

NEW

Smart

Basic Science & Technology



PRIMARY
6
TEACHER'S GUIDE

CURRENT
NERDC
Curriculum

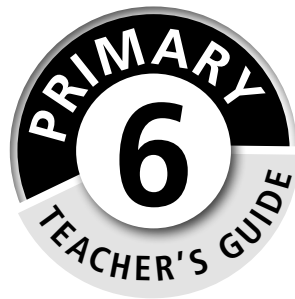


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Introduction

The purpose of the curriculum

The main objectives of the curriculum are to prepare the pupils to:

- develop an interest in science and technology
- acquire basic knowledge and skills in science and technology
- apply scientific and technological knowledge and skills to meet contemporary societal needs
- take advantage of the numerous career opportunities provided by science and technology
- become prepared for further studies in science and technology
- avoid drugs and related vices
- be safety and security conscious.

Time allocation

To cover this curriculum, the recommended weekly time allocation is three periods of 40 minutes each. Pupils need to do regular revision at home in order to cope with the content and new terminology.

The role of the teacher

One of the principal duties of a Basic Science and Technology teacher is to prepare and present good lessons to his or her pupils.

The teacher has to:

- be as well informed as possible on the scheme of work of the subject
- know the aims and objectives of each topic
- select appropriate content materials
- decide on the best methods of presentation such as slides, workstations, videos, discussion groups, worksheets, question-answer sessions, debate, and experiments
- gather equipment and other resources required for the activities
- arrange outings and guest speakers from time to time
- keep informed about environmental issues and other current biological news in Nigeria and the rest of the world.

To be effective in presentation, the teacher must create a written/typed plan for each lesson. This must include aims, objectives, resources, time frames, content for the lesson, activities, homework, assessments, and ideas and additional worksheets to cater for pupils requiring extension or learning support (remedial).

Prepare each topic in advance. Many teachers go into the classroom inadequately prepared. It is your responsibility as a Basic Science and Technology teacher actively to involve your pupils in the learning process. It is a proven fact that pupils learn far more by *doing* than by *listening*.

Science involves being curious and asking questions. Wherever possible, ask questions to engage the pupils and to encourage independent thinking. Start your lessons by asking the pupils to write down answers to questions related to your lesson (approximately five). This will settle them into the lesson. You can use different types of questions in your lessons:

- **diagnostic**, enabling you to determine prior knowledge on the topic
- for **consolidation** of challenging concepts during the lesson
- for **stimulation** of interest in the subject
- for **concluding** the lesson. This will assist you to find out whether pupils have understood the concepts/terminology in the lesson. It will also highlight any areas that they need to revise at home or for you to revisit in the next lesson.

Teachers must ensure that they do not appear to have favourites in the class, so devise a system to ensure that you ask questions fairly, but be careful not to embarrass weak pupils if they cannot answer questions.

How to use this guide

The purpose of this Teacher's Guide is to assist you so that you may be more thoroughly prepared and your teaching will be more meaningful to your pupils. This guide supports a hands-on approach and lays a solid foundation for Primary 6.

You need to be familiar with the key features of the Pupil's Book. The book is divided into 29 topics. Each topic is structured in the following way:

- performance objectives required by the curriculum
- additional resources required for the lesson
- lesson guidelines
- activity guidelines
- exercise answers
- Workbook answers.

How to use the curriculum guide

The curriculum guide is on pages v to xiv of the Pupil's Book. Its primary function is to provide an outline of the subject matter and its content. The curriculum guide enables teachers to clarify their thinking about a subject, and to plan and develop particular curriculum experiences that they believe may require more time and attention when preparing lessons. The criteria all teachers should bear in mind when using the curriculum guide are continuity in learning and progression of experience.

The curriculum guide is sequential. The sequence of the scheme of work is aligned with the Pupil's Book. Do not be tempted to jump around. Rather spend time carefully planning the term to ensure that you adhere to the curriculum guide.

The work is divided into four themes. Each has sub-themes, and the sub-themes have topics. There are 29 topics in total. Allow time at the end of each term for revision and an examination. This time frame may vary depending on the planning of your particular school.

The first lesson is usually an introduction to the topic. Make an effort to make this lesson exciting and informative. You should always explain the meaning of the topic in this lesson, for example: What is Basic Science and Technology? What are minerals? What is personal health? What is information technology?

The last lesson is allocated to revision. In this lesson you can give the class a revision worksheet or a test, or design a fun activity such as a game or a quiz to consolidate the topic.

Plan the time for each topic. The amount will vary according to the ability of the pupils in your class and their prior knowledge. Your management of the class will have an enormous influence on your ability to adhere to the time frames.

Focus on effective discipline strategies. You will have fewer discipline issues if you:

- are punctual
- are well prepared
- follow a plan (write this on the board at the start of the lesson)
- keep your word (do not make empty threats)
- consistently adhere to rules, specially rules related to laboratory safety
- strive to make Basic Science and Technology an exciting subject.

A teacher of Basic Science and Technology is a professional instructor who facilitates, promotes and influences pupils to achieve the outcomes of the curriculum. It is the wish of the authors that the pupils will, at the end of each course in the series (Primary 1–6), attain a level of Basic Science and Technology proficiency that will equip them for future studies in this field.

Sub-theme 1 Learning about our environment

Topic 1 The solar system

Performance objectives

Pupils should be able to:

- identify and name planets in our solar system
- identify the components of the solar system, their location and importance
- state the relationships among the Earth, Sun, Moon and other planets, and the stars
- demonstrate that the Earth exerts a pull on objects and bodies.

Additional resources

- Pupil's Book pages 1 to 10
- Workbook pages 1 and 2
- A large chart of the solar system, if available
- For the extension activities: pieces of A2 cardboard; plastic lids (optional); equipment for painting; small stone chips and rocks; a variety of objects of differing weights that pupils can throw into the air safely
- For the remedial activity: the Internet (if available), for watching video clips

Teaching the lesson

- Discuss the meaning of the term “solar system” and the components of our solar system. Use the picture on page 1 in the PB and bigger charts, if they are available.
- Ensure that pupils understand the concept of there being more than one solar system and galaxy in the universe.

Our solar system

- Encourage pupils to learn and recite the names of the natural bodies in our solar system.
- Discuss the different components of our solar system, referring to their position in relation to the Earth and the Sun.
- Describe the different components' characteristics and importance in our solar system.

The planets

- Discuss the characteristics of each planet using pictures and charts. You could use a physical display to familiarise pupils with the size of each planet and its distance from the Sun.
- Pupils should have a good knowledge of the features of each planet.
- Discuss the new status of the former planet Pluto and encourage pupils to do their own research about it.
- Explain why the satellites in our solar system stay in their own orbits around the Sun.

Earth's relationship to the Sun, the Moon and other stars

- Discuss how the Earth's Moon, the Earth and the Sun form a unique relationship that enables life on Earth, and also creates tides and seasons.
- Discuss the constellations of stars in our galaxy by showing the pupils pictures and identifying well-known constellations.

Gravity and weightlessness in space

- Recap what the pupils know about gravity.
- Ensure that the pupils equate the strength of gravitational pull to the mass of an object.
- Compare human activities on Earth and in space, using supporting media.
- Encourage pupils to do their own research about the International Space Station, and how astronauts must adapt their everyday activities because they are weightless.

Pupil's Book answers

Exercise 1 Answer questions about objects in our solar system PB page 4

1. Meteoroids are small rocks of different sizes that are in orbit in our solar system. Meteors are meteoroids that burn up when they pass through the Earth's atmosphere. We call them shooting stars. Pieces of meteors that do not burn up entirely in the atmosphere, fall to the Earth's surface and are known as meteorites.
2. Asteroids are made of rock and metal; comets consist of dust and ice. Their sizes are similar and range from a few metres to several hundred kilometres in diameter.
3. A star is a ball of burning gases, releasing both light and heat energy.
4. An orbit is the repeating path that a natural satellite follows as it travels in a solar system.
5. The asteroid belt in our solar system is situated between the planets of Mars and Jupiter.

Exercise 2 Answer questions about the planets PB page 8

1. Venus, Earth and Mars are terrestrial (rocky) planets and, therefore, much heavier than the gas planets of Jupiter and Uranus. Terrestrial planets have a greater gravitational pull to the Sun.
2. No, the Sun is a star. It does not orbit and is at the centre of the solar system.
3. Uranus spins on its side around the Sun.
4. Mars is a terrestrial planet, like the Earth. Astronomers believe that conditions on Mars may be able to support life and growth. As such, it may be able to offer humans an alternative home, should they need it in the future.
5. It is a galaxy of stars of which our solar source, the Sun, is one.
6. No, they are not the same thing. A galaxy is all the stars converged in a specific place in space. A constellation is a few bright stars that, together, create a recognisable pattern.

Exercise 3 Answer questions about gravity and weightlessness in space PB page 10

1. Gravity is the force that pulls the mass of one object towards the mass of another object. Gravitational pull is the strength of gravity between two objects.
2. The heavier an object is (the greater its mass), the more gravitational pull it will exert on other, smaller objects.
3. The Earth's gravitational pull on the International Space Station is much reduced, due to the Station's being so far away from the Earth. The mass of the astronauts is a fraction of what it is on Earth and, therefore, they experience weightlessness in space.

4. Accept any relevant answer.
5. You would weigh one eighth of your normal weight. Pupils' answers will differ.

Extension activities

- Divide the class into groups. Get each group to make a model of the solar system on a flat surface (such as A2 cardboard). Pupils use different-sized cardboard cut-outs or plastic lids painted in the likeness of the different planets and moons. Use small stone chips and rocks to illustrate the asteroid belt. Draw in their orbits and label each body clearly.
- Illustrate gravity by having pupils toss different-weighted objects into the air to see which reaches the ground first.

Remedial activities

- If you have access to the Internet, show pupils video clips illustrating the size, position and movement of the planets. Visit <https://youtube.com> and do a search to find suitable clips.
- Teach the pupils a mnemonic to help them to remember the order of the planets.

Workbook answers

Answer questions about our solar system WB pages 1 and 2

1. 1 = Sun; 2 = Mercury; 3 = Venus; 4 = Mars; 5 = Earth; 6 = Earth's Moon; 7 = Jupiter; 8 = Saturn; 9 = Uranus; 10 = Neptune; 11 = Pluto; 12 = asteroid belt
2. Pupils' answers will vary. Accept relevant and accurate answers.
3. a) The Sun is our nearest star and is at the centre of our solar system. All objects in our solar system revolve around the Sun. The Earth's distance from the Sun makes it the only planet where the Sun's heat and light make life possible.
b) Meteoroids are rocks floating in space that create a bright streak of light as they burn up in the Earth's atmosphere. As they do so, they look like a star falling from the sky.
4. The gravitational pull between the Earth, the Earth's Moon and the Sun keeps them in the same position in space.

Topic 2 The Earth and its movements

Performance objectives

Pupils should be able to:

- describe the two important movements of the Earth (rotation and revolution) and their effects
- explain the causes of lunar and solar eclipses and their effects
- discuss some effects of the Earth's movements on the environment
- identify the major sources of light for the Earth and other planets.

Additional resources

- Pupil's Book pages 11 to 26
- Workbook pages 3 to 9
- For Activity 1: globe of the Earth, or a ball of a similar size; torch
- For Activity 4: torch
- For Exercise 3: Internet access

- For Activities 6 and 7: Internet access; library books; magazines
- For the Workbook pinhole camera: long cardboard box or tube (tape two tubes together for a longer box, and then the projected image will be larger); sheet of white paper; duct tape; aluminium foil; pin or thumbtack; pair of scissors; sharp knife or cutter

Teaching the lesson

Movements of the Earth

- Introduce this section using a chart, if one is available, or a diagram on the board showing the Earth rotating on its own axis as it revolves around the Sun.
- Before discussing how the Earth's rotation leads to night and day, check the pupils' understanding of the underpinning concepts.
- Work through the content on page 12 in the Pupil's Book and use the diagram on the same page to help pupils' understanding.
- After the pupils have completed Activity 1, check their understanding of the significance of the Earth's rotation, using question-and-answer methodology.
- Discuss the Earth's revolution around the Sun and how it leads to different seasons in the northern and southern hemispheres. Use the diagram on page 14 in the Pupil's Book to help illustrate the concepts before the pupils complete Activity 2. Demonstrate the effects of the Earth's revolution around the Sun using a globe and torch.
Important: Emphasise the dates for the equinoxes – 21 March and 22 September, and the solstices – 21 June and 21 December.
- While the pupils complete Activity 2, move amongst the groups to offer guidance if necessary, and to assess pupils' grasp of the concepts.
- You could take in the pupils' work for Exercise 1, to do informal assessment.

Lunar and solar eclipses

- Discuss the Moon's revolution around the Earth. Show the pupils a chart illustrating the Moon's path around the Earth, or refer them to the diagram on page 19 in the Pupil's Book.
- Discuss how the movements of the Earth and Moon sometimes cause a lunar or solar eclipse. Refer to the diagrams on page 16 in the Pupil's Book.
- If possible, show short video clips of solar and lunar eclipses to the class. If the pupils have Internet access, they can also search for such videos or print out photographs to show the class.
- Ask the pupils to talk to older people in their community to find out about traditional beliefs and folktales related to solar and lunar eclipses. They can then share these with the class.

Effects of the Earth's movements on the environment

The Earth's movements and day/night and seasonal changes

- Recap what the pupils have learnt about the Earth's movements and how they cause night and day and give us different seasons.
- Then, let the pupils attempt Activity 4 in groups. Move amongst the groups, offering assistance where necessary.
- Once they have completed Activity 4, go through the answers in class, soliciting input from the different groups. Give praise for solid attempts to engage with the content, as well as for correct answers.

- If you have Internet access, let the pupils do research in groups on how the seasons affect human activities, such as farming and lifestyle, in different parts of the world. Let each group share its findings with the class.

The Earth’s movements and the phases of the Moon

- Start the section on the Earth’s movements and the phases of the Moon by asking the pupils if any of them have noticed what the Moon has looked like in the night sky in the past few days. Let them describe in detail what they saw, linking this to a discussion of the phases of the Moon.
- Go through Activity 5 with the pupils, so that they understand what is required of them. This is a fun activity that the pupils can do in pairs or groups. Ask them to record the shape of the Moon each night in a description and in a drawing. They can present their findings on A3 posters, which you can display in class.

The Earth’s movements and ocean tides

- Start this section by asking the pupils what they have seen and know about ocean tides. If any of them have visited the coast, let them share what they saw of tides at the seaside.
- Work through the content on daily tides and spring and neap tides on pages 20 and 21 in the Pupil’s Book. Refer to the diagrams on page 21 in the Pupil’s Book, to help illustrate the concepts.
- If you have Internet access, you could show the pupils tidal forecasts for different places in Nigeria. A useful website to visit is <https://www.tide-forecast.com>

Traditional and modern knowledge about the effects of the Earth’s movements on the environment

- Introduce this section by asking the pupils to share what they know about traditional knowledge of the Earth’s patterns of day and night, and seasonal changes, especially in relation to human activities such as farming or seasonal migration.
- Discuss the requirements of the research pupils will do for Activity 6, and point them towards useful sources of information for their research. Remind them that people in their community, such as people involved in the fishing or farming industries, can be good sources of information related to both traditional and modern knowledge and practices.

Major sources of light for the Earth and other planets

- Work through the content on pages 23 and 24 in the Pupil’s Book. Ask the pupils what conditions are necessary to make life on Earth possible. Discuss the fact that the Earth is the right distance from the Sun to enable life. Refer back to the diagram of the solar system on page 1 in the Pupil’s Book.

Star constellations

- If possible, introduce this section by showing the pupils a chart of the northern hemisphere star constellations. Initiate discussion by asking the pupils if they know how to identify particular stars or constellations in the night sky.
- Link the “movement” of the constellations in the night sky to the rotation of the Earth.

Pupil's Book answers

Activity 2 Explore the Earth's revolutions PB page 15

2. a) Throughout the different seasons, the opposite conditions are experienced in the northern and southern hemispheres.
- b) On 21 March and 22 September, day and night are equal in length, i.e. twelve hours long.
- c) The solstices are the moment when the Sun reaches its most northern or most southern point from the Earth's equator, and then appears to "stop" before reversing direction.
- d) Nigeria is close to the equator so, due to the tilt of the Earth's axis, there is less seasonal variation in the amount of sunlight received than at latitudes further away from the equator.
- e) In the North Pole, there will be zero hours of sunlight; in the South Pole, there will be 24 hours of sunlight. Due to the tilt of the Earth's axis, at this date the North Pole receives no sunlight and the South Pole receives uninterrupted sunlight.

Exercise 1 Answer questions about the Earth's movements PB page 15

2.
 - The rotation of the Earth refers to the fact that the Earth spins or rotates on its own axis. It takes the Earth one day (24 hours) to complete one rotation around its axis. The Earth's rotation leads to day and night.
 - The revolution of the Earth refers to the movement of the Earth around the Sun. It takes the Earth one year ($365\frac{1}{4}$ days) to revolve once around the Sun, or to complete one revolution in its fixed orbit around the Sun. The Earth's revolution causes different seasons and, combined with its own rotation and the revolution of the Moon around the Earth, lunar and solar eclipses.

Activity 3 Explain and research lunar and solar eclipses PB page 17

1. Refer to the text and diagrams on page 16 in the Pupil's Book.
2. a) to c) Pupils' answers will vary. Accept all reasonable answers.

Activity 4 Model and discuss day/night and seasonal changes PB page 18

2. Refer to the text and diagrams on pages 11 to 14 in the Pupil's Book.
3. a) and b) Pupils' answers will vary. Accept all reasonable answers.

Activity 5 Observe and research the phases of the Moon PB page 20

1. to 3. Refer to the text and diagrams on pages 18 and 19 in the Pupil's Book.

Exercise 2 Create a Moon calendar PB page 20

1. and 2. Refer to the text and diagrams on pages 18 and 19 in the Pupil's Book.

Exercise 3 Compare tides to the phases of the Moon PB page 22

2. Refer to the text and diagrams on pages 20 and 21 in the Pupil's Book.

Activity 6 Research traditional knowledge about the effects of the Earth's movements on the environment PB page 22

- Pupils' answers will vary. Accept all reasonable answers.

Activity 7 Research and observe star constellations PB page 26

- Aquarius = the Water-bearer/Cup-bearer; Capricorn = the Goat; Sagittarius = the Archer; Scorpio = the Scorpion; Libra = the Weighing scales; Virgo = the Virgin; Leo = the Lion; Cancer = the Crab; Gemini = the Twins; Taurus = the Bull; Aries = the Ram; Pisces = the Fish
 - and c) Pupils' answers will vary. Accept all reasonable answers.
- Pupils' answers will vary. Accept all reasonable answers.
- Pupils' answers will vary. Accept all reasonable answers.

Workbook answers

Investigate how the Earth rotates and revolves at the same time WB pages 3 and 4

- The lamp represents the light from the Sun.
 - The girl is holding a globe of the Earth. She is holding it at an angle, because the Earth rotates at an angle on its imaginary axis. The Earth completes one rotation in 24 hours.
 - The arrows around the globe show that the Earth rotates on its own axis from west to east. That is why we see the Sun rising in the east in the morning and setting in the west at night.
 - The arrows on the ground shows the direction in which the girl must walk to demonstrate how the Earth revolves in a fixed path or orbit around the Sun. The Earth completes one revolution around the Sun in 365¼ days (about one year).
 - As the girl spins the globe on its axis, the pupils can observe how the Earth's rotation on its axis leads to day and night in different parts of the world.
 - As the girl walks around the light, she demonstrates how the revolution of the Earth leads to different seasons in the northern and southern hemispheres. When it is winter in the northern hemisphere, it is summer in the southern hemisphere.
 - The boy is holding a small ball near the globe of the Earth. This smaller ball represents the Moon, which rotates around the Earth.
 - At certain times, the Earth, Moon and Sun's movements cause them to line up in a certain way that makes it possible for us to see a lunar or solar eclipse.

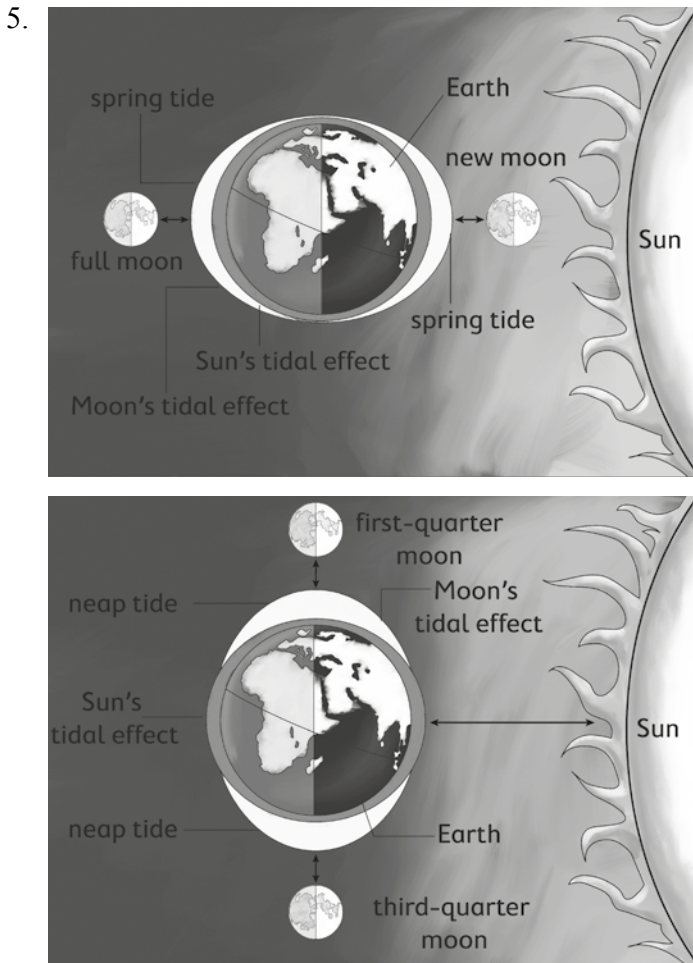
Answer questions about eclipses WB page 7

- It is safe to look directly at a lunar eclipse because the light of the Moon is reflected light from the Sun. Looking directly at a solar eclipse damages your eyesight because you will be looking directly at the Sun.
- During a solar eclipse, the Moon passes between the Earth and the Sun.
 - During a partial solar eclipse, when the Moon passes between the Earth and the Sun, it covers only a part of the Sun's disk. During a total solar eclipse, the Moon completely covers the disk of the Sun.

Answer questions about the Sun, Moon and Earth WB pages 8 and 9

- The light of the Sun comes directly from the Sun itself; the light of the Moon is reflected light from the Sun.
- The phases of the Moon

3. a) The Moon's gravitational force is a pulling force that causes bulges of water in the oceans as the Moon moves around the Earth.
b) Tides
4. a) Spring tides are the highest tides. They are formed when the Earth, Sun and Moon are lined up in a row. This happens about every two weeks during a new moon or full moon.
b) Neap tides are tides that are much lower than usual. They are formed when the Earth, Sun and Moon form a right angle. This causes the Sun and Moon to pull the water in two different directions. Neap tides happen during a quarter or three-quarter moon.



Topic 3 Changes in our climate

Performance objectives

Pupils should be able to:

- identify and write simple weather symbols
- observe changes in our climate over a period of time
- use weather symbols to keep records of weather and climatic changes
- identify some effects of climate change on Earth.

Additional resources

- Pupil's Book pages 27 to 37

- Workbook pages 10 to 12
- Pictures showing the effects of global warming around the globe
- For Exercise 1: Internet access; books; magazines; newspapers
- For Activity 4: Internet access; books; magazines; newspapers; materials to make a poster; Microsoft PowerPoint®

Teaching the lesson

- You could introduce this topic by holding a quick class quiz to find out what the pupils remember about weather from Primary 4. Let them work in groups to answer the questions, and then go through the answers in class. Ensure that all the pupils have a clear understanding of the concept of weather.
- Finish off by asking each group for an example of a weather condition, and write the pupils' input on the board.

Weather and climate

- Refer the pupils to the photograph on page 27 in the Pupil's Book. Ask them to describe the weather conditions visible in/suggested by the photograph.
- Discuss what a meteorologist does. Help the pupils to understand and remember the word "meteorologist" by breaking it up for them: meteor (thing in the air) + ologist (person who studies a particular subject).
- Describe climate and explain how it differs from weather. Ensure the pupils understand that the key difference between climate and weather is the time period over which they occur.

Weather symbols and weather maps

- Recap what the pupils learnt about weather symbols in Primary 4.
- In preparation for Activity 1, refer the pupils to the surface weather map on page 28 in the Pupil's Book. Choose several places on the map (excluding Port Harcourt and Abuja). Use question-and-answer methodology to get the pupils to engage with the symbols shown on the map. As a new symbol is encountered, draw it on the board and ask the pupils for a description. Write the description next to each symbol. You could also let some pupils come and draw the symbols and write the descriptions on the board.
- Referring to the symbols, get the pupils to compare and contrast the weather conditions at different places on the weather map.

Meteorological weather symbols

- Carefully explain the information contained in the weather symbol on page 29 in the Pupil's Book. Then go through the symbols listed in the table.
- Use question-and-answer methodology to check that the pupils can correctly interpret wind speed and cloud cover symbols, in particular.
- Try to show the pupils examples of weather maps, for example, from newspapers, on mobile phones or on television, as you go through the rest of the section. Give them practice in identifying and interpreting the different symbols on the maps. You could also draw simple examples of weather maps on the board.

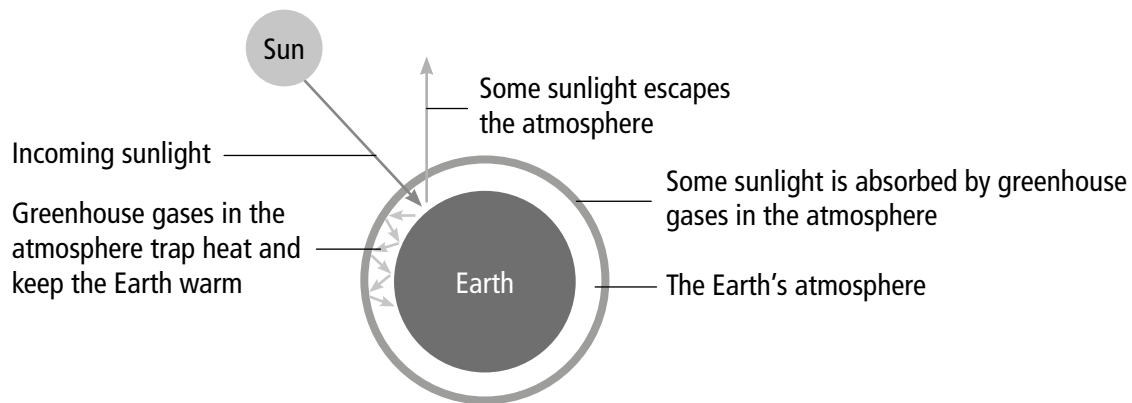
Weather records

- You might like to start this section by asking the pupils what they remember about weather instruments that they learnt about in Primary 4. You could then go on to discuss satellites and weather radar, using the pictures on page 31 as a starting point.

- Go through the answers to Exercise 1 in class. Let the pupils mark their own work, and allow them to add information that they may have omitted. Ask them to rewrite the full answers neatly in their exercise books, for consolidation.
- Arrange the pupils into groups, and ask them to spend a few minutes looking at the weather charts shown on pages 32 and 33 in the Pupil's Book on their own. Using question-and-answer methodology, get the pupils to engage with the charts, and then work through the charts carefully.
- The pupils complete Exercise 2 on their own. Move amongst the pupils while they do so, offering support where necessary.

Global warming

- Try to bring some interesting pictures and articles to class to use as a springboard for discussion on this topic.
- Work through the content on page 35 with the pupils. You could draw a diagram like this one on the board, to help the pupils to understand the greenhouse effect:



- Check that the pupils understand the different meanings of the concepts of global warming, climate change and the greenhouse effect. Make sure that they know what the ozone layer is and understand its relevance to global warming.
- Before reading the case study on pages 36 and 37 in the Pupil's Book, ask the pupils if they know of any effects of global warming experienced in Nigeria and elsewhere in Africa. Read through the case study with the pupils, and then ask them to answer the following questions in pairs. Let pupils swap their work with another pair for marking, and then you can go through the answers in class.

Case study: Nigeria and global warming

1. Which activity carried out in Nigeria is contributing to global warming?
Explain your answer.
 2. Should people living in other parts of the world be concerned about air pollution in Nigeria?
Explain your answer.
 3. Name two effects of global warming that are experienced in Nigeria.
 4. What problems could Lake Chad drying up cause for people living in the countries that border the lake?
- For Activity 4, ensure that the pupils work in mixed-ability groups so that stronger pupils can assist others. Move amongst the groups as they work, ensuring that everyone is contributing and the pupils are working well together. Let the pupils display their posters in class.

Pupil's Book answers

Activity 1 Read a weather map PB page 29

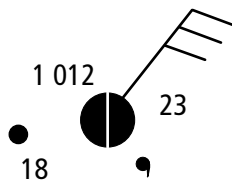
- A degrees Celsius symbol ($^{\circ}$) appears after numbers that indicate temperature. Rainfall and cloud conditions are indicated by the pictures of clouds, rainfall and sunshine.
 - The arrow symbols indicate wind direction and wind speed. The number next to each symbol indicates the dew point.
- In the coastal area near Port Harcourt, the temperature is 28° C and the dew point 25° C. The wind direction is north-east, and the wind speed is 15 knots. There are thunderstorms, bringing rain.
 - In the northern parts of the country, temperatures are significantly higher and the dew points significantly lower than the area near Port Harcourt. The wind speed is lower and skies are mostly sunny/cloudless.
- Pupils will use their own words to describe conditions at Port Harcourt and Abuja, which are as follows:

Weather condition	Port Harcourt	Abuja
Temperature	28° C	33° C
Dew point	25° C	17° C
Wind direction	Northeast	Northeast
Wind speed	15 knots	10 knots
Rainfall and clouds	Thunderstorms; rain	Cloudy; no rain

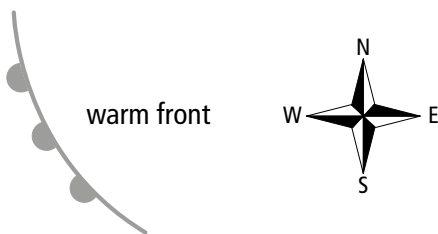
- Kano is the hottest, with a temperature of 46° C.
 - Enugu is the coolest, with a temperature of 26° C.

Activity 2 Draw weather symbols PB page 31

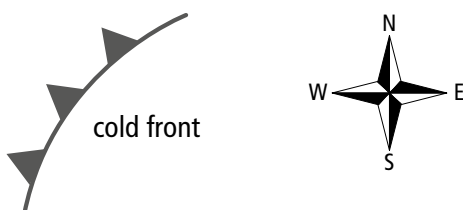
1.



