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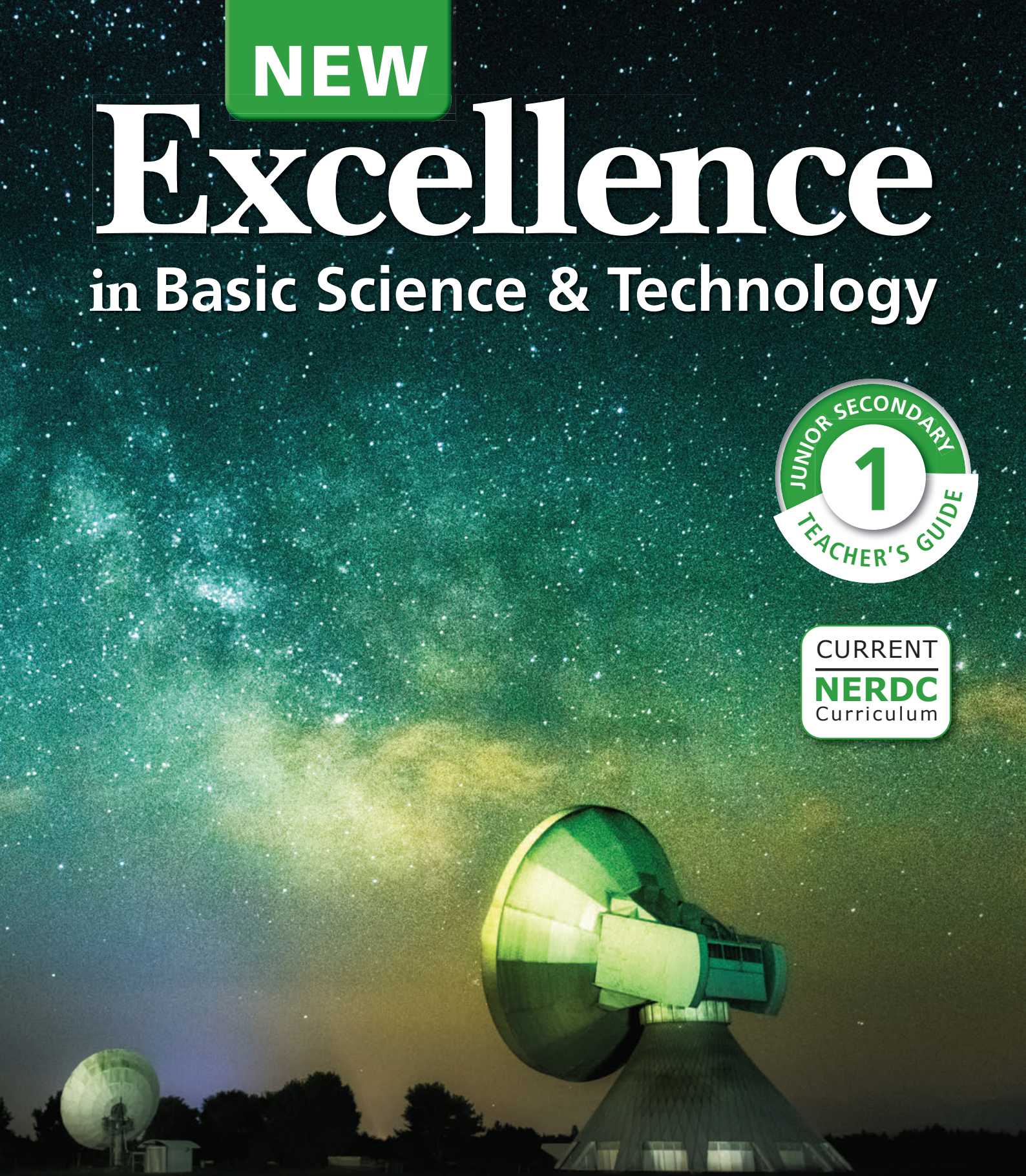
JUNIOR SECONDARY 1 TEACHER'S GUIDE

CURRENT NERDC Curriculum



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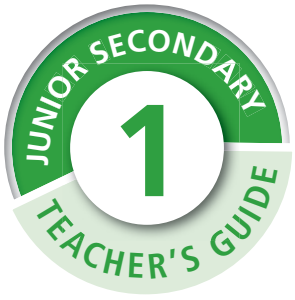

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Contents

Introduction

Introduction – Basic Science & Technology

The Basic Science & Technology curriculum that was revised in 2012 is the result of the restructuring and integration of four Primary and Junior Secondary science curricula. The following science subjects were integrated into one:

- Basic science
- Basic technology
- Physical and health education
- Information technology.

This became necessary to reduce the number of subjects offered in Primary and Junior Secondary schools, to prevent repetition and duplication of concepts that resulted in curriculum overload, to encourage innovative teaching and learning approaches and techniques that promote creativity and critical thinking in students, to promote the holistic view of science at this level for better understanding of a contemporary and changing world and to infuse emergent issues that are of national and global concern, such as gender sensitivity, globalisation and entrepreneurship, into the curricula.

The purpose of the curriculum

The main objectives of the curriculum are to prepare the students 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 drug abuse and related vices
- be safety and security conscious.

Major issues shaping contemporary growth and development of nations and influencing knowledge-driven societies, such as those listed below, were identified and infused into the curriculum content at every level:

- Environmental education
- Climate change
- Drug abuse education
- Foods and drugs safety education
- Disaster risk reduction education
- Consumer education
- Safety and security
- Entrepreneurship.

The goals

The goals of the curriculum place emphasis on:

- guided inquiry
- activity-based teaching and learning using locally sourced materials
- examples that are indigenous and familiar to students
- content that engenders development of relevant attributes and survival strategies for living successfully in a contemporary and global world.

Time allocation

To cover this curriculum, the recommended weekly time allocation is three or four periods of 40 minutes each. Students 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 principle duties of a science and technology teacher is to prepare and present interesting lessons to his or her students.

The teacher has to:

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

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

Teachers must prepare each topic in advance. Many teachers go into the classroom inadequately prepared. It is your responsibility as a science and technology teacher to actively involve your students in the learning process. It is a proven fact that students learn far more by *doing* than by *listening*.

You should apply the scientific method wherever possible and introduce practical projects in the course. Science and technology involves being curious, asking questions and finding solutions. Wherever possible, ask questions to engage the students and to encourage independent thought processes. Start your lessons by asking the students 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 students 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 students if they cannot answer questions.

How to use the book

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 students. This book supports a hands-on approach and builds on concepts taught. These concepts are developed as students progress from JSS1, to JSS2 and JSS3.

You need to be familiar with the key features of these books.

The Student's Book is divided into four main sections:

- Basic science
- Basic technology
- Physical and health education
- Information technology.

A Practice Test is provided at the end of each section for your students to get practise in writing tests and a corresponding memorandum of answers for each test is provided in this Teacher's Guide.

Each of the above sections is further divided into themes, and these themes are made up of topics related to that theme.

Each topic is structured in the following way:

- performance objectives required by the curriculum
- content required by the curriculum
- activities to be completed individually, with a partner, or in groups, or as a whole class
- summary of the topic for revision
- key words – this is essential vocabulary for the topic. The definitions of these words can be found in the Glossary at the back of the Student's Book, as well as in this Teacher's Guide for your easy reference.

- a topic assessment section, which students have to complete individually. The corresponding answers and suggested mark allocation are provided in this Teacher's Guide. Tick marks are used to indicate the required/suggested content for each mark.

The Teacher's Guide also provides guidelines for teaching each topic and answers to some of the activities and exercises in the Student's Book.

How to use the suggested scheme of work

A scheme of work is defined as the part of the curriculum that a teacher will be required to teach in any particular subject. Its primary function is to provide an outline of the subject matter and its content, and to indicate how much work a student should cover in any particular class. A scheme of work allows 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 planning a scheme of work are continuity in learning and progression of experience. You can add your own notes to the scheme of work provided on pages viii–xxiv.

The scheme of work is sequential. The sequence of the scheme of work is aligned with the textbook. Do not be tempted to jump around. Rather spend time carefully planning the term to ensure that you adhere to the scheme of work. Please note that this series of books accommodates all the topics covered by the Federal syllabus, as well the additional ones that are in the Lagos State scheme of work. If you are following the Federal syllabus only, then you must leave out the additional topics not covered by that syllabus.

The curriculum content for the year needs to be completed in that year. We have allocated suggested times to spend on each topic and theme in the curriculum, but this time frame may vary depending on the planning of your particular school.

The *Content covered* column gives the number of suggested lessons for each topic. This has been divided according to the content of the topic.

Start each topic with a short, exciting and informative introduction. You should also explain the meaning of the topic, for example: What is health? What is energy? What is pollution? What is safety? What is freehand sketching? What does it mean to be physically fit? What is data processing?

You should have some form of revision at the end of a topic. If you do not have time, this can involve something for students to complete at home. Examples of ideas for the end of a topic include: a revision worksheet, a test, a game or a quiz. Students can also do their own revision by making mind maps, concept maps or other types of summaries. They can also set tests for each other.

It is important to note that the scheme of work provides a suggested number of lessons for the topic. This will vary according to the ability of the students in your class and their prior knowledge. If you lag behind, you will have to look for more efficient teaching methods or give a little more homework in some sections.

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 less discipline issues if you are: punctual, well prepared, follow a plan (write this on the board at the start of the lesson), keep your word (don't make empty threats), consistently adhere to rules, especially rules related to laboratory and workshop safety, and strive to make Basic Science and Technology an exciting subject. So try your best to be well-prepared and enthusiastic.

A teacher of science and technology is a professional instructor who facilitates, promotes and influences students to achieve the outcomes of the scheme of work. It is the wish of the authors that the students will, at the end of each course in the series (JSS1, JSS2 and JSS3) attain a level of Basic Science and Technology understanding and proficiency that will equip them for future studies in these fields.

