6TWSc.07 Use a range of secondary information sources to research and select relevant evidence to answer questions.	• To find information to answer a scientific question.	• Learners can find information to answer a scientific question.

LANGUAGE SUPPORT

Learners will use the following words:

breathing: the way we take air into our lungs and let it out again

breathing rate: the number of times we breathe in and out in one minute

diaphragm: a muscle in the chest that helps us to breathe in and out

lungs: the organs we use for breathing

windpipe: the air tube that carries air from the nose and mouth to the lungs and back again

CONTINUED

Help learners become more familiar with the terms by giving them starter sentences that use the terms, for example:

- The organs we use for breathing are the _____. (lungs)
- Our bodies need a gas in the air called _____. (oxygen)
- Our bodies produce a waste gas that we must get rid of called _____. (carbon dioxide)
- The air tube that carries the air we breathe in down to the lungs is the_____. (windpipe)
- The muscle in the chest that helps us to breathe in and out is the _____. (diaphragm) The number of times we breathe in and out in one minute is called the _____. (breathing rate)

Diaphragm is a word that learners may find difficult to pronounce. Sound it out for them – dai-uh-fram – and let them repeat it after you.

You should also point to the various parts of the respiratory system on a chart, model or slide when you introduce their names.

Common misconceptions

Misconception	How to identify	How to overcome
Teachers often use a balloon to demonstrate how the lungs expand and contract during breathing. This practice may lead learners to think that the lungs are hollow organs like balloons that can fill up with air when we inhale and collapse and empty when we exhale.	Ask learners to draw a picture of the lungs and to explain what happens to the lungs when we breathe in and out. (see Starter activity idea 1)	Use a bath sponge to explain to learners that the lungs are not hollow but are spongy and made up of numerous tiny air sacs, like the bath sponge. If possible, show a slide or video clip of the lungs.

Starter ideas

1 Getting started (15–20 minutes)

Resources: Learner's Book. Each learner will need paper and coloured pencils

Description: The activity will help identify the misconception that the lungs are hollow and inflate and deflate like a balloon when we inhale and exhale.

Learners should work on their own to draw their pictures.

Use the 'Think-pair-share' method to allow learners to draw their pictures and think about their answers for a minute or two. They then discuss their answers with a partner before sharing their answers with the class.

2 What do you already know about the respiratory system? (15–20 minutes)

Resources: Set of questions about the respiratory system

Description: This activity draws on learners' existing knowledge about the lungs and breathing.

Tell learners to work in pairs to read and answer the questions. Give learners a copy of the questions or project or write them on the board:

1 Which body organs do we use for breathing?
2 Where in the body are these organs found?
3 How many times do we breathe each minute?
4 Why do we need to breathe?
5 Do we breathe all the time? Say why or why not.