2. a)



b)



Pupil's Book answers

Exercise 1 Write a short report PB page 32

1. a) to c)

Instrument	Used to measure	Unit of measurement
Thermometer	Air temperature	Degree Celsius
Rain gauge	Precipitation	Millimetre
Wind vane	Wind direction	The direction in which the wind vane points shows the direction from which the wind is blowing
Anemometer	Wind speed	Kilometres per hour; metres per second
Barometer	Air pressure	Millibar
Hygrometer	Humidity	Grammes of water vapour per cubic metre of air

- Weather satellites communicate weather data in the form of radio waves. The radio waves are sent to the Earth, where they are received and interpreted by antennas.
- Television; newspapers; the Internet; mobile phones
- Farmers, for optimal crop planting and harvesting conditions; airlines, for flight scheduling and adverse/dangerous weather conditions; providing data for the study of climate trends and for predicting likely future climatic conditions; identification of areas on the Earth well or poorly suited to certain activities, e.g. wind farms, etc.

Exercise 2 Read weather charts PB pages 33 and 34

- Add the minimum and maximum temperature readings and divide the result by two.
 - Calculate the average temperature for each month. Add all the months' averages and divide the result by 12.
 - The wettest month is September. The driest month is December.
 - Because Port Harcourt lies almost exactly on the equator, there is no variation in day length throughout the year as there would be for places further north or south of the equator during different seasons. The daylight hours in this case therefore cannot help you to determine which months fall in the summer or winter season.
 - The temperatures are higher in summer and precipitation is lower in winter.
- Most rain falls in summer.
- Tropical monsoon

Exercise 3 Answer questions about changes in our climate PB page 37

- Meteorologists analyse weather data, such as temperature and rainfall records, that they have recorded over many years. This helps meteorologists to work out seasonal climate patterns for different places, and to identify changes in these patterns.
- Pupils' answers will vary, but should show awareness of the fact that different effects of global warming are, and will be, experienced in most parts of the world. Melting polar ice caps are linked to a rise in sea level around the world, which will affect coastal areas (including Nigeria's) the most. The polar bear is just one of many species around the world being negatively affected by global warming. Every species plays a role in maintaining a healthy natural world, so there are no "unimportant" species. Apex predators (like the polar bear) are especially important in maintaining the health of a natural environment (ecosystem).

Remedial activity

- Draw a two-column table on the board. In the first column, draw examples of the different weather symbols the pupils learnt about on page 29 in the Pupil's Book. Get the pupils to copy the table into their exercise books and then, for homework, write an explanation for each symbol in the second column.

Extension activity

- Ask pupils to research the relationship between temperature and air-pressure systems. They can find out how these factors influence conditions experienced in one or more parts of Nigeria.

Case study answers

Case study: Nigeria and global warming TG page 13

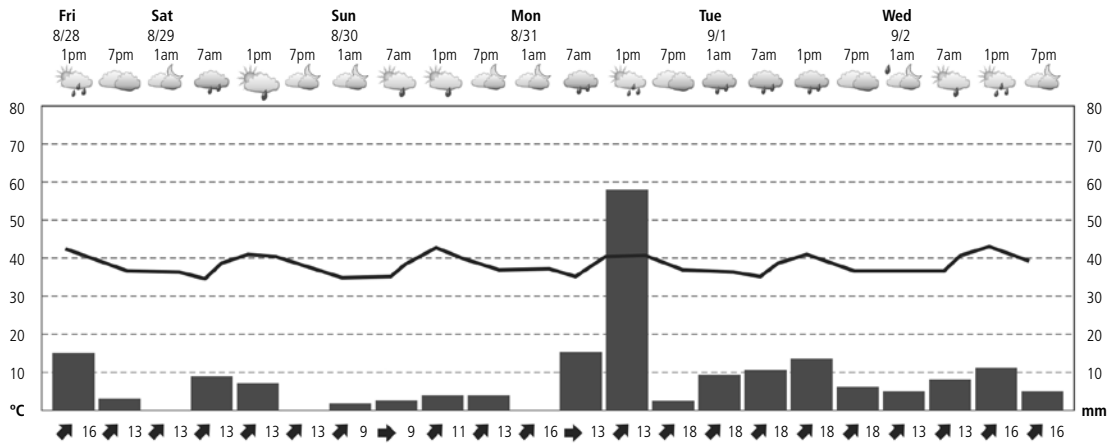
1. Polluting of the air by the oil industry. Thick smoke from oil flares pollutes the atmosphere, increasing the amount of greenhouse gases in the atmosphere. These gases trap heat, increasing temperatures experienced on Earth.
2. Yes, they should be concerned. Global warming is a worldwide problem because changes in the atmosphere in one part of the world can affect places on the other side of the world.
3. Rising sea levels are causing more flooding in coastal areas. In the northern parts of Nigeria, droughts are becoming more frequent.
4. Pupils' answers will vary. Accept any reasonable answers.

Workbook answers

Complete sentences and answer questions WB pages 10 to 12

1. a) The conditions of the atmosphere at a certain place at a certain time are called the weather.
b) The term climate refers to atmospheric conditions and weather patterns over long periods, such as over years and decades.
c) A scientist who studies weather patterns is called a meteorologist.
d) Wind speed is usually measured in knots.
e) We measure temperature in degrees Celsius.
f) Weather records kept over many years and decades help meteorologists to understand climate patterns and to predict changes in the climate.
g) Weather forecasts in newspapers and on television and the radio are based on predictions by meteorologists, for which they use their understanding of climate patterns.
h) Global warming refers to the fact that scientists believe the world is getting hotter due to the effects of the burning of fossil fuels.
i) Climate change refers to the fact that the Earth's normal climate patterns are starting to change much faster than before, with some places getting more frequent droughts and other places getting more frequent floods.
j) The greenhouse effect refers to the way in which air pollution from the burning of fossil fuels prevents the heat from the Sun's rays from reflecting back into space.

2. a) and b) Pupils' answers will vary, but should accurately reflect the weather elements shown in the meteogram:



Topic 4 Forces

Performance objectives

Pupils should be able to:

- explain forces as a push or pull
- give examples of forces
- identify evidence of force
- demonstrate the effect of force on objects
- explain frictional force as the resistance between two surfaces in contact
- mention applications of frictional force in daily activities
- state the advantages and disadvantages of friction.

Additional resources

- Pupil's Book pages 38 to 50
- Workbook pages 13 to 21
- For Activity 1: sticky putty; a few books or a schoolbag
- For Activity 2: brick; piece of string
- For Activity 3: ball; rubber band; tube of toothpaste
- For Activity 4: two bar magnets; piece of string; book
- For Activity 5: ball
- For Activity 6: spiral spring; piece of wire; scale pan; suction cup with a hook; ruler; marbles
- For Activity 7: sticky putty or clay
- For Activity 8: ball that is light in weight; level table
- For Activity 10: ball that is light in weight; level table
- For Activity 12: metre ruler with a hole in the middle; nail
- For Activity 1 (page 49): ball; piece of sandpaper or patch of grass; level table; two stones; ball bearing or marble; lubricant, such as oil or Vaseline
- For Activity 2 (pages 49 and 50): flash cards; two different smooth surfaces; one rough surface

Teaching the lesson

- Ask the pupils to record their findings in all the experiments on force in the worksheet on page 17 in the Workbook.

Examples of forces

- Discuss the different kinds of forces with the class. Encourage them to ask questions and give examples.
- Ensure that all the required resources are available when the pupils do Activity 4.

The force of gravity

- Read through the section on gravity in the Pupil's Book, and then let the pupils do the experiments in Activities 5 and 6.
- In Activity 6, pupils copy the table on page 43 in the Pupil's Book into their exercise books, and then record their results.
- Ensure that all the required resources are available when the pupils do Activities 5 and 6.
- Work through the section on the force of gravity. Explain that when the pupils threw the ball into the air in Activity 5, the ball went up and then returned. It changed its direction of motion along its path. So, a force must have been acting on it. The ball also slowed down, stopped for a moment, and then returned towards the Earth. A force must have caused the ball to slow down and stop. This force is the force of gravity.
- All objects are attracted to the Earth. The ball was attracted to the Earth by the force of gravity.
- Before the pupils dropped the ball in Activity 5, the ball was at rest in their hand. It did not move. When it was released, it started to move downwards. A force must have been responsible for this movement, because the object travelled faster and faster. We know that a force will change the motion of an object. The Earth was pulling the object, the ball, towards it.

The effects of forces

- Read through the section on the effects of forces on pages 43 to 46 in the Pupil's Book. Then get the pupils to do Activities 7 to 12.
- After the pupils have completed Activity 8, explain that when Pupil B blows the ball while it is moving away, the ball moves faster and faster. When Pupil B blows on the ball as it moves towards him or her, the ball slows down and then begins to move in the opposite direction.

What is friction?

- Recap forces.
- Introduce pupils to friction that occurs when forces are applied.
- Illustrate simple examples of friction (rubbing hands together creates heat due to friction, rubbing a ruler on hair or clothing allows you to pick up bits of paper because friction creates static electricity, etc.).
- Discuss the different types of friction.
- Discuss how speed, the type of surface, weight, surface area and lubrication affect friction.
- If possible, demonstrate examples of the above. For instance, it becomes easier to get a ring off your finger if you apply Vaseline because lubricants reduce friction. To further illustrate this, ask pupils to push a large container and a small container on the floor. Which is easier

to move? (Answer: *The smaller one because it does not weigh as much as the heavier object and there is therefore less friction.*)

Effects of friction

- The pupils complete Activities 1 and 2 in groups.
- For Activity 2, the pupils' "lesson" must cover:
 - What friction is. Pupils can rub a smooth surface on a rough surface to demonstrate that friction is a force that stops things from moving; specifically, friction is a resistance to motion.
 - Dry friction. Pupils can rub their hands together to demonstrate dry friction. This type of friction occurs when two solid objects touch or rub against each other. If the objects are stationary (not moving), the friction is static friction. If the objects are moving, the friction is kinetic or sliding friction.
 - Rolling friction. Pupils can rub two smooth surfaces together to demonstrate rolling friction, which occurs when a round surface, such as a ball or wheel, rolls over a smooth surface.
 - How friction is affected by speed: If a car moves slowly, there will be more grip between the tyre and road. This is because there is more friction between the two objects. If the car were to move faster, there would be less grip between the tyre and road. This is because there is less friction between the two objects.
 - How friction is affected by the type of surface: If the surface of car tyres is rough, there will be more grip between the tyres and the road and therefore, more friction. If the car tyres have worn away and are smooth, there will be less grip between the tyres and the road and therefore, less friction.
 - How friction is affected by weight: Weight is due to the force of gravity on an object. The greater the weight of an object, the more friction is needed to move the object. The smaller the weight of an object, the less friction is needed to move the object.
 - How friction is affected by surface area: If the surface area between two objects is small, there will be little contact between the two surfaces, which will result in less friction. The bigger the surface area, the greater the contact with the other surface and therefore, the greater the friction.
 - How friction is affected by lubrication: When there is oil on a surface, there will be less grip when another surface slides against it, resulting in less friction. When there is no oil on a surface, there will be greater grip between the two surfaces, resulting in more friction.
- Remind the pupils that there must be no talking; the lesson needs to be given using only flash cards and practical demonstrations.

Advantages and disadvantages of friction

- The pupils complete Activity 3 by observing and recording the effects of friction.
- Before the outing to a workplace, you could give the pupils some guidance by going through the example of a person riding a bicycle given on the next page.

- As shown below, friction occurs at different places on the bicycle and in different ways:

Friction produces heat causing you to sweat

Friction between palms of hand and handle bars can cause blisters – use cycling gloves

Small surface area of the pedal – less friction will occur



The larger the weight of the object the more friction occurs

Increased speed causes less friction

Small surface area so less friction will occur

Friction of the bicycle chain leading to wear and tear on the chain – use lubricant to prevent

Wider base creates a larger surface area – causing more contact with the floor to provide more grip

Pupil's Book answers

Activity 3 Identify different forces PB page 40

Pupils work in pairs.

1. A Push
B Pull
C Pull
D Pull
E Push
F Push
G Push
2. a) Push
b) Pull
c) Push

Activity 11 Apply force to make an object turn PB page 46

The arrow points in the direction from which the wind is blowing.

Activity 1 Investigate the effects of friction PB page 49

1. It causes friction.
2. It is an advantage on a cold day because the friction generates heat, which helps to keep you warm.
3. The ball does not move smoothly or in a straight line. This is because the ball is an example of rolling friction that is applied on an uneven surface (the grass or sandpaper). The uneven surface causes more friction against the ball, which prevents the ball from rolling faster or in a straight line.
4. The ball rolls quickly and smoothly across the table. There is less rolling friction applied because of the smooth surface of the table.

5. The friction causes heat on the stones, which can cause a flicker of fire or a spark. This happens because this is an application of dry friction, which occurs when two solid objects are rubbed together. The forces applied on the objects move in opposite directions to the movement.
6. The ball bearing rolls smoothly but slowly across the table. This occurs because there is less rolling friction applied because of the smooth surface of the table, but the weight of the object will affect the speed at which it rolls. The weight is due to the force of gravity on the object.
7. Yes; the ball bearing rolls much faster. The oil has caused less grip when the two surfaces slide against each other. This results in less friction, which causes the ball bearing to move faster.

Activity 3 Identify and discuss the effect of friction on machines and tools

PB page 50

After the outing, you could let the pupils analyse their notes in their groups, and then present their observations in a logical, well-ordered list. Move amongst the groups, giving guidance and assistance where necessary. Give each group an opportunity to present their findings.

Workbook answers

Answer questions about forces WB pages 13 and 14

1.	Force	Push or pull
	Kicking a ball	Push
	Throwing a stone	Push
	Closing a door	Pull
	Lifting a chair	Push
	Stretching a rubber band/elastic	Pull

2. a) Hurricane; tornado; tsunami; earthquake; floods
 b) Wind; waves; breeze; gravity; motion
 c) Bomb blast; accident; rocket launch; bulldozer breaking down a wall; brakes of a car
 d) Grabbing a jacket; pushing in a queue; pushing a wheelbarrow; kicking a ball; squeezing a sponge

Complete sentences about forces WB page 14

1. To move a brick with the piece of string, I have to pull the string.
2. The force on the brick is a pulling/attractive force.
3. The brick can also be moved if the brick is pushed.
4. This force is called a pushing/repulsive force.
5. To move an object, it must be pushed or pulled.
6. A force may be large or small.
7. A pulling force is attractive. A pushing force is repulsive.
8. A larger push is needed to move a loaded wheelbarrow than an empty one.
9. A force is always exerted on an object.
10. One object may also exert a force on another object.

Record the answers of your experiments on force WB pages 17 and 18

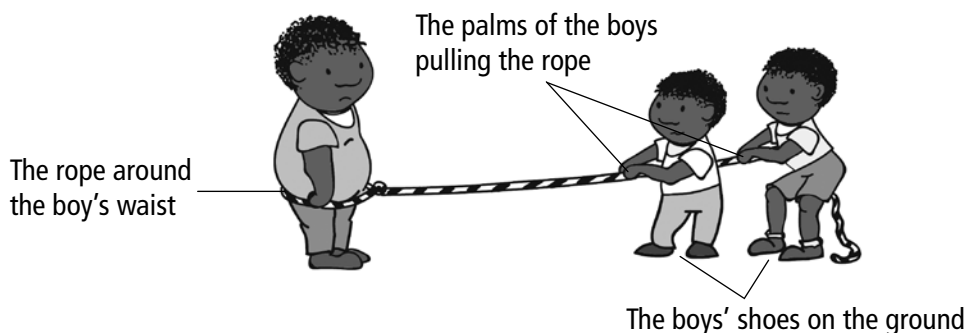
- Activity 1: All forces are push or pull forces.
- Activity 2: Method 1:
 - To move the brick with the piece of string, I had to pull the string.
 - The force on the brick is a pulling force.
- Activity 2: Method 2:
 - The brick can also be moved if the brick is pushed.
 - This force is called a pushing force.
- Activity 4:
 - When one magnet pushes the other away, a repulsive force is at work between the magnets.
 - When the magnet in my hand pulls the other magnet nearer, an attractive force is at work between the magnets.
- Activity 5:
 - All objects are attracted/pulled to the Earth.
 - The ball is attracted to the Earth by the force of gravity.
- Activity 6: Pupils use the table to record their results for the activity.

Object	Extension in mm
Nothing	0 mm
One marble	
Two marbles	
Three marbles	
Four marbles	
Five marbles	

- Activity 7:
 - When you press down on the Prestik or clay ball, it flattens. The downward force deformed the ball.
 - True
- Activity 8:
 - The ball moves faster and faster when the force is exerted on it.
 - The ball moves slower.
- Activity 10: The force which student B exerted on the ball, changed the speed of the moving ball.
- Activity 12: The metre ruler, which was at rest, starts to turn around.

Work with friction WB page 19

1.



Sub-theme 2 Living and non-living things

Topic 5 Human body system: Blood circulation

Performance objectives

Pupils should be able to:

- name parts of the human heart and major blood vessels
- differentiate between arteries, veins and capillaries
- state basic functions of the human heart and blood vessels
- describe how food and materials are distributed to different parts of the body by blood.

Additional resources

- Pupil's Book pages 51 to 60
- Workbook pages 22 to 27
- For Activity 1: pen; paper; stopwatch; copy of the supplied table in which to record their results

Teaching the lesson

- It is best to use a model to explain the structure and function of the heart. Ensure that the pupils clearly understand that the heart consists of four chambers, the atria and the ventricles, and that there is a left and right atrium and a left and right ventricle.
- Ensure that the pupils can differentiate between the different types of blood vessels.
- Work through the content slowly over a few lessons as there is a lot of important information to take in.

Activity guidelines

Activity 1 Find out how exercise affects your heart rate PB pages 54 and 55

This activity aims to show the pupils what effect exercise has on heart rate. Pupils will need a pen, paper, a stopwatch and a copy of the following table on a piece of paper, ready to fill in their results.

Instruction	Activity	Pulse rate per minute
Examples: 1	Sit down	
2		

The pupils must follow the instructions on pages 54 to 55 in the Pupil's Book carefully and continually notate the data that they collect. For each part of the activity, they must determine their heart rate for 30 seconds and multiply the value by 2 (to determine their heart rate for 1 minute).

Explain that your heart rate shows how fit you are. Your level of fitness is affected by how good your heart is at supplying your muscles with blood. When you exercise, your muscles need more oxygen. To get this oxygen to your muscles, you breathe more quickly and your heart pumps faster to supply the muscles with more blood. When you stop exercising, your heart rate and breathing will slowly return to normal. The fitter you are, the quicker your heart rate returns to normal after exercising.

You can measure your heart rate by taking your pulse. Your pulse can be felt where an artery is near the surface of the skin. You can, for example, feel your pulse either on the inside of your wrist or on the side of your neck, just below your jawbone. By putting two fingers lightly on the artery, you can feel the blood being pumped through the artery every time the heart contracts. You can measure your heart or pulse rate by counting the number of times you can feel your pulse in a minute.

To analyse their results, the pupils must draw a line graph. The line graph must have a heading, and the *x*-axis and *y*-axis must be labelled.

Activity 2 Draw and label the human heart and the blood vessels PB page 56

Pupils must work in pairs when they draw the diagram. Each pair must then compare their diagram with another pair's. Check the correctness of the diagram and the spelling of the different parts.

Activity 3 Compare the structure and functions of arteries, capillaries and veins PB page 57

The pupils compare the structure and functions of arteries, veins and capillaries. They do this by studying the diagram of the blood vessels on page 56 in the Pupil's Book and comparing their structure and functions.

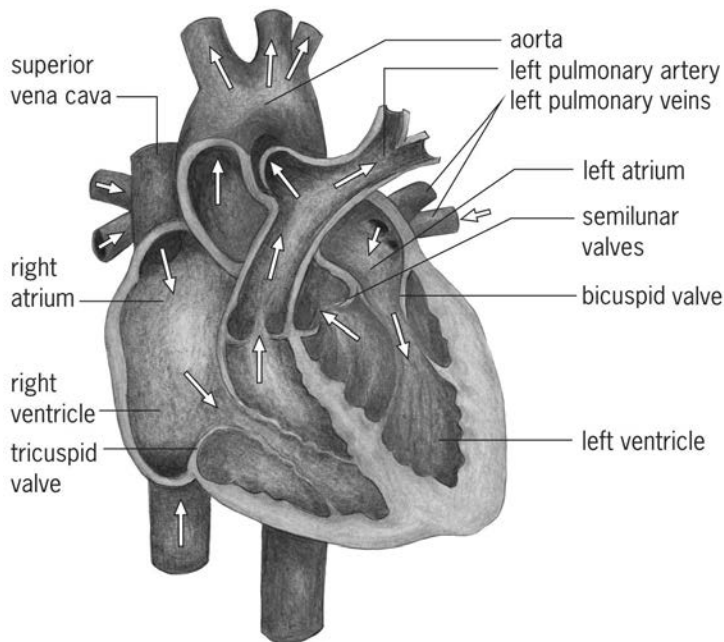
Pupil's Book answers

Exercise 1 State the basic functions of the human heart PB page 54

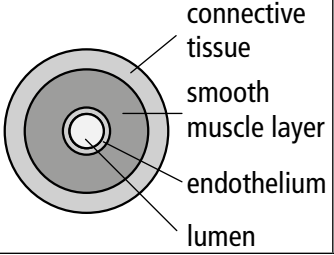
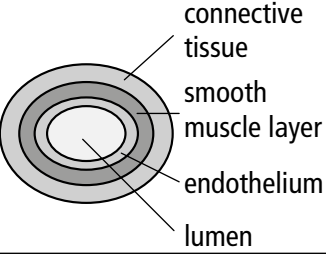
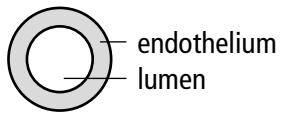
The blood system or circulatory/transport system carries blood to every part of the body. The blood system is made up of a network of blood vessels. The heart works like a pump, and therefore keeps blood circulating through the vessels. The heart is made of a special type of muscle called cardiac muscle. The functions of the heart are to supply food and oxygen to the tissues and to remove carbon dioxide and other waste substances from the tissues.

Activity 2 Draw and label the human heart and the blood vessels PB page 56

1.

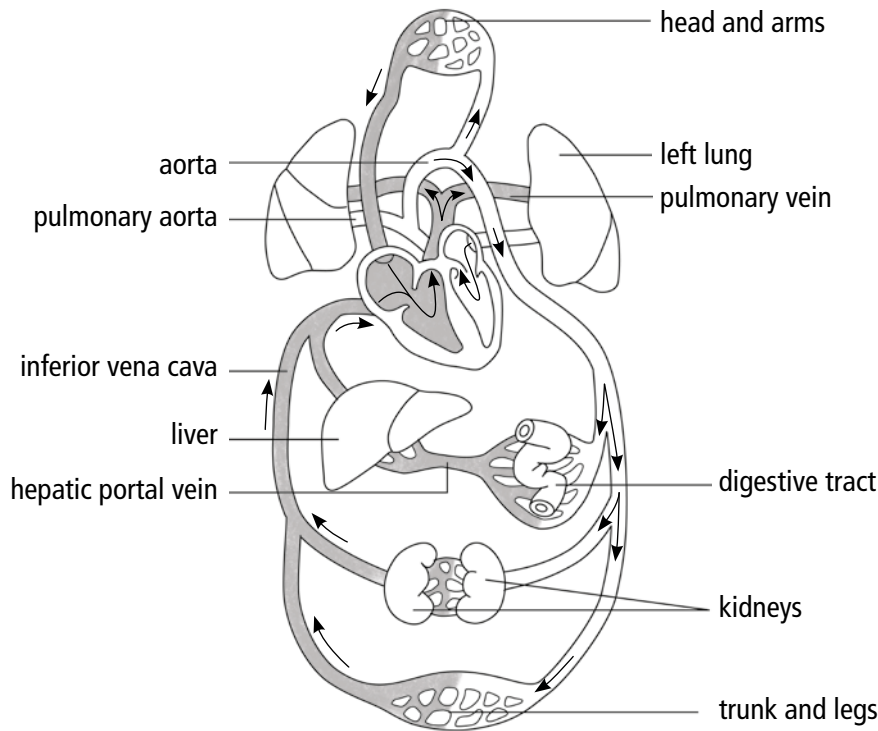


Activity 3 Compare the structure and functions of arteries, capillaries and veins PB pages 57 and 58

Features	Artery	Vein	Capillary
Sketch: Transverse section of the blood vessel	 <p>connective tissue smooth muscle layer endothelium lumen</p>	 <p>connective tissue smooth muscle layer endothelium lumen</p>	 <p>endothelium lumen</p>
Similarity in structure			
Lining	Endothelium	Endothelium	Endothelium
Differences in structure			
Muscular wall	Thick	Thin	Absent
Elastic tissue	Much	Little	None
Valves	Only in aorta and pulmonary artery	Throughout all veins	None
Function			
Transport of blood	From the heart to the body tissue	From the body tissue to the heart	Links arteries and veins
Type of blood transported	Oxygenated (except for pulmonary artery)	Deoxygenated (except in pulmonary vein)	Blood changes from oxygenated to deoxygenated
Rate of blood flow	Rapid	Slow	Slow
Blood pressure	High	Low	Low

Exercise 2 Trace the movement of food by the blood in the body PB page 60

1. and 2.



3. Number 11 (hepatic portal vein)

Workbook answers

Interpret a graph WB pages 22 to 26

1. Before:

$$70 + 74 + 68 + 80 + 140 + 145 + 150 + 155 + 160 + 148 + 110 + 102 + 95 + 85 + 80 + 70 + 70 + 70 = 1872/18 = 104 \text{ beats per minute}$$

After:

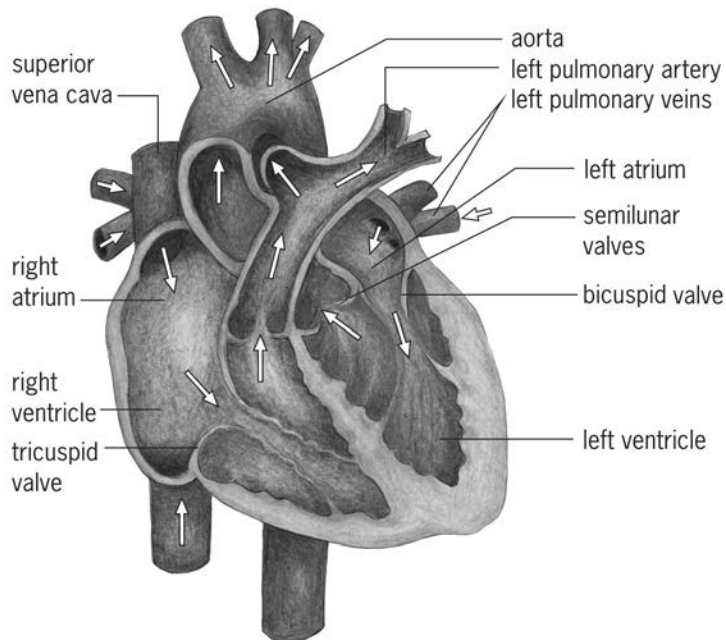
$$64 + 64 + 64 + 64 + 130 + 140 + 142 + 145 + 147 + 120 + 90 + 80 + 70 + 64 + 64 + 64 + 64 + 64 = 1640/18 = 91.1 \text{ beats per minute}$$

- Mayowa's average pulse rate after training was lower than before the training. His pulse rate recovered faster after training than before training. His pulse rate was more constant before and after training.
- The change in the pattern of his heart rate was because the heart muscle became stronger and could pump more blood per beat to the muscle tissue.
- a) Vessel B is the artery.
b) It has a thicker muscular wall than vessel A.
c) Vessel A carries blood at low pressure.
d) 1 = outer wall
2 = smooth lining
3 = thick muscular wall
4 = lumen/opening/inside of blood vessel
- e) Vessel A has valves.

- f) Valves help the blood to flow through the vessel easily and also prevent the blood from flowing back.
5. a) 1 = artery
2 = vein
- b) A = oxygen
B = carbon dioxide
- c) Food
- d) Waste substances
- e) Right atrium
6. a) The heart is a dual pump. The blood travels through the heart twice to complete one cycle. The heart pumps blood to the lungs, and it pumps blood to the rest of the body.
- b) It is a closed system. The blood never leaves the system, but remains within the blood vessels.
- c) Y = the lungs
- d) Gaseous exchange takes place in the lungs. Carbon dioxide is removed and the blood is filled with oxygen before it leaves the lungs again.
- e) 3 and 4
- f) 1 and 2
- g) 1: pulmonary artery
- h) 3: pulmonary vein

Show the actions of the heart WB page 27

1. and 2.



Topic 6 Human body system: Reproduction

Performance objectives

Pupils should be able to:

- explain reproduction in human beings
- differentiate between male and female reproductive organs
- state the functions of male and female reproductive organs
- draw and label the male and female reproductive organs.

Additional resources

- Pupil's Book pages 61 to 64
- Workbook pages 28 to 31

Teaching the lesson

- Reproduction is a fact of life that affects all human beings. It is one of the essential phenomena that make continued life on Earth possible. By Primary 6, most pupils will be aware that all animals and humans reproduce, but they may not know how the process takes place.
- Present the information in a matter-of-fact way and make sure that pupils do not become silly or coy. Also, be sensitive to pupils who come from conservative backgrounds and who may not be comfortable discussing such matters with others, particularly if you have both boys and girls in your class. Also impress on pupils that you will not tolerate smutty jokes about sex, or any form of crudeness.

The structure and function of the male and female reproductive organs

- By Primary 6, pupils will be aware that the male and female bodies are different. Using the information in the Pupil's Book, explain the differences in relation to the role and function of these body parts in sexual reproduction.

Pupil's Book answers

Exercise 1 Summarise information on reproduction PB page 64

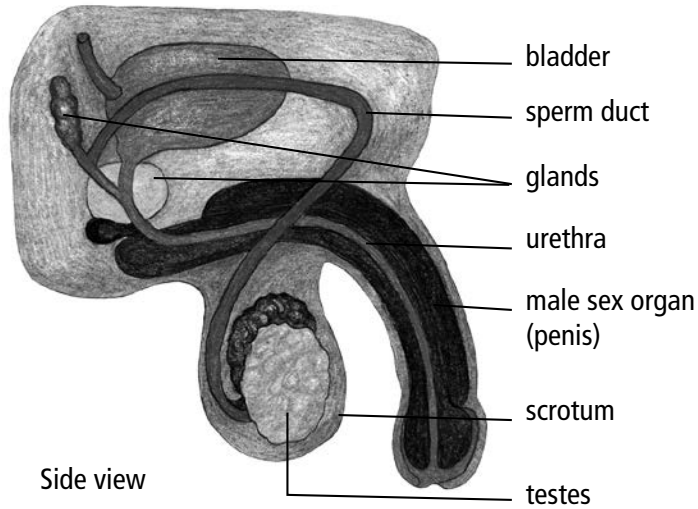
1. a) Reproduction is the process by which plants and animals produce offspring.
b) Fertilisation is when a sperm cell fuses with an egg cell to form a zygote.
2. • Sexual reproduction occurs when a male sex cell (gamete) fuses with a female sex cell to form an embryo that will develop into a new organism. The new organism has characteristics of both the male and the female organism.
• Asexual reproduction occurs when a part of an organism develops into a new organism. The new organism has the same characteristics as the original organism.

3.