Table 1: Basic Science and Technology Teaching Suggested scheme of Work for JSS1

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 1 Learning about our environment	1. Family health (SB p. 2)	• Define sanitation. • State the importance of sanitation and the methods used in good sanitary practice. • Define nutrition. • Explain what a balanced diet is, giving examples. • Define drug abuse, drug misuse and drug addiction. • Describe how drugs are used in medicine. • State the effects of drug abuse.	1. Sanitation – the importance of sanitation, sanitation methods. Activity 1.1 Advertise a cleaning agent. Activity 1.2 Case study: How water is collected in a rural village. 2. Nutrition – a balanced diet. Activity 1.3 Different food groups. 3. Class, examples and functions of different food groups. Activity 1.4 Plan a menu. 4. Drug and substance abuse – medical uses of drugs, side effects of drugs, the effects of drug and substance abuse. Activity 1.5 Drugs amongst high school students in Nigeria. Summary. Topic Assessment.
		2. Environmental pollution (SB p. 9)	• Define air, soil and water pollution. • Identify various pollutants and their effects. • List various causes of pollution. • State ways to reduce the risk of pollution. • Describe pollution control.	1. Air pollution – causes of air pollution, consequences of air pollution, measures to control air pollution. Activity 2.1 Sources and effects of common air pollutants. 2. Soil pollution – causes of soil pollution, consequences of soil pollution, measures to control soil pollution. Activity 2.2 Biodegradable substances. 3. Water pollution – causes of water pollution, consequences of water pollution, measures to control water pollution. Activity 2.3 Eutrophication. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 1 Learning about our environment	3. Living and non-living things (SB p. 17)	• Recognise that all living and non-living things are made up of matter. • List three states of matter. • Collect and identify samples of living and non-living things in their environment. • List the distinguishing characteristics of living and non-living things in their environment. • State the importance of plants and animals to human beings. • Collect samples of some living and non-living things, sort out the materials and explain the uses.	1. Matter. Activity 3.1 Investigate matter. Activity 3.2 Do air and water take up space? 2. States of matter – change of states of matter, classification of matter, characteristics of living and non-living things. Activity 3.3 Identify the characteristics of living things. 3. The importance of plants and animals – importance of plants, resources from plants, importance of animals, resources from animals, the differences between plants and animals. Activity 3.4 Importance of plants and animals. 4. Non-living things – properties of non-metals. Activity 3.5 Collect and identify non-living things. Summary. Topic Assessment.
	Theme 2 Human development and reproduction	4. Human development (SB p. 26)	• Understand the meaning of puberty and adolescence. • Discuss puberty/adolescence changes. • Understand the importance of personal hygiene. • Learn about the menstrual cycle and hygiene. • Discuss the myths and facts about pubertal changes. • Learn how to cope with concerns at adolescence.	1. Puberty and adolescence – puberty/adolescence changes, personal hygiene during adolescence, menstrual cycle and hygiene, myths and facts about pubertal changes, coping with concerns at adolescence. Activity 4.1 Puberty changes. Activity 4.2 Body odour during puberty. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 2 Human development and reproduction	5. The reproductive system (SB p. 31)	• Identify male and female reproductive organs (internal and external) and know its functions. • Understand how to take care of male and female reproductive organs.	1. Male and female reproductive organs – male reproductive system, female reproductive system. 2. Care of the male and female reproductive organs – male organs, female organs. Activity 5.1 Diagram of male reproductive system. Activity 5.2 Human reproductive system. Summary. Topic Assessment.
		6. Human reproduction (i) (SB p. 35)	• Understand how the menstrual cycle works. • Understand what ovulation is. • Understand the process of fertilisation (conception).	1. Menstrual cycle – ovulation, fertilisation (conception). Activity 6.1 Draw a menstrual cycle. Summary. Topic Assessment.
		7. Human reproduction (ii) (SB p. 38)	• Understand the growth process of a foetus. • Know the symptoms of pregnancy and where to get help. • Know the difference between myths and facts about teen pregnancy. • Understand the consequences/implications of teen pregnancy on a physical, social and emotional level. • Know the effects of drugs and self-medication. • Know the effects of drug abuse. • Understand the causes and consequences of birth defects.	1. Growth of the foetus. 2. Symptoms of pregnancy and where to get help. 3. Myths and facts about teen pregnancy. 4. Consequences/implications of teen pregnancy – physical, social, emotional. 5. Effects of drugs and self-medication – effects of drug abuse. 6. Causes and consequences of birth defects. Activity 7.1 Research a birth defect. Activity 7.2 Study a graph showing conception under 18 years. Activity 7.3 Complete a table showing effects of substance abuse. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 2 Human development and reproduction	8. HIV/AIDS (SB p. 44)	• Understand the meaning of HIV and AIDS. • Differentiate between HIV and AIDS. • Understand the mode of transmission. • Identify behaviours that put people at risk. • Know how to prevent HIV and AIDS. • Realise that counselling is available. • Understand the importance of community care and support. • Distinguish between myths and facts about HIV and AIDS.	1. Meaning of HIV/AIDS – difference between HIV and AIDS. 2. Modes of transmission. 3. Behaviours that put people at risk – prevention. 4. Counselling. 5. Community care and support. 6. Myths and facts. Activity 8.1 Make a poster. Activity 8.2 Identify myths and facts about HIV and AIDS. Summary. Topic Assessment.
	Theme 3 You and energy	9. Energy (SB p. 49)	• Explain the meaning of energy. • State and describe the sources of energy. • Name forms of energy. • Explain how energy is transformed from one form to another. • State the uses of energy.	1. What is energy? 2. Sources of energy – coal, natural gas, oil, wind, water, solar energy, wood. Activity 9.1 Discuss sources of energy. 3. Forms of energy. Activity 9.2 Match forms of energy. 4. Energy transformation – some examples of energy transformations, represent energy transformations as a system diagram. Activity 9.3 Interpret an energy transformation diagram. Activity 9.4 Show energy transfer in a system. 5. Uses of energy. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 3 You and energy (continued)	10. Renewable and non-renewable energy (SB p. 57)	• Explain the meaning of renewable and non-renewable energy. • Give examples of renewable and non-renewable energy. • State the implications of misuse of non-renewable energy. • Describe how energy generation affects quality of life.	1. Energy systems. 2. Energy sources. Activity 10.1 Revise energy sources. 3. Renewable energy sources – wind power, solar power, biofuels, wood, hydropower. Activity 10.2 Discuss the advantages and disadvantages of renewable energy sources. 4. Non-renewable energy sources – nuclear power, advantages and disadvantages of using non-renewable sources of energy. Activity 10.3 Discuss advantages and disadvantages of non-renewable energy sources 5. Energy and society. Activity 10.4 Case study. Summary. Topic Assessment.
		11. Forces (SB p. 63)	• Explain the meaning of force. • Identify contact and non-contact forces. • Differentiate between magnetic and gravitational forces. • Measure and calculate gravitational force when mass and height are provided. • Describe how to set up a balanced force. • Explain the meaning of friction, its uses, advantages and disadvantages.	1. Meaning of force. Activity 11.1 Mass and force. 2. Types of force. Activity 11.2 Contact and non-contact forces. 3. Gravitational and magnetic force. 4. Calculation of gravitational force. Activity 11.3 Potential energy. 5. Balanced and unbalanced forces – friction and its uses, advantages and disadvantages of friction. Activity 11.4 Balanced and unbalanced forces. Activity 11.5 Frictional resistance. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 4 Science and development	12. The Earth in space (SB p. 71)	• Explain the terms gravitation, weightlessness, satellite and space travel. • State the effects of gravitation. • Identify the different bodies in the solar system. • Explain rotation and revolution of the Earth and Moon. • Explain and illustrate solar and lunar eclipses. • Understand seasons.	1. Gravitation and weightlessness. Activity 12.1 Gravity and weightlessness. 2. Our solar system. Activity 12.2 Day and night. Eclipses. Activity 12.3 Eclipses. 3. Seasons. Activity 12.4 Different seasons. 4. Satellites – uses of satellites, what is the International Space Station? Activity 12.5 Artificial satellites. 5. Space travel. Activity 12.6 Space exploration. Summary. Topic Assessment. Practice test.
	Revision and Practice test			
	Theme 5 Understanding basic technology	13. Understanding technology (SB p. 84)	• Identify technology-related occupations. • State the importance of technology.	1. Types of technology. 2. What is technology about? 3. Advantages of technology. 4. Technology-related occupations. 5. Why it is important to be technologically literate. Activity 13.1 Discuss technology. Summary. Topic Assessment.
		14. Basic electricity (SB p. 88)	• Define electrical current. • Explain the types of electrical current (AC and DC). • Map an electrical circuit and name its components. • Highlight the symbols used for electrical components. • Describe measuring instruments used in basic electricity. • Define transformer and stabiliser. • Name some electrical appliances and accessories. • Perform simple electrical calculations. • Describe simple electrical connections.	1. What is electricity – electric current, types of current, definition of an electric circuit and its components and symbols, measuring instruments, definition of transformers and stabilisers, electrical appliances and accessories, simple electrical calculations, simple electrical connections. Activity 14.1 Electricity. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 6 Safety	15. Safety guidelines (SB p. 94)	• List safety guidelines for pedestrians. • Demonstrate how pedestrians are to cross the road. • Identify/list safety guidelines for cyclists. • Explain/list safety guidelines for motorists.	1. Safety guidelines for pedestrians. 2. Safety guidelines for cyclists and motorcyclists. 3. Safety guidelines for motorists. 4. Alcohol and road safety. Activity 15.1 Discuss road safety. Summary. Topic Assessment.
		16. Workshop safety (SB p. 97)	• State causes of workshop accidents. • List types of accidents that occur in workshop places. • State workshop safety rules and regulations. • Identify some workshop preventative measures.	1. Causes of workshop accidents. 2. Types of workshop accidents. 3. Workshop safety devices – protective gear, fire extinguishers, safety guards. 4. Safety rules and regulations – wear protective gear, pay attention to safety warnings, use tools and equipment safely, dispose of waste safely, keep the workshop clean and tidy. 5. Prevention of workshop accidents. Activity 16.1 Workshop safety. Activity 16.2 Risk assessment. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 1	Theme 7 Materials and processing	17. Properties of materials (SB p. 102)	• Identify, classify and describe the properties of wood. • Identify, classify and describe the properties of metals. • Identify, classify and describe the properties of ceramics and glass. • Identify, classify and describe the properties of rubber. • Identify, classify and describe the properties of plastic.	1. Wood – properties of wood. Activity 17.1 Properties of wood. 2. Metals – properties of metals, ferrous and non-ferrous metals, forms of metal, uses of metal. Activity 17.2 Metals and their uses. 3. Ceramics and glass – ceramics and glass: the big difference, uses of ceramics, properties and uses of glass, forms of glass. Activity 17.3 Ceramics and glass. 4. Rubber and plastics – types of rubber, identification, properties of rubber, uses, plastics, types of plastics, identification of plastics, properties of plastic, uses. Activity 17.4 Rubber and plastic. Summary. Topic Assessment.
		18. Building materials (SB p. 111)	• Identify different types of buildings. • Identify different types of building materials. • Specifically identify building materials in the locality where the student lives. • Give the uses of different types of building material. • Ensure that cement, sand, gravel, metal, plastics, wood, glass, ceramics, leaves and grass as building materials receive attention.	1. Types of buildings. 2. Types of building material. Distinguishing one material from another: cement, sand and gravel, bricks, metal, plastics, wood, glass and ceramics, leaves and grass. Activity 18.1 Different building materials. Activity 18.2 Uses of cement. Activity 18.3 Uses of metal. Activity 18.4 Uses of wood. 3. Uses of building materials. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 2	Theme 8 Drawing practice	19. Drawing instruments and materials (SB p. 118)	• Identify drawing instruments and materials. • Demonstrate correct techniques for handling drawing instruments and materials. • Construct shapes with drawing materials and instruments. • Care for drawing instruments and materials.	1. Basic instruments and their uses. Activity 19.1 Drawing instruments. 2. Basic handling techniques – T-square, set square, French curve, compass, dividers. Activity 19.2 Simple shapes. 3. Care of equipment. Summary. Topic Assessment.
		20. Board practice (SB p. 123)	• Fix drawing sheet to the board. • Sharpen pencils to conical point and knife edge. • Draw border, horizontal and vertical lines. • Place and draw the title block. • Write freehand legible letters and numerals.	1. Setting drawing paper on the board. 2. Sharpening pencils. Activity 20.1 Two styles of sharpening pencils. 3. Drawing a border, horizontal and vertical lines – the border, horizontal lines, vertical lines. 4. Positioning and drawing the title block. 5. Freehand writing of letters and numerals. Activity 20.2 Basic drafting techniques. Summary. Topic Assessment.
		21. Freehand sketching (SB p. 128)	• Make neat freehand sketches of lines, curves and irregular shapes.	1. Freehand sketching. 2. Lines. 3. Curves and circles. 4. Irregular shapes. Activity 21.1 Freehand sketching. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 2	Theme 9 Tools, machines and processes	22. Woodwork hand tools (SB p. 132)	• Identify a workbench and understand its use. • Identify woodwork hand tools, measuring tools, setting out and marking tools, driving tools, boring tools, holding devices, cutting and paring tools. • Describe the various woodwork hand tools. • Use and sketch woodwork hand tools. • Care for and maintain woodwork hand tools.	1. Workbench fittings and appliances. 2. Measuring tools – tape measure, ruler, try square (T-square), other measuring tools. 3. Setting and marking out tools. Activity 22.1 Marking tools. 4. Driving tools – hammers, mallets, screwdrivers. 5. Boring tools – wood braces, ratchet brace, bradawl. Activity 22.2 Driving and boring tools. 6. Holding devices – vices, clamps. 7. Cutting and paring tools – saw, paring tools, planes, chisels. Activity 22.3 Cutting and paring tools. 8. Care and maintenance of woodwork hand tools. Activity 22.4 Care of woodwork hand tools. Summary. Topic Assessment.
		23. Metalwork hand tools (SB p. 141)	• Identify the different hand tools used for metalwork. • Describe the hand tools used for metalwork. • Sketch the different hand tools used for metalwork. • Use the hand tools used in metalwork. • Care for and maintain metalwork hand tools.	1. Marking out tools – surface plate, scriber, odd-leg calipers. 2. Measuring tools and gauges – steel rule, protractor. Activity 23.1 Marking out and measuring tools. 3. Driving tools – punches, screwdrivers, spanners. 4. Cutting tools – chisels, files. Activity 23.2 Metalwork tools. 5. Care and maintenance of metalwork hand tools. Activity 23.3 Care and maintenance of metalwork tools. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 2	Theme 9 Tools, machines and processes (continued)	24. Maintenance of tools and machines (SB p. 146)	• Explain the meaning of maintenance. • Identify different types of maintenance practices. • Explain why tools and machines need regular maintenance. • Maintain and care for workshop tools and machines.	1. Maintenance – what is a machine? 2. Types of maintenance – preventative maintenance, corrective maintenance, predictive maintenance. Activity 24.1 Types of maintenance. 3. Importance of maintenance – cleaning. Activity 24.2 Cleaning and caring for tools and machinery. Summary. Topic Assessment. Practice test.
	Revision and Practice test			
	Theme 10 Basic human movement	25. Physical education and health education (SB p. 155)	• Describe the meaning and purpose of physical education. • Describe the meaning and purpose of health education. • Differentiate between physical education and health education. • Explain the scope of physical education.	1. Physical education – meaning of physical education, purpose of physical education, scope of physical education. Activity 25.1 A call to action. 2. What is health education? Meaning of health education, purpose of health education, nutrition, your environment, hygiene. Activity 25.2 Healthy eating. Activity 25.3 Personal health. 3. Difference between physical education and health education. Activity 25.4 The components of health education and physical education. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 2	Theme 10 Basic human movement (continued)	26. Physical fitness and body conditioning programme (SB p. 161)	• Explain the meaning of physical fitness. • List the components of physical fitness and differentiate between health and performance-related components. • Mention the characteristics of a physically fit person. • List appropriate exercises to develop different components of physical fitness. • Demonstrate exercises to develop strength, endurance and flexibility. • State safety precautions.	1. What does physically fit mean? 2. Importance of being physically fit. 3. Components of physical fitness – components of physical fitness for health, components of physical fitness for performance athletes. 4. Characteristics of a physically fit person. 5. Exercises to develop physical fitness – muscular strength, muscular endurance, flexibility. Activity 26.1 Practise some exercises. 6. Exercise and safety. Summary. Topic Assessment.
		27. Recreation, leisure and dance activities (SB p. 167)	• Define recreation, leisure and dance. • Differentiate between recreation, leisure and dance. • List some benefits derived from recreational and dance activities.	1. Recreation and leisure. Activity 27.1 Distinguish between recreation and leisure. 2. Dance – types of dance, dance and culture. Activity 27.2 Case study. 3. Benefits of recreation and dance. Summary. Topic Assessment.
Term 3	Theme 11 Sports and games	28. Athletics (track and field) (SB p. 171)	• Define athletics. • Describe basic skills in discus and shot put. • Perform the basic skills in discus and shot put. • Draw and label the sectors with dimensions. • Take part in warm-up activities. • List safety measures in shot put and discus. • Explain the benefits of taking part in athletics.	1. Discus throw – discus skills. Activity 28.1 Practise discus throwing. 2. Shot put – shot put skills. Activity 28.2 Practise shot put. 3. Safety when throwing. Activity 28.3 Throwing sectors. 4. Benefits of athletics. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 3	Theme 11 Sports and games (continued)	29. Ball games (SB p. 177)	• Give a brief history of soccer and volleyball. • Describe soccer and volleyball, including the equipment and surface needed for each game. • Demonstrate skills in soccer and volleyball. • Know something about the rules of each game. • Recognise who the officials are for each game. • Be aware of some of the common injuries in each game and safety measures. • Be aware of the values of each of these ball games.	1. Soccer – history of soccer, basic skills and techniques, practical performance of soccer, rules of the game, officials, facilities and equipment, common injuries, values. Activity 29.1 Soccer skills. Activity 29.2 Soccer officials. Activity 29.3 Soccer injuries. 2. Volleyball – history of volleyball, basic skills and techniques, rules of the game, practical performance of volleyball, officials, facilities and equipment, common injuries, values. Activity 29.4 Volleyball skills. 3. Activity 29.5 Comparing ball games. Summary. Topic Assessment.
		30. Contact and non-contact sports (SB p. 187)	• Differentiate between contact and non-contact sports. • Give examples of contact and non-contact sports. • List the benefits of taking part in contact and non-contact sports. • Demonstrate common skills in contact and non-contact sports. • List safety measures in contact and non-contact sports.	1. Contact sports – wrestling, judo. Activity 30.1 Wrestling. Activity 30.2 Judo. 2. Non-contact sports – gymnastics, swimming. Activity 30.3 Gymnastics. Activity 30.4 Swimming. Summary. Topic Assessment.
	Theme 12 Health education	31. Personal, school and community health (SB p. 194)	• List and explain the three determinants of health. • List four characteristics of a healthy person. • Explain the meaning of sewage and refuse. • List five methods of sewage disposal. • List three methods of refuse disposal. • List sources of water supply.	1. Factors that affect your health – hereditary, environment, lifestyle. 2. Characteristics of a healthy person. 3. Sanitation – sewage disposal, refuse disposal, water supply. Activity 31.1 A simple water filter. Summary. Topic Assessment.
		32. Food, nutrition and health (SB p. 199)	• Explain the meaning of food and nutrition. • List the different types of food. • Classify food based on nutrients. • List the importance of each food nutrient. • State the importance of food.	1. Different types of food. 2. Classes of food nutrients – carbohydrates, proteins, fats and oils, vitamins, minerals and salts, water. Activity 32.1 Nutritional value of foods. 3. Functions of food. Activity 32.2 Food groups. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 3	Theme 12 Health education (continued)	33. Pathogens, diseases and their prevention (SB p. 207)	• Identify the diseases caused by pathogens. • List different types of diseases. • Mention the effect of diseases on athletes' performance in physical activities. • List types of disease preventative measures.	1. Diseases caused by pathogens – bacterial diseases, viral diseases, fungal diseases, diseases caused by protozoans, sexually transmitted infections (STIs). Activity 33.1 Cholera. 2. Effect of diseases on athletes' performance. 3. Disease preventative measures – nutrition and exercise, clean environment, use of safe water, proper disposal of refuse and sewage, medical treatment, good hygiene, immunisation, good ventilation, health education. Summary. Topic Assessment. Practice test.
	Revision and Practice test			
	Theme 13 Early technology	34. Technology of different information ages (SB p. 214)	• Understand what is meant by different information ages. • Explain and understand the technology and tools of the Stone Age, the Bronze Age and the Iron Age. • Describe the term Middle Ages. • Explain the Industrial Age, its technologies, and how it came about. • Discuss the Electronic Age and its impacts. • Outline the main features of the Information Age.	1. The Stone Age. 2. The Bronze Age. 3. The Iron Age. 4. The Middle Ages. 5. The Industrial Age. 6. The Electronic Age. Activity 34.1. Summary. Topic Assessment.

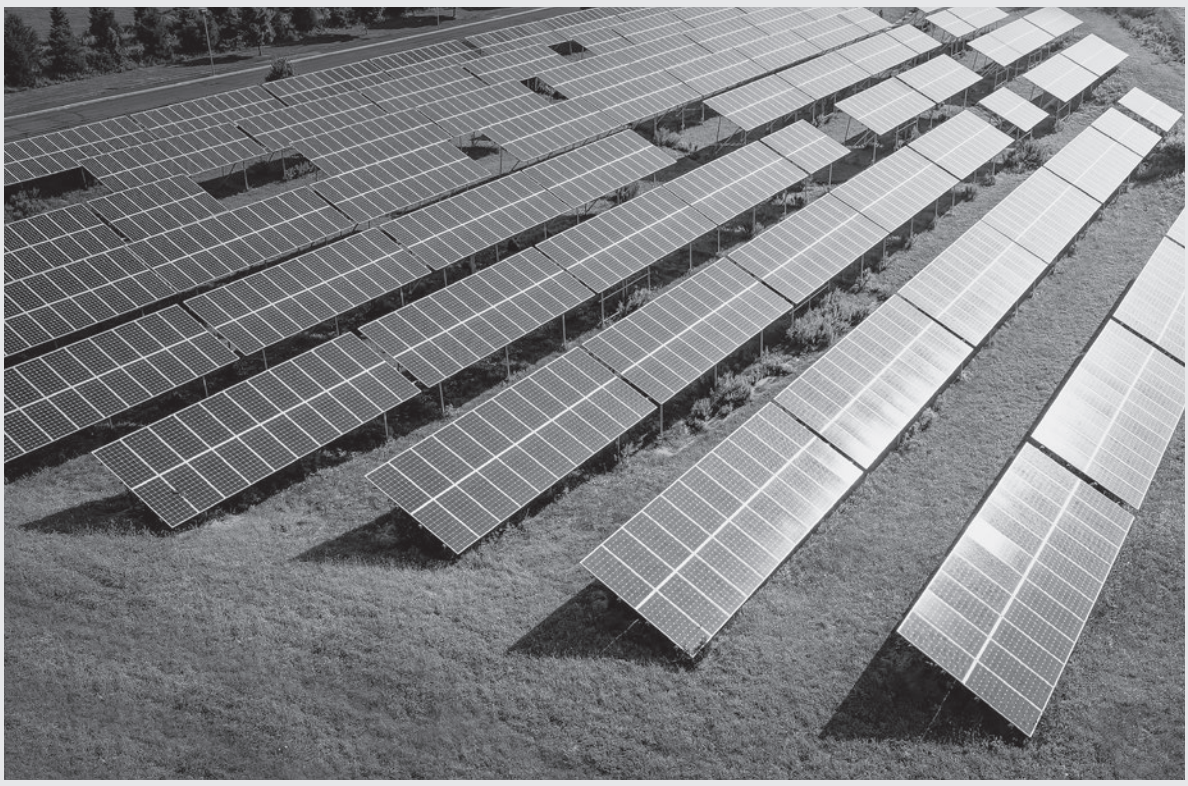
Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 3	Theme 14 Basic computer operations and concepts	35. Historical development of computers (SB p. 219)	• List early counting devices. • State the problems with counting large numbers with early counting devices. • Name mechanical counting and calculating devices. • Name electromechanical counting devices. • Compare electronic devices with modern computers. • State the contributions of named IT inventors. • Able to give the definition of a (modern) computer. • Identify the five generations of computers and describe their features. • Understand the difference between digital, analog and hybrid computers.	1. Early counting and calculating devices – limitations of early counting and calculating devices. 2. Mechanical counting/computing devices. 3. Electromechanical counting/computing devices – the Enigma machine, the Bombe device, the Herman Hollerith tabulating machine, the Zuse Z3. 4. Electronic counting/computing devices – John von Neumann's machine, electronic numeral integrator and calculator (ENIAC), the modern computer, Philip Emeagwali. 5. Generations of computers – First Generation (1942–1958) vacuum tubes, Second Generation (1959–1964) transistors, Third Generation (1964–1971) integrated circuits, Fourth Generation (1971 – present) microprocessors, Fifth Generation (present and beyond) artificial intelligence. Activity 35.1 Inventions. Activity 35.2 The abacus. Activity 35.3 Contributions of an IT inventor. Activity 35.4 Technological development of the computer. Activity 35.5 Computers and everyday life. 6. Computer systems: digital, analog and hybrid computers – digital computers, analog computers, hybrid computers. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 3	Theme 14 Basic computer operations and concepts (continued)	36. Basic computer concepts (SB p. 229)	• Define computer system. • List the parts of a computer system. • Mention the categories of the parts of a computer system. • Describe the computer as an input-processing-output (IPO) system.	1. The parts of a computer system – input devices, processing device, the systems unit, output devices, storage devices. Activity 36.1 Types of keyboards. Summary. Topic Assessment.
		37. Data processing (SB p. 236)	• Define data processing. • State the stages of data processing and describe what it entails. • State the features of a computer that make it an ideal tool for data processing. • Discuss the advantages and disadvantages of computers.	1. What is data processing – examples of data, the main types of data, qualities of good information. 2. Data processing cycle – data gathering, data collation, input stage, processing stage, output stage, storage stage. Activity 37.1 Gathering data. Activity 37.2 Case study: Online data storage. 3. Importance of computers as data processing tools – advantages of the computer, disadvantages of the computer. Activity 37.3 Handling data: Chuku Emekwa's petrol station. Summary. Topic Assessment.

Term	Theme	Topic	Performance objectives (students should be able to:)	Content covered
Term 3	Theme 15 Computer ethics	38. Basic knowledge of IT (SB p. 245)	• Define computer ethics and provide examples of ethical computer practices. • List ways of taking care of a computer room/laboratory. • State the rules and regulations of the computer laboratory. • Observe computer room rules and regulations.	1. Computer ethics. Activity 38.1 Ethical situations. 2. Taking care of the computer room. Activity 38.2 A message in cartoons. Activity 38.3 How to care for the school's computer room. 3. Rules and regulations of the computer room. Activity 38.4 Computer room rules. Summary. Topic Assessment.
		39. Applications of IT in everyday life (SB p. 250)	• State the use of IT in daily activities. • Identify the impact of IT in daily activities. • Mention some ICT devices in the home, school and environment.	1. Uses of IT – communication, timing and control, information processing or management. Activity 39.1 Using IT to communicate. Activity 39.2 Different technologies in everyday life. 2. IT and society. Summary. Topic Assessment.
		40. Information transmission (SB p. 254)	• Define information transmission. • List ancient methods of transmitting information. • Identify modern methods of transmitting information. • Differentiate between electronic and non-electronic methods of communication. • Classify information by its mode of transmission using examples.	1. Ancient methods of transmitting information – oral information, beating drums. Activity 40.1 Drum talk – Africa's 'wireless'. Town crying, firelighting, whistling, drawing diagrams, making representations. 2. Modern methods of transmitting information. 3. Modes of receiving information – visual devices, audio devices, audio-visual devices. Summary. Topic Assessment. Practice test.
	Revision and Practice test			

SECTION 1

Basic science



THEME 1

Learning about our environment

TOPIC 1: Family health

Performance objectives

1.1 Define sanitation.
1.2 State the importance of sanitation and the methods used in good sanitary practice.
1.3 Define nutrition.
1.4 Explain what a balanced diet is, giving examples.
1.5 Define drug abuse, drug misuse and drug addiction.
1.6 Describe how drugs are used in medicine.
1.7 State the effects of drug abuse.

Introduction

This topic focuses on family health and introduces the students to sanitation, nutrition and drug abuse. It should teach them to improve and maintain good health, prevent disease and reduce risky behaviours.

Activity 1.1: Advertise a cleaning agent

PAIRS (SB p. 3)

Answers

Commonly used cleaning agents can be listed on slips of paper and students can pick them out of a hat to avoid repetition. Students can cut out pictures of the cleaning agents from magazines and stick them on cardboard for their enactment. Students may mime the use of cleaning equipment rather than bring them to class as they have the potential to be cumbersome.

Activity 1.2: How water is collected in a rural village

INDIVIDUAL (SB p. 3)

Resources

Article in SB, page 3

Guidelines

Students either read the article as a class or work on their own. They answer the questions and then discuss the answers.

Answers

1. She used an unwashed bucket without a cover. It was not suitable as it had not been cleaned; it was uncovered therefore various things could get into the bucket.
2. Cleaned it/disinfected it
3. Because the water had been contaminated from various sources and was not safe to drink.
4. It could get contaminated from the dirty bucket, from being uncovered, or from leaves from the bush.
5. She could have used a clean container with a lid.
6. They should have boiled it or disinfected it.

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 1.3: Different food groups

PAIRS (SB p. 4)

Resources

Magazines, poster paper, scissors, glue

Guidelines

Facilitate a discussion on the importance of a balanced diet and explain the importance of eating food from the different food groups.

Discuss the features of a good poster.

Students bring old magazines to class.

Divide the class into pairs to prepare their posters. Towards the end of the lesson, students show their poster to the rest of class.

Discuss the information in the posters using the rubric below as a guideline.

Criteria for poster	Marks
1. Concise, accurate content with relevant and interesting information	5
2. Well-organised and well-written information with effective use of headings	5
3. Effective use of time to produce a good standard of work	5
4. Presented in an attractive, creative and visually appealing way	5
Total	20

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 1.4: Plan a menu GROUP (SB p. 5)

Resources

A blank menu plan for breakfast, lunch and supper for a week

Guidelines

This exercise can be done as a project in groups of four to five students. They plan the meals for the exercise and then submit their meal plans to you in not more than a weeks' time.

Assessment

Informal: Peer-assessment – Discuss meal plans as a class.

Activity 1.5: Drugs amongst high school students in Nigeria GROUP (SB p. 7)

Answers

1. They are easily accessible and affordable.
2. 40.1%. It is quite high.
3. Peer pressure, curiosity, social and emotional problems and any other reason
4. They can behave erratically, they may not focus well in class, they may be distracted and aggressive or inattentive and disinterested in their schoolwork. It usually affects their performance in a negative manner and they perform poorly at school. It leads to family problems and social problems, crime may increase as students resort to crime to pay for drugs. Students become less successful at school and this leads to a greater burden on the community to support out-of-work youngsters.
5. Have a class discussion on what can be done to make the open drug market less accessible to students. For example, increase policing, have a whistle-blowing hotline to report drug syndicates, etc.
6. Yes/No. Students must substantiate their answers. If yes – health education would educate the students and make them better informed as to the impact that drugs have on their bodies. Counselling will help students with some of their personal issues that drive them to do drugs and give them skills to cope better with their personal problems. If no – peer pressure is too strong, the drug problem afflicts students from diverse backgrounds irrespective of their environment. There is enough information in communities and in the media about the dangers of drugs and drug usage is on the rise.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

balanced diet – a diet consisting of the proper quantities and proportions of foods needed to maintain good health and sustain normal growth and development

drug abuse – the repeated use of illegal drugs or the misuse of medication, which causes harm to the body

hygiene – conditions and practices that help to maintain health and prevent the spread of diseases

nutrition – the process by which humans take in and use food in their bodies or the study of the diet as it relates to health

sanitation – the provision of facilities and services for the safe disposal of human urine, faeces and wastes

drug misuse – the use of a drug for purposes it was not intended for, or using too much of it

addiction – a psychological and physical inability to stop consuming a chemical, drug or substance

Topic 1: Assessment

Question 1

1.1 D ✓ (1)
1.2 D ✓ (1)
1.3 A ✓ (1)
1.4 B ✓ (1)
1.5 D ✓ (1)
1.6 C ✓ (1)
[6]

Question 2

2.1 Sanitation is the provision of facilities and services ✓ for the safe disposal ✓ of human urine and faeces ✓. (3)

2.2 a) Recycling ✓
b) Filtration ✓
c) Landfill ✓ (3)

2.3 The residents should throw their rubbish into bins ✓. This waste should be removed regularly and taken to a local dumping site that is located far away from residential areas ✓.
Plastic, paper and glass should be recycled rather than simply dumped outside ✓.
Children should not be allowed to play near dumping sites as they could be exposed to harmful bacteria and also get cut by broken glass or other sharp objects laying around ✓. (4)
[10]

Question 3

3.1 **[10]**

Class of food	Function	Example
Protein food	Required for the structure, function and regulation of the body's tissues and organs	Meat, poultry, fish, eggs
Carbohydrates	Major source of energy for the body	Bread, rice, cereals
Fats and oils	Concentrated source of energy, carries vitamins and hormones	Oil, butter, sweets
Vitamins and minerals	Protect against diseases; important for immune and nervous system	Fruit and vegetables
Protein (Dairy)	Growth and repair of body tissues, protection against infections and disease	Milk, yoghurt, cheese

Question 4

4.1 Therapeutic purposes ✓, for example used to treat allergies.
Diagnostic purposes ✓, for example dye tablets or drinks are used in x-rays to diagnose digestive system disorders.
To cure ✓ certain ailments or diseases.
Replacement ✓ of essential hormones and vitamins that are lacking in the body.
Drugs, such as vaccines, have a preventative ✓ function and ward off or lessen the severity of a disease. (5)

4.2 Drug abuse is the repeated use of drugs ✓ without prescription or instruction from a health worker ✓.
Drug abuse reduces attention span ✓ and may cause users to become paranoid and aggressive ✓. Users can lose self-control and may suffer from hallucinations ✓. (5)
[10]
Total: [36]

Topic 2: Environmental pollution

Performance objectives

2.1 Define air, soil and water pollution.
2.2 Identify various pollutants and their effects.
2.3 List various causes of pollution.
2.4 State ways to reduce the risk of pollution.
2.5 Describe pollution control.

Introduction

This topic focuses on environmental pollution and discusses air, soil and water pollution. The causes and effects of various pollutants are discussed and ways to control the pollution is described.

Activity 2.1: Sources and effects of common air pollutants INDIVIDUAL (SB p. 11)

Resources

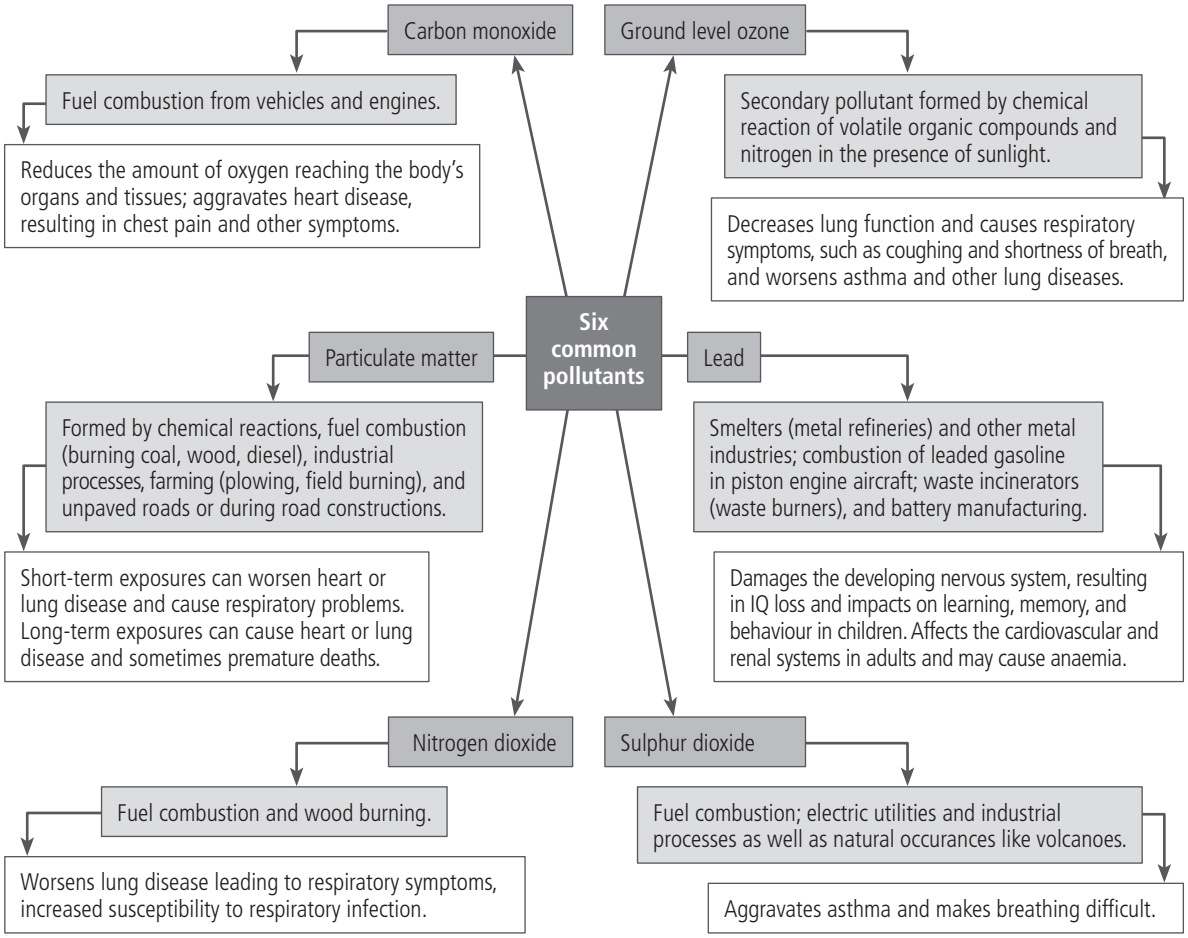
Mind map in SB, internet for research

Guidelines

Begin by discussing the six common pollutants in the mind map. Allow the students to conduct research in the library or on the internet to find the answers. Explain to the students that mind maps are used to visually organise information and that they are usually created around a single concept. In this case, the concept is: common pollutants.

Answers

When complete, the mind map should look similar to the mind map below:



Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 2.2: Biodegradable substances

INDIVIDUAL (SB p. 12)

Guidelines

The exercise can be done as classwork or homework.