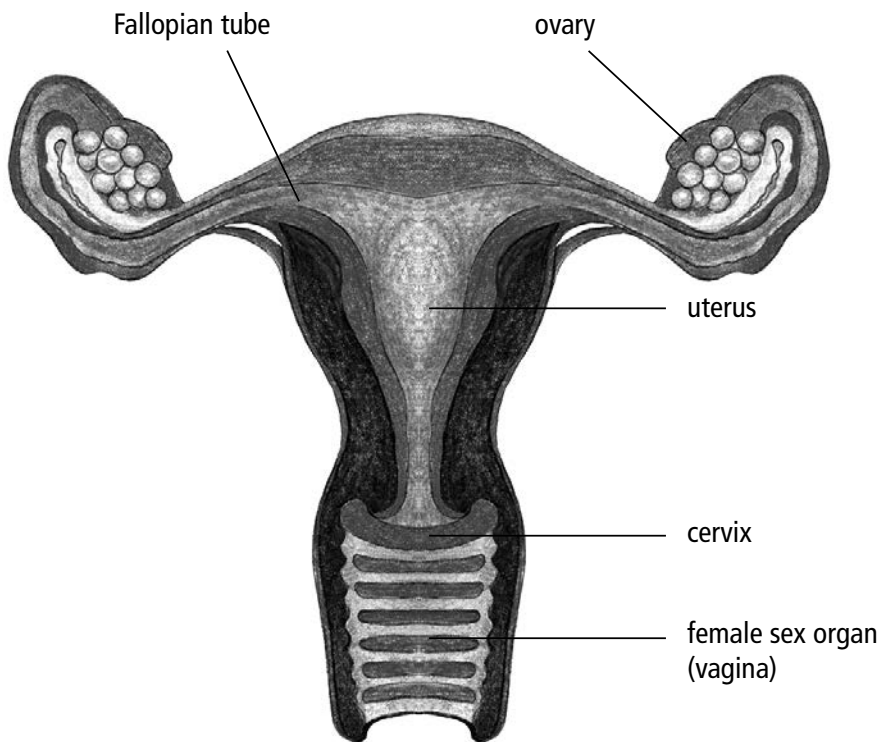
	Male	Female
Hormone produced by the reproductive system	Testosterone	Oestrogen
Name of gamete	Sperm cell	Egg cell/Ovum
The place where gametes are produced	Testes	Ovary
The organs that transfer gametes	Penis	Vagina

Activity 1 Draw labelled diagrams of the male and female reproductive organs PB page 64

1. Male reproductive organs



Female reproductive organs



Workbook answers

Write about reproduction WB pages 28 to 31

1. a) • Reproduction is the process by which plants and animals create offspring. There are two types of reproduction: sexual and asexual reproduction.

- Sexual reproduction is when a male gamete fuses with a female gamete to form a zygote that will develop into a new organism. The new organism has characteristics of both the male and the female organism.
 - Asexual reproduction is when part of an organism develops into a new organism. The new organism has the same characteristics as the original organism.
- b) Reproduction is important for the survival of all living things. Without a mechanism for reproduction, life on Earth would come to an end.
- c) Sexual reproduction
2. a) 1 = egg cell/ovum; 2 = sperm cells; 3 = fertilised egg/zygote; 4 = foetus
- b) In the ovaries of a female
- c) In the testes of a male
- d) Item 3 is a single cell. Item 4 is an organism that consists of millions of cells that form different types of tissues and organs.
- e) In the Fallopian tubes of the female
- f) In the uterus of the female
3. a) and b) • 1 = Scrotum – Controls the temperature of the testis and protects it.
- 2 = Urethra – Transports urine and semen to the outside of the body. (The lines of 2 and 4 point to the same thing: one must be the penis and the other the urethra.)
- 3 = Sperm duct – Transports the sperm cells from the testes to the male sex organ.
- 4 = Male sex organ/penis – Is placed in the female sex organ to transfer the semen into the body of the female.
- 5 = Testis – Produces the sperm cells.
4. a) and b) • 1 = Uterus – The uterus is where a baby will grow and develop before being born.
- 2 = Fallopian tube – Fertilisation takes place here. Also transports fertilised egg to the uterus.
- 3 = Ovary – Where the egg cells are produced.
- 4 = Cervix – A ring of muscles that close the lower end of the uterus.
- 5 = Female sex organ/vagina – Where the sperm is placed during sexual intercourse.

Topic 7 Air

Performance objectives

Pupils should be able to:

- demonstrate that air presses on every object
- explain why things move in air
- explain why boats fixed with sails move faster on windy days
- state some of the applications of air pressure in: navigation; generation of electricity; floatation and suction.

Additional resources

- Pupil's Book pages 65 to 73
- Workbook page 32

- For the inverted tumbler with water demonstration: a glass; enough water to fill the glass to the top; a piece of paper to cover the top of the glass; a container to work over
- For Activity 1: empty soft drink can; bucket filled with cold water; hotplate; kitchen tongs; water
- For Activity 2: large party balloon; a straw; sticky tape; approximately 5 metres of string; pair of scissors; elastic band
- For Activity 3: large party balloon; small toy car; a straw; elastic band; sticky tape
- For Activity 4: a piece of polystyrene, e.g. a small food packing tray or the bottom of a paper cup; kebab skewer; straws; paper cut into a rectangle; glue; container or basin filled with water
- For the section, “Why things move in air”: helium-filled balloons; string; objects light enough to be lifted by the balloons

Teaching the lesson

Air pressure

- To familiarise the pupils with air pressure, get them to pump up a deflated football or inner tube of a bicycle, inflate a balloon and then deflate it.
- Bring to class a glass, enough water to fill it to the top, a piece of paper to cover the top of the glass, and a container to work over, in case of spills. Demonstrate the inverted tumbler with water experiment to the pupils and explain what keeps the water from pouring out.
- Explain atmospheric pressure by doing the collapsing can activity on page 65 of the Pupil’s Book.
- The pupils should write down what they observe in their exercise books.

Things that fly in the air

- Explain the aerodynamic forces that enable large, heavy aeroplanes and gliders to fly, and the delicate balance between the opposing forces of thrust, drag, lift and weight that must be managed by the operating crew to get the aircraft to lift off, gain height, maintain height, descend and land safely.
- Without air pressure and air flow, no flight would be possible for any object, including hot-air balloons, kites and birds.
- Focus on the adaptations of birds that enable flying and try to get hold of a bird skeleton to demonstrate the rigidity and structure of bird bones.
- Examine different objects that float in the air and determine the special characteristics keeping them afloat.

Why things move in air

- Any surface that creates air resistance will be moved by moving air (wind).
- Demonstrate by having groups make an air-propelled balloon (Activity 2), an air-propelled car (Activity 3) and an air-propelled toy boat (Activity 4).
- Tie helium-filled balloons to an object to lift it.

Applications of air pressure

- Discuss different applications using a variety of concrete examples.

Pupil's Book answers

Activity 1 Demonstrate air pressure PB pages 65 and 66

1. The can collapses as soon as it hits the cold water.
2. The air inside the can is suddenly cooled by the cold water, resulting in a lower air pressure inside the can than the outside air pressure. The outside air pressure pushes in on the can, crushing it.

Exercise 1 Answer questions on air PB page 69

1. Air pressure exists because the atmospheric layers press down onto one another and, cumulatively, onto the Earth's surface. The air layer directly above the surface will have a higher pressure reading than the air higher up on a mountain. The further away a place is from the Earth's surface, the lower the air pressure will be.
2. The wings and wing flaps of an aeroplane create lift.
3. An aeroplane takes off into the wind. As the aeroplane accelerates, the shape of the wings causes the air above the wings to speed up more, resulting in a lower air pressure above the wings. The air pressure below the wings increases, creating lift. Extended flaps on the wings increase the surface area of the wings, providing a larger surface for the air below the wings to push up against, which creates better lift.
4. Hot air is less dense and has a lower pressure than cool air. By heating the air inside the balloon, the air becomes lighter than the air outside the balloon, and so the air rises. As long as the air inside the balloon is kept warm, the hot-air balloon will stay afloat.
5. a) The bird's bone structure is rigid, which provides firm attachment for flight muscles. The bones have air pockets within them, making them less dense and also lighter.
b) The bird's wingspan is large compared to its body, which creates better lift. The wings are covered with smooth, lightweight feathers, which reduces drag. Longer feathers that can be spread create a larger surface, resulting in better lift.

Extension activities

- Make a simple parachute and demonstrate it outdoors to show floatation due to air pressure and air resistance.
- Have a class competition to see whose balloon cars or toy boats go the greatest distance.
- Pupils can do research on indigenous birds to identify the characteristics that make them fast and agile flyers.

Remedial activities

- Hold a class quiz on the content taught.
- Recap the importance of air pressure in our daily lives.

Workbook answers

Explain the properties of air WB page 32

1. a) Suction created by the rubber seal dislodges blockages in the drainpipe. The suction creates a low-pressure vacuum above the blockage, while the higher-pressured air below the blockage pushes it into the vacuum.
b) The air inside the balloon is heated, making it less dense and lowering the pressure. The balloon will rise above the higher-pressured air layer on the Earth's surface.

- c) The tyres of a vehicle are filled with air to ensure a smoother ride. Air has volume and takes up space. Air pressure in a tyre can be controlled by releasing air or adding air through a valve.
 - d) Heavy cargo and passenger aeroplanes make transport easy and fast. Without the interaction of high and low air pressure enabling the plane to lift off, transport by air would not be possible.
2. The picture shows that air has mass and that the layers of air in the atmosphere pressing down on the Earth's surface create a higher air pressure at sea level than on a mountain or a plateau. The deflated balloon is lighter than the inflated one.

Topic 8 Mineral resources

Performance objectives

Pupils should be able to:

- name types of mineral resources in Nigeria
- describe the physical characteristics of some major mineral resources
- explain the importance of mineral resources in industries; transport; communication; the economy.

Additional resources

- Pupil's Book pages 74 to 79
- Workbook pages 33 and 34
- Samples or pictures of minerals, e.g. tin ore, crude oil, coal, iron ore, alum, marble and gypsum ore
- Charts and maps to show the sources of minerals in Nigeria
- Examples of by-products of crude oil used in daily life
- For the extension activity: Internet access; library; magazines; book; newspapers

Teaching the lesson

Types of mineral resources in Nigeria

- Collect samples or pictures of minerals, such as tin ore, crude oil, coal, iron ore, alum, marble and gypsum ore to show during class activities.
- Point out identifiable characteristics of each, for example, colour, shine, smell and hardness.
- Use a map to identify where these minerals are mined in Nigeria.
- Ensure that the pupils can distinguish between fuel, metallic and non-metallic minerals.
- Ask the pupils to group the minerals into liquid and solid minerals.
- Use charts and maps to show the sources of minerals in Nigeria.
- Show the pupils examples of by-products of crude oil and other minerals that they use at home, to show their importance in our lives.
- Discuss the various uses of the most important minerals in Nigeria and how they have improved the economic development of the country.
- Discuss the adverse effects of mining on the environment.

Physical characteristics of some major mineral resources

- The pictures in the Pupil's Book can be supplemented with pictures or samples of minerals.

- Discuss the uses of the different minerals, with specific focus on the uses of crude oil and its by-products, because it is the main source of revenue in Nigeria.

Pupil's Book answers

Activity 1 Observe and compare different minerals PB pages 76 and 77

Mineral	Hardness	Lustre	Colour	Crystals or layers?	Liquid or solid?
Coal	Hard	Dull	Black	Layers	Solid
Iron ore	Hard	Dull	Grey	Layers	Solid
Sapphire	Hard	Shiny	Blue	Crystals	Solid
Talc ore	Hard	Dull	White	Crystals	Solid
Crude oil	Soft	Shiny	Black	–	Liquid
Gypsum ore	Hard	Dull	White	Crystals	Solid
Gold	Hard	Shiny	Gold	Layers	Solid
Lead ore	Hard	Shiny	Grey-Brown	Layers	Solid
Tin ore	Hard	Shiny	Dark Grey	Layers	Solid

Exercise 1 Answer questions on mineral resources PB page 79

- a) Crude oil. The richest deposits are in the Niger River Delta and offshore in the coastal region of the delta.
 - b) Pupils' answers will vary. Accept answers that coincide with the information on pages 77 to 79 in the Pupil's Book.
- Lead prevents rust.
- Bitumen
- Paraffin is a by-product of crude oil, which is a mineral found in Nigeria.
- Crude oil
- Talc
- All the minerals are solid, except for crude oil and natural gas.

Extension activity

- Pupils do research on the effect of oil pollution on marine life and present their findings to the class.

Remedial activity

- Recap the most important minerals and their uses.

Workbook answers

Name minerals WB page 33

1.	Fossil fuels	Metallic minerals	Non-metallic minerals
	Coal	Iron ore	Bitumen
	Crude oil	Zinc	Sulphur
	Natural gas	Lead	Gypsum
			Rock salt
			Diamonds
			Talc

2. Accept any one of the uses listed:

Crude oil	Fuel for transport; heating; coke for making electrodes or dry cells; lubricant for engines; Vaseline for skin barrier against moisture; plastic products
Coal	Used as energy source to generate electricity for heating and lighting
Lead	Lead-zinc has non-ferrous qualities and is used to make alloys with other metals for making ammunition and batteries, which need to be rust free
Iron ore	Used to make steel, which is used in all types of construction
Bitumen	Used to construct tar roads and to make coke, a substance used in the iron and steel industry
Talc	Ingredient in ceramics, paper, paint, roofing, plastics, cosmetics and talcum powder
Gypsum	Used in the production of cement and plaster of Paris
Rock salt	Used in chemical and processing plants

Explain how over-exploitation harms the environment WB page 34

1. Industries and processing plants using coal or other fossil fuels release harmful chemicals into the air that can cause illnesses and respiratory diseases in humans and animals.
2. Oil refineries and power stations generating electricity use water for cooling machinery or in the manufacturing process. This water, which contains chemicals, is sometimes pumped into rivers, which could harm the environment and fragile ecosystems.
3. Oil spills sometimes occur during the extraction and transportation of crude oil, for example, through damaged pipelines. Oil pollution affects all living things on land and in water. Oil can pollute the soil, rivers, wells and groundwater. It can kill animals and cause humans to become ill or die. Marine animals and birds are vulnerable to oil pollution, and it thus disturbs ecosystems and habitats.

Assessment: Answers

1. a) The Sun is the biggest object in our solar system. Because of its size, it has the greatest gravitational pull.
b) The Sun is at the centre of our solar system. All other objects in our solar system are pulled towards the Sun and orbit around it.
c) The Sun is a burning ball of gases, such as hydrogen and helium. (6)
2. The Earth receives light and heat from the Sun in sufficient quantities (not too much or too little), to enable plants to grow and produce food through photosynthesis. The Earth has an atmosphere that contains oxygen, which humans and animals need to survive. The atmosphere causes air pressure, which enables our lungs to expand and compress for breathing. The distance of the Earth from the Sun and the terrestrial composition of the Earth cause enough gravitational pull to literally keep things firmly on the surface of the Earth. (6)
3. No, it is not true. A person weighs the same in space as on Earth. It is the lack of gravity that makes one feel weightless. (2)
4. a) The Earth spins or rotates on its own axis. It takes the Earth one day (24 hours) to complete one rotation around its axis. (2)
b) It takes the Earth one year (365¼ days) to revolve once around the Sun, or to complete one revolution in its fixed orbit around the Sun. (2)
c) When our side of the Earth faces the Sun, we have daylight. The other side of the Earth then has night. (2)
d) During new moon, none of the sunlit side of the Moon is visible from the Earth. (1)
e) During full moon, there are higher tides than normal, called spring tides. (2)
5. a) During a solar eclipse, the Moon passes between the Earth and the Sun. During a lunar eclipse, the Earth passes between the Moon and the Sun. (2)
b) It is safe to view a lunar eclipse with the naked eye, but not a solar eclipse. During a lunar eclipse, the light of the Moon is reflected light from the Sun. Looking directly at a solar eclipse damages your eyesight because you will be looking directly at the Sun. (2)
6. The light of the Sun comes directly from the Sun itself; the light of the Moon is reflected light from the Sun. (2)
7. Constellations are groups of stars that form patterns or shapes that look like animals or objects. Pupils' answers will vary. Accept any correct answer. (2)
8. Weather refers to the conditions in the atmosphere at a specific time and place. The climate of a region refers to weather patterns over long periods, such as over years or decades. (2)
9. a) The term "current pressure" on a weather symbol refers to air pressure.
b) Symbols are used on maps to give information about current weather.
c) A high dew point indicates a high moisture content in the air.
d) The point where temperature changes occur between air masses is called a front. (4)
10. a) 100% cloud cover
b) Hail
c) Easterly wind; wind speed of 50 knots (6)
11. • All the data gained from the measurements can be used for the study of climate trends and for predicting likely future climatic conditions.
• Farmers can determine optimal crop planting and harvesting conditions.
• Airlines can use the data for flight scheduling and be warned of adverse/dangerous weather conditions.

- Areas on the Earth well or poorly suited for certain activities can be identified, e.g. wind farms, etc. (Any 3) (3)
- 12. Global warming refers to the fact that scientists believe that the world is getting hotter. (1)
- 13. a) The greenhouse effect (1)
- b) The Earth's atmosphere has an ozone layer that protects us from the harmful ultraviolet rays of the Sun (the rays that cause sunburn). The atmosphere lets light rays from the Sun through to warm up the Earth. The atmosphere also allows heat rays to reflect back into space, which prevents the Earth from becoming too hot. However, when waste gases from burning fossil fuels build up in the atmosphere, the heat gets trapped on the Earth. (4)
- 14. Pupils' answers will vary, but should show awareness of the fact that different effects of global warming are, and will be, experienced in most parts of the world. Melting polar ice caps are linked to a rise in sea level around the world, which will affect coastal areas (including Nigeria's) the most. The polar bear is just one of many species around the world being negatively affected by global warming. Every species plays a role in maintaining a healthy natural world, so there are no "unimportant" species. Apex predators (like the polar bear) are especially important in maintaining the health of a natural environment (ecosystem). (3)
- 15. Attractive; repulsive; gravity; friction (4)
- 16. One can drop a ball from a height. It will fall to the ground because of the force of gravity. (2)
- 17. • Changing of the shape of an object
 - Setting an object which is at rest (not moving) in motion, and causing an object to stop moving
 - Changing the direction in which an object is moving
 - Causing an object to move faster or slower
 - Causing an object to turn
 - Having no effect because the force used is too small (Any 3) (3)
- 18. Friction is a force that stops things from moving. (2)
- 19. • Dry friction, e.g. rubbing your hands to generate heat
 - Fluid friction, e.g. water resistance on a boat
 - Rolling friction, e.g. a round surface such as a ball or wheel rolling over a surface (6)
- 20. • In a camping or survivalist setting, friction can be used to start fires. Friction created by rubbing two pieces of wood together heat the wood until it reaches combustion temperature (around 425 degrees Celsius or 800 degrees Fahrenheit) and catches fire. For this to work, the wood must be quite dry and have little or no resin present.
 - Friction of a matchstick against the side of a match box creates a flame.
 - Writing with a pencil requires friction. You could not hold a pencil in your hand without friction. It would slip out when you tried to hold it to write. The graphite pencil lead would not make a mark on the paper without friction.
 - A pencil eraser uses friction to rub off mistakes written in pencil lead. Rubbing the eraser on the lead wears out the eraser due to friction, while the particle worn off gather up the pencil lead from the paper. (Any 2) (2)
- 21. a) • When using a ballpoint pen, friction triggers the ball to roll, thereby releasing the pen's ink.
 - Friction between the road and a car's tyres help the driver to control the vehicle's speed. When the driver applies the brakes, the car slows to a stop. (Any 1)
- b) Roads become slippery when wet. The water acts as a lubricant, reducing the amount of friction between the tyres and road surface, causing the car to skid. (4)

22. • Speed – For example, when a car is moving slowly, there will be more grip between tyre and road because of more friction.
 • Weight – The greater the weight of an object, the more friction there will be when moving the object.
 • Surface area – A small surface area means less contact with the other surface and, therefore, less friction. (Any 1) (1)
23. a) True
 b) True
 c) False. Arteries carry blood from the heart to the rest of the body.
 d) True
 e) False. The right atrium receives blood from the vena cava vein. (5)
24. a) Blood travels away from the heart in the aorta.
 b) The waste from the cell metabolism is mainly the gas carbon dioxide.
 c) The heart is made of a special type of muscle called cardiac muscle.
 d) The two lower chambers of the heart are called ventricles.
 e) The best way to measure your heartbeat is to take your pulse rate. (5)
25. a) Pulmonary artery
 b) Vena cavae
 c) Valves
 d) Septum
 e) Endocardium (5)
26. a) The A side of the heart does not have to pump the blood that it receives far, i.e. only to the lungs. The B side must pump blood far, i.e. to the rest of the body, and therefore it needs thick walls to perform this function. (2)
 b) 1 = pulmonary artery; 2 = valve; 3 = valve; 4 = valve; 5 = left ventricle; 6 = aorta; 7 = vena cava; 8 = right atrium; 9 = vena cava; 10 = valve; 11 = tendon (11)
 c) i) Number 6
 ii) Numbers 1, 7 or 9 (2)
 d) i) Part 4 prevents blood from flowing back to the ventricle.
 ii) Part 11 prevents the blood from going back into the atrium when it contracts.
 iii) Part 8 receives blood from the body.
 iv) Part 9 brings deoxygenated blood from the body to the heart. (4)
27. a) Vessel B. It has a smaller lumen and thicker muscular wall. (2)
 b) Vessel A. It has a thinner muscular wall. (2)
 c) 1 = thin outer wall; 2 = smooth lining; 3 = thick muscular wall; 4 = small lumen (4)
 d) Vessel A. They help the blood to flow through the vessel easily and prevent the blood from flowing back. (2)
 e) A capillary blood vessel has only one thin outer wall. (3)
28. a) A: scrotum
 b) B: testes
 c) A: reproduction
 d) D: testes
 e) C: 4
 f) A: 1
 g) D: 5
 h) D: 6 (8)
29. a) 1 = sperm duct; 2 = urethra; 3 = male sex organ/penis; 4 = testis; 5 = scrotum; 6 = bladder (6)
 b) i) Sperm ducts

- ii) Male sex organ/penis (2)
- c) i) Excretes urine and semen out of the body of the male.
- ii) Produces sperm cells. (2)
- 30. a) An egg cell is a gamete and is formed inside the ovary of a female. A zygote is formed when an egg cell and a sperm cell fuse.
- b) The urethra excretes urine and semen from the body of a male. The uterus is where the foetus develops in a female body before it is born. (4)
- 31. The air in our atmosphere contains oxygen, without which no living human or animal can survive. (2)
- 32. Air is in a gaseous state. Heated air will rise, and air pressure will decrease. When air is cooled, the pressure will increase as it drops down to Earth. (4)
- 33. Accept any experiment where an object such as a balloon, bicycle inner tube, paper bag, etc. can be inflated by filling it with air. Something as simple as blowing air bubbles through a straw in water would be sufficient. (5)
- 34. a) Gypsum
- b) Rock salt
- c) Coal
- d) Talc
- e) Crude oil
- f) Bitumen
- g) Iron ore
- h) Sapphire (8)
- 35. Over-exploitation of oil could have a devastating effect on the environment in terms of air, soil and water pollution. Nothing grows where oil has come into contact with the soil. Oil from leaky pipelines seeps into the soil and groundwater, making it unfit for agricultural or human use. Rivers and mangroves are polluted, upsetting their ecosystems. Crude oil extraction happens mainly in the Niger Delta and the surrounding ocean. Leakage of oil into the water kills fish, which are the livelihood and staple food of many people living in the area. The ecosystems of the areas where oil pollution occurs are sometimes changed irreversibly. The processing of crude oil into fuel releases harmful chemicals into the air, as well as contaminating water resources such as wells and rivers.
 Crude oil generates the highest income for the country and most resources are therefore applied for crude oil extraction. Mining operations of other crucial minerals suffer or cease altogether. These minerals then must be imported at greater cost. Crude oil is a fossil fuel, and therefore non-renewable. The resource will eventually be depleted, so steps should be taken to strengthen the economy sufficiently to absorb the future loss of revenue. (5)

Total mark: 164

Sub-theme 1 Understanding basic technology

Topic 1 Primary and secondary colours

Performance objectives

Pupils should be able to:

- separate white light into the colours which make it up
- identify and name the colours in light/the rainbow
- name objects which have characteristics of natural colours
- collect and list materials which produce colours
- sort primary and secondary colours from coloured plates
- identify characteristics of different colour shades
- mix primary and secondary colours, and identify the shades of colours produced.

Additional resources

- Pupil's Book pages 94 to 100
- Workbook pages 35 to 40
- Charts or objects to show the colours of the rainbow
- For Activity 1: water; shallow box or tray; sticky putty; piece of white card; small mirror
- For Activity 2: sheet of white paper or card; torch; glass bottle
- For Activity 3: three torches; cellophane paper of different colours; sticky tape
- For Activity 4: palette or dish with three blobs of red, blue, yellow and black paint; paintbrush; paper
- For Activity 5: white paper; different colours of coloured cellophane; felt-tip pens
- For Activity 7: sharp pencil; white card; pair of scissors; compass; coloured card or crayons
- For Activity 8: equipment for painting and a number of different-coloured paints

Teaching the lesson

- In addition to the activities in the Pupil's Book, there is a range of exciting experiments in the Workbook that will give pupils the opportunity to continue experimenting with colour and light. They could also be used as extension activities. It is best to do these either as class demonstrations or to let the pupils work in small groups.
- Before the pupils begin each experiment, make sure that they have all the materials they will need, otherwise they will not achieve the desired effect.
- The experiments provided in the Workbook are:
 - Primary and secondary colours (page 35)
 - Bounce light (page 36)
 - Separate colours (page 37)
 - Make natural dyes (page 38).

Components of light

- Read through the section on light with the pupils and use a prism to show that light can be divided up into a spectrum of colours.

The colour spectrum

- Read through the section on light with the pupils and use a prism to show that light can be divided up into a spectrum of colours.
- Explain that the seven colours of the rainbow – violet, indigo, blue, green, yellow, orange and red – and the range of colours between these colours, are known as the colour spectrum. Draw the pupils' attention to the pictures of the colours of the rainbow/the colour spectrum on pages 95 and 96 in the Pupil's Book.

Why do things have colours?

- Read through the content on page 96 in the Pupil's Book with the pupils, and discuss why different objects have different colours.
- Distinguish between primary colours (the primary colours of light, as well as those of paint), secondary colours and complementary colours. Discuss mixing colours to get secondary colours.

Producing known colours from primary colours

- Discuss producing new colours by mixing primary colours.
- Let the pupils complete the exercise and activities on pages 98 to 100 in the Pupil's Book.

Activity guidelines

Activity 1 Make a rainbow PB page 95

- In groups of three or four, pupils carry out the experiment to make a rainbow.
- Discuss how the light splits into the seven colours of the rainbow.

Activity 2 Create a rainbow by shining light PB page 95

- In groups of three or four, pupils create a rainbow by shining light from a torch through a glass bottle.
- Discuss how the colour spectrum is made visible on the white paper/card.

Activity 3 Experiment with lights PB page 98

- In groups, the pupils mix colours (red, blue and yellow) in light and create different colours where the lights overlap. Where all three overlap, white light is produced.

Activity 4 Experiment with shading and tinting PB page 98

- The pupils experiment with shading and tinting colours. Black is added when shading, and white when tinting.

Activity 5 Filter light PB page 99

- Divide pupils into groups to carry out the experiment using coloured filters.
- Keep a record of the colours that are affected, and how they are affected.

Activity 6 Collect objects to illustrate the colours of the rainbow PB page 99

- Let the pupils work in groups of four. Move amongst the groups to offer assistance or guidance if necessary.
- Allow the groups to make a labelled display of the objects they have collected.

Activity 7 Make a colour spinner PB page 100

- Let the pupils work in pairs.
- Move amongst the pairs to offer assistance or guidance if necessary. Help any pupils who struggle to use the compass correctly.

Activity 8 Mix colours PB page 100

- Encourage the pupils to work carefully and neatly as they prepare their charts in groups.
- Ask them to try to create as many “new” colours as possible.
- Let the pupils display their charts in the classroom.

Pupil’s Book answers

Exercise 1 Answer questions about colour PB page 99

Pupils answer the questions on their own.

1. All life on Earth would cease.
2. The colours present in white light are red, orange, yellow, green, blue, indigo and violet.
3. The Sun’s light falls on the object. All the colours are absorbed except red, which is reflected back into our eyes.
4. White light shines through a prism or water droplets, which causes the light to split into the seven different colours of the colour spectrum.
5. The primary colours of light are red, green and blue, whereas the primary colours of paint are red, yellow and blue.
6. Secondary colours are formed when primary colours are mixed together.

Workbook answers

Revise what you have learnt about colours WB pages 39 and 40

1. Red, orange, yellow, green, blue, indigo and violet
2. The colour spectrum
3. The primary colours of light are red, green and blue. The primary colours of paint are red, yellow and blue.
4. The secondary colours are purple, green and orange.
5. The Sun’s light falls on the object. All the colours are absorbed except blue, which is reflected back into our eyes.
6. Adding white to a colour is tinting. Adding black to a colour is shading.
7. Complementary colours are red and green, purple and yellow, and blue and orange.

Topic 2 Use of drawing instruments: Board practice

Performance objectives

Pupils should be able to:

- use drawing instruments
- draw circles using a compass
- draw horizontal lines using a T-square
- draw vertical lines.

Additional resources

- Pupil's Book pages 101 to 104
- Workbook pages 41 to 43
- For Activity 1: sharp pencil; eraser; ruler; pair of compasses, set square; try-square; ruler; pair of dividers (optional)

Teaching the lesson

What is drawing?

- Explain to the pupils that drawing has always been an important form of communication for human beings. For example, pictograms were used in prehistoric times to describe and show objects.
- Different types of drawing can be used for different purposes. The most common purpose is as a form of visual art, in which the artist uses drawing instruments to express on paper what he or she sees, feels and/or thinks.

Use of drawing instruments

- The most basic drawing instruments include a pencil, eraser and ruler.
- For technical drawing, the additional drawing instruments required are a pair of dividers, a pair of compasses, a protractor, a try-square (T-square), a set square, and spring clips or masking tape.
- Read through pages 101 to 104 in the Pupil's Book, explaining each tool carefully. Ideally, have examples available for the pupils to examine and use.

Activity guidelines

Activity 1 Practise drawing PB page 104

- As the pupils practise drawing in this activity, move around the classroom, checking that they are managing. Where necessary, provide help and encouragement.

Topic 3 Introduction to woodwork hand tools

Performance objectives

Pupils should be able to:

- explain what a hand tool is
- list cutting tools used in woodwork
- list marking tools used in woodwork
- identify measuring tools.

Additional resources




- Pupil's Book pages 105 to 110
- Workbook pages 41 to 43
- Measuring tools; marking tools; cutting tools





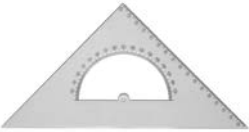

Teaching the lesson

- Work through the tools discussed on pages 105 to 108 with the pupils. Explain what each tool is made of and how it is used. Ideally, try to have examples of the tools available for the pupils to examine.
- Pupils can complete the worksheet in the Workbook on pages 41 and 42.
- After the pupils have completed the table on page 43 in the Workbook, ask for volunteers to show their drawings to the rest of the class. Check the accuracy of the drawings and give constructive feedback.