Answers

1. The term 'biodegrade' means that a substance is capable of being decomposed by bacteria or other microorganisms avoiding pollution.
2. Glass bottles
3. 100 years
4. Cotton rags, rope, wool socks, leather shoes, nylon fabric
5. Tin cans, aluminium cans, plastic bottles, glass bottles, paper, milk cartons, plastic holder rings

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 2.3: Eutrophication

INDIVIDUAL (SB p. 14)

Guidelines

This task can be done as a class exercise or a homework task.

Answer

Excessive nutrients from fertilisers run off from the land into rivers and other water bodies. The high concentration of nutrients in the water causes aquatic plants, particularly algae, to grow rapidly and prolifically. High algal growth results in an algal bloom, which depletes oxygen and prevents sunlight from penetrating the water. This causes plants, fish and other aquatic organisms to die. When the dead organisms are decomposed by bacteria, more oxygen is used up and this can eventually lead to the death of the ecosystem.

Assessment

Informal: Self-assessment – Discuss the answer in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

biodegradable – a substance or object capable of being decomposed by bacteria

effluent – liquid waste or sewage discharged into water

environmental pollution – the addition of substances to the environment that may be harmful to living organisms

eutrophication – excessive nutrient enrichment of a body of water, frequently due to runoff from the land, which causes a dense growth of aquatic plant life

global warming – a gradual decrease in the overall temperature of the Earth's atmosphere due to increased levels of carbon dioxide and other pollutants in the atmosphere

greenhouse gases – gases that trap heat that would otherwise escape from Earth

pollutants – substances that cause pollution

non-biodegradable – substances that cannot be decomposed by other living organisms, thereby causing pollution

Topic 2: Assessment

Question 1

1.1 B ✓ (1)
1.2 C ✓ (1)
1.3 B ✓ (1)
1.4 A ✓ (1)
1.5 D ✓ (1)
[5]

Question 2

2.1 a) Carbon dioxide ✓ – respiration/ burning of fossil fuels ✓.
Methane ✓ – agricultural practices/ livestock production ✓. (4)

b) Global warming causes sea levels to rise ✓. This leads to the loss of habitats ✓ and causes widespread extinction ✓.
Rainfall patterns change with global warming ✓ and this leads to unusual droughts, fires and flooding in certain areas ✓.
Warming of the seas cause collapse of ecosystems ✓.
(Any five of these answers.) (5)

2.2. a) Chlorofluorocarbons ✓ They react with ozone molecules to break them apart ✓ and this causes thinning ✓ of the ozone layer. (3)

c) It can cause cancer ✓ and cataracts ✓. (2)

2.3 Pollutants in the soil decrease the number of bacteria, fungi and soil organisms such as earthworms ✓.
A decrease in these important soil organisms decreases the ability of soil particles to bind with each other, leading to erosion ✓ and loss of soil fertility ✓. (3)
[17]

Question 3

3. 5; 1; 4; 6; 2; 3
✓✓✓ Correct sequence
✓✓ 1 sentence out of sequence
✓ 2 sentences out of sequence
[3]
Total: [25]

TOPIC 3: Living and non-living things

Performance objectives

3.1 Recognise that all living and non-living things are made up of matter.
3.2 List three states of matter.
3.3 Collect and identify samples of living and non-living things in their environment.
3.4 List the distinguishing characteristics of living and non-living things.
3.5 State the importance of plants and animals to human beings.
3.6 Collect samples of some living and non-living things, sort out the materials and explain the uses.

Introduction

This topic covers matter, the characteristics of living and non-living things, the importance of plants and animals and the classification of non-living things.

Activity 3.1: Investigate matter

GROUP (SB p. 17)

Resources

Some plastic bags, collecting jars, spoons

Guidelines

Arrange students in groups and instruct them to take care when collecting living organisms. Allow them to go outside to collect living and non-living things and return to the classroom to complete the activity.

Answers

3. a) Students should draw up a table to classify their specimens as living or non-living.
   b) Students discuss whether their samples are solids, liquids or gases.
   c) Students should draw up a table like the one in the SB to classify their specimens as solids, liquids or gases.
4. Answer depends on the samples that students have collected.

Activity 3.2: Do air and water take up space?

CLASS (SB p. 18)

Resources

Some plastic bags, straw, water, a stone, a book

Guidelines

You will need to set up four plastic bags for the class demonstration before this lesson. One bag is filled with air, one with water and one contains a stone. The fourth bag is used for blowing into. Pass the three bags around the class and students must look at the shape of the bags and discuss how each one feels. Use the fourth bag to blow into and then allow students to complete Question 4.

Answers

4. a) The **shape** of the bag that was filled with water could change. Water is a **liquid**.
   b) The stone felt **hard**. The stone is a **solid**.
   c) The bag that was filled with air was **light**. It has no definite **shape**. Air is a **gas**.
   d) The book on top of the bag was **raised** when the plastic bag was filled with air. Air takes up **space** even though we cannot see it.

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 3.3: Identify the characteristics of living things

PAIRS (SB p. 21)

Guidelines

You can set this as a classwork or a homework task.

Answers

1. a) Photosynthesis – a process in green plants that uses carbon dioxide, water, chlorophyll and light energy to make food such as glucose. Oxygen is produced.

b) Respiration – a process in all living things that uses oxygen and glucose to make energy and carbon dioxide
c) Autotrophic – an organism that is able to make its own food by photosynthesis
d) Excrete – to remove waste products
e) Chlorophyll – a green pigment found in plant cells

2. a) A – growth; B – growth/sensitivity; C – movement; D – reproduction
b) Excretion, respiration, nutrition

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 3.4: Importance of plants and animals

PAIRS (SB p. 22)

Guidelines

Allow students to work and research in pairs for this activity.

Answers

1. Maize, sorghum, millet
2. Plants remove carbon dioxide from the atmosphere and release oxygen into it during the day when they photosynthesise. At night, they remove oxygen and produce carbon dioxide by respiration.
3. Monkeys, chimpanzees, bats, some insects, birds
4. a) Cows, goats
b) Donkeys, camels
5. Plants produce energy that they need for life by photosynthesis. They use carbon dioxide, water, chlorophyll and light energy to make food such as glucose. Glucose is used to make energy by respiration. Oxygen is produced.

Assessment

1. Informal: Self-assessment – Discuss the answers in class.

Activity 3.5: Collect and identify non-living things

GROUP (SB p. 23)

Guidelines

Students should collect ten non-living items and complete the table.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

atoms – small particles that make up matter
autotrophic – organisms like plants that are able to make their own food
chlorophyll – a green pigment found in plants
excrete – to remove waste products from chemical reactions in the body
heterotrophic – organisms like animals that eat other organisms
matter – anything that takes up space and has mass
photosynthesis – the process that plants use to make food
respiration – chemical reactions in all living cells that produce energy using food and oxygen
state – whether an object is a solid, liquid or gas

Topic 3: Assessment

Question 1

1. a) 142 cm ✓✓ (2)
   b) 168 cm ✓✓ (2)
   c) 16 cm ✓✓ (2)
   d) Zeenat ✓✓ (2)
   [8]

Question 2

2. a) Metal ✓✓ (2)
   b) It will be a conductor of heat ✓ and electricity ✓, it will be able to be drawn into thin wires ✓, it will be very strong ✓, it may be magnetic ✓. (any 4 = 4)
   [6]

Question 3

3. a) Any living thing, such as a plant, animal, etc. ✓. (1)
   b) Any metal, such as copper, iron, aluminium, lead, silver, etc. ✓. (1)
   c) Any non-metal, such as oxygen, carbon, sulphur, nitrogen, etc. ✓. (1)
   d) Wood ✓ (1)
   [4]

Total: [18]

THEME 2

Human development and reproduction

TOPIC 4: Human development

Performance objectives

4.1 Understand the meaning of puberty and adolescence.
4.2 Discuss puberty/adolescence changes.
4.3 Understand the importance of personal hygiene.
4.4 Learn about the menstrual cycle and hygiene.
4.5 Discuss the myths and facts about pubertal changes.
4.6 Learn how to cope with concerns at adolescence.

Introduction

This topic covers puberty and adolescence and the changes that take place during this time. It includes myths and facts about changes in puberty.

It also includes the menstrual cycle and hygiene as well as coping with adolescence.

ACTIVITY 4.1: Puberty changes

INDIVIDUAL (SB p. 29)

Students can write down and tick any seven from the following list of changes:

Change that takes place	Boys only	Girls only	Both boys and girls
breast development		✓	
pubic hair growth			✓
underarm hair growth			✓
menstruation starts		✓	
testicles get larger	✓		
penis gets larger	✓		
voice deepens	✓		
facial hair develops	✓		

ACTIVITY 4.2: Body odour during puberty

INDIVIDUAL (SB p. 29)

Body odour: hormonal changes take place that cause glands to develop, e.g. in the armpits. These release a chemical that causes an odour.

Key words

menstruation – also known as having a period; the loss of blood from the vagina during the monthly cycle
menstrual cycle – the cycle that prepares the body for pregnancy
vaginal flora – useful bacteria that live in the vagina
ovulation – the release of an egg from the ovary
semen – fluid and sperm cells
puberty – a time in the life of young people when their bodies change to become sexually mature and able to reproduce
adolescence – period following puberty during which a young person develops from a child to an adult

Topic 4: Assessment

Question 1

1.1 D ✓ (1)
1.2 A ✓ (1)
1.3 C ✓ (1)
[3]

Question 2

2. It is not likely ✓ but is possible because sperm can live for up to five ✓ days in the female body and ovulation ✓ time may vary, so it can be difficult to predict ✓. **[4]**

Question 3

3. Both boys and girls grow underarm ✓ and pubic hair ✓. **[2]**

Question 4

4. A menstrual period is the vaginal bleeding ✓ that takes place at the end of the menstrual cycle ✓. **[2]**

Total: [11]

TOPIC 5: The reproductive system

Performance objectives

5.1 Identify male and female reproductive organs (internal and external) and know its functions.
5.2 Understand how to take care of male and female reproductive organs.

Introduction

This topic covers the structure of the male and female reproductive systems as well as the functions of the various parts.

The importance of keeping these organs healthy and disease-free is also covered.

ACTIVITY 5.1: Diagram of male reproductive system

INDIVIDUAL (SB p. 32)

1 = bladder
2 = testis
3 = scrotum
4 = urethra
5 = penis
6 = vas deferens

ACTIVITY 5.2: Human reproductive system

INDIVIDUAL (SB p. 33)

a) fallopian tubes
b) testes
c) ovaries
d) There could be no fertilisation and, therefore, no pregnancy.
e) semen

Key words

glands – a structure in the body that produces and releases substances
fertilised – an egg and sperm cell that have joined together
secretions – useful substances produced and released, usually by a gland, in the body

Topic 5: Assessment

Question 1

1. They need to be strong and muscular ✓ to be able to contract ✓ to push the baby out of the uterus ✓ and down the vagina, out of the body ✓. **[4]**

Question 2

2. a) Ovaries produce the eggs (ova) ✓ and female hormones, oestrogen and progesterone ✓. (2)
   b) Testes produce sperm ✓ and the male hormone testosterone ✓. (2)
   [4]

Question 3

3. The urethra carries both semen ✓ and urine ✓ out of the body. **[2]**

Total: [10]

TOPIC 6: Human reproduction (i)

Performance objectives

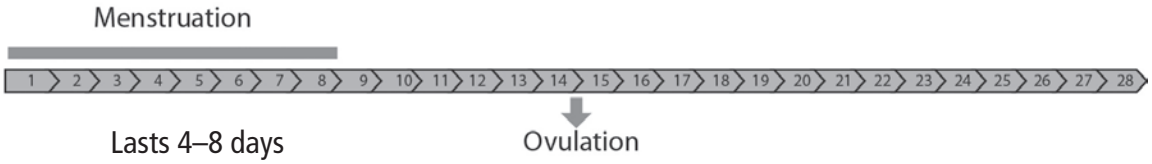
6.1 Understand how the menstrual cycle works.
6.2 Understand what ovulation is.
6.3 Understand the process of fertilisation (conception).

Introduction

This topic covers that sequence of the menstrual cycle, including ovulation and the fertilisation of the egg (conception).

ACTIVITY 6.1: Draw a menstrual cycle

INDIVIDUAL (SB p. 36)



Timeline of a 28-day menstrual cycle

Key words

gamete – male or female reproductive cell (egg and sperm in humans)
zygote – cell formed when a male and female gamete join together
embryo – developing baby in the early stages of pregnancy
foetus – developing baby in the later stages of pregnancy

Topic 6: Assessment

Question 1

1. a) ovulation ✓ (1)
   b) fallopian tube ✓ (1)
   c) zygote ✓ (1)
   [3]

Question 2

2. The lining of the uterus breaks down ✓ and the unfertilised egg comes out ✓ with the lining in the menstrual flow ✓. **[3]**

Total: [6]

TOPIC 7: Human reproduction (ii)

Performance objectives

7.1 Understand the growth process of a foetus.
7.2 Know the symptoms of pregnancy and where to get help.
7.3 Know the difference between myths and facts about teen pregnancy.
7.4 Understand the consequences/implications of teen pregnancy on a physical, social and emotional level.
7.5 Know the effects of drugs and self-medication.
7.6 Know the effects of drug abuse.
7.7 Understand the causes and consequences of birth defects.

Introduction

This topic covers the development of the foetus and teenage pregnancy. The effects of prescription medicines and self-medications is covered, as well as the effect of drug abuse, including tobacco, alcohol and illegal drugs. Birth defects are also discussed.

ACTIVITY 7.1: Research a birth defect

INDIVIDUAL OR GROUP (SB p. 41)

This can be done individually or in groups. The poster should be colourful and eye-catching without too much detailed wording.

Sickle cell disease

- Fairly high incidence in Nigeria.
- Red blood cell disorder.
- Not enough normal red blood cells to carry oxygen around the body.
- Some cells are sickle or crescent shaped. They block some blood vessels.
- No cure.
- Treatment can relieve pain and help prevent problems associated with the disease.
- Parents can be screened to see if they are carriers.

Cystic fibrosis

- Also an inherited condition.
- The lungs and digestive system are attacked.
- The body produces thick, sticky mucus which can clog lungs and block the pancreas.
- It can be life-threatening.
- People with cystic fibrosis usually have a shorter life-span than other people.

ACTIVITY 7.2: Study a graph showing conception under 18 years

INDIVIDUAL (SB p. 41)

Investigate early pregnancies.

1. 45,000 girls
2. Any reasonable ideas e.g. there may have been more education on the consequences of early pregnancy; contraceptives could have been more easily available.

ACTIVITY 7.3: Complete a table showing effects of substance abuse

INDIVIDUAL (SB p. 42)

Any one consequence for each cause:

Cause	Consequence
Tobacco (smoking)	The baby can be born too early and have a low birth weight. The baby may also suffer from heart defects, a cleft lip and palate and other defects.
Alcohol	The baby could suffer from foetal alcohol syndrome (FAS). This can cause them to be born early or underweight and not grow well. These children have a small head and small eyes and often have learning problems at school. They may have behaviour problems and battle to get on with other people.

Cause	Consequence
Illegal drugs Marijuana (cannabis)	There is a risk of the baby being premature or having a low birth weight. The chemicals in marijuana stop the baby getting enough oxygen.
Cocaine	The effects of cocaine on the foetus can last for its lifetime. It can lead to the baby being born early or sometimes causes the death of the foetus. If the mother smokes crack cocaine during her pregnancy, the child may have learning problems at school when it is older.
Crystal meth	Crystal meth causes the heart rate of the mother and baby to increase. The baby can be born addicted to the drug and may suffer withdrawal symptoms.
Heroin	The baby can be born addicted to heroin and suffer withdrawal symptoms.

Key words

hormones – special chemicals that travel in the bloodstream and carry messages to other parts of the body

pelvis – the bony structure that is shaped like a bowl and made up of the hip bones and lower back bones

abort – deliberately stopping a pregnancy and causing the embryo or foetus to leave the uterus

placenta – the organ where the foetus is joined to the uterus of the mother; it provides the foetus with food and oxygen and removes wastes from it

cleft lip and palate – a birth defect that causes the foetus to develop with a split in the upper lip and roof of the mouth

premature baby – a baby that is born more than three weeks before its due date

Topic 7: Assessment

Question 1

1.1 A ✓ (1)
1.2 D ✓ (1)
1.3 C ✓ (1)
[3]

Question 2

2. Any three, but must include the first one below:
   - missed period
   - nausea
   - swollen/tender breasts
   - tiredness
   - mood swings
   - heartburn. **[3]**

Question 2

3. a) At conception ✓. (1)
   b) From either one or both parents ✓. (1)
   c) Any three, including:
      - heart defect
      - cleft lip and palate
      - spina bifida
      - club foot
      - Down syndrome
      - cystic fibrosis
      - sickle cell disease. (3)

[5]

Question 4

4. a) implantation ✓ (1)
   b) foetus ✓ (1)
   c) foetal alcohol syndrome ✓ (1)

[3]

Total: [14]

TOPIC 8: HIV/AIDS

Performance objectives

8.1 Understand the meaning of HIV and AIDS.
8.2 Differentiate between HIV and AIDS.
8.3 Understand the mode of transmission.
8.4 Identify behaviours that put people at risk.
8.5 Know how to prevent HIV and AIDS.
8.6 Realise that counselling is available.
8.7 Understand the importance of community care and support.
8.8 Distinguish between myths and facts about HIV and AIDS.

Introduction

This topic discusses the HIV virus and that it can develop into AIDS. Although there are treatments available, there is no cure.

The way that the HIV virus is passed from one person to another is covered, as well as ways to avoid contracting the virus.

The importance of counselling for HIV and AIDS patients, and also of community involvement, also forms part of this topic.

There are many incorrect ideas and myths about HIV and AIDS, and some of these are discussed.

ACTIVITY 8.1: Make a poster

GROUP (SB p. 47)

Guidelines

The poster should be colourful and eye-catching and should not have too much detailed information on it. It should highlight the main ways HIV can be prevented from spreading, especially relating to young people.

ACTIVITY 8.2: Identify myths and facts about HIV and AIDS

INDIVIDUAL (SB p. 47)

Answers

Answer true or false for each of the following statements:

1. You can tell if someone has HIV or AIDS by looking at them. False
2. Circumcision prevents the spread of HIV. False
3. HIV is caused by bacteria. False

Key words

virus – a very small particle that causes disease
sterilised – made free of bacteria and other microorganisms
STD – a sexually transmitted disease, most often spread during sex
caesarean section – using surgery to deliver the baby, rather than a vaginal, or normal, birth

Topic 8: Assessment

Question 1

1. C ✓ **[2]**

Question 2

2. The virus could get passed on during her pregnancy ✓, she could pass it on during childbirth ✓, or she could pass it on while breastfeeding ✓. **[3]**

Question 3

3. If needles or equipment ✓ used for tattoos or body piercing is not sterilised ✓, it could have some blood ✓ from the previous person who used it, in or on it. That person could be HIV ✓ positive and the virus could then pass to the next person ✓ using it. **[5]**

Total: [10]

THEME 3

You and energy

TOPIC 9: Energy

Performance objectives

9.1 Explain the meaning of energy.
9.2 State and describe the sources of energy.
9.3 Name forms of energy.
9.4 Explain how energy is transformed from one form to another.
9.5 State the uses of energy.

Introduction

This topic covers energy – its sources, forms, uses and transformations.

Activity 9.1: Discuss sources of energy

GROUP (SB p. 50)

Guidelines

Help students brainstorm sources of energy in Nigeria. Mention illegal tapping of natural gas pipelines.

Activity 9.2: Match forms of energy

PAIRS (SB p. 52)

Answers

1. A – Light energy
   B – Chemical energy
   C – Kinetic energy
   D – Light and heat energy
   E – Gravitational potential energy
   F – Sound energy
   G – Electrical energy
   H – Elastic potential energy
   I – Nuclear energy

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 9.3: Interpret an energy transformation diagram

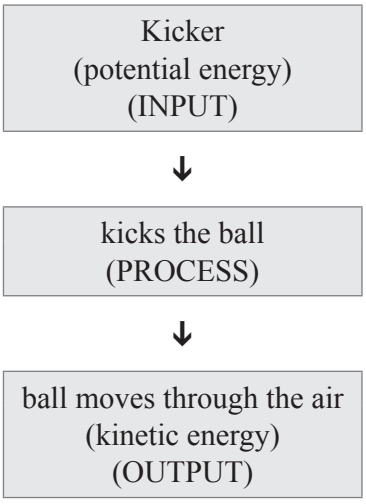
INDIVIDUAL (SB p. 54)

Guidelines

If students find it difficult to consolidate energy transformation diagrams, give them some other examples.

Answers

1. Elastic potential energy of bat and gravitational potential energy of ball
2. Kinetic energy
3. a) i)



ii)

Heat source (electrical energy) (INPUT)

↓

water heats up (PROCESS)

↓

water boils (heat energy) (OUTPUT)

b) Students to draw a similar diagram using their own example.

Activity 9.4: Show energy transfer in a system

GROUP (SB p. 54)

Resources

Flexible plastic ruler, measuring tape, eraser

Guidelines

Arrange students in groups and read through the instructions for the activity. Students record their results before answering the questions.

Answers

1. The more the ruler is bent, the further the eraser will travel.
2. The initial energy is elastic potential energy in the ruler that is transformed to kinetic or movement energy of the eraser.
3. The eraser flew through the air as the ruler sprung back.
4.

Ruler pulled back (potential energy) (INPUT)

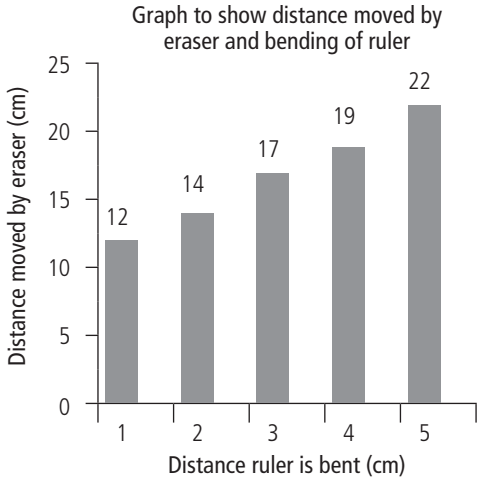
↓

pushes eraser (PROCESS)

↓

eraser flies through the air (kinetic energy) (OUTPUT)

5. Conclusion – The more potential energy there is in the bent ruler, the more kinetic energy the eraser gets and so it moves further.
6. Repeat the experiment several times and take an average of the results at each amount of bending.
7. Students should draw a bar chart that looks something like the one below.



How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

non-renewable sources of energy – sources of energy that cannot be replaced once they have been used, for example coal and oil

photovoltaic cells – special panels that can absorb light energy and convert it to electricity

potential energy – energy that is stored in a system

renewable sources of energy – sources of energy that can be replaced, for example wind energy

transformed – changed or converted

Topic 9: Assessment

Question 1

1. Coal ✓, oil ✓, wind ✓, hydropower ✓, solar energy ✓, wood ✓, gas ✓. **[7]**

Question 2

2. a) The Sun ✓✓; hydropower ✓✓; fossil fuels ✓✓. (any one) (2)
   b) Nuclear energy ✓✓; chemical energy from batteries ✓✓. (any one) (2)
   [4]

Question 3

3.

Renewable	Non-renewable
wind ✓	coal ✓
hydropower ✓	diesel ✓
solar power ✓	nuclear power ✓

[6]

Question 4

4. Energy is the ability to do work ✓✓. **[2]**

Question 5

5. Petrol ✓ and diesel ✓. **[2]**

Question 6

6. a) Light energy is also called solar ✓ energy. (1)
   b) Energy that is stored in a stretched elastic band is called potential ✓ energy. (1)
   c) Kinetic ✓ energy comes from vibrating objects. (1)
   d) Kinetic ✓ energy is also called movement energy. (1)
   e) The energy stored in atoms is called nuclear ✓ energy. (1)
   f) Energy transferred by a difference in temperature is also called heat/thermal ✓ energy. (1)
   g) Gravitational energy is energy that is stored in a raised ✓ object. (1)
   h) Moving water is a source of kinetic ✓ energy (1)
   i) Energy systems ✓ can store and release energy. (1)
   [9]

Question 7

7. a) A wind turbine is an example of an energy system as the input is wind ✓ which is transformed to kinetic energy of the blades ✓. The kinetic energy is used to drive a turbine which is the process ✓. The output is electrical energy ✓. (4)
   b) i) Stone in a catapult with potential energy (input) ✓ → released (process) ✓ → stone moves → kinetic energy (output) ✓ (3)
   ii) Electrical energy (input) ✓ → sound system (process) ✓ → sound produced (output) ✓ (3)
   iii) Wood (potential energy) ✓ → combustion (process) ✓ → heat and light energy (output) ✓ (3)
   [13]

Question 8

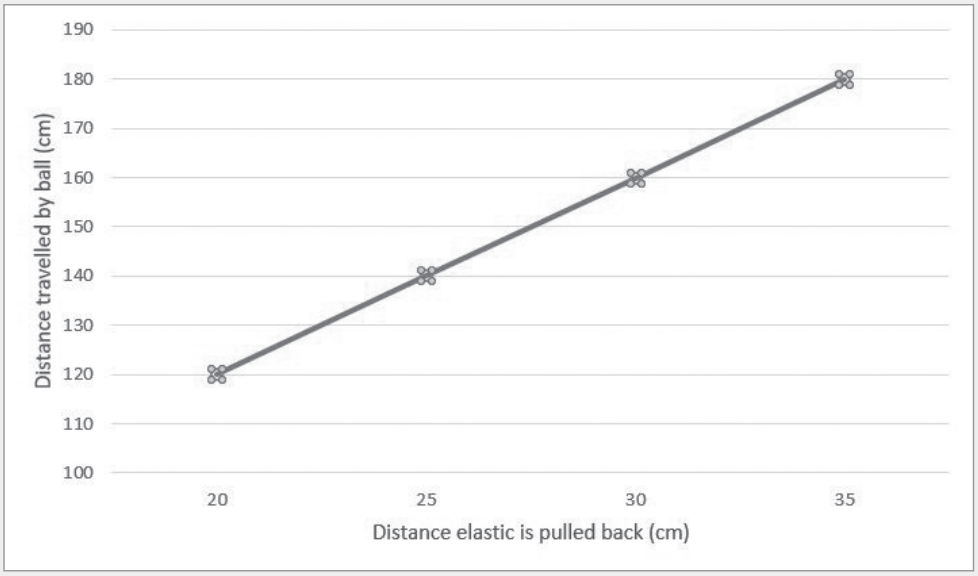
8. a) Plants use the Sun's light energy to make food through photosynthesis for other living things ✓. Fuels, such as petrol and diesel, provide energy for the engines to run ✓. Energy from wind can be used to make electricity ✓. We need energy in our homes for cooking, providing light, playing music, charging our mobile phones, and helping to keep the temperature comfortable ✓. (4)

b) Photosynthesis is part of an energy system as the input ✓ is the Sun's energy ✓, the process is photosynthesis that takes place in green parts of the plant ✓ and the output is food ✓. (4)

[8]

Question 9

9. a) Graph to show how the distance travelled by a ball depends on the distance the catapult's elastic is pulled back



Heading ✓ (1)
Axes labelled ✓✓ (2)
Points plotted ✓✓✓✓ (4)
Neatness ✓ (1)

b) 30 cm ✓ (1)

[9]

Total: [67]

TOPIC 10: Renewable and non-renewable energy

Performance objectives

10.1 Explain the meaning of renewable and non-renewable energy.
10.2 Give examples of renewable and non-renewable energy.
10.3 State the implications of misuse of non-renewable energy.
10.4 Describe how energy generation affects quality of life.

Introduction

This topic covers renewable and non-renewable energy – its sources and the advantages and disadvantages of each type.

Activity 10.1: Revise energy sources

INDIVIDUAL (SB p. 57)

Guidelines

Help students match sources of energy to definitions.

Answers

1. – A; 2. – C; 3. – B; 4. – F; 5. – E;
6. – D; 7. – G

Activity 10.2: Discuss the advantages and disadvantages of renewable energy sources

GROUP (SB p. 58)

Guidelines

Assist students to draw up tables.

Answers

1. A renewable energy source is one that can be renewed or replaced once it is used.
2. Solar power, wind energy, biofuels, wood, hydropower
3. Trees can be planted to replace trees used for wood. Wind power is supplied whenever the wind blows.
4.

Type of energy	Advantages	Disadvantages
Wind	Does not cause pollution	Does not look good, can catch fire easily
Solar power	Does not harm the environment; cheap	Does not function on cloudy days
Biofuels	Use plants for fuel, does not harm the environment	Uses up agricultural land
Hydropower	Does not cause pollution	Disrupts the natural flow of the river

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 10.3: Discuss advantages and disadvantages of non-renewable energy sources

INDIVIDUAL (SB p. 59)

Guidelines

Assist students to draw up tables.

Answers

1. A non-renewable energy source is one that cannot be replaced once it is used up.
2. Oil, coal, natural gas, nuclear power
3. Oil and natural gas are present on Earth in finite amounts – once these are used up there is no more.

4.

Type of energy	Advantages	Disadvantages
Coal	Cheap	Damages environment by production of greenhouse gases
Oil	Available in great quantities	Damages the environment Oil tankers can have accidents
Natural gas	Available in great quantities	Highly flammable
Nuclear power	Can produce large amounts of energy; no greenhouse gases produced	Can cause accidents with the release of harmful radation

Activity 10.4: Case study INDIVIDUAL (SB p. 60)

Guidelines

Assist students with reading difficulties.

Answers

1. He was a welder.
2. He had to close his business as there was no electricity supply and the cost of renting a generator was too high.
3. a) An apprentice is someone who is learning a trade such as welding.
   b) They had to find other work.
4. Improved supply of power to cities and towns; greater production of power.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

climate change – changes to the temperature and rainfall patterns as a result of too much gas in the atmosphere
fermented – when the sugar in something (for example a plant) has changed to alcohol
fossil fuels – fuels like coal, oil and natural gas that were formed millions of years ago by dead plants and animals
nuclear fission – splitting the nucleus of an atom
sustainable – able to use something continuously

Topic 10: Assessment

Question 1

1. They are sustainable ✓, which means that they can be used for a long time ✓. They do not cause pollution ✓. Examples include wind, solar, hydropower and wood ✓. **[4]**

Question 2

2. Chemical ✓, wind ✓, light ✓, nuclear ✓, hydropower ✓, elastic potential energy ✓, and gravitational potential energy ✓. (any 6 = 6) **[6]**

Question 3

3. Students should draw a diagram similar to Figure 10.2 on page 58 in the Student's Book.
   Labels: Reservoir ✓, sluice gates ✓, powerhouse ✓, power lines ✓, turbine ✓. (any 4 = 4) **[4]**

Question 4

4. Advantages: Does not harm the environment ✓; provides cheap electricity ✓. (2)
   Disadvantages: No power on cloudy days ✓. (1)
   [3]

Question 5

5. a) Sugarcane ✓, maize ✓, sunflowers ✓. (any 2 = 2)
   b) Agricultural land is used ✓ that could be used for food crops ✓. (2)
   [4]

Question 6

6. Kinetic energy ✓ is changed to electrical energy ✓. **[2]**

Question 7

7. Produces greenhouse gases when burned ✓; can lead to deforestation ✓. **[2]**

Question 8

8. a) It is the energy that is released when the nuclei of atoms ✓ of some material, like uranium, are split ✓. (2)
   b) Advantage: Large amounts of energy are produced ✓.
   Disadvantages: Radioactive waste is produced ✓; can cause meltdown of reactors ✓. (3)
   c) Uranium ✓ (1)
   [6]

Question 9

9. Oil ✓, coal ✓, natural gas ✓. **[3]**

Question 10

10. There are often interruptions to the electricity supply in Nigeria ✓. This is challenging as many industries and people depend on it for their work ✓. Many Nigerians have had to find other employment ✓ that does not rely on electricity ✓. (any 3) **[3]**

Total: [37]

TOPIC 11: Forces

Performance objectives

11.1 Explain the meaning of force.
11.2 Identify contact and non-contact forces.
11.3 Differentiate between magnetic and gravitational forces.
11.4 Measure and calculate gravitational force when mass and height are provided.
11.5 Describe how to set up a balanced force.
11.6 Explain the meaning of friction, its uses, advantages and disadvantages.