Pupil's Book answers


Activity 1 Explain the function of tools PB pages 108 to 110







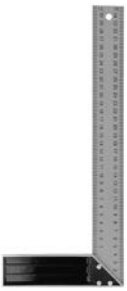
Tool	Name and function	Purpose		
		Marking	Measuring	Cutting
	Bradawl: Used to make indentations to that nails or screws can be inserted more easily	✓		
	Pair of dividers: Used to measure and transfer circular dimensions		✓	
	Bow saw: Used for cross-cutting wood			✓

Tool	Name and function	Purpose		
		Marking	Measuring	Cutting
	Spirit level: Used to determine whether a surface is perfectly level		✓	
	Marking gauge: Used to mark out parallel lines	✓		
	Tenon saw: Used for rip-cutting and cross-cutting wood			✓
	Axe: Used to shape, split and cut wood			✓
	Set square: Used to draw straight vertical lines and angles		✓	
	Tape measure: Used to measure distances		✓	

Workbook answers

Say what tools are used for WB pages 41 and 42

Tool	Function	Purpose		
		Mark	Measure	Cut
	Used to saw wood			✓

Tool	Function	Purpose		
		Mark	Measure	Cut
	Used to measure lengths		✓	
	Used to saw wood			✓
	Used to ensure that surfaces are perfectly level horizontally or straight, vertically		✓	
	Used to mark out parallel lines	✓		
	Used to cut wood			✓
	Used to chop wood			✓
	Used to measure and mark wood	✓	✓	

Description	Name
Has a cutting edge used for carving hard material such as wood or stone by hand	Chisel
It is used to make the surface of the wood very smooth	Plane
It is used for marking and for making holes to indicate position	Bradawl
It is used for cutting materials such as cardboard	Panel saw
It consists of a strip of cloth, paper or steel marked off in centimetres and is used for taking measurements	Tape measure
This tool is used for drawing arcs and circles accurately	Pair of compasses

Topic 4 Maintenance and safety on our roads

Performance objectives

Pupils should be able to:

- explain the meaning of maintenance
- list types of maintenance
- state the importance of maintenance
- define safety
- list safety precautions
- state causes of accidents in the workshop and on the road
- list safety devices.

Additional resources

- Pupil's Book pages 111 to 124
- Workbook pages 44 to 63

Teaching the lesson

What is maintenance?

- Read through the information on maintenance on pages 111 to 114 in the Pupil's Book. Pay particular attention to the definition of maintenance, the three different types of maintenance, and the importance of maintenance in all areas of our lives.
- After pupils have completed Activity 1, let them answer the questions on maintenance in the Workbook on pages 44 to 46.
- For question 2 in the Workbook, the pupils interview an adult about the need for maintenance and record their answers. The pupils then need to work in a group and decide how to present their findings to the class. Discuss the questions to be asked carefully with the pupils before they do the activity.

What is safety?

- Read through the information on safety, highlighting, in particular, the reasons why it is necessary to stay safe and the reasons why we need safety rules. Also discuss the concept of dangers, which include:
 - dangerous objects
 - dangerous weapons
 - dangerous situations.
- By the end of this topic, pupils must be able to recognise whether they are safe or not and whether they are acting in a way that will keep them safe.
- Ask the pupils to complete Activity 1 on page 116 in the Pupil's Book. The pupils will most likely think of many different scenarios in which they may be unsafe. Assess each answer given. The pupils must describe how to prevent the situation and how they would get help if they needed it.

What are accidents?

- Explain the concept of an accident. An accident is a sudden event (such as a car crash) that is not planned or intended, and that causes damage or injury to people and things. In most cases, accidents can be prevented.
- Discuss the paragraph the pupils must write in Activity 2, explaining what is expected. Remind them that you will be assessing not only the content, but also their sentence construction, spelling and punctuation. The paragraph can be written in their exercise books.

Preventing accidents on the road

- The pupils complete Activity 3. Discuss their answers in class, and ensure that quieter pupils get the opportunity to participate.

Safety precautions in the workshop

- Read through the safety precautions on page 121 in the Pupil's Book, discussing each rule with the class. Work through the safety devices and clothing described on the same page.
- For Activity 11, the pupils examine the picture and list reasons for wearing each item of clothing or equipment.

Fire extinguishers

- Read through the section on fire extinguishers and take the pupils to examine one in the school. Explain why it is there and why they are not to play with it.
- The pupils can then do Activity 12. Read through the case studies with the class. Working in pairs or groups, they can then decide on the actions to be taken in each situation.

The first-aid box

- Go through the section on the first-aid box with the pupils, and then let them do Activity 13.

Pupil's Book answers

Activity 1 Discuss maintenance PB page 114

Pupils' lists will differ. Discuss their answers in class.

Activity 2 Write about an accident PB page 116

Pupils' paragraphs will differ. Discuss their answers in class.

Activity 3 Talk about road safety PB page 117

1.



Railway crossing



Beware of skidding



Road narrows



Watch out for cyclists



Loose gravel
on the road



Pedestrian crossing



Traffic light



Beware of cattle
in the road



Two-way traffic

2. In the first diagram, the boy is chasing after a ball in the traffic. He could cause an accident and/or get knocked over by a vehicle. In the second diagram, the boy is crossing at a pedestrian crossing. This is a safe way to cross a road because motorists know they must stop.

Activity 4 List rules about safety on the way to school PB page 117

1. and 2. Pupils' answers will vary.
3. First diagram: It is dangerous to hold onto a moving vehicle as you can be involved in an accident if the vehicle stops suddenly or changes direction.
Second diagram: Never jump off a moving bus as you could fall and be knocked over by a vehicle.

Activity 5 Travel safely in cars PB page 118

1. It is not safe for her to sit on her mother's lap because she could be thrown off the lap if the car were to stop suddenly.
2. They are wearing seat belts to prevent their being thrown out of the car in an accident or up against the car's interior.
3. It is distracting for other motorists and the children's hands or arms could be hit by a passing vehicle.
4. The vehicle's lights
5. They are less likely to go through the windscreen in an accident.
6. They are often thrown onto the road, where they are driven over by other motorists.
7. To avoid distracting the driver and causing him or her to lose concentration

Activity 6 Get out of vehicles safely PB page 118

1. The passenger exiting onto the pavement, because he is not in the path of the traffic.

2. You could be injured by oncoming traffic.
3. You should check there are no vehicles or pedestrians approaching the car.

Activity 7 Follow safety rules PB page 119

1. and 2.

- Do not hold on to moving vehicles; ride behind them.
- Do not run or play in traffic; play in parks or at home.
- Do not exit a car in the traffic; exit onto the pavement.
- Do not talk on your mobile phone as you cross the road; wait until you have crossed the road.
- Do not sit on the back of a truck while it is moving; you should be seated, wearing a seat belt.
- Do not create a disturbance as a passenger by, for example, jumping up and down or waving your arms; sit quietly.
- Accept any reasonable answer.

Activity 8 Cross roads safely PB pages 119 and 120

1. and 2. First diagram: The man is running across the road between cars. Walk and cross at a stop street, pedestrian crossing or traffic light.

Second diagram: The man is talking on his mobile phone while crossing the road, and so he is distracted. Wait until you have crossed the road before using your mobile phone.

Third diagram: The pedestrian is crossing at a bend in the road, and so cannot see oncoming traffic. Cross only at a straight section of road.

Fourth diagram: The woman is walking between the vehicles on the road. Always walk on the pavement and cross at a stop street, pedestrian crossing or traffic light.

Activity 10 Identify safety rules in the Technology classroom PB page 120

- The computer screen is broken, and the live wires could be dangerous.
- The bag on the floor could be tripped over.
- The pair of scissors is being used inappropriately; it should be used only to cut.
- The water spilt onto the computer could damage the computer and also cause an electricity hazard.

Activity 11 Decide on reasons for wearing safety clothes PB page 121

- Apron, to protect one's clothes
- Gloves, to protect one's hands from heat and chemicals
- Goggles, to protect one's eyes and face from splinters and chemicals
- Closed shoes, to prevent objects from falling on one's feet and hurting them

Activity 12 Identify appropriate safety actions PB page 122

- Case study 1: Chibuka should report the rash and his burning eyes to his employer. In future, he should wear a face mask and goggles when applying the spray. He needs to check on the name of the chemical and its side effects before he uses it again.
- Case study 2: Amarachi should report her backache to her supervisor and ask that she be provided with a trolley to load the heavy barrels.

Activity 13 Sort items in a first-aid box PB pages 123 and 124

1. Pupils' answers will vary.

2.

Clean	Treat	Protect	Additional
Sterile gauze pads	Scissors	Bandages	First-aid instructions
Antiseptic wipes	Tweezers	Latex free disposable gloves	
Cotton tip/buds	Thermometer	Face mask	
Water purification tablets	Tablets to stop diarrhoea	Surgical tape	
	Paracetamol	Safety pins	
	Antibiotic ointment	Sun cream	
	Antacid tablets	Insect repellent	
	Eye wash	Small burn dressing	
	Antihistamine	Adhesive tape roll	
	Hot/cold gel pack	Blister plasters	
	Anti-nausea tablets	Sterile gauze pads	

Extension activities

- Let the pupils answer the questions on safety in the Workbook on pages 47 and 48. They may work individually or in groups to record their answers.
- Let the pupils answer the questions on road safety in the Workbook on pages 49 to 51. They may work in groups.
- Get the pupils to answer question 5 on page 63 in the Workbook.

Remedial activity

- Let the pupils answer questions 1 to 4 on pages 62 and 63 in the Workbook, for revision and consolidation.

Workbook answers

Answer questions and interview adults WB pages 44 and 46

1. a) Maintenance refers to the tasks that we carry out regularly (daily, weekly or monthly), to keep equipment or machinery in a good condition.
b) Predictive maintenance means that you guess or predict what might go wrong, and you take steps to put it right or prevent it from happening. Preventative maintenance is maintenance that you carry out before the machine breaks down. Corrective maintenance means that you fix something that has broken down or is faulty.
c) Pupils' answers will differ.

Write and talk about safety WB pages 47 and 48

1. It is important to think before you do anything and to be aware of the need to obey safety rules so that you do not cause accidents or hurt yourself or others. It is very important that you are safe at all times, whether at home or at school.
2. a) and b) Pupils' answers will vary.
3. Pupils' answers will vary. Ask the pupils to assess one another when acting out the scene.
4. Discuss how to set out a letter and the appropriate language and tone to be used.

Interpret traffic signs WB pages 49 and 50

1. and 2. Pupils' answers will vary.
3. a) It is safer to cross at a pedestrian crossing because traffic automatically stops there for pedestrians.
b) The distance straight across the road is the shortest. If you weave in and out of traffic, it will take you longer to cross the road and it will be more difficult for motorists to see you.
c) Running across a road is dangerous because it takes you longer to stop. Also, motorists have more difficulty seeing you.

List road safety rules WB page 51

1. to 4. Pupils' answers will vary, but they will most likely list road safety rules they learnt about in this topic. Accept any reasonable answer.

Identify more road safety rules WB page 52

1. Pupils' answers will vary.
2. a) Always get into a car when it is stationary.
b) Children should sit in the back in a car seat or wearing a seat belt.
c) Never do anything to distract the driver.
d) No arms or legs should be extended out of the car.
e) Always get out of the car on the pavement side.
f) Babies should be strapped into a baby seat.

Identify road safety dangers WB page 53

1. and 2. First diagram: Correct
Second diagram: Incorrect. Only walk on pavements or, if there is no pavement, on the side of the road where you will be facing oncoming traffic.
Third diagram: Never play with a ball close to a road as it could roll into the road and you could be injured if you chase after it.

Identify dangerous situations at home WB page 54

1. These family members are preparing food on and around a hot stove top. There are too many of them in one area. They are crowded together, which is dangerous because it could cause accidents. One of them could get burnt by hot food or oil splashing from the pan. They should be wearing some protective clothing, for example, an apron, so that their clothes do not get caught up in anything. The boy who is cooking on the hot stove is not paying attention to what he is doing. The man is attempting to pick up hot food using his fingers instead of a cooking utensil. The woman is using a knife which is far too big for what she is cutting. The other child is putting his fingers close to the knife while the woman

cuts food. The work surface should be cleaned on an on-going basis. For example, the egg shells should be thrown in the rubbish bin and the spilt liquid should be wiped up.

2. Pupils' answers will vary.

Identify dangerous situations at school WB pages 56 and 57

Pupils should tick the following safety rules:

- 4. Handle tools and equipment with care and pack them away.
- 6. Do not run when carrying a sharp pointed object, knife or pair of scissors.
- 8. Always use the correct tool for the job.
- 14. Make sure no clothing can get caught in tools or equipment.

Write safety rules for the Technology classroom WB page 58

Discuss the safety rules listed in the Workbook, and then allow the pupils to make up their own rules, particularly with regard to the Technology classroom that they use.

Classify safety rules WB page 59

To and from school	At home	At school and on the playground
Sit down while eating sandwiches or other food	Do not unlock medicine cabinets or play with tablets	Tie back long hair
Cross at pedestrian crossings or traffic lights	Do not touch pots or pans on the stove	Handle tools and equipment with care and pack them away
Never chase a ball out into the street before checking where the cars are	Do not walk when carrying a sharp pointed object, knife or pair of scissors	Do not run when carrying a sharp pointed object, knife or pair of scissors
Do not touch broken glass or a sharp object	Always use the correct tool for the job	Always use the correct tool for the job
Look left, right and left again before crossing a road	Never chase a ball out into the street before checking where the cars are	Wear protective goggles when using tools
Never play games in the street	Do not pull dangling cords or stick your fingers into plug points	Always wait for your turn to use equipment
	Do not touch broken glass or a sharp object	Do not touch broken glass or a sharp object
	Do not play with matches or open fire	Make sure no clothing can get caught in tools or equipment
	Wash your hands and make sure the work surface is clean before you work with tools	
	Make sure there are no small objects on the floor for young children to choke on	
	Keep kerosene and petrol locked away	

List reasons for wearing safety gear WB page 60

1. Apron, to protect their clothes
2. Gloves, to protect their hands from heat and chemicals
3. Goggles, to protect their eyes and face from splinters and chemicals
4. Closed shoes, to prevent objects from falling on their feet and hurting them
5. Cap or hairnet, to secure their hair to prevent it becoming entangled in machinery

Analyse case studies WB page 61

- Case study 1: Raliat needs to report the poor condition of Garba's goggles to the manager so that he can be given a new pair.
- Case study 2: Obiora needs to respect the safety rules as he could contaminate the fresh produce. Customers do not want his hair touching the produce as this is unhygienic.

Sub-theme 2 You and energy

Topic 5 Simple machines: Levers

Performance objectives

Pupils should be able to:

- collect and identify simple machines
- identify the parts of the lever
- list common uses of levers.

Additional resources

- Pupil's Book pages 125 to 129
- Workbook pages 64 to 68
- For Activity 1: firm board; split pins; string; paperclips, sticky tape

Teaching the lesson

- Explain that people use energy to do work. Sometimes it is not possible to do the work that needs to be done because we do not have enough energy to do the task. Machines make our lives easier by enabling us to use less energy to do more work.
- A simple machine is a mechanical device that makes work easier.
- Draw the pupils' attention to the picture on page 125 in the Pupil's Book which shows the six basic types of simple machines: the inclined plane, wheel and axle, wedge, screw, lever and pulley.

Activity guidelines

Activity 1 Make and use a simple lever PB page 126

- Hand out the following resources to each pair of pupils:
 - firm board
 - a split pin
 - string
 - three paperclips
 - sticky tape.

- Pupils need to cut out the shapes of arms from the firm cardboard. They use a split pin to make the “elbow joint”. They attach paperclips at intervals along the arm, using sticky tape. They thread string through the paperclips as shown in the picture on page 126 in the Pupil’s Book. They attach an object to one end of the string, and they pull the other end of the string to create movement.
- Move amongst the pupils as they work, giving guidance and assistance where necessary.

Activity 2 Identify and collect simple machines PB page 128

- Bring your own examples of tools and/or appliances that use levers to show the pupils, in case they cannot bring anything from home or the variety is limited.
- Typical items that pupils could bring include braai tongs, pair of scissors, pliers, stapler, cutting shears, etc.
- Provide an opportunity for the pupils to show the class what they have brought and explain why they chose the item/s.

Pupil’s Book answers

Activity 3 Identify levers and their uses PB page 129

Lever	Class of lever	Effort, fulcrum and load	Use/s
1. Hammer	1st class	Effort: Handle Fulcrum: Person’s hand Load: Head of the hammer driving in a nail	Joining wood using nails
2. Wheelbarrow	2nd class	Effort: Handles Fulcrum: Wheels Load: Item inside the wheelbarrow	Carrying a load
3. Cutting shears	1st class	Effort: Handles Fulcrum: The point at which the handles move/pivot Load: The item being cut	Cutting grass and shrubs
4. Braai tongs	1st class	Effort: Arms Fulcrum: The back end of the tongs Load: The item held in the middle of the front of the tongs	Picking up food

Activity 4 Draw different types of levers and identify the parts PB page 129

- a) Broom: 3rd class lever. Effort = the sweeper’s arms; fulcrum = where broom meets the ground; load = the dirt being swept up
 - b) Pair of pliers: 1st class lever. Effort = arms of pair of pliers; fulcrum = middle of pair of pliers; load = the items held in the middle of the front of the pair of pliers
 - c) Wheelbarrow: 2nd class lever. Effort = wheelbarrow’s handles; fulcrum = wheels; load = the item/s inside the wheelbarrow

Workbook answers

Identify types of simple machines WB page 64

Example of simple machine	Type of simple machine	What it is used for
Pair of scissors	Collection of two levers joined together	Cut different types of materials
Wheelbarrow	Lever/wheel and axle	Carry heavy loads
Axe	Wedge attached to a lever	Chop strong materials such as wood
Screwdriver	Wedge at the end/lever/screw	Unscrew objects
Fishing reel	Pulley	Attach fishing line/reel in fish
Ramp	Inclined plane	Makes heavy load easier to move
Crowbar	Wedge at the end attached to a lever	Open tight objects
Nutcracker	Collection of two levers joined together	Crack nuts
Cricket bat	Lever	Hit a ball

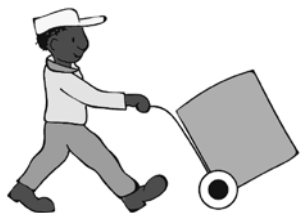
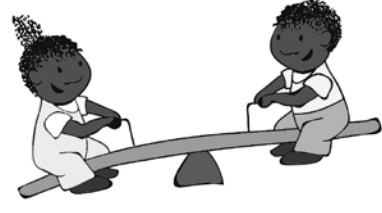

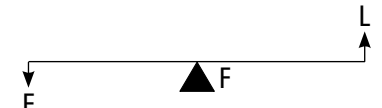
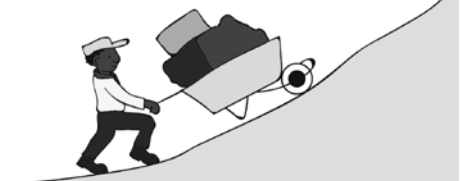



Identify classes of levers WB page 65

- There are three different kinds of levers.
 - The different kinds of levers are referred to as classes of levers.
 - In a first-class lever, the fulcrum is between the effort and load. The fulcrum can be anywhere between the effort and load.
 - In a second-class lever, the load is between the fulcrum and the effort.
 - In a third-class lever, the effort is between the fulcrum and load.
- A rake is a third-class lever.
 - The effort is in the middle of this lever.
 - The load is light.
 -



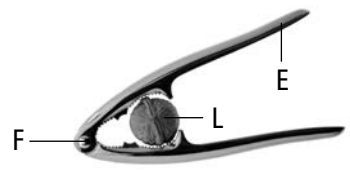

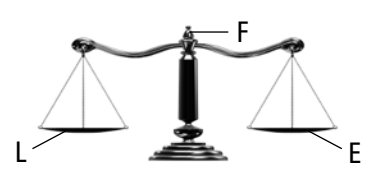
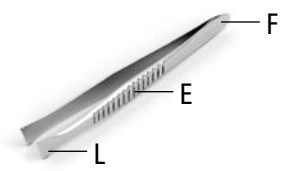
Draw systems diagrams WB page 66

1. and 2.





<p>A</p> 	<p>B</p> 
<p>a)</p> 	<p>b)</p> 
<p>C</p> 	<p>D</p> 
<p>c)</p> 	<p>d)</p> 

Identify the class of lever WB pages 67 and 68

1. and 2.

	F = fulcrum L = load E = effort	What it is used for	What class of lever it belongs to	Reason
<p>a)</p> 		<p>Crack nuts</p>	<p>2</p>	<p>It provides mechanical advantage</p>
<p>b)</p> 		<p>Catching fish</p>	<p>3</p>	<p>It does not provide mechanical advantage but gives distance, accuracy and speed</p>
<p>c)</p> 		<p>Use to measure quantity of food</p>	<p>1</p>	<p>It provides mechanical advantage. It allows people to measure out correct amounts</p>
<p>d)</p> 		<p>Hold small objects</p>	<p>3</p>	<p>It provides mechanical advantage to lift objects</p>

1. and 2.

	F = fulcrum L = load E = effort	What it is used for	What class of lever it belongs to	Reason
e)		Lift objects	1	It provides mechanical advantage to lift objects
f)		Lift objects	2	It provides mechanical advantage making it easier to lift objects
g)		Lift objects	3	It provides mechanical advantage but gives distance
h)		Lift objects	2	It provides mechanical advantage making it easier to lift objects

Topic 6 Simple machines: Pulleys

Performance objectives

Pupils should be able to:

- recognise and identify simple pulley machines
- identify and describe the different uses of pulley machines in everyday life
- distinguish between fixed and movable pulleys
- make and use pulley machines to do work.

Additional resources

- Pupil's Book pages 130 to 135
- Workbook pages 69 to 72
- For Activity 3 practice pulley model: wire coat hanger; rope; wooden spool; small book
- For the Workbook pulley model: cardboard cereal box; 2 litre plastic milk bottle; pair of scissors; corrugated cardboard (to make a small box), or a smaller box, or a baby food jar; wire coat hanger; hot glue gun; string; aluminium foil; decorative paper and craft glue (optional), to neaten the outer case of the elevator

Teaching the lesson

- Explain pulleys and their uses to pupils. Refer to page 130 in the Pupil's Book.

- Explain the different types of pulleys to pupils. Refer to page 131 in the Pupil's Book.
- Name and identify the different parts of the pulley. Demonstrate how each part works, especially with regard to the movement of the load.

Activity guidelines

Activity 1 Examine and observe pulleys at work PB page 134

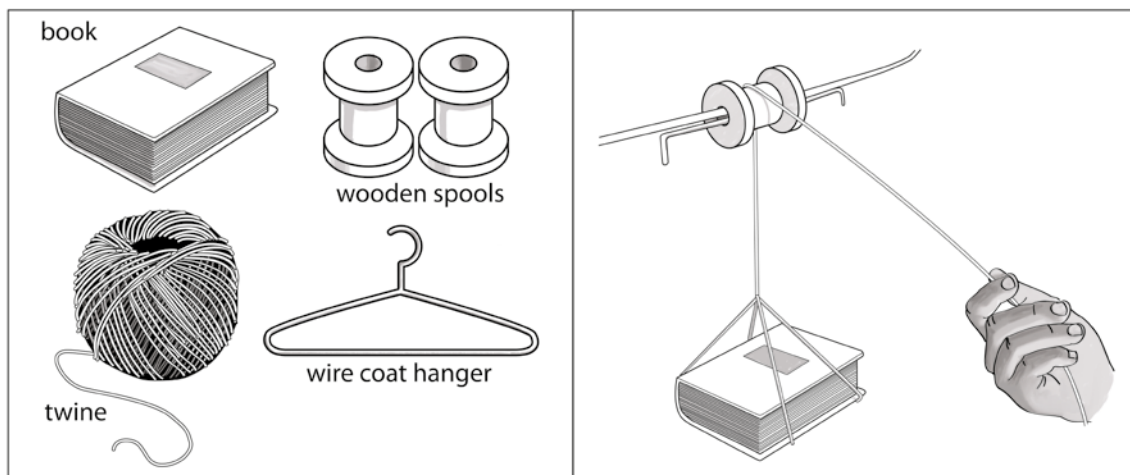
- Arrange an excursion for the pupils so that they can observe pulleys at work. Hold a class discussion after the excursion, so the pupils can discuss what they observed. Use this opportunity to check the pupils' understanding of the ways in which pulleys work.

Activity 2 Identify and collect simple machines PB page 134

- In this activity, the pupils make a list of different tools and appliances that use pulleys.
- Discuss the following examples of pulleys: moveable clothes line, water well, escalator, gym equipment and fishing rod.

Activity 3 Make a model of a pulley PB page 135

- Before the pupils tackle this task, which is for assessment, let them make a practice example of a simple pulley system using a wire coat hanger, rope, wooden (or plastic) spool and a small book:



- Discuss Activity 3 with the pupils, so that they know what is expected of them. Draw the assessment rubric provided below on the board, and let the pupils copy it into their exercise books. (Or, you can make copies of the rubric and hand them out to the pupils.) Go through the rubric so that the pupils have a clear understanding of what you expect of them and how marks will be allocated.
- Ideally, pupils should bring the required resources to class to complete the activity. However, be sensitive to the fact that some pupils may find this difficult or impossible, so ensure that you have spare resources available in class for the pupils to use for this assessment task.

MARKING RUBRIC FOR PULLEY PROJECT

Date briefed: _____

Date completed: _____

Names of team members: _____

	Criteria	4	3	2	1	Comments
1	Planning					
2	Design specification sheet					
3	Construction of model					
4	Use of a pulley system					
5	Aesthetic value					
	Total					

Key:

- 4 Excellent work is of an exceptionally high standard; all planning is detailed; all aspects of the design specification sheet are adhered to in detail. Model is well constructed, neat, stable and effectively demonstrates an application of the pulley system.
- 3 Good work of a high standard; all planning is complete; all aspects of the design specification sheet are adhered to. Model is well constructed, neat, stable and effectively demonstrates an application of the pulley system.
- 2 Fair work is of a satisfactory standard; minor omissions in the planning; more attention needs to be given to the design specification sheet. Model demonstrates an application of the pulley system but is unstable and lacks details.
- 1 Certain aspects of the work is incomplete or rushed. Lack of detail in most aspects of the planning; the design specification sheet lacks detail. Model is poorly constructed, unstable and is evident of poor preparation and organisational skills. Uses a very basic unstable pulley system.

Pupil's Book answers

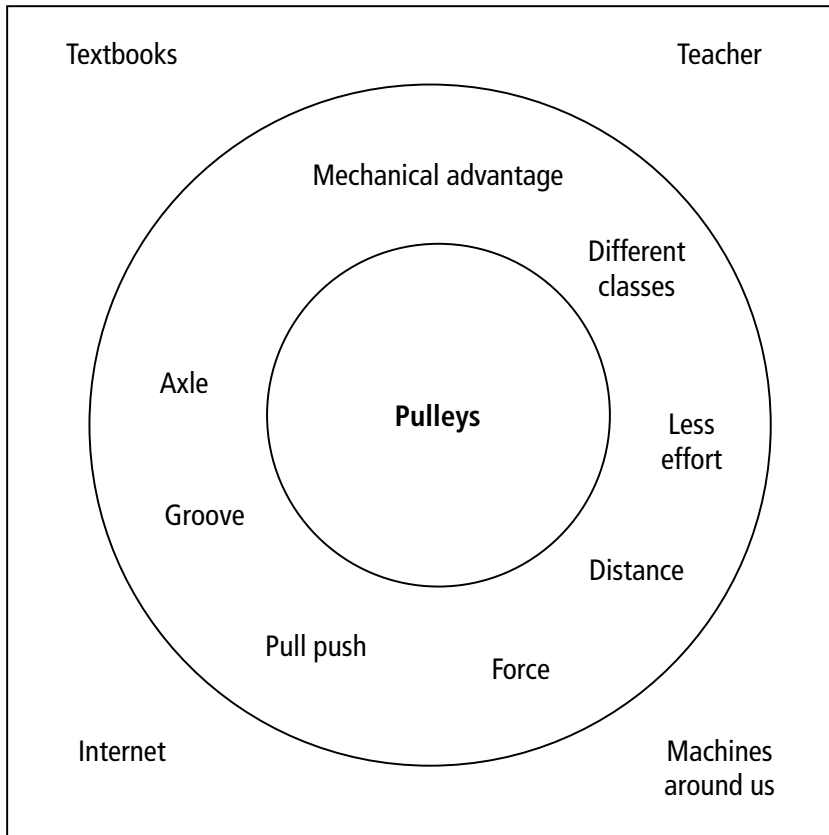
Exercise 1 Revise common applications of pulleys PB page 134

In high-rise buildings, pulleys provide elevators with the power to lift heavy loads safely. A pulley in a well makes the lifting task easier by changing the direction of movement. Tall pulleys fitted with a hook attachment are commonly used in construction. Search and rescue personnel use pulleys to move heavy loads to safety.

Workbook answers

Complete a circle map about pulleys WB page 69

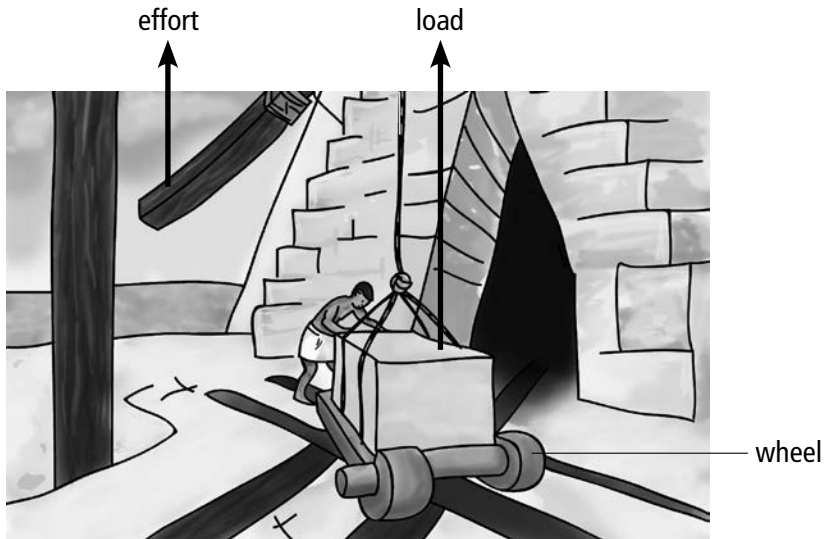
Pupils' circle maps will vary, but may look similar to this example:



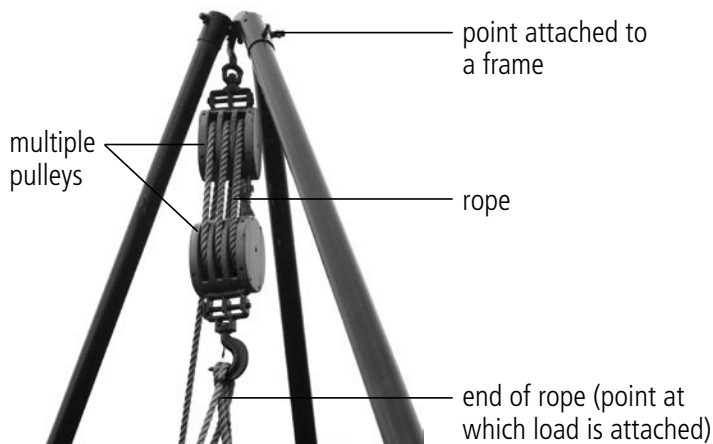
Revise what you know about pulleys WB page 70

1. A pulley is one of the earliest simple machines. Its main use is to make it easier to lift heavy objects. A pulley consists of a wheel that rotates on an axle, which is a rod through the centre of the wheel. The wheel usually has a groove around the outside edge. This groove enables a rope or belt to move around the pulley. Pulling down on the rope can lift an object attached to the rope. Work is made easier because pulling down on the rope is made easier due to the force of gravity.