Introduction

This topic explains the meaning of force, and the different types of force. Students will find out how contact and non-contact forces, and magnetic and gravitational forces, differ. Balance and imbalance are discussed, and the important concept of friction, along with its practical advantages and disadvantages, receive attention.

Activity 11.1: Mass and force

INDIVIDUAL (SB p. 63)

Guidelines

To start off this topic ask students: "How much do you know about forces?"

Answers

1. True
2. False
3. False (if she only used her own strength)
4. True
5. False

Assessment

Informal: Teacher, students and self

Activity 11.2: Contact and non-contact forces

INDIVIDUAL (SB p. 65)

Answers

1. Contact forces, where the objects touch, include frictional, tensional, air resistance, applied and normal forces. Non-contact forces result from action-at-a-distance, meaning the objects are not in contact, and include gravitational, electrical and magnetic forces.
2. a) Non-contact
   b) Contact
   c) Contact
   d) Non-contact
   e) Non-contact
3. Force
4. Type of force.

Activity 11.3: Potential energy

INDIVIDUAL (SB p. 66)

Guidelines

Use this short activity to get students thinking about energy and forces.

Answers

1. Potential energy due to gravity is, for example, a boulder resting at the top of a cliff or an apple about to fall from a tree.
2. d) 168.56 J

Activity 11.4: Balanced and unbalanced forces

INDIVIDUAL (SB p. 68)

Guidelines

Ask students to think about the direction of forces acting on an object.

Answers

1. Forces acting on a boulder.
2. A: Friction
   B: Boulder moving right to left
   C: Earth's surface pushing upward
   D: Gravity pulling downward

Activity 11.5: Frictional resistance

PAIRS (SB p. 69)

Guidelines

Emphasise the role of friction as a counter-force.

Answers

1. Friction is a force that holds back the movement of an object with which it is in contact. Examples: Friction stops objects from slipping or sliding; gives vehicle tyres traction; belts and pulleys rely on friction to transfer energy; used as a braking force to slow down objects such as cars and bicycles; and grindstones used to sharpen blades.
2. a) Object D – because surface area is greatest.
   b) Object E – because it has the least contact surface area that will not change as the wheel rotates.
   c) Object C – because when it moves it will fall over and change the contact surface area.
3. Friction causes heat.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

balanced force – any pushes and pulls are balanced by another force in the opposite direction

contact force – a force where objects touch

force – any interaction that changes the motion of an object

friction – a force that holds back the movement of an object with which it is in contact

gravitational force – a force driven by the mass of an object

magnetic force – a force driven by electrical properties

non-contact force – a force where objects are not in contact

unbalanced force – a force that causes a change in the motion of an object

Topic 11: Assessment

Question 1

1.1 B ✓ (1)
1.2 B ✓ (1)
1.3 A ✓ (1)
[3]

Question 2

2. A force is any interaction ✓ that tends to change the motion of an object ✓.
[2]

Question 3

3. Contact force: where the objects touch ✓✓.
Non-contact: results from action-at-a-distance ✓, meaning the objects are not in contact ✓. **[4]**

Question 4

4. a) Applied force: is a force that is applied ✓ to an object ✓ by a person or another object ✓.
b) Gravitational force: is the force with which the Earth ✓, Moon or other large object ✓ attracts other objects towards itself ✓.
c) Normal force: is the support force exerted ✓ upon an object that is in contact ✓ with another stable object ✓.
d) Spring force: is the force exerted ✓ by a compressed or stretched spring ✓ upon any object that is attached to it ✓.
e) Tension force: is the force that is transmitted ✓ through a string, rope, cable or wire ✓ when it is pulled tight by forces acting from opposite ends ✓. (3 × 3 = 9)
[9]

Question 5

5. A balanced force is when all forces acting on an object ✓ balance each other ✓ the object will be at equilibrium ✓ and it will not accelerate or change its position ✓.
An unbalanced force changes the state of motion ✓ of an object ✓ and causes acceleration ✓✓. **[8]**

Question 6

6. Any three advantages:
- stops objects from slipping or sliding ✓
- gives vehicle tyres traction ✓
- belts and pulleys rely on friction to transfer energy ✓
- used as a braking force to slow down objects such as cars and bicycles ✓
- used to sharpen blades ✓ (3)

Any three disadvantages:
- generates heat, which is a waste of energy ✓
- slows down moving objects in contact with air ✓
- causes wear and tear on contact surfaces between moving parts ✓
- expensive lubricants are needed in machinery to lessen the force of friction ✓. (3)

[6]
Total: [32]

THEME 4

Science and development

TOPIC 12: The Earth in space

Performance objectives

12.1 Explain the terms gravitation, weightlessness, satellite and space travel.
12.2 State the effects of gravitation.
12.3 Identify the different bodies in the solar system.
12.4 Explain rotation and revolution of the Earth and Moon.
12.5 Explain and illustrate solar and lunar eclipses.
12.6 Understand seasons.

Introduction

The Earth's position in the solar system and the concepts of gravitation, weightlessness, satellite and space travel are introduced. Students are introduced to different bodies in the solar system, and the relationship between the Sun, Earth and the Moon in terms of how they are positioned with respect to one another.

Activity 12.1: Gravity and weightlessness

INDIVIDUAL (SB p. 72)

Resources

Round objects of different size to demonstrate the concept of bigger objects exerting greater gravitational attraction, e.g. a bathroom scale, stone, a smaller stone, a feather

Guidelines

Stress the concept of gravity increasing with an increasing size of an object.

Answers

1. Weightlessness is what you feel when there are no external objects touching your body and pushing, or pulling, on it. The force of gravity cannot be felt through contact; it is an action-at-a-distance force.
2. The order is a) marble; b) a solid ball, like a cricket ball; c) the Earth; d) the Sun. They are arranged by size – the bigger the object, the bigger the force of gravity which it exerts.
3. A skydiver experiences weightlessness while in a state of free fall because all contact forces are removed.
4. Readings on a scale change because of the force of gravity acting on the object being measured (gravitational force) and recording different readings relative to the mass of the object on the scale (contact force).
5. They will reach the ground at the same time.

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 12.2: Day and night

GROUP (SB p. 74)

Resources

Torch and ball to give a three-dimensional demonstration

Guidelines

Stress that the Sun's light, and rotation of the Earth (once in 24 hours) is the primary cause of day and night.

Answers

For questions 1 and 2, set up the experiment.

3. The torch represents the Sun, and the ball represents the Earth.

4. One side of the ball is in shadow/ darkness.
5. and 6. Point X is now in darkness/shadow.
7. Day and night on Earth occurs because of the Earth's rotation on its axis once every 24 hours causing one half of Earth to be in shadow and one in light.

Activity 12.3: Eclipses

GROUP (SB p. 74)

Resources

Sticky tape; a cardboard tub (empty toilet paper roll or make your own); scissors to cut cardboard; aluminium foil (optional); wire (35 to 50 cm long); a styrofoam ball about 10 cm in diameter, or any round fruit about this size; a ping pong ball or a styrofoam ball that is ping pong ball size; a piece of stiff cardboard or plywood for the base (about 60 cm long and 20 cm wide); a torch to represent the Sun

Guidelines

Give each group of four enough materials to make their own model of the Sun-Moon-Earth eclipse system (see the diagram on page 75 of the SB for the finished model). The two eclipses could be divided between the groups.

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 12.4: Different seasons

INDIVIDUAL (SB p. 75)

Answers

1. The Earth experiences four different seasons.
2. The Earth revolves around the Sun once every 365.25 days (a year).
3. Countries like Nigeria do not experience the same extremes of season as, say, Europe, because Nigeria is closer to the equator (in the tropics).
4. The two main causes of seasons are the rotation of the Earth around the Sun once in a year and the fact that the Earth's axis is not perpendicular in relation to the Sun, but inclined at 23.5°.
5. When it is winter in the Northern Hemisphere it is summer in the Southern Hemisphere.

Activity 12.5: Artificial satellites

INDIVIDUAL (SB p. 77)

Resources

Model of a satellite, NASA website: https://www.nasa.gov

Guidelines

Help students to identify five famous satellites or space vehicles. Remind them that they are not all drawn to scale. Mention that TV signals come from satellites. If you watch sport, you need a satellite dish.

Answers

Famous satellites or space vehicles from left to right: Soyuz Rocket, Sputnik, Apollo space craft, Space Shuttle and the International Space Station.

Activity 12.6: Space exploration

INDIVIDUAL (SB p. 79)

Resources

NASA website: https://www.nasa.gov

Guidelines

Get students to think about space exploration with a question: "Have people been to the Moon?"

Students draw their own timelines. Encourage them to find illustrations of some of the space craft or satellites or the national flags of the countries mentioned and include them on their timelines to make it look interesting.

Answers

1. (As an example)
   1957 – First artificial satellite – Sputnik 1 (Russian) – launched into space
   1961 – First human in space – Yuri Gagarin (Russian)
   1969 – First men on the Moon (Apollo 10 – American)

1970 – First probe to land on Venus (Russian)
1971 – First space station (Salyut 1 – Russian)
1979–80 – Voyager 1&2 (American) sent to Jupiter and Saturn
1981 – First Space Shuttle (American) launched
2012 – NASA's Curiosity Rover successfully landed on Mars
2014 – Launched in 2004, the European Space Agency's Rosetta probe reached Comet 67P/Churyumov–Gerasimenko. A soft landing was successful and valuable data has been sent back from the comet's surface.

Assessment

Informal: Self-assessment – Share timelines in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

eclipse – when the shadow of a planet or satellite falls on another planet or satellite
gravity – a force that acts on all objects, big or small
satellite – a natural or artificial (made by humans) object that orbits a larger object (usually a planet) in space
seasons – the different conditions experienced as the Earth revolves around the Sun and the different hemispheres (north and south) receive different amounts of energy (light and heat) from the Sun
solar system – the Sun and the planets that move around the Sun in their orbits
space travel – the exploration of space by both unmanned satellites and space probes
weightlessness – experienced when an object is free of all contact forces

Topic 12: Assessment

Question 1

1. Gravity has a pull effect ✓ on objects ✓. This means that objects are attracted towards, for example, the Earth's centre ✓. **[3]**

Question 2

2. Any three:
   - moons ✓
   - asteroids ✓
   - comets ✓
   - meteors ✓ **[3]**

Question 3

3. Any three:
   - Mars ✓
   - Venus ✓
   - Mercury ✓
   - Jupiter ✓
   - Saturn ✓
   - Uranus ✓
   - Neptune ✓ **[3]**

Question 4

4. Lunar eclipse: the Earth ✓ is between the Sun and the Moon ✓ and the Earth's shadow falls on the Moon ✓. Solar eclipse: the Moon ✓ is between the Sun and the Earth ✓ and the Moon casts a shadow on the Earth ✓. **[6]**

Question 5

5. Seasons are a result of two things: the rotation of the Earth ✓ around the Sun ✓ once in a year ✓; and that the Earth's axis ✓ is not perpendicular ✓ in relation to the Sun but inclined at 23.5° ✓. **[6]**

Question 6

6. Any five: A satellite is an object ✓, natural or artificial ✓ (made by humans) ✓ which orbits a larger object ✓ (usually a planet) ✓ in space ✓. **[5]**

Question 7

7. a) The International Space Station is a very big ✓ spacecraft ✓ which orbits the Earth. It is a home to astronauts ✓ from many different countries ✓. (4)
   b) It does not belong to a particular nation as many nations worked together to build the International Space Station ✓. (1)

[5]

Total: [31]

Practice test: Answers

Topic 1

1. *Any four ways:*
   - Not using a latrine and defaecating in the open ✓, increases the risk of faecal contamination as flies and other insects feed off the faeces and then sit on surfaces and food items ✓.
   - Not washing hands after defaecating ✓ can cause microorganisms to be transmitted when the person touches surfaces, other people and food ✓.
   - If food is exposed to water contaminated with faecal matter ✓, microorganisms can be transmitted via the food especially if the food is not washed properly ✓.
   - Through the release of raw sewage into water bodies ✓✓
   - Through unwashed hands ✓ when food is prepared and handled ✓ (8)
2. It puts a person at risk of getting ill with disorders such as obesity, diabetes, cancer, high blood pressure and heart disease ✓✓. (2)

[10]

Topic 2

1. a) iii ✓ (1)
   b) iv ✓ (1)
   c) i ✓ (1)
   d) ii ✓ (1)
2. *Any two activities*:
   Industrial activity ✓
   Agricultural activity ✓
   Waste disposal ✓
   Acid rain ✓
   Provide an explanation as to how the activity causes soil pollution in Nigeria ✓✓. (4)

[8]

Topic 3

1. a) Any metal, e.g. iron, copper ✓
   b) wood, fossil fuels ✓ **[2]**

Topic 4

1. Hormone changes ✓ take place. These cause glands ✓ in the armpits ✓ (and pubic areas) to release chemicals ✓. **[4]**

Topic 5

1. To keep the testes at the correct temperature ✓ for sperm development ✓. (2)
2. In the fallopian ✓ tubes ✓. (2)

[4]

Topic 6

1. A male gamete ✓ (sperm) joins the female gamete ✓ (egg) to form a zygote ✓. (3)
2. Hormones ✓ cause the change. (1)

[4]

Topic 7

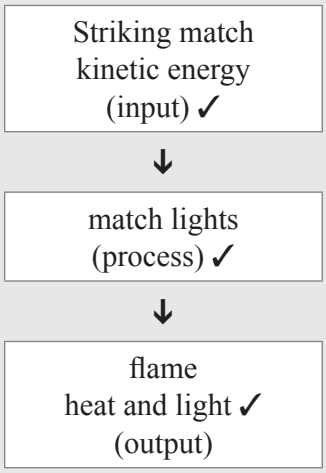
1. During the pregnancy ✓, she may develop high blood pressure ✓. If she is under the age of 15, there can be complications ✓ during the birth ✓ if she has an underdeveloped pelvis ✓. **[5]**

Topic 8

1. a) human ✓ immunodeficiency ✓ virus ✓ (3)
   b) acquired ✓ immunodeficiency ✓ syndrome ✓ (3)
2. Practise abstinence ✓ (1)
3. Yes ✓ (1)

[8]

Topic 9

1. 

(3)

2. Students should draw a similar diagram to the one above using their own example. (3)

[6]

Topic 10

Any three points:

- Hydropower does not cause pollution but disrupts the natural flow of water in rivers ✓✓.
- Wind energy does not cause pollution but the wind turbines do not look good and make a noise. They can easily catch fire ✓✓.
- Solar power works well in sunny places but no energy is produced on cloudy days. It is cheap and does not harm the environment ✓✓.
- Biofuels do not harm the environment but use up farm land that could be used for food production ✓✓.

[6]

Topic 11

1. Force is a push or pull action on an object when it is in contact with, or even close to, another object or objects ✓. (1)
2. They both attract objects (pull objects towards them) ✓. (1)
3. Sir Isaac Newton ✓ (1)
4. In theory, forever. However, it will usually be stopped by another object ✓. (1)
5. You would slip and slide and lose your balance ✓. (1)

[5]

Topic 12

1. Weightlessness is being without apparent weight. An object in free fall, or an object acted on by a force that cancels out gravity, will be weightless. Gravity exerts a force (it attracts objects) so they have weight ✓. (1)
2. Planets, Moons, Sun, asteroids, comets ✓ (1)
3. In a solar eclipse, the Moon blocks out the Sun by coming between the Earth and Sun. In a lunar eclipse, the Earth's shadow falls on the Moon, because the Earth is between the Sun and the Moon ✓. (1)
4. USSR and secondly, the USA ✓ (1)
5. It is a big space station that is permanently orbiting the Earth and is owned by all the nations who take part in the project, including Russia, the USA, some European countries, Canada and Japan ✓. (1)

[5]

Total: [67]

SECTION 2

Basic technology

THEME 5

Understanding basic technology

TOPIC 13: Understanding technology

Performance objectives

13.1 Identify technology-related occupations.
13.2 State the importance of technology.

Introduction

Technology is used in everyday life to solve problems and meet people's needs and wants.

Activity 13.1: Discuss technology

GROUP (SB p. 86)

Guidelines

Facilitate the discussion. There is a wide range of acceptable answers.

Answers

1. Technology is the use of scientific knowledge for practical purposes.
2. • Toothbrush – material – nylon for the bristles; design – the contours of the brush and the handle; the plastics moulding process.
   • Can of cooldrink – food technology (the making of the cooldrink – if it is fruit juice, it is pasteurised, or if it is fizzy, it is carbonated); materials – lightweight aluminium for the can; the shape is designed to use the minimum amount of material; the tab is designed to remain attached to the can when it is opened (as an anti-littering device).
   • Wheelchair – mechanics – wheels and brake mechanism; some wheelchairs are electric; ergonomics and comfort – wheels should be able to turn easily, the chair should be collapsible and light for easy transport.
   • Swimming pool – materials for the shell of the pool; mechanical and process – the pump and filter system; chemistry – how the water is kept clean (either with chlorine or salt).
   • Book – materials – paper, ink and adhesives for binding; process – the printing process.
3.

Occupation	Materials	Tools and equipment	Processes
Architect	Concrete, steel, brick, wood, glass	Drawing board, drawing equipment e.g. T-square	Design, construction
Civil engineer	Concrete, steel, tar	Drawing board, drawing equipment	Design, construction
Food technologist	Foodstuffs, plastic wrap, foil	Freezer, oven, conveyer belt	Cooking, sterilising by pasteurising or irradiating; preserving by drying, pickling, adding sugar or vacuum-packing
Electrician	Insulated copper wire; plastic plug socket plates	Screwdrivers, pliers, digital ammeter or multi-tester	Wiring, troubleshooting
Ceramic artist	Clay, glazes	Potter's wheel, firing kiln	Design and construction

4. Communication – cell phones; Transport – bicycle, bus, car, train, aeroplane; Health – vaccinations/ immunisations and antibiotics

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

technological literacy – the ability to use technology tools or knowledge

technology – to do with machines, including electronics, and improvements or progress linked to those machines

Topic 13: Assessment

Question 1

1. knowledge ✓; needs ✓; tools ✓; high-tech ✓ **[4]**

Question 2

2.

Advantages	Disadvantages
Increases efficiency and productivity (saves time)	Is often harmful to the environment
Is a source of economic growth	Makes certain jobs obsolete – so can result in job loss
Makes life easier	
Improves quality of life	
Provides easy access to information	

[7]

Question 3

3. a) network engineer ✓ (1)
   b) materials engineer ✓ (1)
   c) dental technician ✓ (1)
   d) biotechnologist ✓ (1)
   e) civil engineer ✓ (1)
   f) web developer ✓ (1)

[6]

Total: [17]

TOPIC 14: Basic electricity

Performance objectives

14.1 Define electrical current.
14.2 Explain the types of electrical current (AC and DC).
14.3 Map an electrical circuit and name its components.
14.4 Highlight the symbols used for electrical components.
14.5 Describe measuring instruments used in basic electricity.
14.6 Define transformer and stabiliser.
14.7 Name some electrical appliances and accessories.
14.8 Perform simple electrical calculations.
14.9 Describe simple electrical connections.

Introduction

Electricity is the flow of electrons (energy) along a conductor (usually copper wire). The strength of an electrical current is measured in volt, the amount of current in amps, and the resistance to electrical flow in ohms. Alternating (AC) and direct (DC) current are the two types of flow. Measuring and controlling the flow of an electric current is all part of basic electricity.

Activity 14.1: Electricity

INDIVIDUAL OR GROUP (SB p. 91)

Resources

Student's Book, any pictures of electricity, electrical appliances, or electric current. Simple circuits in the way of, for example, a torch, with its bulb and batteries, and an on/off switch.

Guidelines

Introduce the activity by showing students a torch, with no batteries in it. Ask them why the torch won't light up. Now, place batteries in the torch, switch it on, and ask them why the torch now lights up.

Answers

1. Electricity is the flow of electrons (energy) from negative to positive in an electrical circuit.
2. a) False. Electricity flows from negative to positive.
   b) True
   c) False. The strength of the current is measured as voltage (how powerful the current is) while amount of electricity (volume) is measured in amps.
   d) True
   e) True
3. In the first diagram (direct current) electricity flows in one direction (as shown by the single direction of the arrows) through the circuit; hence DC. The circuit can be broken (the flow will stop) by means of a switch. In the second diagram, the direction of flow alternates (changes direction, as shown by the arrows pointing in two directions; hence AC. Here too, a switch is used to control the flow of electricity.
4. $220 \times 20 = 4400$ watts or 4.4 kilowatts (Kw)
5. $4400 \div (220 \times 5) = 4$
6. $60 \div 4 = 15$ A

Assessment

Teacher assessment. Go through the answers with the students and, in particular, explain the calculations.

Key words

AC – abbreviation for alternating current, a way in which electricity moves along a wire
amperage – measure of the amount (rather than the strength) of an electrical current
circuit – a collection of connected electrical components or parts of objects
DC – abbreviation for direct current (see also AC)
electrical current – the actual, measurable flow of electricity through a circuit
resistance – anything, including electrical components, which act to slow down, or prevent, the flow of electricity in a circuit
voltage – the strength of an electric current (see also amperage)

Topic 14: Assessment

Question 1

1. a) An electric current is the rate of flow ✓ of the electrons (electrical charge) ✓ past a certain point ✓. An electric current exists when there is a net flow of electric charge through a certain point ✓. In electric circuits, this charge is carried by electrons moving along or through a conductor ✓. (5)

   b) A circuit is a closed ✓ loop ✓ that electrons (electricity) ✓ can travel in ✓ and unless the circuit is complete ✓, making a full circle back to the electrical source ✓, no electrons will move ✓. (Maximum five.) (5)

   c) An electrical transformer is a piece of equipment ✓ that either raises ✓, or lowers voltages ✓ and currents in an electrical circuit ✓✓ (5)

   d) A stabiliser is a piece of electrical equipment ✓ designed to deliver a constant voltage output ✓ to reduce surges ✓ that can damage electrical circuits ✓ and appliances ✓. (5)

   e) A multimeter is also known as a VOM ✓ (volt-ohm-milliammeter) ✓ that can take a several electronic measurements ✓ and combine several measurement functions ✓ in one instrument, such as voltage, current, and resistance ✓. (5)

[25]

Question 2

2. Ohm's law states that voltage (V) ✓ is equal to the current (I) flowing in a circuit ✓, multiplied by the resistance of the circuit (R) ✓ ($V = I \times R$) ✓✓ **[5]**

Question 3

3. Voltage ✓✓ **[2]**

Question 4

4. A connection is where one component of an electrical system ✓ joins another ✓ to allow current to flow through the system ✓ and to provide energy in that system ✓. **[4]**

Total: [36]

THEME 6

Safety

TOPIC 15: Safety guidelines

Performance objectives

15.1 List safety guidelines for pedestrians.
15.2 Demonstrate how pedestrians are to cross the road.
15.3 Identify/list safety guidelines for cyclists.
15.4 Explain/list safety guidelines for motorists.

Introduction

Nigeria has a high incidence of death and serious injury on the roads. Road safety is very important and should be taken seriously.

Activity 15.1: Discuss road safety

GROUP (SB p. 95)

Answers

1. Facilitate the discussion and consider inviting a traffic officer or paramedic to speak to the class.
2. • Lawlessness – speeding; drinking and driving; driving without a licence or a fraudulently-obtained licence
   • Recklessness – driving without a seatbelt; riding a motorcycle without wearing a helmet
   • Carelessness – failing to check the condition of the car's tyres; talking on cell phone while driving
3 • Seatbelts – they are now retractable and lock with sudden movement.
   • Airbags – some cars release cushions of air during a crash.
   • Alcohol breathalyser tests for checking motorist's alcohol levels
   • Car seats for small children; helmets for motorcyclists

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

pedestrian – someone walking along a road or place where vehicles drive
reflectors – a piece of plastic that is fastened to a bicycle or to a piece of clothing, so that it can be seen more easily at night
safety – not likely to cause any physical injury or harm
visible – can be seen

Topic 15: Assessment

Question 1

1. Any three of the following:
   - Cross at the pedestrian crossing/ zebra crossing ✓.
   - Stop when the pedestrian light is red. Walk when the pedestrian light is green ✓.
   - Do not cross in the path of oncoming traffic/jay walk ✓.
   - If there is no pavement or sidewalk, walk facing oncoming traffic ✓.
   - Concentrate/do not be distracted when crossing a road ✓.
   - Make sure you are visible at night – at night be bright ✓! **[3]**

Question 2

2.

Do	Don't
Wear a helmet	Ride against traffic
Obey all traffic lights and stop signs	Ride through a green traffic light without looking left and right
Use hand signals to indicate turning	
Dress to be seen	
Use lights and reflectors at night	

[6]

Question 3

3. Any three of the following:
   - helmet ✓
   - gloves ✓
   - boots or heavy-duty shoes ✓
   - thick trousers/pants ✓
   - protective jacket ✓ **[3]**

Question 4

4. Any three of the following:
   - Drive only if you have a valid driver's licence ✓.
   - Wear a seatbelt ✓.
   - Ensure passengers wear seatbelts ✓.
   - Don't drink and drive ✓.
   - Don't speed/obey the speed limit ✓.
   - Rest often when driving long distances ✓.
   - Drive a roadworthy vehicle ✓. **[3]**

Question 5

5. a) It prevents you flying from your seat if there is a sudden stop or a collision. If not wearing a seatbelt, you can hit the windscreen or be flung from the car ✓✓. (2)
   b) During a car accident, often the person not wearing a seatbelt is the one who does the damage. Their body is flung about at high speed and can collide with other occupants in the car ✓✓. (2)
   c) Without a valid driver's licence, you have not been approved as a competent and responsible driver and may not know the rules of the road ✓✓. (2)

[6]

Question 6

6. Drunk driving: Alcohol/drinking negatively affects a driver's reaction time and driving ability/judgement ✓✓. Speeding: The faster you drive, the less time there is to notice dangerous situations or to brake or turn the steering wheel to avoid a collision ✓✓. Fatigue: If you drive when tired, you risk falling asleep at the wheel or making mistakes/losing concentration ✓✓. Faulty vehicle: An unroadworthy vehicle is dangerous on the road. Examples include: Brakes can fail. OR Tyres can burst, making the vehicle swerve into oncoming traffic or off the road. OR If headlights are not working, a vehicle is invisible to other cars in the dark. OR If windscreen wipers are not working, the driver cannot see in heavy rain ✓✓. (4 × 2)

[8]

Total: [29]

TOPIC 16: Workshop safety

Performance objectives

16.1 State causes of workshop accidents.
16.2 List types of accidents that occur in workshop places.
16.3 State workshop safety rules and regulations.
16.4 Identify some workshop preventative measures.

Introduction

Workshop safety is a matter of common sense. If you are responsible, careful, organised and prepared, you can make sure the workshop environment is safe.

Activity 16.1: Workshop safety

PAIRS (SB p. 100)

Guidelines

If you do not have a workshop or a laboratory, inspect the classroom. Ask students to consider aspects such as working space, storage space and ventilation (if working with solvents).

Assessment

Informal: Teacher, peer and self – Ask students to make notes on their safety assessment and present or discuss their notes in class.

Activity 16.2: Risk assessment

PAIRS (SB p. 100)

Answers

Job to be analysed: Making a coffee table with a glass top

Steps in job	Hazards associated with each step	Precaution/ Solution
1. Cut wood with saw.	Injury while sawing.	Clamp wood securely while sawing.
2. Glue and clamp wood frame.	Fumes from glue frame might get in the way while drying.	Work in well-ventilated area. Wear a nose mask. Identify a safe, out-of-the way place to glue the frame and leave it to dry.
3. Cut glass to size.	Injury while cutting glass Injury caused by unsafe disposal of glass off-cuts.	Wear protective gloves. Identify glass safety waste barrel for offcuts. It should be clearly labelled, so that everyone (including cleaners) know that it contains broken glass.
4. Smooth glass edges.	Injury while sandpapering or filing glass edges.	Hold or clamp glass securely. Wear protective gloves.
5. Mount glass in frame.	Dropping or breaking glass while lifting and fitting.	Ask classmate to help lift glass if it is a large piece. Discuss beforehand who will do what.

Assessment

Informal: Self-assessment – Students check their answer against this example.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

electrocution – death by electric shock
safety guard – a physical barrier over moving machine parts, such as blades

Topic 16: Assessment

Question 1

1.
- Poor housekeeping ✓.
- Beginning the job without proper instructions or planning ✓.
- Ignoring safety procedures ✓.
- Working while distracted ✓.
- Taking shortcuts ✓. **[5]**

Question 2

2.
a) Safety glasses or visor ✓ (1)
b) Ear muffs ✓ (1)
c) Mask ✓ (1)
d) Gloves ✓ (1)
e) Heavy duty shoes ✓ (1)
f) Apron or dustcoat ✓ (1)
[6]

Question 3

3.
a) Cuts and injury from machines, tools or broken glass ✓. (1)
b) Injury from falls (usually caused by tripping or slipping) ✓. (1)
c) Burns from heat or corrosive chemicals ✓. (1)
d) Inhalation of fumes, hazardous chemicals or dust ✓. (1)
e) Electric shocks or electrocution ✓. (1)
f) Fire ✓. (1)
[6]

Question 4

4.
- Wear protective gear ✓.
- Keep the workshop clean and tidy ✓.
- Use tools and equipment safely ✓.
- Dispose of waste safely ✓.
- Pay attention to safety warnings ✓. **[5]**

Total: [22]

THEME 7

Materials and processing

TOPIC 17: Properties of materials

Performance objectives

17.1 Identify, classify and describe the properties of wood.
17.2 Identify, classify and describe the properties of metals.
17.3 Identify, classify and describe the properties of ceramics and glass.
17.4 Identify, classify and describe the properties of rubber.
17.5 Identify, classify and describe the properties of plastic.

Introduction

Students are introduced to the properties of different materials, namely wood, metals, ceramics, glass, rubber and plastics.

Activity 17.1: Properties of wood

GROUP (SB p. 104)

Resources

Samples of different kinds of wood: hardwoods, softwoods, wood from different tree species

Guidelines

Help students to identify the samples they brought to class. Introduce them to different types of wood by making them aware that not all wood is the same. Try to organise a visit to a forestry plantation or a timber yard.

Answers

3. As an example: **Iroko** has a variable colour, from pale-yellow to medium-brown when fresh but darkening to a uniform brown colour. On exposure to the weather, it bleaches like teak. Iroko lasts a long time and is not too hard or heavy, with good all-round strength properties and a pleasing appearance. It is used, for example, in ship and boat building, for high-class joinery in public buildings, for laboratory benches, draining-boards, garden furniture and flooring.

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 17.2: Metals and their uses

CLASS (SB p. 105)

Resources

Specimens of different metals

Guidelines

Follow on the wood example by emphasising that metals also have different properties.

Answers

1.

Property	Metal
It is very malleable, so it is often used in jewellery.	Gold; platinum
It is an excellent conductor of electricity.	Copper; gold
It gives a lovely sound when used to make bells or gongs.	Bronze (copper and tin alloy; brass (copper and zinc)
It rusts very easily, so it is usually painted or treated before use.	Iron
It is easy to draw out into wire.	Gold; platinum
This mystery metal is so reactive that it bursts into flame if placed in water.	Potassium
This metal is very heavy; about twice as dense (heavy) as iron.	Mercury
It has a dull lustre and does not shine at all.	Lead

2. Uses for each of the following metals:
   - Silver: Jewellery, coins, tableware, mirrors, photography, electrical contacts, has anti-bacterial properties
   - Copper: Jewellery, coins, electrical wiring, motor industry, plumbing, and circuitry. Combined with other metals it is used to form alloys.
   - Iron: Manufacturing machine tools, automobiles, hulls of large ships, machine parts, and building parts. Combined with other metals to form steel. Iron compounds are useful, e.g. water treatment.
   - Aluminium: Cans, window frames, aircraft, cookware, heat resistant clothing, mirrors, electric cables
   - Gold: Jewellery, coins, electronics, computers, dentistry, medicine, aerospace, glass-making, art (gold leaf)

Activity 17.3: Ceramics and glass

CLASS (SB p. 107)

Resources

Samples of pottery (made from clay) ceramics and glass

Guidelines

Emphasise that clay, ceramics and glass are also materials, with their own special properties.