2.



3. A single pulley is used to change the direction of the applied force from a pull to a push. Instead of lifting up the load, the load is attached to one end of a pulley and the other end of the pulley rope is pulled down, making it easier to lift the load. However, you can also use multiple pulleys. When you use multiple pulleys, you have to pull the rope longer in order to get the object to travel the same distance as it does with one pulley. But since you are increasing the distance, you have to apply less force. Granted, you have to apply that force for the greater distance, but it is generally more comfortable and feels easier because you do not have to strain yourself.
4. and 5. It is a compound pulley system. There are a number of pulleys being used.



Build a model of a pulley system WB pages 71 and 72

Use the rubric provided on page 61 of this Teacher's Guide to mark this assessment task.

Topic 7 Inclined planes

Performance objectives

Pupils should be able to:

- mention examples of inclined planes
- construct and use inclined planes to lift a load
- state the advantages of inclined planes.

Additional resources

- Pupil's Book pages 136 to 139
- Workbook pages 73 to 74
- For Activity 2: baskets or buckets; weights (such as bricks or books); tables; a plank of wood; rope

Teaching the lesson

- Explain the concept of an inclined plane to the pupils. Use the example of a pupil who needs a wheelchair to move around. Ask the pupils to try to imagine themselves in that situation. Discuss the difficulties they would experience without the use of wheelchair ramps.
- Show the pupils a ramp, if there is one at the school.
- Refer the pupils to pages 136 to 138 in the Pupil's Book. Go through the examples and explanations of where inclined planes are used.

Activity guidelines

Activity 1 Observe the use of inclined planes and discuss their advantages

PB page 139

- Arrange an excursion for the pupils to a nearby place that uses inclined planes. This could be a hospital, shopping mall, children's playground, construction site, etc.
- After the excursion, let the pupils hold discussions in groups about the advantages of using inclined planes in the place that they visited.

Activity 2 Use planks to make an inclined plane

PB page 139

- Ensure that the pupils have all the resources they will need before they begin this activity.
- Move amongst the groups as the pupils work, providing guidance and assistance where necessary.

Workbook activity Use inclined planes to help people

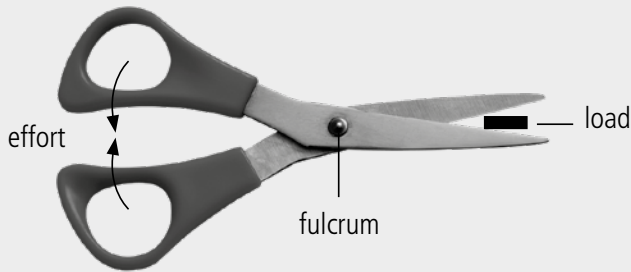
WB pages 73 and 74

1. a) Divide the class into groups, and then allow the pupils to look around the school to identify places that would be difficult for a person using a wheelchair to access.
b) The pupils must identify materials that could be used to build a ramp, bearing in mind the combined weight of the wheelchair and its occupant.
2. The pupils take measurements of the required length, breadth and height of the ramp, and then they draw the inclined plane they will build.
3. The pupils then build a simple model of an inclined plane and identify areas at the school where it would enable a wheelchair user to move around more easily.

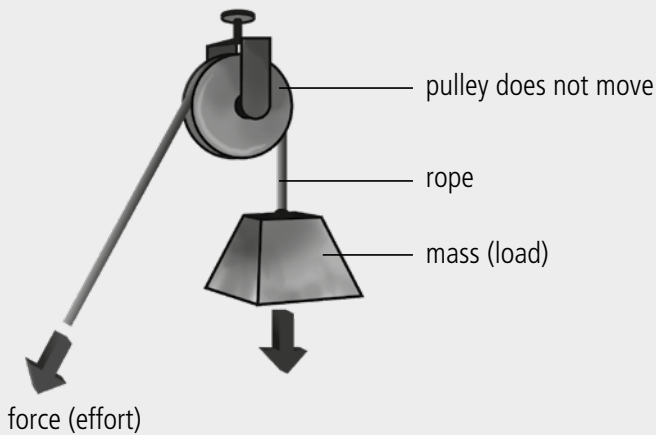
Assessment: Answers

1. Red, orange, yellow, green, blue, indigo and violet (7)
2. The colour spectrum (1)
3. The primary colours of light are red, green and blue. The primary colours of paint are red, yellow and blue. (2)
4. The secondary colours are purple, green and orange. (3)
5. The Sun's light falls on the object. All the colours are absorbed except blue, which is reflected back into our eyes. (3)
6. Adding white to a colour is tinting. Adding black to a colour is shading. (2)
7. The complementary colours are red and green, purple and yellow, and blue and orange. (3)
8.
 - a) An eraser is used to erase or rub out errors in a drawing.
 - b) A pair of compasses is used to draw arcs and circles.
 - c) A ruler is used to measure lengths and draw straight lines.
 - d) A set square is used to draw vertical lines and angles. (4)
9.
 - a) To get the paper straight on the drawing board, move the try-square to the bottom of the board, and then line up the paper against it. You can position the paper in landscape or portrait format.
 - b) The paper has to be attached to the drawing board so that it does not move around while you are drawing. You can attach the paper by using masking tape, sticky tape or drawing board clips. (4)
10.
 - a) Marking gauge; pair of compasses; bradawl
 - b) Axe; bow saw; tenon saw
 - c) Spirit level; try-square; tape measure (9)
11. An accident is an event that is unplanned or unexpected and that can result in injury, damage or death, or a combination of all of these. (2)
12. People can be careless and do not watch out for hazards. People sometimes play with dangerous objects. Peoples may use equipment badly. (3)
13.
 - a) Knives; saw; electrical equipment (Any 2)
 - b) Guns; bow and arrows; knives (Any 2)
 - c) Travelling on an overloaded bus; playing on a road; working with electrical tools without obeying safety rules (Any 2) (6)
14. Goggles protect the face and eyes from harmful liquids and objects that could cause injury. (2)
15. Every school should have a first-aid box, in case there is an accident and someone needs to be treated. Everyone should know where the first-aid box is kept. (3)
16. A simple machine is a mechanical device that changes the direction or magnitude of a force. (2)
17. Lever, wheel and axle, screw, wedge, inclined plane (12)
18. Simple machines make our lives easier by enabling us to use less energy to do more work. (2)
19. Linkages (1)
20.
 - Linear movement, e.g. riding a bicycle
 - Reciprocating movement, e.g. bouncing a ball
 - Oscillating movement, e.g. kicking a ball
 - Rotary movement, e.g. doing a cartwheel. (8)
21.
 - First-class lever, e.g. pair scissors
 - Second-class lever, e.g. nut cracker

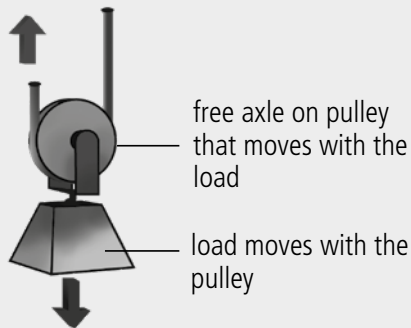
- Third-class lever, e.g. staple remover (6)
22. a) First-class lever (1)
- b) (3)



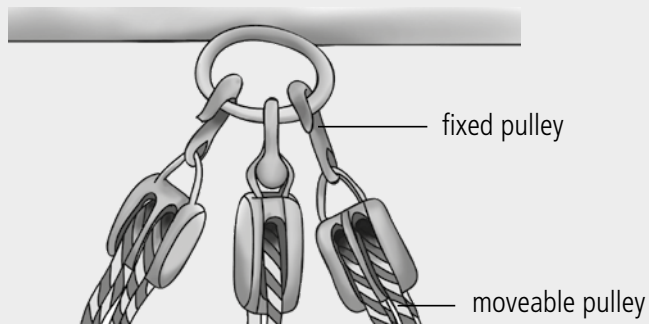
23. A pulley is one of the original simple machines. The original primary use for pulleys was to make it easier to lift heavy items. A pulley consists of a wheel that rotates on an axle, which is a rod through the centre of the wheel. The wheel usually has a groove around the outside edge. (2)
24. Elevator; water well; exercise machine; construction pulley; cinema curtains (Any 4) (4)
25. • Single fixed pulley:



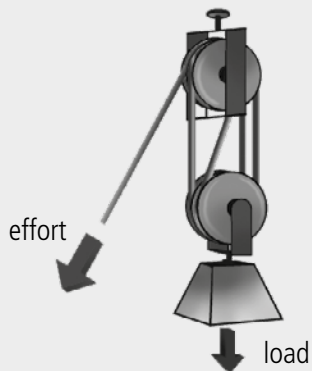
- Moveable, or class 2 pulley:



- Compound pulley system:



- Block and tackle compound pulley:



- (Any 3) (6)
26. An inclined plane makes it easier to lift up a heavy load. (2)
27. You can push the load a greater distance with less force. The amount of work stays the same. (2)
28. Installing a ramp enables you to push a wheelchair a greater distance, which is easier than lifting it up, because it is very heavy. (2)

Total mark: 107

Sub-theme 1 Basic movement

Topic 1 Physical fitness and body conditioning

Performance objectives

Pupils should be able to:

- mention components of physical fitness and body conditioning
- demonstrate the execution of agility, power, flexibility and balance
- identify activities for measuring agility, power, flexibility and balance
- measure your own agility, power, flexibility and balance
- mention the benefits of these components of physical fitness and body conditioning.

Additional resources

- Pupil's Book pages 145 to 155
- Workbook pages 75 to 78
- For Activity 1: two wooden blocks for each runner; two lines, e.g. ropes, tape or cones
- For Activity 2: tape measure; a wall you can mark; piece of chalk
- For Activity 3: a beam about 15 cm wide and 6 m long

Teaching the lesson

Components of physical fitness and body conditioning

- Discuss how the pupils are going to focus on strength, muscular endurance and fitness conditioning in this section. Discuss the pictures on page 145 in the Pupil's Book. Ask the pupils whether they have tried any of the exercises shown. Get the pupils to make their own poster, so they have a better understanding of the different exercises.
- Discuss the different components of overall fitness: muscular strength, muscular endurance, cardiorespiratory endurance, body composition and flexibility. Get the pupils to look at each of the pictures on pages 145 in the Pupil's Book as you read through the description of each component.

Building fitness and body conditioning

- Muscular strength – Look at the illustrations on page 146 in the Pupil's Book with the pupils, and discuss the different activities. Get the pupils to add more exercises that help to develop muscular strength.
- Muscular endurance – Look at the illustration on page 147 in the Pupil's Book with the pupils and discuss. Get the pupils to think of other ways they could develop their muscular endurance.
- Cardiorespiratory endurance – Explain that “cardio” refers to the heart and “respiratory” refers to using the lungs. Discuss the information and illustration with the pupils.
- Body composition – Look at the illustrations that show the muscle, fat and bone composition of the body. Discuss with the pupils.

- Flexibility – Discuss the two illustrations of the pupils stretching. Flexibility is being able to move your body easily in different ways.

Measurement of agility

- Read through the paragraphs with the pupils, and then let them do Activity 1.
- Make sure you have all the equipment you need before you go out with the pupils.
- The two lines for the 10 m shuttle run must be marked out 10 metres apart. Read through the method with the pupils. Get them to stretch before they start the shuttle run.

Measurement of power

Sergeant jump

- This is a fun exercise, and it teaches the pupils to jump high. Read through the paragraph with the pupils, and then let them do Activity 2.
- Read through the method with the pupils, and then let them mark off the wall using chalk. Get the pupils to work in pairs so they can take turns to mark the jumps on the wall and do the jump.

Static broad jump

- You can make this jump fun by putting a small pipe in front of the pupils. This exercise also teaches the pupils to jump up high. Read through the instructions on page 150 in the Pupil's Book.

Measurement of flexibility

Standing broad jump

- The standing broad jump is the same as the static broad jump, except that the pupils do not pause when in the half-squat position.
- Ensure that the pupils warm up before attempting the jump.

Straight-knee touch

- This is a good stretching exercise. Read the instructions to the pupils, and then ask them to try it. It is important that they do not bend their knees. If they cannot touch their toes at the first attempt, they must continue to do the stretching exercise until they can touch their toes. Emphasise the importance of stretching only to the point of tension.
- Read about the static stretch with the pupils, and then let them try it themselves.

Measurement of balance

Beam walk

- Read through the description of the beam walk. Then, let the pupils do Activity 3.
- The beam walk is a fun activity. The pupils need to focus when they do the beam walk, but make the exercise into an enjoyable game. Let them practise for a while, and then hold a little competition. If they fall off, they are “out”.
- Pupils can have fun timing one another. You could also have music playing, so they can use a rhythm to walk across the bar.
- Let the pupils finish off the section by completing Exercise 2.

The benefits of agility

- Read through the different benefits of agility with the pupils.

- Ask the pupils which sports, exercises or activities require agility, in their opinion. Discuss the photograph.

The benefits of power

- Read about the benefits of power and strength training with the pupils.
- Discuss the photograph. Ask the pupils whether or not they think they should train using heavy weights, and why.

The benefits of flexibility

- Read through the benefits of flexibility with the pupils.
- Ask if any of them can do the splits like the person in the photograph. It is fairly unlikely that this will be the case, so also ask them who can touch their toes, or perform any other feats of flexibility.

The benefits of balance

- Be sensitive about balance because some pupils are not as physically well coordinated as others. Some of them may not have good balance.
- Let them try standing like the woman in the picture. They may struggle, so give them simpler versions of the pose to try.
- Then let the pupils do Exercise 3.

Pupil's Book answers

Exercise 1 Mention components of fitness and body conditioning PB page 148

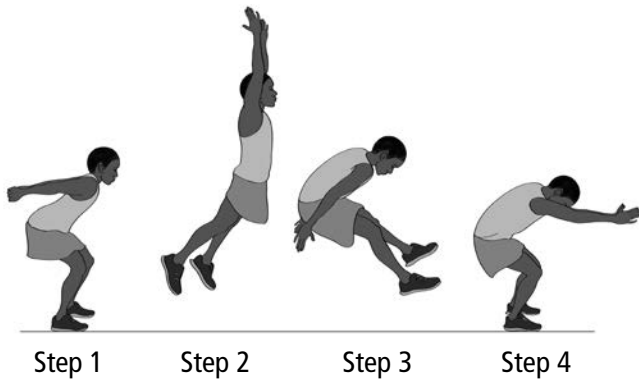
1. Lift light weights; do sit-ups, press-ups and squat thrusts. (Pupils learnt about squat thrusts in Primary 5.)
2. Do plenty of stretching. You need to warm up before stretching. While stretching, you need to stop at the point of tension. It is preferable to warm up before exercising (rather than stretch).
3. Muscular strength; muscular endurance; cardiorespiratory endurance; body composition; flexibility (Any 3)
4. Pupils' answers will vary. Accept any reasonable answers. Suggested answers include: You could gain a great deal of weight. You might struggle to breathe. You could find it difficult to join in certain activities with other pupils, such as playing a game or a sport.

Exercise 2 Revise measurement of physical fitness and body conditioning

PB page 152

1. For the 10 m shuttle run, you need two wooden blocks, two lines 10 metres apart, and a tape or cones.
2. You start with your foot behind the starting line. When the teacher says go, sprint to the opposite line to pick up the wooden block. Run back to the start and place the wooden block behind the starting line. Without stopping, run back and pick up the second block, and then sprint back to the starting line.
3. To do a sergeant jump, stand next to a wall and reach up as high as you can. Make a chalk mark where your fingers touch the wall. Bend your knees and jump upwards as high as you can, stretching your arm up as high as possible. Make a mark using the chalk. Keep jumping as high as you can, making a mark each time.







4.



5. Start at one end of the beam and walk the length of the beam to the other end. Turn around and walk back to the starting end.

Exercise 3 Revise benefits of physical fitness and body conditioning PB page 155

1. Agility is being able to control your body well, and to move and change direction quickly. Agility helps you to move quickly and effectively. Being agile improves your general athletic ability. It also reduces bone and muscle injuries.
2.
 - a) True
 - b) False. Power training does help build a healthy body because you get fit.
 - c) True
 - d) False. Power training strengthens the bones and reduces bone and muscle injuries.
 - e) True

3. Power building	Flexibility	Agility
 <p>Lifting light weights</p>	 <p>Doing a yoga balancing pose</p>	 <p>Playing football</p>
	 <p>Touching your toes</p>	 <p>Playing basketball</p>
	 <p>Doing the splits</p>	

Workbook answers

Fill in missing words WB page 75

1. a) Muscular strength is the power that helps you carry heavy things.
b) Cardiorespiratory endurance makes us use our lungs, heart and blood vessels.
c) Muscular endurance is when you are able to use muscle power for longer periods of time.
d) To move our bodies in many different ways without being stiff means we are flexible.
e) Body composition is the combination of fat, muscle and bone.

Choose the correct words in brackets WB pages 75 and 76

1. a) We can improve our body composition by eating healthy foods and drinking water.
b) We should always stretch to prepare for exercise.
c) To build muscle power, we should exercise our muscles when exercising.
d) Cardiorespiratory endurance forces you to use your lungs, heart and blood vessels.

Identify body conditioning activities WB page 76

1. a) 4
b) 3
c) 1
d) 2

Write and draw about agility and balance WB pages 77 and 78

1. 10 m shuttle; static broad jump
2. a) It will improve your athletic performance.
c) It helps with balance, control and flexibility.
3. Balance helps you to turn quickly without falling over when running on the sports field. Balance helps you to land on your feet after shooting or jumping.
4. Yes, because everything is connected. Writing, sitting and controlling your pencil are all activities that require balance.
5. Pupils' answers will vary. Accept any reasonable answer.
6. You can use a stop watch in most activities, for example, the 10 m shuttle run and the beam walk. When you record your time in different activities, you can see how much you have improved.

Sub-theme 2 Games and sports

Topic 2 Athletics: Track events

Performance objectives

Pupils should be able to:

- describe types of relay races
- list the skills involved in the track events relay races and hurdles
- perform the skills in the track events relay races and hurdles.

Additional resources

- Pupil's Book pages 156 to 163

- Workbook pages 79 and 80
- For Activity 1: batons (enough for all the teams)
- For Activity 2: five hurdles

Teaching the lesson

Types of relay races

- Discuss the 4 × 100 metre, 4 × 400 metre, and medley relay races. Focus on the similarities and differences between them.
- Ensure the pupils understand that teamwork and practising skills are essential for these races.

Relay skills

- Students should handle the batons and do simple grip exercises in pairs to familiarise themselves with the size, weight and feel of the baton.
- Once they feel comfortable, they could practise taking off from a kneeling position and a standing position and then running with the baton.
- Explain and demonstrate the non-visual take-over exchange.
- Show the pupils the marks on the track between which such an exchange should take place.
- Let the pupils practise the relay skills outside over short distances.
- Where possible, show the pupils videos of these skills or get more experienced pupils to demonstrate them.
- Use a whistle to start practice races at first, and introduce a starting gun later on.
- As pupils gain confidence and improve their skills, time their efforts using a stopwatch to motivate them to achieve faster times.

Basic skills in hurdles

- Discuss the basic skills in hurdles, referring to pages 161 and 162 in the Pupil's Book.
- If possible, show videos to familiarise the pupils with the skill of clearing a hurdle.
- Demonstrate stretching exercises that pupils should do before any activity.
- Introduce the pupils to basic skills in hurdles by letting them do Activity 2.
- Get them to practise over short distances and only a few low obstacles at first.
- Focus on building their confidence before attempting full-sized hurdles.
- Emphasise clearing the hurdle using the correct leg and arm action.
- Then get the pupils to practise the strides between hurdles using the three-step method.
- There are many coaching videos on the Internet for honing specific hurdle skills. The pupils could watch some of these, and then practise indoors.

Activity guidelines

Activity 1 Practise non-visual baton changeover PB page 160

- This activity should ideally be done on an athletics track or marked track on grass.
- Do this activity once the pupils feel confident with the procedure.
- Divide the pupils into groups of four and discuss the rules.
- Pupils could be assessed on their skills first, and then compete against one another to see which group is the fastest.

Pupil's Book answers

Exercise 1 Answer questions on track events PB page 163

1. Correct baton grip; quick take-off from a kneeling or standing position; smooth non-visual take-over exchange (Any 2)
2. Each runner runs a short distance and a non-visual changeover ensures a faster overall time for the team.
3. If a baton is dropped, the team will be disqualified.
4. During a non-visual changeover, the receiving runner should wait for a verbal command from the incoming runner before taking off. Should the receiver start running too soon, the handover will not be possible within the handover zone and the team will be disqualified. The incoming runner will also be tired and eager to hand over to a fresh runner as soon as possible.
5. The three-step method is how a hurdle athlete should count his or her steps between hurdles, to be able to clear each hurdle with the same leading leg. It is counted from the first step of the trailing leg on landing: jump-1-2-3-jump.
6. By using the three-step method and lengthening or shortening your strides between hurdles.
7. Your arm action counterbalances your legs and body as you clear the hurdle, and provides extra forward motion.
8. The head, neck and torso should form a straight line. Bend the upper body parallel to the leading leg to clear the hurdle, and then straighten up directly afterwards.
9. It provides support for the body as the athlete lands and straightens up.
10. Athletes take off in a staggered pattern for this race. First runners are staggered further apart than for the normal 400 metre sprint. The first athlete takes off from a kneeling position; the receiving runners take off from a standing position. The first receivers take off in their lanes, but then move towards the inside lane soon after the changeover. The third and fourth runners receive the baton standing in a line across the lanes, and must receive the baton and take off within a 20-metre demarcated area.

Extension activity

- Ask pupils to do research on famous Nigerian relay teams and hurdles winners.

Remedial activity

- Recap the rules and regulations of relay and hurdles races, and what could cause an athlete to be disqualified.

Workbook answers

Identify features of athletics track events WB pages 79 and 80

1. a) This is a blind or non-visual changeover between two relay athletes.
b) This could be either a 4 × 100 metre relay, or it could be at the first changeover in a medley relay. Only 100 metre relay legs require a non-visual changeover of the baton.
c) The lines show the beginning and end of the 20-metre changeover area in which the baton must change hands from the incoming to the receiving athlete.
d) There are four athletes in each relay team.
2. a) Ten hurdles
b) Her leading leg is the straight leg extended out in front of her. Her trailing leg is the bent leg.

- c) She is supposed to bring it down and back forcefully and quickly.
- d) Three steps
- e) The right foot. All the hurdles are supposed to be cleared with the same leading leg.

Topic 3 Athletics: Field events

Performance objectives

Pupils should be able to:

- explain the meaning of high jump and long jump
- demonstrate styles and stages in high jump and long jump
- mention the rules in high jump and long jump
- draw and label the high jump poles and long jump pitch.

Additional resources

- Pupil's Book pages 164 to 173
- Workbook page 81
- Charts and/or videos showing: different styles of high jump; long jump
- Athletes to demonstrate: different styles of high jump; long jump
- For Activity 1: high jump pitch
- For Activity 2: long jump pitch
- For the extension activity: Internet access; library; magazines; newspapers

Teaching the lesson

What are high jump and long jump?

- Discuss the two types of jumps, what the aim of each is, and where they take place on the athletics track.

High jump

- Show the pupils how the high jump pitch is set up so that jumps can be measured, and for safe landing.
- Discuss the five high jump styles, using the content and pictures in the Pupil's Book.
- Have the pupils act out the different styles in slow motion without jumping. This will give them the opportunity to familiarise themselves with the direction of the approach, their position in relation to uprights, the take-off mark and the positioning and direction of the body on take-off.
- If possible, show videos of the different styles and have the pupils discuss the positive and negative aspects of each style.
- The pupils should know about the different styles, but preferably focus on developing one style for competitions.
- If possible, arrange for demonstrations of the different styles and provide an opportunity for the pupils to ask questions about the different styles.
- Then let the pupils do Activity 1. Encourage all the pupils to try at least one jump. As they practise different styles, point out their errors and suggest ways to correct them.
- During the activity, explain and demonstrate the rules in high jump and what actions could result in an athlete being disqualified from an event.

Long jump

- Briefly discuss the basic styles in long jump and stress that speed and jumping power are necessary for good results.
- If possible, show charts and videos of the different styles and point out the different stages of run-up, take-off, flight and landing in each.
- Demonstrate the styles or get experienced athletes to demonstrate them.
- For Activity 2, get the pupils to practise at the long jump pitch to familiarise themselves with the different styles and stages.
- Focus on measuring distance from the take-off board to the first mark of impact in the pit, and on hitting the take-off board correctly and using the legs, arms and body to create as much height and forward motion as possible.
- Revise the correct technique and correct errors after each attempt.
- Explain the rules and regulations in long jump during the activity and get the pupils' input as to the reasons for the need for rules in an athletics event.
- Those pupils who cannot participate in the activity can be taught how to measure and record attempts.
- Motivate the pupils by making it a fun event in which everyone competes against themselves to attain their personal best distance.

Pupil's Book answers

Exercise 1 Answer questions on field events PB page 163

1. The high jump is an athletics event where an athlete tries to jump over a horizontal bar set between two uprights, without dislodging it. The aim is to clear the highest height in three jumps or fewer.
2. Fosbury flop; scissors; Western roll; straddle; Eastern cut-off (Any 3). The most preferred style is the Fosbury flop.
3. A jumper could be disqualified if he or she took off from both feet; if the bar is dislodged after landing due to the jumper's actions.
4. A contender has three attempts at each height. Should a jumper clear the bar on the first attempt, he or she can sit out until the bar is set at a new height.
5. A long jump is measured from the edge of the take-off board nearest to the pit to the nearest impact mark in the sand pit.
6. Pupils may list any three of the rules listed on page 173 in the Pupil's Book.
7. Hang; sail; hitch-kick
8. Accept any drawings that resemble the pictures on pages 165 and 169 in the Pupil's Book.

Extension activity

- Pupils do independent research on famous high jump and long jump athletes.

Remedial activities

- Show videos without the sound and have pupils complete a quiz about the different styles of high jump and long jump demonstrated.
- Recap the rules of high jump and long jump.

Workbook answers

Identify features of athletics field events WB page 81

1. a) Western roll
b) Fosbury flop
c)
 - The jumpers approach the bar from opposite sides.
 - In the Western roll, the jumper clears the bar on his or her side and takes off from the inner leg. In the Fosbury flop, the jumper takes off from the outer leg.
 - In the Western roll, the jumper's legs are twisted when going over the bar. In the Fosbury flop, the jumper's legs are bent at the knees as they clear the bar, and the body is arched backwards in a curve over the bar.
 - In the Western roll, the jumper lands face down and makes a three-point landing. In the Fosbury flop, the jumper lands on his or her shoulders, facing up.
2. a) Sail
 - Take-off – The arms are stretched out straight upwards, the hips are forward and the legs are bent.
 - Flight – The body is straight, both arms are stretched straight up and the legs are pulled up under the body.
- b) Hang
 - Take-off – The arms are extended to the opposite sides of the legs, and the leading leg's knee is bent and lifted high.
 - Flight – The arms are held backwards, the body “hangs” upright and the hips are pushed out.

Topic 4 Ball games

Performance objectives

Pupils should be able to:

- list the rules and regulations of different ball games
- mention the key officials of different ball games
- play different ball games and observe the rules
- draw the pitch and positions of players in different ball games.

Additional resources

- Pupil's Book pages 174 to 181
- Workbook pages 82 to 84
- For Activity 3: Internet access
- For Activity 4: A3 paper or cardboard; pencil; ruler; crayons or paints in different colours
- For Activity 5: Equipment required for the pupils to play table tennis; handball; basketball

Teaching the lesson

- Discuss ball games with the pupils, guiding the discussion when appropriate towards football, table tennis, volleyball, basketball, hockey and handball. Then, let the pupils complete Activity 1. You could also get the pupils to set up a class display showing different ball games.

- As each of the games is introduced to the pupils, discuss the rules and regulations (page 177 in the Pupil’s Book), equipment and key officials (pages 178 and 179), and positioning of players (pages 179 and 180) that are needed for each game.
- Draw the pupils’ attention to the importance of wearing safety equipment for certain sports and the importance of playing according to the rules of the game.

Table tennis PB pages 175, 177 and 178

- Introduce the pupils to the game of table tennis. Gather the pupils around a table tennis board and discuss equipment, rules and scoring.
- Get the pupils to complete Activity 4 on page 181 in the Pupil’s Book to gauge their understanding of the game.
- Divide the pupils into teams of two players. Appoint game officials (umpire, assistant umpire, timekeeper, stroke counter). Allow the pupils to play a game of “ping-pong” or table tennis, depending on the equipment available, on a knock-out basis so that everyone has a turn.

Handball PB pages 176, 177 and 179

- Introduce the pupils to the game of handball. Get pupils who know the game to share their knowledge of the game with the rest of the class.
- Discuss the terms and skills needed to play handball.
- Get the pupils to complete Activity 4 on page 181 in the Pupil’s Book to gauge their understanding of the game.
- Get pupils to practise the different skills needed for handball; refer to the illustrations on page 176 in the Pupil’s Book.
- Explain how points are scored and how the game is played.
- Mark out a handball court.
- Choose a goal referee and a field referee, and give each official a red card and a yellow card that they can use to notify players of infringements. Appoint a scorekeeper and timekeeper.
- Divide the pupils into teams of six players, with boys and girls in separate teams. Allow the pupils to play a game of handball.

Basketball PB page 180

- Ask the pupils what they remember about basketball from Primary 4, and get individual pupils to share their knowledge of the game. Revise basketball skills, player positions and drills with the pupils.
- In Activity 3, the pupils get the opportunity to expand their knowledge of the game by watching video clips on the key positions in basketball.
- Get the pupils to complete Activity 4 on page 181 in the Pupil’s Book to gauge their understanding of the game.
- Choose a goal referee and a field referee, and give each official a red card and a yellow card that they can use to notify players of infringements. Appoint a referee, scorekeeper and timekeeper (refer to page 178 in the Pupil’s Book).
- Divide the pupils into teams of six players. Help the players to position themselves correctly (refer to page 180 in the Pupil’s Book). Allow the pupils to play a game of basketball.

Workbook answers

Fill in the missing words WB page 82

1. Soccer is a ball game played by two teams of eleven players each. The object is to get the ball into the opponent's goal. The winner is the team that scores the highest goals by the end of the game. The field is rectangular in shape. There is a linesman located at each end of the field.

Answer true or false questions WB page 82

1. True 2. True 3. False 4. False 5. True 6. True

Match the skill to the sport it is used for WB page 83

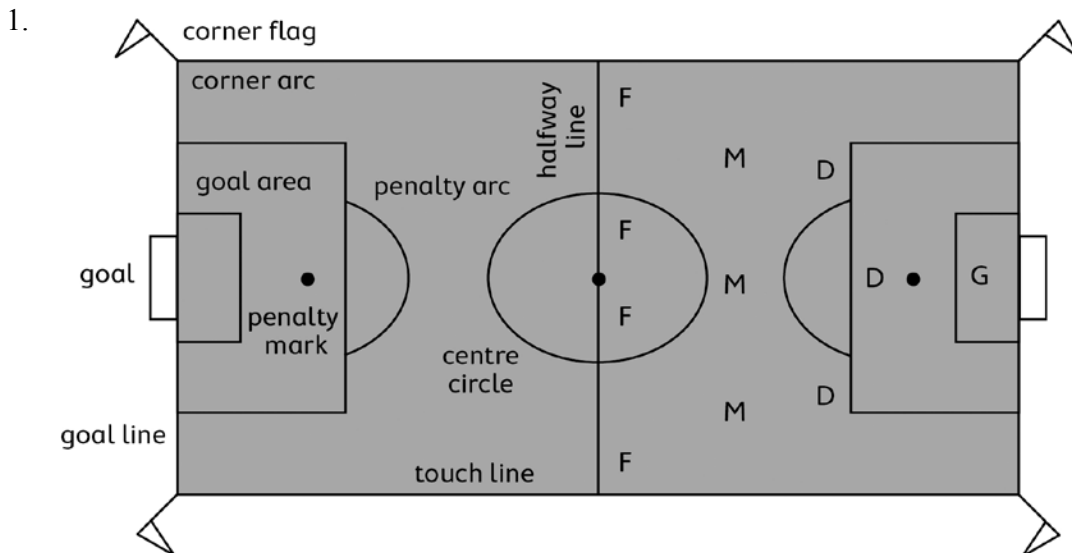
1. B 2. F 3. E 4. A 5. C 6. D

Name officials in charge of ball games WB page 83

1.

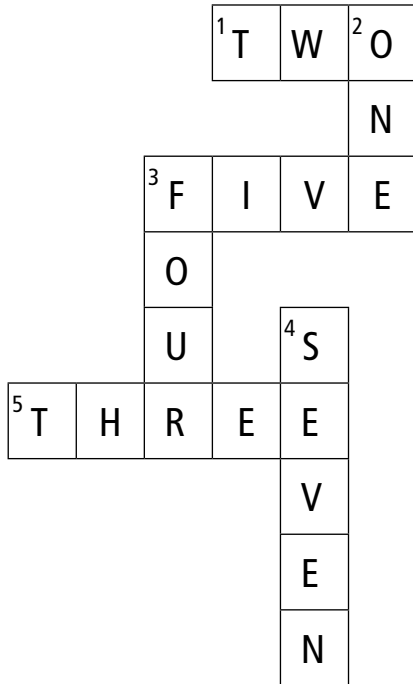
Sport	Official in charge
Soccer	Referee
Baseball	Umpire
Table tennis	Umpire
Volleyball	Referee
Hockey	Umpire
Basketball	Referee

Draw a football pitch WB page 84



Complete a ball games “number” puzzle WB page 84

1.



Topic 5 Indigenous games

Performance objectives

Pupils should be able to:

- list indigenous games
- demonstrate the skills of some indigenous games
- perform some indigenous games
- perform the basic skills used in indigenous games
- list safety rules for indigenous games.

Additional resources

- Pupil’s Book pages 182 to 188
- Workbook pages 85 to 89
- Internet access
- For Activity 2: Pupils’ own *Ayo* boards
- For Activity 5: Traditional drums
- For the Workbook *Kokawa* wrestling match poster: pens; pencils; crayons; paintbrushes; paints; etc.

Teaching the lesson

- This should be an interactive and fun-filled topic because many of the pupils will be familiar with and participate in indigenous games.
- Allow pupils to talk about their own experiences and knowledge regarding each of the games.
- Instill in pupils a sense of pride and ownership of their cultural heritage.

Dambe: Traditional boxing

- Hold a class discussion on *Dambe* boxing. Allow the pupils to lead the discussion by sharing their knowledge of *Dambe* boxing. Guide the discussion so as to cover aspects such as skills, safety, and the festivities that accompany competitions.
- Make the pupils aware that it is a sport practised by adults as it can be violent.
- Refer the pupils to pages 182 to 184 in the Pupil's Book, to identify and discuss points that they may not have mentioned.
- Refer the pupils to page 188 in the Pupil's Book, to discuss safety rules in *Dambe* boxing. Then, let the pupils complete Activity 1.

Ayo

- Ask pupils to bring their *Ayo* boards to school. Allow the pupils to discuss how the game is played.
- Refer the pupils to Activity 2, and let them play a game of *Ayo*. Move amongst the pupils to assist, if necessary.

Kokawa: Traditional wrestling

- Discuss *Kokawa* wrestling with the pupils, allowing them to share what they know or have heard about this traditional activity.
- Then, for Activity 4, let the pupils view a video clip of *Kokawa* wrestling matches on the Internet.

Langa

- This is a fun section that enables all the pupils to participate.
- Discuss the game of *Langa* with the pupils. Ask for some volunteers from the class to do a quick demonstration of the game.
- Then, let the pupils complete Activity 5.

Mgba

- Many of the pupils will be familiar with this game and would have played it at some time in their childhood. The game is aimed at sharpening the mind, improving the reflexes and developing focus and concentration.
- Allow the pupils to watch the game on YouTube, using this link: https://www.youtube.com/watch?v=gbmNYD_YjzY
- Let the pupils choose a partner and play a game of *Mgba*.

Mgba umunwanyi

- Discuss traditional women's wrestling with the pupils.
- Discuss safety issues in the game and refer the pupils to the relevant content on page 188 in the Pupil's Book.
- Refer the pupils to pages 187 and 188 in the Pupil's Book, and then discuss the different occasions when these festivals are held.
- Make the pupils aware of the growing popularity of women's wrestling in Nigeria today. Allow the pupils to watch a video clip on Nigerian female wrestling on YouTube by following this link: https://www.youtube.com/watch?v=Doo_0iyf5Ak

Activity guidelines

Activity 1 Perform a *Dambe* boxing display PB page 184

- Discuss the rules that must be adhered to (refer to page 183 in the Pupil's Book).
- Arrange for the boys in the class to demonstrate their *Dambe* boxing skills. Make the pupils aware that this is a demonstration of the skills needed in *Dambe* boxing.
- Match boys according to fitness level and body stature. Encourage good hand-eye coordination, quick footwork and both attacking and defence skills.
- The girls will form supporter groups to cheer on the teams.
- Arrange a friendly *Dambe* boxing display match at school during a Physical Education lesson. Allow the winning team to showcase their *Dambe* boxing skills at assembly.

Workbook answers

Write about traditional *Dambe* boxing WB page 85

1. Arguments in favour of the game may include some of these points:
 - Contestants may take part in competitions to display their masculinity, bring honour to their families, or to win prize money.
 - It is inexpensive to participate in *Dambe* boxing. All that is needed is a good level of physical fitness, good hand-eye coordination and quick footwork.
 - Modern *Dambe* boxing is now being included in international African sports festivals, such as the All Africa Games.

Some disadvantages of participating in the game may include some of these points:

- There are no age restrictions for participants.
- It is a violent game that can cause serious injury.
- Contestants may be unequally matched.
- No protective gear is worn.
- The “fatal blow” that enables a contestant to win may cause serious injury, or even death.

Make your own *Ayo* board WB page 86

1. Allow the pupils to be creative and use available resources to make their own *Ayo* boards. Create a display of the boards that they make. Allocate prizes based on a variety of criteria that take into account pupils' individual talents and strengths, for example: the most creative and original boards; the most neatly constructed boards; the most solidly built boards; etc.

Write a dialogue about *Kokawa* wrestling WB page 87

Pupils' answers will vary, but opinions need to be substantiated by pupils' interpretation of the action in the photograph.

Pupils may also create a colourful poster advertising a planned *Kokawa* wrestling match. All the relevant details of the match need to be included, such as the name of the event, the date, the venue and the price of the tickets.

Think about *Langa* and Nigerian tradition WB page 88

1. Pupils' answers will vary, but will most likely mention the fact that Nigeria is proud of its culture and heritage and wants it to be remembered.
2. and 3. Pupils' answers will vary. Accept all reasonable answers.

Sub-theme 3 Health education

Topic 6 Personal and environmental health

Performance objectives

Pupils should be able to:

- explain the meaning and importance of personal health
- explain the meaning and importance of environmental health
- state the importance of vision
- draw and label the structure of the tooth
- list two dental problems and their prevention
- mention some methods and importance of waste disposal
- write on the effects of noise pollution on human beings.

Additional resources

- Pupil's Book pages 189 to 203
- Workbook pages 90 to 92
- For Activities 1 and 2: large sheets of paper; materials for creating posters, e.g. pencil crayons; paintbrushes; paints; felt-tip pens; etc.
- For Activity 2: pictures, magazine and newspaper articles, books that provide different perspectives on the importance of vision and sight impairment; someone with knowledge of visual impairment, to talk to the class
- Chart of the Braille alphabet
- Charts and diagrams showing the structure of a tooth; dental problems that can result from poor care of the teeth
- Dental practitioner or healthcare officer, to speak to the class about preventing tooth decay
- Video or cartoon on how to brush one's teeth correctly
- Articles or pictures related to the effects of noise pollution on human beings

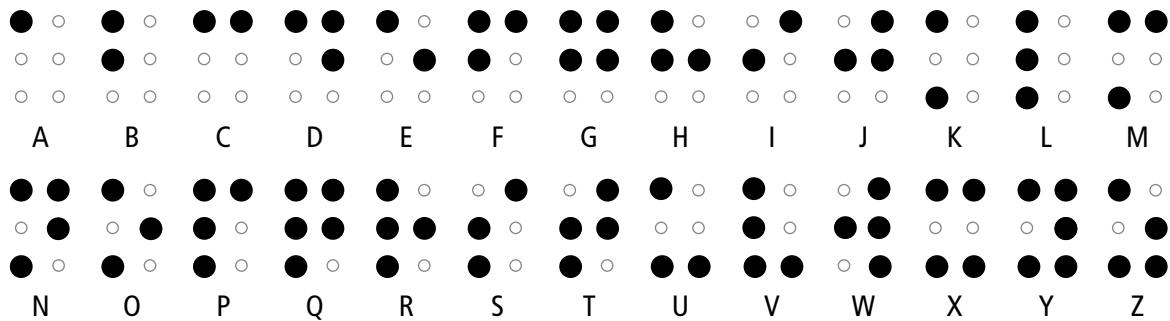
Teaching the lesson

Meaning and importance of personal health and environmental health

- Introduce this section by looking at the photographs on page 189 in the Pupil's Book with the pupils. Hold a class discussion about the aspects of personal and environmental hygiene and health shown in the photographs. Write the pupils' contributions on the board.
- Explain the meaning and importance of personal and environmental health and work through the content on pages 189 and 190 with the pupils. Ask for volunteers to read aloud one example from the "boards" to the class. Ask the pupils to explain each example.
- Then let the pupils complete Activity 1. Ensure that they have the materials they will need to create posters.

Importance of vision

- Be sensitive when covering this section as some pupils may be visually impaired or have friends or relatives who are. Model a sense of respect for people who have to learn to cope with this impairment, and emphasise their courage and persistence in learning to master challenging coping skills.
- Look at the photograph on page 191 with the pupils, and discuss Braille with them. Show the pupils a chart of the Braille alphabet or draw the chart on the next page on the board.



- If you think the pupils are mature enough to cope well, ask individuals to share what they know about what it means to have a visual impairment – how daily life is affected, etc.
- Go through the content on page 191, and then let the pupils do Activity 2.

Dental problems and prevention

Structure of the tooth

- Show the pupils charts and diagrams showing the structure of the tooth as you go through the content on page 192 in the Pupil's Book.
- Draw a diagram of a tooth on the board and ask the pupils to supply labels for the different parts. Once the pupils understand and can identify the different parts of a tooth, let them complete Exercise 1.

Causes of dental problems

- Read through this section with the pupils. Show them pictures illustrating the types of problems that can result from poor dental care.
- Look at the pictures showing stages of tooth decay, and ask the pupils to identify the changes shown in each picture.
- Show the pupils charts and pictures of different types of dental problems that can result from poor care of teeth.
- You could conclude this section by asking the pupils to work in groups and create a poster illustrating how to keep teeth healthy.
- Then, let the pupils complete Activity 3. If possible, invite a dental practitioner or healthcare officer to speak to the class about preventing tooth decay.
- If possible, show the pupils a video or cartoon on how to brush one's teeth correctly.

Methods and importance of waste disposal

- Look at the photographs on page 196 in the Pupil's Book with the pupils and use them as a springboard for discussion. Ask the pupils what they remember about waste disposal from Primary 5, and write their contributions on the board.
- Introduce them to the concepts of liquid waste (sewage), solid waste (refuse) and hazardous waste.
- To prepare for Activity 4, ask the pupils to form groups, and then discuss what they know about waste disposal in their own community. Ask them to write down their ideas. Come together and discuss the pupils' contributions as a class.
- Then, let the pupils do Activity 4. Explain to the pupils how to do a waste audit safely.

Noise pollution

- Introduce this section by asking pupils to mention sources of noise pollution in their own community. Ask them what they think about noise pollution and its impacts. Ask them for ideas on how the sources of noise pollution they mention could be reduced.
- Look at the picture on page 198 in the Pupil's Book together with the pupils, and then let them do Activity 5.
- Examine the decibel scale on page 200 in the Pupil's Book with the pupils. Ask them which of the noises on the scale they have experienced personally. Ensure that they understand what a decibel is, and then look at the table on page 199 in the Pupil's Book.
- Work through the rest of the content in this section with the pupils, and then read the case study on noise pollution on page 202 in the Pupil's Book with the pupils.
- Read through the case study a second time. Stop at appropriate places in the text and ask the pupils to paraphrase/explain what the text is saying, to ensure good comprehension. Where appropriate, relate points made in the text to the pupils' own experience.
- Then, let the pupils complete Exercise 2. Discuss the answers as a class. Try to bring some interesting articles or pictures related to the effects of noise pollution on human beings to class. Discuss these with the pupils.
- Let the pupils complete Exercise 3. Afterwards, you could get the pupils to write a class letter about noise pollution in the community to send to a local newspaper. You could write the letter on the board first, with the pupils giving input.

Activity guidelines

Activity 2 Discuss the importance of vision PB page 192

- For questions 1 and 2, try to make additional resources available, such as pictures, magazine and newspaper articles and books that provide different perspectives on the importance of vision and sight impairment.
- If possible, try to arrange for someone who knows about some aspect of visual impairment to come and talk to the class. Alternatively, you could arrange an outing to an organisation or group of people that assist visually impaired people in some way.
- As empathy is an extremely important emotional and social skill, you may wish to use this activity as an opportunity to encourage its development in the pupils.

Pupil's Book answers

Activity 1 Review examples of personal and environmental health PB page 191

1. The pupils' ideas should be similar to the examples shown on the "boards" on page 190 in the Pupil's Book.
2. Pupils' answers will vary. Accept any reasonable answer.
3. The pupils' posters should have similar content to the "boards" on page 190 in the Pupil's Book.

Activity 2 Discuss the importance of vision PB page 192

The pupils' answers to the questions in this activity will vary. Accept all reasonable answers. Allow the pupils to share their research findings for question 4 with the class.

Exercise 1 Draw and label the structure of the tooth PB page 193

The pupils' diagrams should look similar to the diagram of a tooth on page 193 in the Pupil's Book.

Activity 3 Discuss the causes and prevention of dental problems PB page 195

2. a) Bad breath; plaque and tartar on the teeth
- b) You must remove plaque by brushing your teeth because the bacteria in plaque create acid in their waste. The acid eats into the enamel and dentine layers of teeth. This tooth decay creates cavities or holes in teeth. If a cavity gets big enough to reach down to the nerve inside the tooth, you will get bad toothache. The pulp inside the tooth can also get infected and create an abscess, causing your face to swell up. If the cavity is very big, the tooth will have to be extracted or pulled out.
- c) Bacteria inside the mouth feed on bits of food left behind, especially the remains of sugary foods. These bacteria form a sticky layer of plaque on the teeth and the gums. Plaque can lead to tooth decay.
- d) Holding the toothbrush at a 45-degree angle, move the toothbrush back and forth in short strokes. Take care to brush the inner and outer surfaces of the teeth, and not just the chewing surfaces. To brush the inside surfaces of the front teeth, hold the brush vertically and make up and down strokes. Do not forget to brush the gums too.

Activity 5 Discuss noise pollution PB page 198

1. a) Radio; loudspeaker; mobile phone; musical instrument (guitar); ambulance siren
- b) Pupils' answers will vary. Accept any reasonable answer.
- c) Pupils' answers will vary. Accept any reasonable answer.

Exercise 2 Answer questions about the noise pollution article PB page 203

1. a) Markets; grinding machines; clothes sellers; sirens; mobile phones; okada men; neighbours; street vendors; loud traffic; late-night parties; churches; pubs; clubs; record players; televisions
 - b) Some parents cannot afford to buy hearing aids. Other parents can afford hearing aids, but still need to buy expensive batteries for the hearing aids.
 - c) A lack of peace and quiet may be contributing to some deaths that appear to have been caused by heart disease. People exposed to extreme noise pollution over long periods can develop other illnesses, such as high blood pressure, heart disease, anxiety and depression.
 - d) Any sound louder than 75 dB is already a pollutant, but people are regularly exposed to sounds louder than 115 dB from a variety of different sources. This sound level is enough to cause permanent hearing loss.
2. Pupils' answers will vary. Accept any reasonable answer.

Extension activities

- Pupils do research on the history and origins of Braille.
- Pupils do research on the health impacts of poor waste disposal systems in Nigeria/Africa, including common illnesses and diseases caused by improper waste disposal.

Remedial activity

- Arrange the pupils into groups, and assign each group a section in this topic. Each group should make a summary of the main points in their section. They can then swap their summaries, and check the accuracy and completeness of one another's work.

Workbook answers

Complete sentences WB pages 90 to 92

Pupils' pictures and captions will vary. Accept any reasonable answer.

1. Personal health includes different ways in which we should take good care of our body so that we can stay healthy.
2. Environmental health includes all factors from the environment in which we live that could affect our health and well-being.
3. Vision refers to our ability to use our sense of sight to see the world around us using our eyes.
4. If we do not take good care of our teeth, we can develop dental problems such as cavities/abscesses.
5. Improper disposal of raw sewage can contaminate drinking water and cause diseases such as diarrhoea and cholera.
6. Solid waste dumped by people along roadsides or in rivers is a breeding ground for disease-causing germs.
7. Hazardous waste includes toxic chemicals from factories or mines, and medical waste such as used needles and syringes that may have disease-causing germs or blood on them.
8. Noise pollution refers to extremely loud, irritating sounds caused by humans, animals and machines. Noise pollution can damage our hearing and even make us deaf.

Topic 7 Use of medicine

Performance objectives

Pupils should be able to:

- mention the features for identifying fake medicines
- list some normal uses of common drugs
- describe the effects of normal use of medicines
- discuss the effects of excessive use of medicines.

Additional resources

- Pupil's Book pages 204 to 209
- Workbook pages 93 to 99
- Packets, containers and packaging of a wide variety of both genuine and fake medicines
- Poster or charts that illustrate the effects of both normal and excessive use of medicines
- For the case study: measuring jug; teaspoon; boiled water; salt; sugar; orange or mashed banana (optional) (enough of each for all the groups to prepare oral rehydration solution)
- For Activities 2 and 3: large sheets of paper; materials for creating posters, e.g. pencil crayons; paintbrushes; paints; felt-tip pens; etc.
- For Activity 3: a health professional who can talk to the pupils about the effects of normal and excessive use of medicines; newspapers; magazines; library; the Internet

- For Exercise 1: large sheets of paper; materials for creating a colourful summary, e.g. pencil crayons; paintbrushes; paints; felt-tip pens; etc.

Teaching the lesson

- You could introduce this topic with a class discussion on the role and importance of medicine in our lives. Ask the pupils to share their personal experiences around this.
- Read through the content on page 204 in the Pupil's Book with the pupils and look at the photograph together.

Features for identifying fake medicine

- Introduce this section by letting the pupils examine the packets, containers and packaging of a wide variety of both genuine and fake medicines.
- Ask them to form groups, and then give each group a few examples of genuine and fake medicine packaging. Let them examine them carefully and try to identify which is which.
- Let each group share their ideas with the class, and then tell them which are genuine and which are fake.
- You could then move on to working through the mind map on how to avoid buying fake medicines.
- Then, let the pupils do Activity 1.

Normal uses of medicine

- Once you have worked through this section with the pupils, you could ask them to draw a mind map, summarising what they have learnt about the normal uses of medicine. Ask them to include examples of each type of medicine, where applicable.

Effects of normal or excessive use of medicines

- Introduce this section by asking the pupils to share any instances they know about when someone used medicine normally and/or excessively. The pupils may have some misconceptions about what constitutes normal and excessive use of medicine, so correct them when this is the case.
- Draw a table on the board and make a list of examples of both types of use, which the pupils can then copy into their exercise books.
- If possible, show the pupils posters or charts that illustrate the effects of both normal and excessive use of medicines.
- Bring to class the materials the pupils will need to prepare oral rehydration solution in groups. Read through the case study with the pupils, and solicit their knowledge and experience of babies and young children having diarrhoea. Go through the instructions carefully.
- Let each group make oral rehydration solution. Move amongst the groups to ensure they are measuring the ingredients carefully and correctly. When they have finished making the solution, praise them and let them each taste the solution. Ask them to describe what it tastes like.
- The pupils can then complete Activity 2, which they should enjoy. Assign pupils to groups so that each group has both stronger and weaker pupils. Ensure that pupils work together cooperatively and respectfully.

Activity guidelines

Activity 1 Discuss features for identifying fake medicines PB page 206

- Let the pupils work in groups for questions 1 and 2, and then on their own for question 3, when they make notes of their observations.
- Move amongst the pupils as they work, offering guidance where necessary.

Activity 3 Find out more about normal and excessive medicine use PB page 209

- If possible, invite a health professional, such as a doctor, nurse or pharmacist, to come and tell your class more about the effects of normal and excessive use of medicines.
- Ensure that the pupils have the packaging and the notes they made in Activity 1 available, so that they can show the health professional and get the person's input.

Exercise 1 Create a summary about medicine use PB page 209

- Let the pupils work on their own.
- You could take in the pupils' work to check their grasp of the content. Address any weaknesses through revision in class.
- Let the pupils display their mind maps in the classroom.

Pupil's Book answers

Exercise 1 Create a summary about medicine use PB page 209

1. a) Pupils should mention any three of the features that assist with identifying fake medicine given on page 205 in the Pupil's Book.
b) Pupils' answers should show an understanding of the importance of reading and following dosage instructions and safety precautions on medication packaging. Work through some examples of typical dosage instructions with them before they explore and summarise this further themselves.
c) Pupils should mention any of the effects of normal use of medicine given on page 207 in the Pupil's Book.
d) Pupils should mention any of the side effects that can occur, even with normal use of medicine, given on page 207 in the Pupil's Book.
e) Pupils should mention any of the effects of excessive use of medicines given on page 207 in the Pupil's Book.

Extension activities

- Pupils do research on the different schedules used to classify medicines: what the schedules are, their purpose, etc. Pupils can present their findings in a short report and present it orally to the class.
- Although you may find suggestions for practical demonstrations of the effects of excessive medicine use on the Internet, you could also, in a sensitive and appropriate way, draw on what pupils may have observed in their own community or in the media, to create opportunities for open and honest discussions.

Remedial activities

- Give pupils the packaging or empty containers of several commonly used medicines. Ask them to examine the packaging to see what the medicine is used for. They can then present

their findings in the form of a table in their exercise books. Ask them to give the name of the medicine, its purpose and its recommended dosage for both adults and children (if applicable).

- Bring to class an interesting magazine or newspaper article on codeine addiction. Mention that people can become addicted to codeine unintentionally. Emphasise that with proper medical help, people can recover from addiction. Recap the effects of normal and excessive use of medicines.

Workbook answers

Answer questions about drugs WB pages 93 to 99

1. False
Correction: Diabetics need insulin to control their blood sugar, even if they use bitter leaf.
Explanation: Diabetics can use bitter leaf, but it should not be used to replace the insulin needed to control this disease.
2. False
Correction: Inhalants do cause real harm.
Explanation: Inhaling solvents can lead to vomiting, black-outs and heart problems. Long-term abuse damages the brain, liver and kidneys. Inhalants are often highly flammable, so they can lead to accidents and severe burns.
3. True
Explanation: Alcohol is a significant cause of drug-related deaths. The nicotine in cigarettes is the leading cause of preventable deaths.
4. False
Correction: Cannabis can be harmful.
Explanation: Users may become psychologically addicted to cannabis. It affects learning and concentration. Excessive use can make users tired and anxious. It affects memory and learning. It may be a “gateway” drug leading to more serious drug use.
5. True
Explanation: When abused, anabolic steroids cause blood clotting and cholesterol changes, liver and kidney cancer, acne and aggression. In adolescents, it affects their growth. In males, it affects the male organs and causes prostate cancer. In females, it causes irregular menstruation and the development of male characteristics such as a beard.
6. False
Correction: Cola drinks that contain caffeine cannot safely help people such as long-distance truck drivers to stay awake for long periods.
Explanation: Caffeine gives energy, but too much is dangerous.
7. False
Correction: Alcohol and cigarette smoking harm unborn babies during pregnancy.
Explanation: Drinking during pregnancy can cause serious damage to an unborn child. Smoking affects the growth of an unborn baby.
8. False
Correction: Injecting drugs such as heroin is a more dangerous way of using drugs than taking tablets.
Explanation: Injecting can damage veins and users risk being infected with hepatitis and HIV and AIDS.

Topic 8 Effects of drug abuse

Performance objectives

Pupils should be able to:

- list the names of some common hard drugs
- identify the health effects of drug abuse
- discuss the socio-economic effects of drug/substance abuse
- educate others on drug abuse.

Additional resources

- Pupil's Book pages 210 to 218
- Workbook pages 93 to 99
- Pictures, photographs, newspaper or magazine articles, etc. relevant to different hard drugs
- Large sheets of paper; materials for creating posters, e.g. pencil crayons; paintbrushes; paints; felt-tip pens; etc.
- For Activity 1: someone (or a few people) to talk to the class about different aspects of drug addiction
- For Activity 2: large sheets of paper; materials for creating posters, e.g. pencil crayons; paintbrushes; paints; felt-tip pens; etc.
- Videos on recovered addicts' experiences
- "Before" recovery and "after" recovery photographs of people who used to be addicts
- Poster that explains the signs and symptoms of drug abuse

Teaching the lesson

- Recap what the pupils learnt about abuse of recreational drugs in Primary 5, and what they learnt about the effects of excessive use of medicines in the previous topic.
- Ask the pupils what they understand by the term "hard drugs". Write a correct definition of the term on the board.

Drugs

- Explain the two groups into which hard drugs can broadly be classified: uppers and downers.
- Read through the content on examples of hard drugs on pages 211 to 213 with the pupils. Introduce each drug by showing the pupils pictures, photographs, newspaper or magazine articles, etc. relevant to the drug. It is vitally important that pupils begin to appreciate the personal and socio-economic effects of drug abuse, so try to include resources that contribute to this aim.
- Once this section is completed, let the pupils work in small groups to create a colourful and informative poster. They need to include at least three of the hard drugs discussed in the Pupil's Book. Their posters should show, by means of pictures and/or text:
 - initial reasons why users use the drug
 - what the user experiences at first
 - what the user experiences after the drug has been used several times
 - what the long-term health and personal consequences of using the drug can be.
- Let each group present their poster to the class, and then display them in the classroom.

Hard drugs and drug addiction

- Ask the pupils what they understand by the terms “addiction” and “drug addict”. Write correct definitions of these terms on the board.
- If possible, show the pupils videos on recovered addicts’ experiences. There are many available on YouTube, but you will need to watch them yourself beforehand to determine their suitability for this age group.
- Share true accounts with the pupils of people who abuse drugs. Newspapers, magazines and the Internet are good resources for these stories.
- You could also show the pupils suitable “before” recovery and “after” recovery photographs of people who used to be addicts. Emphasise the negative health and personal consequences of drug abuse and addiction.
- If possible, show the pupils a poster that explains the signs and symptoms of drug abuse. Discuss these in class.

Effects of drug abuse on health

- If possible, show the pupils posters that illustrate the detrimental effects on health of specific drugs.
- Work through the content on pages 214 and 215 in the Pupil’s Book. Ask the pupils to summarise what they have learnt in the form of a mind map, which they can draw in their exercise books.

Socio-economic effects of drug abuse

- As you work through this section with the pupils, bring relevant pictures, photographs, newspaper or magazine articles to class to show the pupils. Look for resources that will illustrate how the socio-economic effects of drug abuse play out in Nigeria.
- Help the pupils to understand that drug abuse has a wide circle of effect or influence: individuals, families, communities, societies, countries.

Activity guidelines

Activity 1 Listen and learn about drug abuse PB page 217

- Arrange for someone suitable to visit the class and talk about the use of hard drugs and drug addiction. If possible, have a recovered addict talk to the pupils about his or her journey out of addiction.
- You could also ask a health practitioner or drug counsellor to come and share their perspective with the class.

Activity 2 Take part in a drug information campaign PB page 218

- Offer assistance and guidance when necessary while the pupils do this activity.
- Arrange a suitable opportunity for them to display their posters and drama sketches to others in the school and also the wider community, if possible.

Pupil’s Book answers

Exercise 1 Write an article about drug abuse PB page 218

1. a) The pupils’ letters may use any examples of hard drugs, and may include heroin, cocaine, Valium, Mandrax and Indian hemp.

- b) The pupils may mention any of the health effects of drug abuse, and may include health effects mentioned on pages 214 and 215 in the Pupil's Book.
- c) The pupils may mention any examples of how people are affected by drug abuse, and may include effects mentioned on pages 215 and 216 in the Pupil's Book.
- d) Pupils' answers will vary, depending on their situation. Accept any source of information and counselling about drugs and drug addiction that exists in the pupils' community.

Workbook answers

Answer questions about drugs WB pages 93 to 99




Please refer to page 90 in this Teacher's Guide for the answers to the Workbook questions for this topic.

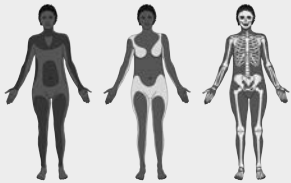

Assessment: Answers

1.	Column A	Column B
	a) Muscular strength	Enables you to lift heavy weights and is important for sports in which the athlete must exert force
	b) Muscular endurance	Lifting a weight repeatedly without getting especially tired
	c) Flexibility	Good range of movement in the joints
	d) Body composition	Ratio of fat to muscle and bone in the body
	e) Cardiorespiratory endurance	Helps you to lead an active lifestyle, working the heart, lungs and blood vessels

(5)

2. Muscular strength; muscular endurance; cardiorespiratory endurance; body composition; flexibility (5)
3. We need to regulate the amount of bone, muscle and body fat in the body. (2)
4. Pupils' answers will vary. Accept any reasonable answer. (3)

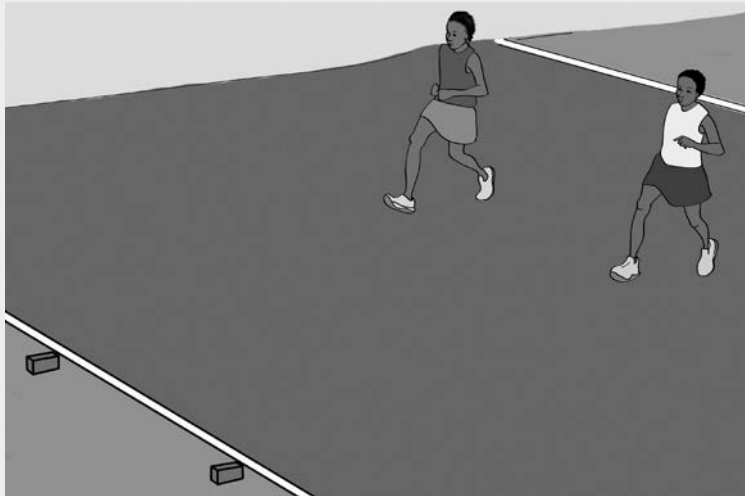
5.	Column A	Column B
		Cardiorespiratory endurance
		Balance
		Muscle strength

Column A	Column B
	Body composition
	Flexibility

(5)

6. They need to have a good body composition, good balance when kicking the ball, and muscular and cardiorespiratory endurance, to be able to play until the end of the game. (2)

7.



(4)

8. a) Stand next to a wall and reach up as high as you can. Make a chalk mark where your fingers touch the wall. Bend your knees and jump upwards as high as you can, stretching your arm up as high as possible. Make a mark using the chalk. Keep jumping, to see if you can jump even higher. (2)
- b) Yes, the sergeant jump would help with basketball. The exercise will enable you to jump higher to block or catch a ball. It will also help with shooting because you can get your body higher up into the air. (2)
9. a) • A kneeling start has the athlete starting from starting blocks and is used for the first leg in a relay race.
• A running start has the athlete taking off from a standing position and is used for the second, third and fourth legs of a relay race. (2)
- b) • A visual takeover exchange of the baton happens in a 4 × 400 metre relay or medley relay, where the second-, third- and fourth-leg athletes can look back towards the approaching runner to gauge the remaining distance before exchange of the baton is imminent.
• A non-visual takeover exchange happens only in the 4 × 100 metre relay, where the receiving athlete starts running looking ahead, while the incoming athlete is responsible for placing the baton securely into the receiving athlete's hand. This method is used to optimise changeover speed. (4)

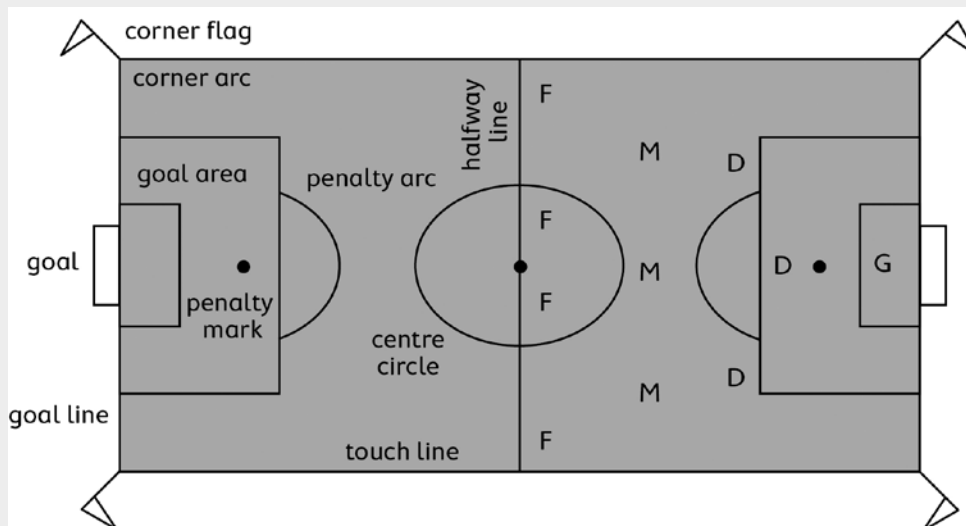
- c) • A first-leg runner will take off from a kneeling position and may use starting blocks. The runner will have the baton in his or her left hand and will hand over the baton into the receiving athlete's right hand in a non-visual takeover exchange. However, should the first-leg runner decide to start with the baton in his or her right hand, the baton will be handed into the left hand of the receiving athlete.
 - The second-leg runner starts running from a standing position and receives the baton blind. (4)
10. a) The trunk or upper body must be bent at the waist and be parallel to the leading leg. The head, neck and torso should be in a straight line, and the chin up. (2)
- b) The leading leg must clear the hurdle as straight as possible. The toes should not be pointed, but positioned at a 90° angle to the leg. (2)
- c) The trailing leg must be bent at the knee and swept wide and flat over the hurdle. The foot should be kept angled to the side, with the toes facing forward so that they do not connect with the hurdle. (2)
- d) As the leading leg lifts, the athlete thrusts the arm opposite the leading leg forwards. The athlete moves the arm opposite to the trailing leg backwards, as when sprinting. (2)
11. a) The high jump is an athletics field event. Athletes jump over a horizontal bar between two uprights, trying to achieve the greatest height. (2)
- b) The long jump is an athletics field event. Athletes run down a narrow runway, step off from a sunken, flat board, and then jump into a sandpit, trying to achieve the greatest distance for forward jumping. (2)
12. • In the Fosbury flop, the jumper takes off from the outer foot about half a metre past the first upright, rotating the hips to clear the bar on the back facing upwards.
- In the straddle, the jumper approaches from the opposite side until just past the first upright. He or she takes off from the inner foot and the outer leg is swept up and over the bar. The body rotates and clears the bar, with the jumper facing down. (4)
13. a) The run-up must be neither too short nor too long, allowing the jumper to reach maximum speed.
- b) The take-off is from one foot and the jumper must not overstep the board.
- c) During the flight stage, the jumper needs to stay in the air for as long as possible.
- d) For the landing, the jumper must try to fall forward or sideways, and then leave the pit on the far side. (8)

14.

Ball game	Official in charge
Football	Referee
Table tennis	Umpire
Volleyball	Referee
Basketball	Referee
Hockey	Umpire
Handball	Referee

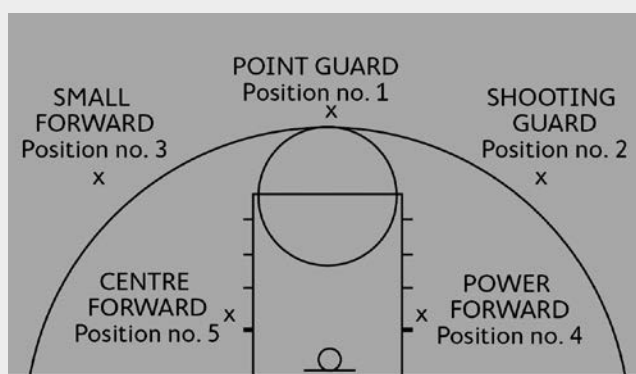
(6)

15. a)



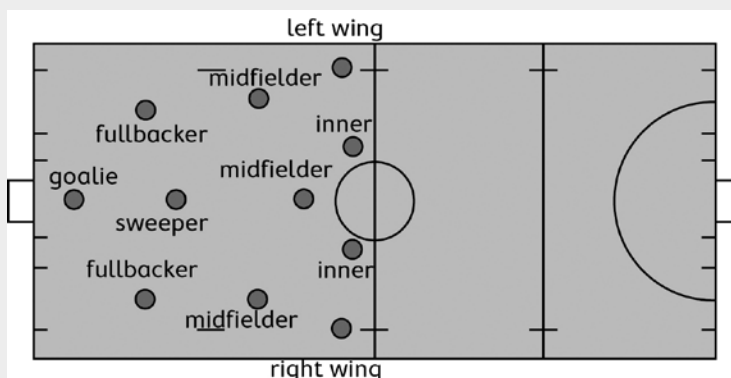
(11)

b)



(5)

c)



(11)

16. *Dambe* boxing; *Ayo*; *Kokawa* wrestling; *Langa*; *Mgba*; *Mgba umunwanyi* (Any 3) (3)

17. a) *Dambe* boxing: Good level of physical fitness; good hand-eye coordination; quick footwork; good attack skills; good defence skills (Any 3) (3)

b) *Mgba* (clapping game): Sharp reflexes; focus; concentration (Any 2) (2)

18. a) *Dambe* boxing: *Kara* (pieces of material); *zare* (knotted cord); *kalangu* (drums used to call contestants to the ring) (Any 1)

b) *Kokawa* wrestling: A sand-filled circle in which the game is played

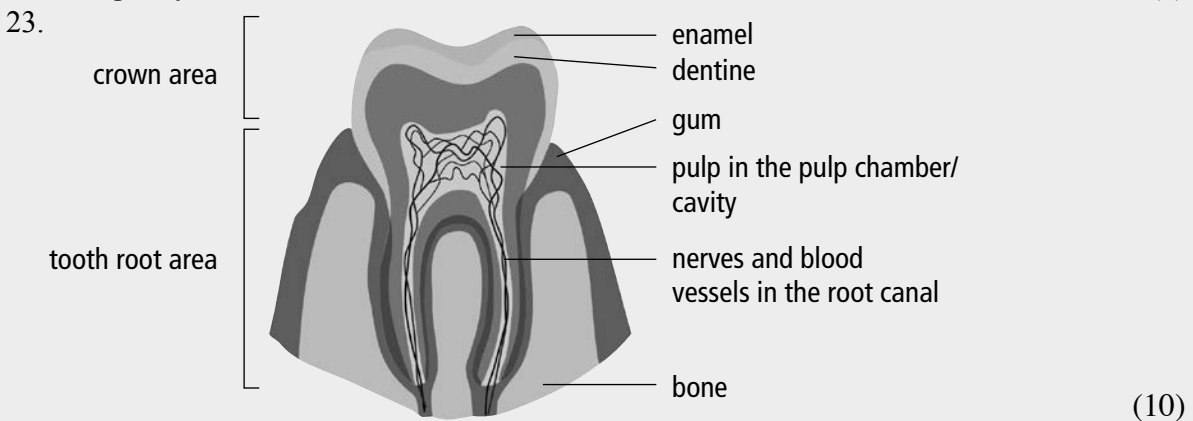
c) *Mgba*: No special material or equipment is needed for the game.

d) *Ayo*: Board with twelve holes, six on either side of the board; 48 seeds (Any 1)

e) *Langa*: No special material or equipment is needed for the game. (5)

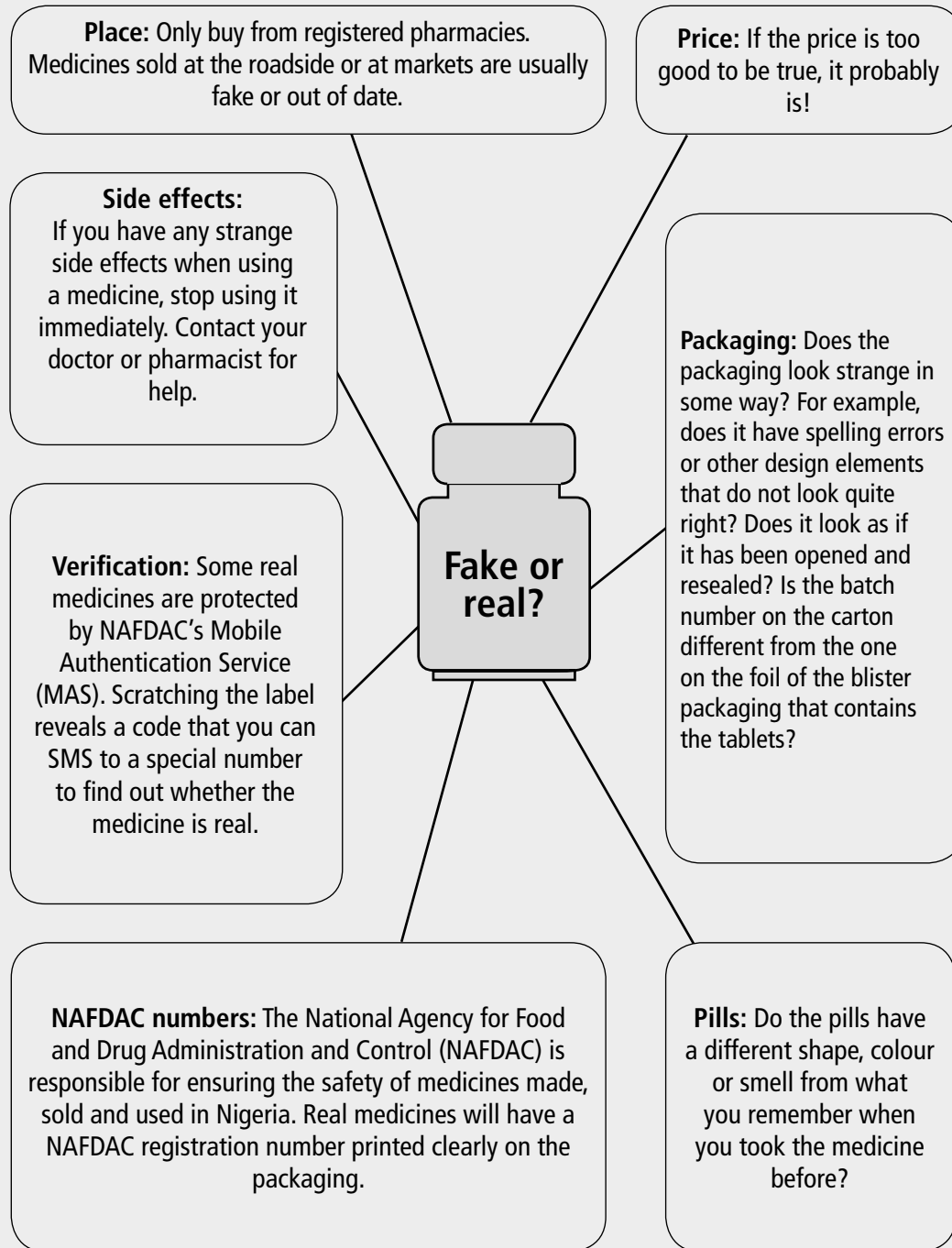
19. a) *Dambe* boxing: Contestants are matched according to body size; matches take place in a sand-filled circle.

- b) *Kokawa* wrestling: Contestants are matched according to weight; matches take place in a sand-filled circle.
- c) *Mgba*: There are no safety rules as the game is not dangerous.
- d) *Ayo*: There are no safety rules as the game is not dangerous.
- e) *Langa*: There are no safety rules as the game is not dangerous. (5)
20. Personal health includes different ways in which we should take good care of our bodies so that we can stay healthy. Environmental health includes all factors from the environment in which we live that could affect our health and well-being. (2)
21. a) Pupils can list any three of the examples given on page 190 in the Pupil's Book. However, accept any reasonable answer. (3)
- b) Pupils can list any three of the examples given on page 190 in the Pupil's Book. However, accept any reasonable answer. (3)
22. People who are blind or who have problems with their sight have to learn to adapt to life without vision, which is a difficult task. People who are visually impaired need to learn Braille to be able to read. They must also learn how to move around on their own safely. Accept any reasonable answer. (2)



24. Cavities; abscesses. Both can be prevented by brushing your teeth regularly and avoiding sugary foods. (4)
25. a) Liquid waste contaminates drinking water, which can cause epidemics of diseases such as diarrhoea and cholera. (2)
- b) Solid waste smells bad and is a breeding ground for germs that cause diseases. (2)
- c) Waste from factories can leak deadly chemicals into the soil, rivers and groundwater. Waste from mining activities often contains hazardous chemicals that can pollute rivers and groundwater. Oil spills can cause serious environmental pollution. Waste gases from burning oil cause air pollution, which contributes to diseases related to breathing, such as asthma and lung cancer. (2)
26. a) Noise pollution refers to extremely loud, irritating sounds caused by humans, animals or machines. (2)
- b) Accept any two reasonable answers. (2)
- c) Noise pollution can lead to hearing loss. People exposed to extreme noise pollution over long periods can develop other illnesses, such as high blood pressure, heart disease, anxiety and depression. (2)
- d) Accept any two reasonable answers. Pupils will most likely mention preventative measures given on pages 200 and 201 in the Pupil's Book. (2)

27. Pupils can mention any three of the features shown in the mind map below.



(3 × 2 = 6)

28. • Over-the-counter medicines can be bought directly from pharmacies or sometimes from other types of shops.
 Examples: Painkillers containing aspirin or paracetamol; cough mixtures (ones that do not contain codeine); blood tonics
- Prescription medicines can be bought only from a pharmacy using a prescription from a doctor.
 Examples: Cough mixtures and painkillers containing codeine; antibiotics for fighting infections; morphine; insulin; antidepressants; sleeping pills (2 × 2 = 4)
29. All legal medicines have instructions on their packaging and package inserts that give further instructions on the correct use of the medicine. The dosage instructions show

- when and how much of the medicine children or adults should take. Medicines also have expiration dates printed on their packaging. After this date, the medicine will be unsafe to use. (2)
30. People can become addicted to a medicine. Aspirin can cause stomach ulcers if it is used too often. If you often take antibiotics to fight infections, they will no longer work well because your body becomes resistant to them. (3 × 2 = 6)
31. a) Hard drugs are very dangerous drugs that have a strong effect on the body's nervous system.
- b) A drug addict is someone who is addicted to hard drugs. Drug addicts become so dependent on drugs that they will do anything to get their next "fix". (2)
32. a) • Uppers are drugs that are designed to make users feel on top of the world. They make people feel alive, charming and full of energy.
- Downers are drugs that, at first, make users feel relaxed or laid back. (2)
- b) Upper: cocaine. Downers: cannabis; heroin; Mandrax (Any 1) (2)
33. • Heroin: Users inject the drug directly into the bloodstream.
- Cocaine and crack cocaine: Users usually snort these through the nose as a white powder.
- Valium (diazepam): Users take much larger doses than prescribed, and more often than prescribed. People who are addicted to Valium often take it together with alcohol or other substances. They also often use other methods to take it, such as injecting or snorting it to get a faster effect.
- Mandrax: Mandrax can be swallowed or injected, but the tablets are usually crushed and smoked with Indian hemp, using a pipe or a bottleneck.
- Indian hemp: It is usually smoked in the form of a rolled-up "joint", and is sometimes mixed with Mandrax or other drugs. (3 × 2 = 6)
34. Pupils may list any three health effects of hard drugs, and may include any of the health effects described on pages 214 and 215 in the Pupil's Book. (3 × 2 = 6)
35. Codeine; amphetamine; ecstasy; opium; morphine; solvents (Any 2) (2)
36. • People often get trapped into addiction by drug smugglers. They are then forced by the drug traffickers to smuggle drugs across borders, if they want to keep getting a supply of drugs.
- Smugglers caught with illegal drugs can face long prison sentences in most countries. Some countries even have the death penalty for drug smugglers.
- The illegal drug trade is often linked to other crimes, such as the arms trade, gang warfare and human trafficking.
- Battling drug smuggling and drug addiction is very expensive.
- Schoolchildren and students who use these drugs find it hard to study and relationships also suffer.
- Poor performance at school leads to fewer work opportunities later on in life.
- Drugs are expensive and their effect makes it unlikely that drug addicts would be able to earn enough money to afford them. Some drug addicts turn to crime and other high-risk behaviour. Many are arrested and go to prison.
- Some drug addicts become prostitutes (people who sell their bodies for sex) to get money for drugs.
- Almost all drug addicts die young.
- Drug addicts are at very high risk of getting infected with HIV and contracting AIDS through the sharing of injection needles.
- It is extremely difficult to treat drug addiction. Addicts need special care to help them cope with the withdrawal symptoms. Treatment centres can help only a limited number of addicts. It is also expensive to provide such treatment.

- Desperate addicts and their families may also become victims of false healers who promise miracle treatments or cures for drug addiction in return for large payments. There are no easy cures for drug addiction, so addicts and their families should guard against believing these false promises. (Any 3) (3 × 2 = 6)

Total mark: 197

Sub-theme 1 Basic computer operation

Topic 1 Word processing with the computer

Performance objectives

Pupils should be able to:

- identify word processing software
- mention some of the uses of word processing software
- identify and use the Title Bar, Menu Bar and Tool Bars
- create and edit documents
- save and retrieve documents.

Additional resources

- Pupil's Book pages 237 to 249
- Workbook pages 100 and 101
- Computer laboratory or access to computers on which Microsoft® Word is installed

Teaching the lesson

Word processing software: Microsoft® Word

- Start the lesson by reminding the pupils of the difference between software and hardware. Another name for software is a computer program or application.
- Explain what word processing software is.

Uses of word processing software

- Hold a class discussion on the uses of word processing software and mention some examples of how it is used in the home and the work environment.

The word processing environment

- Demonstrate how to start Microsoft® Word by selecting “All Programs” on the Start menu, and then selecting Microsoft® Word in the “Most used” list. If the program does not appear in this list, scroll down to find it.
- Minimise and restore a document to demonstrate Title and Menu Bar options.
- Show the pupils the screen layout and basic Microsoft® Word functions. Start with the Ribbon at the top of the screen. The Ribbon holds all the commands in groups on ribbon tabs. Demonstrate the commands on the “Home” tab.

Word processing skills

- Guide the class by typing and moving within a document to demonstrate the various skills, such as selecting, cutting and pasting of text.
- Show the pupils how to use the “File” tab to get to the Backstage area. Demonstrate the saving and retrieving of documents.

Activity guidelines

Activity 1 Talk about the uses of word processing software PB page 238

- In this opening activity, the pupils work in groups and discuss uses of word processing software, particularly in the home and school environments.
- Pupils may have seen typewriters only in movies. A typewriter manually prints the letters on a page. Errors are covered with white correction fluid. If possible, bring a typewriter to class for the pupils to examine.

Activity 2 Create a document and explore Microsoft® Word PB page 241

- Offer guidance where necessary while the pupils explore Microsoft® Word and practise using the Zoom slider.

Activity 3 Practise selecting, copying, cutting, pasting and deleting PB page 244

- For questions 1 and 2, the pupils practise selecting text by highlighting it using the mouse and double-clicking on a single word.
- Show the pupils how to select an entire row: move the mouse pointer to the left of the row and when it changes to an arrow, click once.
- Show the pupils how to select an entire paragraph: double-click to the left of the paragraph.
- When the pupils feel comfortable selecting text using the mouse, help them where necessary while they practise copying, cutting and pasting text.

Activity 4 Practise formatting text and paragraphs PB page 246

- Move amongst the pupils to offer assistance where necessary while they practise formatting text and creating bulleted lists and numbered lists.

Activity 5 Insert a table and pictures PB page 248

- The syllabus does not specify that pupils should be able to insert a table and a picture, but these are tasks that pupils will nevertheless enjoy exploring and mastering.
- Some pupils may find this activity challenging, so offer assistance where necessary. Encourage the pupils to have fun embellishing their documents with a table and a picture.

Pupil's Book answers

Activity 1 Talk about the uses of word processing software PB page 238

1. to 3. Pupils' answers will vary.

Exercise 1 Use word processing software at school PB page 239

1.

Office	Home
A legal document	A poem
A contract	A birthday party invitation
	A job application
	A holiday brochure

2. Pupils' answers will vary. Suggested answers include creating school communication notices, application forms and order forms, letters, timetables, notes for pupils, and so on.
3. Pupils' answers will vary. Suggested answers include party invitations and greeting cards.

Activity 2 Create a document and explore Microsoft® Word PB page 241

3. The Quick Access Toolbar provides an easy way to perform common functions in Microsoft® Word, for example, opening documents, saving documents and undoing an action.
4. "File"; "Home"; "Insert"; "Design"; "Page Layout"; "References"; "Mailings"; "Review"; "View" (Any 3)
5. A tooltip appears, showing the name of the command.

Activity 3 Practise selecting, copying, cutting, pasting and deleting PB page 244

4. Copying copies the selected text to the Clipboard for pasting/insertion elsewhere. The original text is unaffected. Cutting removes the selected text and puts it onto the Clipboard for pasting/insertion elsewhere. The original text is removed.
5. Select the text, and then press the Backspace or Delete key.

Activity 4 Practise formatting text and paragraphs PB page 246

3. Use the "Lines and Paragraph Spacing" button, which is found in the "Paragraph" group of commands on the "Home" tab, to choose the amount of space to have between lines of text and paragraphs.

Activity 6 Practise saving, closing and retrieving PB page 249

2. Use the "Save As" command, which can be found in Backstage view. The new version of the document will need to be given a different name from the original, or it will need to be saved in a different location from the original.
3. Use the "Save" command on the Toolbar.
4. To close a document, open Backstage view and then click "Close". To retrieve a document, open Backstage view, click "Open" and select the document in the dialog box. A recently used document can also be selected in Backstage view in the "Recent Documents" list.

Extension activity

- Learning to touch type is an invaluable skill for all pupils as working on computers will become a way of life for many of them in the future. Look for online typing courses and resources, so that they can start learning this vital skill.

Remedial activity

- Not all pupils will have had prior experience with word processing, and the best way to gain confidence is by using word processing software. Encourage the pupils to complete all their school assignments, or as many as possible, using the word processing software available to them.

Workbook answers

Explain how to edit a document using a word processor WB pages 100 and 101

1. a) Move the cursor to the heading line and click the “Centre Text” button on the “Home” tab.
- b) Select the heading text. Use the “Font Color” button on the “Home” tab to change the colour of the heading. Use the “Font Size” button on the “Home” tab to change the font size of the heading.
- c) Move the cursor to a new line. Click the “Numbering” button on the “Home” tab to start a numbered list. Enter your five favourite foods, pressing “Enter” after each one to start a new numbered line.
- d) Use the mouse to select all the items in your list of foods. Click the “Copy” button on the “Home” tab. Move the cursor to a new position, and then type the heading “Games”. Move the cursor to a new line and click the “Paste” button on the “Home” tab. The new list will still contain foods. Delete each food in the new list and replace it with a game.
- e) Click the “Pictures” button on the “Insert” tab. Use the dialog box to select the file that contains the picture you want to insert.

Topic 2 Drawing with the computer

Performance objectives

Pupils should be able to:

- identify computer drawing packages
- draw geometrical shapes (lines, ellipses and rectangles)
- do freehand drawing
- use the Fill tool to add colour to drawing
- use the alphabet (Text) tool to label drawings
- print a drawing.

Additional resources

- Pupil’s Book pages 250 to 258
- Workbook page 102
- A functional computer system on which Paint Artist or CorelDRAW® is installed
- Paper and printer
- Common objects or pictures and drawings of common objects such as boxes, fish, tins, cows, fans, cars, etc.

Teaching the lesson

- After each section in which the pupils learn a new drawing skill in this topic (pages 253 to 258 in the Pupil’s Book), list the steps for completing the procedure on the board. The pupils will be able to refer to these steps as they work.
- At the end of the lesson or section, ask the pupils to copy the steps into their exercise books, for consolidation and revision.

What are computer graphics?

- Hold a class discussion on what computer graphics are and show the pupils a variety of different examples from local media.

- Ensure the pupils understand that graphics are drawings, photographs and images that can be created or shown using a computer. Computer graphics display art and images to the user, and make understanding concepts easier.
- Guide the class to identify the drawing package available on the computer system they are using. This is likely to be Microsoft Paint®.

Drawing packages

- Guide pupils to explore the drawing package’s environment. Drawing packages have a toolbar, a menu bar and printable area.
- Briefly describe the features of the most well-known applications, such as Microsoft Paint® (MS Paint®), Adobe Photoshop® and CorelDRAW®. The most common features are: drawing straight lines and freehand lines; drawing geometric shapes; writing text labels in different sizes, fonts and colours; and a paint palette from which different colours can be chosen to paint an object or “fill” it.
- You might like to discuss using layers to “build” images. This is a more advanced way to draw an image, but pupils will no doubt find the concept interesting. A layer is a transparent platform that holds content such as text or a photograph. Because layers are transparent, you can see ‘down’ through multiple layers to the content beneath each one. By stacking images on top of one another, you can create interesting graphics.

Drawing with Microsoft Paint®

- Begin this section by demonstrating to the pupils the basic skills they will need to master to be able to use Microsoft Paint®. Refer to page 253 in the Pupil’s Book. Let the pupils practise these skills and develop confidence using them, before you move on to more complex skills. Before you start the section on geometrical drawings, recap the basic skills, writing them on the board as you do so. Ask the pupils to copy them into their exercise books.
- Ensure that pupils understand what geometrical drawings are and what characteristics distinguish them from other types of drawings. Direct the pupils to the “Shapes” group, and the different options available there. Now show the pupils how to draw a straight line, rectangle and ellipse, or oval. Then let the pupils work in small groups and create the same shapes themselves. They can follow the steps given on pages 254 and 255 in the Pupil’s Book. Move amongst the groups to help pupils where necessary.
- After the pupils have completed Activity 3, demonstrate how to do freehand drawings in Microsoft Paint®. Spend some time showing the pupils the different brush options available. Let the pupils spend time exploring the different brushes and familiarising themselves with the appearance of the line or mark each makes. Then, let them complete the steps given on page 256 in the Pupil’s Book.
- Once the pupils have gained some confidence with freehand drawing, ask them to experiment with drawing the following objects: boxes; fish; tins; animals, e.g. cows; a fan; cars; etc. Given them the pictures you have brought to class to help them. Encourage them to use as many different brushes as they can.

Painting objects

- Introduce the Fill tool to the pupils and describe its purpose. Show the pupils the icon for the tool in Microsoft Paint® and show them the different colours available in the “Colours” group. Then, demonstrate the tool to the pupils by completing the steps given on page 257 in the Pupil’s Book.

- Give the pupils an opportunity to explore this new tool on their own, by asking them to complete the same steps themselves.

Labelling

- Discuss labelling with the pupils and ask them to think of different reasons why we would want to add text to drawings. Prompt them with ideas, such as to make an invitation to a birthday party, or to make a poster about a community meeting.
- Introduce the pupils to the Text tool and describe its purpose. Show the pupils the icon for the tool in Microsoft Paint®. Demonstrate the different text formatting options available on the “Text” menu. Then, demonstrate the tool to the pupils by completing the steps given on page 257 in the Pupil’s Book.
- Give the pupils an opportunity to explore this new tool on their own by asking them to complete the same steps themselves.
- They can then complete Activity 5.

Print a drawing

- This is an exciting task for the pupils because at last they will see the result of their creative efforts in print!
- Ensure that the printer you will use is set up correctly, that it has paper, and that it is switched on. If the school does not have a colour printer, you could save the pupils’ work to a storage device, such as a flash drive, and then arrange to have their drawings printed in colour using a different printer.
- Demonstrate to the pupils the steps for printing a file, or drawing, in Microsoft Paint®. Go through the steps given on page 258 in the Pupil’s Book several times, until the pupils are ready to attempt them on their own. Then, let the pupils print out their drawings.
- Commend the pupils for their hard work and congratulate them on the new skills they have learnt. Let the pupils display their drawings in the classroom.

Activity guidelines

Activity 3 Draw a geometrical face PB page 255

- Once the pupils are reasonably confident drawing a straight line, rectangle and ellipse, let them do Activity 3. Encourage them to be creative and have fun drawing faces using geometrical shapes.
- Move amongst the pupils while they work, to assist where necessary.

Activity 4 Freehand drawing PB page 256

- In this activity, the pupils continue to work on the drawing of a face that they created for Activity 3. They use their new freehand-drawing skills to add eyebrows, hair and ears to the face. Encourage the pupils to be creative and adventurous.
- Move amongst the pupils while they work, to assist where necessary.

Activity 5 Painting and labelling PB page 258

- In this activity, the pupils continue to work on the drawing of a face that they created for Activity 3. They use their new ‘painting’ skills to add colour to their drawing, using the Fill tool. They add their name to their drawing using the Text tool. Encourage the pupils to be creative in their use of colour, and to use a variety of different text formatting options.
- Move amongst the pupils while they work, to assist where necessary.

Pupil's Book answers

Activity 1 Types of computer graphics PB page 250

2. a) Digital illustrations; logos; diagrams; graphs; charts; maps; screenshots
- b) Any image in the Pupil's Book can be used as an example.
- c) The graphics show examples of topics mentioned in the book and show people engaged in activities described in the book. They show the information in a real-world context. In the case of screenshots, they show a task being performed in a computer program or application.

Activity 2 Identify the drawing packages on a computer PB page 252

- Pupils' answers will vary, depending on the context. One way to open an application is to double-click the application's icon on the desktop. Another way is to open the application from the Start menu.
- Adobe Photoshop® is the correct graphics application to use for removing red eyes from a photograph.
- Pupils' answers will vary.

Extension activity

- Demonstrate how to use other tools of the drawing package, such as the magnifier tool and the eraser, and show the pupils other ways to work with drawings, such as cropping, resizing and rotating drawings. Then, let them explore these tasks on their own.

Remedial activity

- Provide pupils with extra opportunities to master the basic drawing skills covered in this topic: drawing geometrical shapes (lines, rectangles and ellipses), drawing freehand drawings of objects and figures, using the Text tool to label drawings, and printing their drawings.

Workbook answers

Write what you know about drawing with the computer WB page 102

1. Microsoft Paint®, Adobe Photoshop® and CorelDRAW® are examples of graphics applications.
2. Adobe Photoshop®
3. Geometrical drawing uses shapes such as lines, circles, squares and triangles. Freehand drawing enables you to use the mouse to draw as though you were using a pencil, pen or paintbrush.
4. You would use an ellipse to draw a circle.
5. You would use the Text tool in the "Tools" group on the "Home" tab. Once the Text tool is selected, text can be typed anywhere on the drawing. The appearance of the text can be changed/formatted, using the buttons on the "Text" menu.

Topic 3 Precautions in the use of computers

Performance objectives

Pupils should be able to:

- identify precautions that should be taken in the use of the computer
- list precautions that should be taken by computer users
- state reasons why we should take care of humanware (computer users).

Additional resources

- Pupil's Book pages 259 to 265
- Workbook page 103

Teaching the lesson

Precautions in the use of computer hardware

- Refer the pupils to pages 259 to 261 in the Pupil's Book when you work through the ways in which computer hardware can be protected.
- Discuss with the pupils how an Uninterruptible Power Supply (UPS) (page 259), and stabilisers and surge protectors (page 260) protect computer hardware.
- Emphasise the danger of overloading sockets (page 261), and the importance of dust and moisture protection for computer hardware (page 261).
- Take the pupils to the school's computer room, or refer to a desktop or laptop computer, and discuss with the pupils how the computer is being protected.
- Pupils can then complete Activity 1 on page 261.

Care for the humanware

- Discuss the term "humanware" with the pupils.
- Discuss the various activities that people spend time doing on a computer, especially the long periods of time they spend playing computer games.
- Discuss the importance of using the correct sitting posture while working at a computer.
- Demonstrate:
 - correct sitting posture (refer to page 262 in the Pupil's Book)
 - use of anti-glare measures (page 262)
 - correction positioning of the monitor and placement of the hands (page 263).
- Pupils complete Activity 2 by referring to the images that illustrate bad and good sitting posture.

Why we should care for the users

- Discuss with the pupils the errors that can be caused by human fatigue when individuals do not look after their health when using any type of machine.
- The reliability and efficiency of a computer depends on the correct execution of operations by the user. Therefore, it is important that users are alert when operating a computer.
- Draw the pupils' attention to the following injuries, which can occur through improper use of a computer:
 - pain and swelling in the elbow, wrist or hands
 - eyestrain, resulting in blurred vision, dry, red eyes, headaches and itchy eyes
 - carpal tunnel syndrome – a wrist injury that may require surgery.
- Pupils can then complete Exercise 1.

Pupil's Book answers

Activity 1 PB page 261

2. a) The computers would switch off without shutting down properly. This could cause damage to the hardware and software. Work will probably be lost too.
- b) If there are no stabilisers to protect the computers when they turn on again, the large surge in electricity flow could damage parts of the computers. A large electricity surge can melt the plastic and damage cords.

Activity 2 PB page 263

1. Poor sitting posture can cause back pain and neck pain, as well as pain in the shoulders and arms.

Exercise 1 PB page 265

1. An Uninterruptible Power Supply (UPS) protects the computer during power cuts. A UPS contains batteries that charge when the power is on. When the electricity goes off, the batteries supply power to the computer.
2. Overloading electricity sockets can cause fires.
3. a) and b) Discuss the correct positioning of the monitor, mouse and keyboard, use of anti-glare filters, and the correct sitting posture and positioning of the hands to avoid strain and injury.
4. Bad posture can cause health problems, such as back pain, tiredness and headaches. Fatigue has many negative effects, such as:
 - You cannot stay awake.
 - You cannot pay attention in class and you make more mistakes.
 - You cannot remember things.
 - You cannot make decisions.

Taking care of computer users can prevent injuries such as pain and swelling in the elbow, wrist or hands, eye strain, and carpal tunnel syndrome – a wrist injury that may require surgery.

5. Avoid overloading plug sockets, to prevent fires. Ensure that the computer monitor, keyboard and mouse are correctly positioned, that an anti-glare filter is used if necessary, and correct sitting posture and position of the hands are maintained.

Workbook answers

Write about precautions to take in the use of computers WB page 103

1. The term “humanware” refers to a computer user/person who uses a computer.
2. Uninterruptible Power Supply. The device protects the computer during power cuts. A UPS contains batteries that charge when the power is on. When the electricity goes off, the batteries supply power to the computer.
3. Advise the friend not to use the overloaded sockets because it is dangerous. The sockets could heat up and start a fire, or the heating up of the sockets could cause cables to melt and get damaged.
4. Maintain correct sitting posture because bad posture can cause health problems, such as back pain, tiredness and headaches.
 - Fatigue has many negative effects, such as:

- You cannot stay awake.
- You cannot pay attention in class and you make more mistakes.
- You cannot remember things.
- You cannot make decisions.
- Use an anti-glare filter or move the computer away from the light to prevent eye strain.
- Position the monitor correctly by ensuring the monitor is at arm's length away from the eyes and that the centre of the monitor is directly in front of you. Position the hands correctly by ensuring the keyboard is directly in front of you. The wrists should be straight and relaxed. Sit close to the keyboard, so that you do not have to stretch to reach it. This will prevent pain and swelling in the elbow, wrist or hands, eye strain, and carpal tunnel syndrome – a wrist injury that may require surgery.

Sub-theme 2 Basic concepts of information technology

Topic 4 Classification and uses of common IT gadgets

Performance objectives

Pupils should be able to:

- classify common IT gadgets
- state the uses of some common IT gadgets
- operate at least two common IT gadgets.

Additional resources

- Pupil's Book pages 266 to 272
- Workbook pages 104 and 105
- A chart or pictures of common IT gadgets such as laptops, handheld computers, palmtops, iPads, iTabs, etc.
- Flash drives; smartphones; memory cards
- For the remedial activity: A3 paper; pictures of common IT gadgets (enough for each group); pencil crayons, paints, etc. for making a colourful poster

Teaching the lesson

- Innovation and the development of new products in information technology are moving at such a fast pace that it would be difficult to cover all types of common IT gadgets. This is why we classify them according to their general use, such as audio/video, storage devices, handheld devices (smartphones and tablets such as the iPad) and multimedia devices.

Classification of common IT gadgets

- Start this section with a demonstration of some common IT gadgets for the class. If possible, bring items that they may not have seen before to class. Or, show them a chart showing pictures of the gadgets and how they are used.

- Before you start the section on different types of computers, draw a table on the board and write desktop, laptop and tablet in the first column. Then ask the pupils to tell you what they know about these gadgets. Write their answers in the table.
- When you work through the section on audio and video gadgets, try to bring at least one of the devices listed in the Pupil's Book to class for the pupils to examine.
- Show the pupils several pictures of each type of device. Stimulate discussion by asking the pupils what they would use each device for. If one of them has one of the devices, ask him or her to share what they know.
- Introduce the section on storage devices by showing the pupils as many of the different devices listed in the Pupil's Book as you can, or show them pictures of each device. Ask them to tell you what each device is. Write the (correct) names in a mind map on the board, with "Storage devices" at the centre of the mind map.
- Then, read through the section on page 268 in the Pupil's Book with the pupils, and look at the pictures at the bottom of the page. Ask the pupils to close their books, and then ask them questions about each device's use/s, and use their answers to complete the mind map on the board. They can consult the Pupil's Book if they need to. Let the pupils copy the mind map into their exercise books once it is complete.
- Talk about the importance of storage devices and backing up your data regularly. Demonstrate how to use a number of different storage devices and, if possible, let the pupils practise using them too. Then let them do Exercise 1.
- Several pupils may be familiar with smartphones, so introduce this section by asking pupils to share their knowledge and experiences. Try to bring a few different smartphones to class for the pupils to examine.
- Read through the case study on smartphones in Nigeria, and then let the pupils answer the questions in pairs. Go through the answers in class.

Uses of some IT gadgets

- As you work through this section, ensure that pupils get opportunities to use at least two of the gadgets discussed in the Pupil's Book to perform tasks such as copying or transferring documents, music files, etc.

Operating common IT gadgets

- This is a practical section in which pupils can continue to practise using common IT gadgets.
- Use Activities 1 and 2 on page 272 in the Pupil's Book to explore, through discussion and, if possible, demonstration, aspects and uses of common IT gadgets with which the pupils may not be familiar.
- Be sensitive to pupils' circumstances in these discussions. If you think it necessary, emphasise the fact that though IT gadgets can be useful and are used widely in some parts of the world, there are still many perfectly good ways of doing the same tasks which do not involve the use of IT gadgets.

Activity guidelines

Activity 1 Classify computers and talk about their uses PB page 267

- Let the pupils do this activity in groups, and then hold a class discussion in which they can all share their ideas.
- Move on to discussing other types of jobs or real-life situations in which people might have different types of IT gadgets which they use for different purposes.

Activity 1 Operate a smartphone PB page 272

- The pupils should be reasonably familiar with this device by now, but move amongst the groups to assist where necessary. If possible, let them do research on the Internet to answer question 3.

Activity 2 Operate a common IT gadget PB page 272

- Once the pupils have completed this activity, let them share their experiences and answers in a class discussion.
- Spend time discussing social media with the class. At Primary 6 age, pupils will not be allowed to use many social media sites, but they may have older siblings, or relatives, who use them.
- Discuss the potential value of using social media, but highlight the disadvantages, as well as the potential dangers.
- This might be a good opportunity to mention that people have communicated for centuries without using modern technology, so not having access to IT gadgets to do so, does not make any difference to many people's lives.

Pupil's Book answers

Activity 1 Classify computers and talk about their uses PB page 267

1. There is a laptop computer on the desk in front of the doctor and a desktop computer on the desk behind him. The doctor is holding a tablet.
2. Pupils' answers will vary. Possible uses for each type of computer include:
 - Desktop computer – emailing; viewing X-rays; preparing presentations; viewing patients' records; conducting research on the Internet
 - Laptop computer – attending meetings; showing presentations
 - Tablet computer – emailing, patient visits, recording patient symptoms.

Exercise 1 How do you use storage devices? PB page 269

- Schoolwork – flash drive
- Photographs – memory card
- Music – CD-ROM
- Emails – hard drive

Case study: Smartphones in Nigeria PB page 270

1. Reasons for increased mobile Internet usage in Nigeria include:
 - a) cheaper and better smartphones
 - b) better service from mobile networks
 - c) "lite" mobile applications that use less data.
2. Nigeria has more Internet users than Kenya.
3. Nigeria has 52.1 million more mobile phone users than Egypt.
4. There are many opportunities for e-commerce, application development and video-streaming services.

Activity 1 Operate a smartphone PB page 272

2. Pupils' answers will vary. Possible answers include: making telephone calls; reading emails; sending and receiving text messages; listening to music; using the Internet; consulting maps; reading books; using social media.
3. Pupils' answers will vary. Possible answers include: headphones; speakers; microphones; camera lenses.

Activity 2 Operate a common IT gadget PB page 272

3. Pupils' answers will vary. Possible answers include: desktop computers; laptops; tablets.
4. Pupils' answers will vary.

Remedial activities

- Give pupils who are struggling with the classification and uses of common IT gadgets a mini project to do in small groups. Give each group pictures of a variety of different devices. Ask them to create a poster to put up in the classroom. They can cut out the pictures and stick them on the poster, using a mind map or table format, or any other type of design they think will be suitable. By referring to the Pupil's Book, they can then add the characteristics and uses of each IT gadget to the poster. Encourage them to create a colourful, creative poster.
- All pupils must be able to operate at least two common IT gadgets. Choose gadgets that are available to the class and get pupils to perform some everyday tasks. Give pupils who have not yet mastered these skills additional time to practise the required skills. Pair them with stronger pupils who will be able to help.

Workbook answers

Classify common IT gadgets WB page 104

1.
 - a) Computer
 - b) Storage device
 - c) Storage device
 - d) Smartphone
 - e) Video gadget
 - f) Computer
2. Possible uses of the gadgets above include:
 - a) Browsing the Internet; email; playing games; word processing; video editing
 - b) Transferring files; data back-ups; storing music and photographs
 - c) Making backups; storing data; playing music and videos
 - d) Making telephone calls; sending text messages; taking photographs
 - e) Taking photographs; recording videos
 - f) Browsing the Internet; playing games; word processing; creating graphics; video and music editing.

Topic 5 The Internet

Performance objectives

Pupils should be able to:

- explain the meaning of search engines and social networks
- use the Internet for various functions, such as online registration, checking of results and use of social networks
- mention the importance of using these functions of the Internet
- mention some forms of abuse of the Internet.

Additional resources

- Pupil's Book pages 273 to 280
- Workbook page 106
- For the additional activity: A3 paper; pencil crayons, paints, etc. for making a colourful poster

Teaching the lesson

Search engines

- Explain to the pupils what a search engine is, and what a database is. A database is a software application that is used to store and retrieve large amounts of data. A search engine uses a database to store a giant index, much like the index at the back of a book. Just as you use the index of a book to find the page you are looking for, a search engine uses its index to find web pages containing the search words you typed in.
- Mention the names of popular search engines and show the pupils their search pages, if you can. Otherwise, you could show them pictures of the search pages.
- Show the pupils some search results on a computer, if possible, while you explain how to understand/interpret search results. Otherwise, you can show them pictures of search results while you explain. Refer to the searching tips given on page 275 in the Pupil's Book.
- Then let the pupils do Activity 1. Move amongst the groups, assisting where necessary.
- Then move on to Activity 2. When the activity is completed, discuss the questions as a class.

Online activities and social networking tools

- Prepare for Activity 2 by identifying suitable websites to use as part of the activity. You will need a suitable social networking site, a site that publishes sports results, the name of someone on Facebook or Twitter whose page or feed you can visit, and a movie review site.
- Go through the content on pages 275 to 277 in the Pupil's Book with the pupils, and then complete Activity 2 on page 277 with the pupils. First demonstrate the tasks to the pupils, and then let them work in groups to complete them on their own.

Importance of Internet tools

- Some of the uses of Internet tools in this section might be rather unfamiliar to the pupils, so allow ample time for questions and discussion. Allow the pupils to share their own knowledge and experiences.
- Demonstrate to the pupils how the Internet can be used for research, education, banking, and leisure and entertainment. Show them some educational websites that might be of use to them in the future. Visit a few banking websites and show the pupils the type of facilities

and information available on these websites. Visit a wide variety of entertainment sites suitable for pupils of this age, and show them a few online shops.

- While the pupils do Activity 3, move amongst the groups offering guidance where necessary.

Abuses of the Internet

- To introduce this section, you could bring some magazine or newspaper articles to class, or print out personal stories from the Internet, that deal with this topic.
- Carefully work through the list of safety precautions relevant to using the Internet. It is imperative that pupils take to heart the fact that using the Internet can put one in contact with people who wish to do us harm.

Additional activities

- Working in small groups, ask the pupils to create a poster illustrating one or more of the safety precautions listed on page 280 in the Pupil's Book. When completed, let the pupils display their posters in the classroom.
- Ask the pupils to write a short play/dialogue or prepare a role play that illustrates one of the safety precautions listed on page 280 in the Pupil's Book.

Workbook answers

Explain benefits and forms of abuse of the Internet WB page 106

Benefits of the Internet	Abuses of the Internet
Researchers can use the Internet to search for information using keywords, and they can order books online	Criminals can put false and harmful information on the Internet
The Internet has e-books, video tutorials, online courses, educational websites and educational communities	Bullies and criminals can pretend to be someone they are not
The Internet makes banking accessible to people who do not live near a bank	
Using the Internet, you can play games, listen to music, read books, watch movies, talk to friends and family, and keep up to date with the news	

Topic 6 IT and society

Performance objectives

Pupils should be able to:

- mention various aspects of human society influenced by the computer
- mention some wrong notions about IT
- mention some career opportunities in IT.

Additional resources

- Pupil's Book pages 281 to 289
- Workbook pages 107 and 108
- Resource person/people, to talk about one or more careers in IT
- For Activity 2: A3 or A4 paper; pencil crayons, felt-tip pens
- For the extension activity: A3 or A4 paper; pencil crayons, felt-tip pens

Teaching the lesson

Aspects of society influenced by the computer

- Introduce this topic by holding a quick class brainstorming session: ask the pupils to think of ways in which the computer has influenced different aspects of society. Mention a few examples to guide them along the right track, and then write their contributions on the board.
- Show the pupils charts, pictures, newspaper and magazine articles, or books that mention/illustrate an aspect of society that has been influenced by the computer. This is a good opportunity to emphasise the exciting side of computers to the pupils, particularly the ways in which computers will be relevant to them in their adult working life, and personal life.
- As you work through the different sections on pages 281 to 284 with the pupils, regularly ask them to make notes in their exercise books on what they have learnt in each section. Ask them to write their notes in the form of a table, mind map or bulleted list. Ask for volunteers to share their notes on a given section with the class. Let the others give constructive feedback and decide as a class if anything needs to be added to the notes. They can then all amend their own notes accordingly.

Wrong notions about IT

- Ask the pupils if they have ever heard or read anything negative about information technology, and discuss their contributions as a class. Explore attitudes about IT that the pupils may have heard expressed by friends or family.
- Ask the pupils for their personal opinions on IT: emphasise that we are all entitled to our opinion, and that we do not all have to agree on whether IT is beneficial or harmful to society. Explore the pupils' opinions, emphasising mutual respect for the opinions of others.
- Then work through the content on pages 285 and 286 in the Pupil's Book, and let the pupils complete Exercise 1 on their own. You could take in their work and then discuss the opinions pupils expressed in the exercise, but without mentioning names, because some of the questions touch on personal opinions/information that might be sensitive for pupils.

Career opportunities in IT

- This is another potentially exciting section for the pupils as they learn about careers in IT. Hopefully, they can begin to explore their own ideas about careers they think they might like to do in future.
- Arrange to have at least one resource person come and speak to the pupils about his or her career in IT. If feasible, you could arrange for the pupils to visit the person in his or her place of work instead. Most people are willing to share their experiences and opinions, so it should not be too difficult to arrange for more than one IT professional to come and speak to the class. After each session, allow enough time for the pupils to ask the person questions. If the pupils are a little shy at first, start the ball rolling by asking a few questions yourself.

- Activity 2 is a good opportunity for the pupils to explore a particular career in IT in more depth. Let each group present their job advertisement to the class and give the pupils time to ask questions, should they wish to.
- Let the pupils display their advertisements in the classroom.

Pupil's Book answers

Exercise 1 PB page 286

1. Possible answers include a public library, an Internet café and a school library.
2. Pupils' answers will vary.
3. Computers create job opportunities. Good advice would be to look for learning programmes and opportunities to learn the skills required to perform one of the jobs that the use of computers has created.

Extension activity

- Pupils can work in pairs or on their own. Refer the pupils to the careers in IT discussed on pages 287 and 288. Ask them to choose one of the careers, and then do more research on it. Ask them to find educational institutions in Nigeria and/or elsewhere in Africa that offer training courses or programmes for that career.
Ask the pupils to write up their findings neatly on a poster and present it to the class.
Display the posters in the classroom so that all the pupils can refer to them, should they wish to.

Remedial activities

- Pupils can work on their own for this activity. Refer them to pages 281 to 284 in the Pupil's Book. Ask them to read the content on these pages, and then choose five aspects of society that have been influenced by the computer. They can then write down in their exercise book the most important points made in each section.
- Let the pupils work in pairs. Ask them to read the content on wrong notions about IT on pages 285 and 286 in the Pupil's Book. Then, ask them to write and perform a dialogue/role play in which they discuss and explore wrong notions about IT.

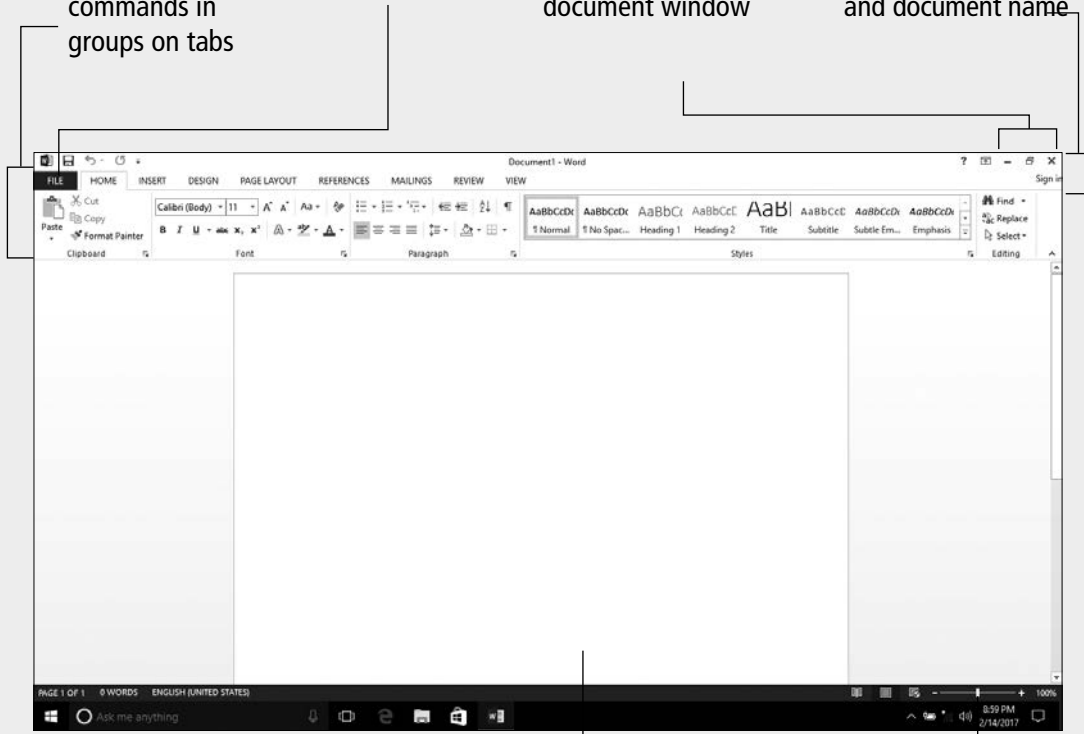
Workbook answers

Write about and discuss careers in IT WB page 107

1.
 - Graphic designer
 - Programmer
 - Database manager
 - Website designer

Assessment: Answers

1. **Ribbon:** holds all the commands in groups on tabs
"File" tab: opens Backstage view
Buttons: to minimise, maximise or close the document window
Title bar: shows the program and document name



- Document area:** area where your work is displayed
Zoom slider: makes text look larger or smaller

- (5)
2. Open Microsoft® Word and go to the Backstage view. Select “New” in the menu on the left. (3)
 3. Use “Save As” when you want to save an existing document in a new location or with a new name. (2)
 4. Select text by dragging the mouse over the text while holding down the left mouse button. Copy text using the “Copy” button on the “Home” tab. Paste text using the “Paste” button on the “Home” tab. (5)
 5. Change the colour of text using the “Font Colour” button on the “Home” tab. Change the font size using the “Font Size” drop-down list on the “Home” tab. (3)
 6. Click on the “Insert” tab, and then click the “Table” button. Select the number of rows and columns you want, using the Table grid. (3)
 7. Click on the “Insert” tab, and then click the “Pictures” button. Use the dialog box to select the picture you want to insert. (4)
 8. To retrieve a document, open the Backstage view and click on “Open”. Select the document you want in the dialog box. (2)
 9. a) The Fill tool is used to colour in shapes. (2)
b) Microsoft Paint®, Adobe Photoshop® and CoralDRAW® are three popular graphics applications. (2)
c) You can add text to a drawing using the Text tool. (5)

10. The pupils' answers will vary, but should show evidence of being able to draw geometrical shapes, draw using freehand tools, "paint" parts of their drawing using the Fill tool, and label parts of their drawing using the Text tool. (10)
11. • Use an Uninterruptible Power Supply (UPS).
 • Use a surge protector.
 • Avoid overloading sockets. (3)
12. • A UPS protects the computer during power cuts.
 • A surge protector protects the computer against large changes in electricity flow, such as lightning.
 • Not overloading sockets protects the computer against fires, which can be caused by overloaded sockets. (3)
13. The term "humanware" refers to a computer user/person who uses a computer. (1)
14. • Maintain correct sitting posture.
 • Use an anti-glare filter or move the computer away from the light to prevent eye strain.
 • Position the monitor correctly by ensuring the monitor is an arm's length away from the eyes and that the centre of the monitor is directly in front of you.
 • Position the hands correctly by ensuring the keyboard is directly in front of you. The wrists should be straight and relaxed. Sit close to the keyboard, so that you do not have to stretch to reach it. (4)
15. • Bad posture can cause health problems, such as back pain, tiredness and headaches.
 • Fatigue has many negative effects, such as:
 • You cannot stay awake.
 • You cannot pay attention in class and you make more mistakes.
 • You cannot remember things.
 • You cannot make decisions.
 • Taking care of computer users can prevent injuries such as pain and swelling in the elbow, wrist or hands, eyestrain, and carpal tunnel syndrome – a wrist injury that may require surgery. (3 × 2 = 6)
16. "IT" stands for Information Technology. (1)
17. a) and b)
 • Computers: laptop; desktop; tablet (Any 1)
 • Audio and video gadgets: digital camera; video recorder (Any 1)
 • Storage devices: flash drive; external hard drive; memory card (Any 1)
 • Smartphones: smartphone (4 × 2 = 8)
18. a) and b)
 • Word processing: desktop; laptop; smartphone; tablet (Any 1)
 • Telephone conversations: smartphone; laptop; tablet (Any 1)
 • Create and share multimedia: smartphone; tablet; MP3 player (Any 1)
 • Social networking: desktop; laptop; tablet; smartphone (Any 1) (4 × 2 = 8)
19. A search engine searches a database of websites and returns a list of results based on search terms. (2)
20. Google; Bing; Yahoo (Any 2) (2)
21. Some websites, such as banking websites, need to know who you are and to protect your account using usernames and passwords. Other websites, such as social media sites, need to know who you are so that they can keep all your conversations and messages linked to you. (2)
22. "Real-time" information means information that is updated on a regular basis so that visitors to a website always see the latest updates. Sports scores are an example of real-time information. (2)

23. Different social networks enable you to interact with other users in different ways. Common to all social networks would be registering for the network, logging onto the social network website, and reading or posting information of whichever type that social network uses, e.g. photographs, videos, messages or a combination of these. (2)
24. Twitter; Facebook; Instagram (Any 2) (2)
25. Research; education; banking; shopping; entertainment (Any 3) (3)
26. Not everyone online is who they say they are. Criminals and bullies use the Internet and may pretend to be someone else in order to get personal details from you or to try to meet you in real life. (2)
27. • Never give out personal information such as your last name, home address, school name or telephone number.
 • Do not include personal information in usernames or screen names.
 • Keep passwords strictly private.
 • Do not post photographs or videos without parents' permission.
 • Do not arrange to meet an online friend in person without your parents' or caregiver's permission.
 • Do not send or reply to nasty or strange messages.
 • Do not download anything from an unknown person or website.
 • Do not visit websites you have never heard of without permission from your parents or caregivers. (Any 5) (5)
28. • Communication – People can communicate via emails, blogs and websites. Mobile phones have become affordable. Information can be accessed quickly by browsing the Internet.
 • Security – Crimes can be committed through the use of computers. Tools we use to keep ourselves safe, for example, alarms, security cameras and anti-virus software, have improved with technology.
 • Banking – Many transactions can be performed without our having to be physically present in the bank. ATMs enable us to withdraw money at any time of the day or night.
 • Education – Pupils have quick access to information on any topic they can imagine. Devices are used in the classroom and at home to assist learning. Websites help pupils to learn a wide range of subjects, for example, languages, mathematics and computer programming.
 • Hospitality – Holidays and flights can be booked online. Smaller accommodation providers can advertise online and compete with giant hotels and resorts.
 • Exploration and exploitation of natural resources – Computers and sensors make it possible to collect huge amounts of data about natural resources. This data is used to plan for the future. Technology helps us to make use of natural resources in the most efficient way.
 • Agriculture – Farmers use computers, sensors, robots and drones to help manage farms. Farmers have access to weather information and data about the amount of nutrients and moisture in the soil.
 • Medicine – Research of symptoms and consultations with other doctors have been made easier and faster. Computers are used to keep and share patient medical records. Scanners are used to take pictures of what is happening inside our bodies and to monitor our breathing and heart rate. Information technology is used to find new cures and medicines. (Any 5) (10)
29. • Information technology is too costly.
 • Information technology results in job losses.

- Computers and information technology do not fit well with religious beliefs and traditions. (3)

30.

IT career opportunity	What they do
a) Website designer	D. Create web pages using a combination of design and programming
b) Programmer	A. Write computer programs using programming languages
c) Graphics designer	B. Create designs using typography, images and illustrations
d) Database manager	C. Organise data and keep it safe

Total mark: 115