Answers

List of uses of ceramics and glass:

- Car windscreens: Safety glass, as this glass will not splinter if damaged. It is compulsory to use safety glass in car windscreens and windows.
- Bowls and dishes to put in a hot oven: Ceramic, as it is heat resistant, but also special glass, such as Pyrex glass.
- Light bulbs: Glass as it is transparent and can be moulded into shapes.
- Floor tiles: Ceramic as it is hard-wearing and can be decorated.
- Cups, plates and other crockery: Ceramic because it can be decorative.
- Laboratory beakers (and rods, dishes): Glass as it is transparent, strong and inert.
- Bottles for cooldrinks or beer: Glass.
- Insulators on high voltage electricity cables: Ceramic, as it is a good thermal and electrical insulator.

Activity 17.4: Rubber and plastic

INDIVIDUAL (SB p. 109)

Answers

1. a) False. While plastic is petroleum-based, rubber is a natural product (latex from rubber trees). However, today, artificial rubber may be made from chemical compounds.
   b) False. Proper gumboots are made from rubber.
   c) True
   d) True
   e) False. Buckets are made from plastic.
   f) True
2. a) Tyre: rubber
   b) Kettle: plastic
   c) Plumbing fittings: PVC (a type of plastic)
   e) Elastic or rubber bands: rubber
3. Students are required to do their own research on the difference between injection moulding and extrusion processes for producing plastic products. The answers could be presented in the form of a poster. **Extrusion** is a process where molten (very hot, in a liquid form) plastic is pushed through what is called a die, which gives the plastic product its shape – but only in two dimensions. After the molten plastic goes through the die, it passes through a series of sizers, or forms, that hold the shape of the part as it cools. A puller grips the cooled plastic and moves it through the sizing equipment. It can be cut into required lengths, giving the product its third dimension. **Injection** moulding is a process where molten plastic is injected into one or more spaces in a three-dimensional mould. This mould opens and closes as parts are formed and ejected from the mould.
   See for example: http://www.engineeredprofiles.com/plastic-extrusion-vs-injection-molding/

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

ceramics – an inorganic, non-metal solid made from clay (very fine-grained earth, with its own special mineral properties)
ferrous – contains lots of iron
glass – an amorphous, transparent solid material without a chemical structure; made from silica quartz (sand)
metal – a hard, opaque element or compound; often shiny in appearance, that is mined
non-ferrous – does not contain much iron; more expensive than ferrous metal
properties – special characteristics or features of a substance or material
wood – an organic (from living trees), fibrous (made up of fibre) and porous (absorbs and holds water) plant tissue found in the stems and roots of trees
rubber – an elastic material used to make various items, such as tyres
plastic – a malleable material made from both natural and artificial raw materials; can be pressed or moulded into different shapes without breaking

Topic 17: Assessment

Question 1

1. a) Wood is a renewable resource (new trees can be planted) ✓.
   - It is (compared to ferrous metals and ceramics) relatively light-weight ✓.
   - It is very adaptable as a building material and can be sawn, drilled, bored, shaved, nailed, glued, planed and even bent fairly easily ✓.
   - It is relatively cheap ✓.
   - When properly treated or painted, wood is long-lasting ✓.
   - There are different kinds of wood (hard and soft) suited to different purposes ✓.
   - It is fairly common and is easier to work with than, say for instance, metals or ceramics ✓.
   - Wood is very versatile and can be used for many different things ✓. (Any five.) **[5]**

Question 2

2. Hardwoods are hard ✓ and are generally darker in colour ✓ than softwoods and referred to as wood ✓. Softwoods are softer ✓ and generally called timber ✓ after felling. **[5]**

Question 3

3. Metals have lustre (this means they can be shiny and reflect light) ✓, density (they can be heavier than expected) ✓, sound (they can emit a unique sound when struck) ✓, are malleable (most metals can be hammered into thin sheets or a different shape) ✓, have ductility (soft metals can be bent or twisted fairly easily) ✓, conductive properties (electricity or heat can be conducted through it) ✓, have reactive properties (reactions can occur when metals are exposed to water or acid) ✓. (Any five.) **[5]**

Question 4

4. a) Ferrous metals contain lots of iron ✓, non-ferrous metals do not contain iron ✓. (2)
   b) Ferrous: iron ✓.
   Non-ferrous: aluminium, copper, zinc, gold, silver, platinum, cobalt, mercury, tungsten ✓. (Any one.)(2)
   [4]

Question 5

5. Ceramics are made from clay (very fine-grained earth, with its own special mineral properties) ✓✓. Glass is made from silica quartz (sand) and is naturally transparent ✓✓. **[4]**

Question 6

6. Glass reflects and refracts (bends) light rays ✓.
   - Reflection and refraction can be modified or improved by cutting and polishing ✓.
   - Glass can be coloured by adding metallic salts, and glass can be painted ✓.
   - Glass is brittle, and shatters easily, but it is very strong and lasts well ✓.
   - Glass can be formed or moulded, often by blowing, into different shapes ✓.
   - Glass fibre can be extruded (forced out) and used as an insulator ✓. **[5]**

Question 7

7. Glass sheets and panes ✓, safety glass ✓, glass fibre ✓, glass wire (optic fibres) ✓, glass pellets ✓, glass rods ✓. (Any five.) **[5]**

Total: [33]

TOPIC 18: Building materials

Performance objectives

18.1 Identify different types of buildings.
18.2 Identify different types of building materials.
18.3 Specifically identify building materials in the locality where the student lives.
18.4 Give the uses of different types of building material.
18.5 Ensure that cement, sand, gravel, metal, plastics, wood, glass, ceramics, leaves and grass as building materials receive attention.

Introduction

There are different types of building material. Often, what is available as a building material depends on where you live. Different building materials have different uses. Cement, sand, gravel, wood, glass, ceramics, leaves and grass, are important building materials.

Activity 18.1: Different building materials

INDIVIDUAL (SB p. 112)

Resources

Samples of different building materials (wood, brick, sand, grass)

Guidelines

Show students samples of different building materials that are used for building.

Answers

A: Wood
B: Bricks
C: Mortar
D: Glass
E: Tiles

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 18.2: Uses of cement

INDIVIDUAL (SB p. 113)

Resources

See previous activity.

Guidelines

Ask: "How are building materials used?"

Answers

1. A: Mixing cement by hand; B: Portable cement mixer; C: Industrial ready-mixed concrete
2. A: The cheapest method is 'by hand'; then B: with a portable mixer and the most expensive is the C: ready-mixed concrete dispenser.
3. Use Method A for small jobs where a small amount is needed at a time and the concrete can be mixed and used immediately; Method B is used for mixing larger quantities and can be done on site giving the workers a chance to use the mix before it hardens and has the advantage of being able to be moved around a construction site. Method C would be used at large construction sites where mixing is done during transit to the site and discharged directly into chutes, pumps, large buckets or precast moulds.

Activity 18.3: Uses of metal

PAIRS (SB p. 114)

Resources

Poster paper, letter stencils or computer printer

Guidelines

Students must be guided to design an advertising poster for one or more building materials using the resources named above.

Assessment

The class can vote for the posters and decide which one makes the most impact.

Activity 18.4: Uses of wood PAIRS (SB p. 115)

Resources

Softwood samples

Guidelines

Get students to think about the uses of wood.

Answers

1. Roof, flooring, doors and internal walls (timber frames)
2. It will not wear well, could decay faster than hardwood, cannot be sanded too often to remove dents and wear, and is not suited for load-bearing.
3. It is cheaper than hardwoods and can be used as roof trusses because it does not have to bear heavy loads.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

bricks – a type of rectangle block made of clay or cement; mainly used to build walls in a house

cement – a building material used in the foundations of houses to make concrete, to cement bricks together and to plaster walls; it is mixed with water and then it hardens.

concrete – a mixture of cement, sand and gravel; mainly used to build foundations in a building

construction – to build something

gravel –chipped stones or aggregate; mixed with cement and sand to make concrete

leaves and grass – cheap natural building materials that are easy to work with (wattle and daub)

plastic – an artificial building material made mainly from polyurethane that, in turn, is made from crude oil

sand – silica dioxide (SiO_2), which is used in the building industry to make cement and concrete

Topic 18: Assessment

Question 1

1.
- Cement: Cement consists of lime ✓, silica ✓ and other chemicals ✓. When mixed with water ✓ it becomes very hard ✓. It is used to make concrete for house foundations, to cement bricks together and to plaster walls ✓.
- Sand and gravel: Sand is silica dioxide ✓. Gravel is chipped stone or aggregate ✓. Sand mixed with cement makes mortar ✓ and is used to cement bricks together and for plastering walls ✓. Sand and cement mixed with gravel makes concrete ✓ which, when reinforced with steel rods or mesh, is used for heavy and large building projects ✓, such as multi-storey buildings, bridges and dams ✓.
- Bricks: Bricks are made of clay ✓ or cement ✓. Fired clay bricks are baked in a furnace ✓. Bricks are durable ✓ and strong ✓ and are mainly used in the construction of walls ✓.
- Wood: Wood is a natural ✓ and renewable product ✓ that is strong ✓ and durable ✓ if treated properly ✓. In the construction industry it is mainly used for timber-frame houses ✓ and roof trusses ✓, doors and door frames ✓ and window frames ✓.
- Plastics: Plastic is an artificial building material ✓ made from polyurethane ✓ which comes from crude oil ✓, and is durable, cheap and easy to work with ✓. It has many uses including roofing sheets ✓, guttering, downpipes, plumbing ✓, electrical conduits ✓, irrigation pipes, sewerage pipes ✓, window frames and electrical socket mouldings ✓.

(Any five.) (5 × 2)

[10]

Question 2

2. a) They are available locally ✓, they are cheap or even free ✓, and in some cases they are the only building materials that people can afford ✓. (3)

b) They are not as durable ✓ and will need to be replaced from time to time ✓. (2)

[5]

Question 3

3. a) Glass is transparent and allows light to pass through ✓. (1)

b) In the windows ✓. (1)

[2]

Question 4

4. a) Plaster (or mortar) is the result of cement mixed with sand ✓. Concrete is made up of cement, sand and gravel ✓. (2)

b) Steel is used because it's a very strong metal and helps keep the concrete foundations in place ✓✓. (2)

[4]

Total: [21]

THEME 8

Drawing practice

TOPIC 19: Drawing instruments and materials

Performance objectives

19.1 Identify drawing instruments and materials.
19.2 Demonstrate correct techniques for handling drawing instruments and materials.
19.3 Construct shapes with drawing materials and instruments.
19.4 Care for drawing instruments and materials.

Introduction

This topic introduces some basic drawing instruments, such as the T-square, set square, French curve and compass, and shows students how to use them.

Activity 19.1: Drawing instruments

INDIVIDUAL (SB p. 118)

Answers

Instrument	Use
Dividers	Measuring equal distances
Compass	Drawing circles and arcs
French curve	Drawing shapes with curves
T-square	Drawing parallel lines and lines at right angles
Set square	Drawing parallel lines and lines at right angles or 30º, 45º and 60º angles

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 19.2: Simple shapes

INDIVIDUAL (SB p. 120)

Assessment

Informal: Teacher and self-assessment. For Question 4 ask students to draw the car shape on a loose page marked with their name. Display the drawings on the wall in the class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

compass – an instrument for drawing arcs and circles
dividers – an instrument for measuring or dividing lines
French curve – a template for drawing curved lines
set square – a right-angled triangle used for drawing lines especially at 30º, 45º, 60º and 90º angles
T-square – a T-shaped instrument for drawing straight lines and right angles
technical drawing – the act and practice of drawing something to show how it functions or is constructed

Topic 19: Assessment

Question 1

1. Technical drawing is the act and practice of drawing something to show how it functions ✓ or is constructed ✓. **[2]**

Question 2

2. a) French curve: drawing curved lines ✓ (1)
   b) set square: drawing parallel lines, perpendicular lines and lines at set angles ✓ (1)
   c) T-square: aligning, or setting in a straight line, and drawing parallel lines and lines at right angles ✓ (1)
   d) compass: drawing circles ✓ (1)
   e) dividers: measuring, marking and transferring measurements ✓ (1)

   [5]

Question 3

3.
- Keep pencils sharp ✓.
- Keep rubbers clean ✓.
- Store equipment in a tray or organiser cases ✓.
- Prevent French curves and other plastic templates from getting broken by storing them in a cardboard folder or between pieces of cardboard ✓. **[4]**

Total: [11]

TOPIC 20: Board practice

Performance objectives

20.1 Fix drawing sheet to the board.
20.2 Sharpen pencils to conical point and knife edge.
20.3 Draw border, horizontal and vertical lines.
20.4 Place and draw the title block.
20.5 Write freehand legible letters and numerals.

Introduction

Working drawings are done on a drafting board. This topic introduces students to some basics of board practice, such as how to attach the drawing sheet to the board and how to draw the title block.

Activity 20.1: Two styles of sharpening pencils

INDIVIDUAL (SB p. 124)

Resources

Pencils, files or pads of sandpaper, knives

Activity 20.2: Basic drafting techniques

INDIVIDUAL (SB p. 125)

Resources

Drafting boards, sheets of drawing paper, tape

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

border – lines drawn around the edge of the drawing sheet
drafting board – a smooth board that paper is placed on while making drawings
title block – a block at the bottom of a technical drawing that contains important information, such as the title and date

Topic 20: Assessment

Question 1

1. Large, flat, smooth ✓✓✓. **[3]**

Question 2

2. a) A3 ✓ (1)
   b) A2 ✓ (1)
   [2]

Question 3

3. By using tape ✓ or clips ✓. **[2]**

Question 4

4. a) Any three of the following: pencil sharpener, knife, file, sandpaper pad ✓✓✓. (3)
   b) A = conical point ✓; B = knife edge or chisel point ✓ (2)
   [5]

Question 5

5. a) board ✓ (1)
   b) T-square ✓ (1)
   c) down ✓ (1)
   [3]

Question 6

6. a) set square ✓ (1)
   b) bottom, top ✓ (1)
   c) T-square ✓ (1)
   [3]

Question 7

7. Name ✓, title ✓ or description of drawing ✓, date ✓. **[3]**

Question 8

8. a) Always keep your drawing board clean and neat. Do not write on it with ink or damage it with sharp objects ✓. (1)
   b) Keep your paper from wrinkling or tearing by fastening its four corners with drafting (drawing) tape. This tape is less sticky than sellotape or masking tape, and you can pull it off without tearing the paper ✓. (1)
   [2]

Total: [21]

TOPIC 21: Freehand sketching

Performance objectives

21.1 Make neat freehand sketches of lines, curves and irregular shapes.

Introduction

Drawing without instruments is called freehand sketching. Students are given tips for freehand drawing of lines, curves, circles and shapes.

Activity 21.1: Freehand sketching

INDIVIDUAL (SB p. 130)

Guidelines

Remind students that sketching is meant to be fast. Suggest that they do the sketches in Activity 15.1 twice – first carefully with the emphasis on accuracy and then quickly with the emphasis on speed.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

freehand sketching – drawing without using instruments

sketch – a rough or preliminary drawing

Topic 21: Assessment

Question 1

1. Freehand sketching is drawing without instruments such as a ruler ✓✓. **[2]**

Question 2

2. Freehand sketching is used to make quick, rough drawings ✓. It is used to plan the final, technical drawing or to explore ideas ✓. **[2]**

Question 3

3.
- By using a hard or a soft pencil. (The softer the pencil, the thicker the line.) ✓
- By changing how hard you press on the paper. (The harder you press, the thicker the line.) ✓
- By using a pencil with a hard or blunt point. (The blunter the pencil, the thicker the line.) ✓
- By adjusting the angle at which you hold the pencil. (The lower the angle, the thicker the line.) ✓ **[4]**

Question 4

4. See Student's Book page 129. **[2]**

Question 5

5. No formal answers. (5 × 3)
[15]
Total: [25]

THEME 9

Tools, machines and processes

TOPIC 22: Woodwork hand tools

Performance objectives

22.1 Identify a workbench and understand its use.
22.2 Identify woodwork hand tools; measuring tools, setting out and marking tools, driving tools, boring tools, holding devices, cutting and paring tools.
22.3 Describe the various woodwork hand tools.
22.4 Use and sketch woodwork hand tools.
22.5 Care for and maintain woodwork hand tools.

Introduction

Woodwork hand tools are introduced. These tools are used to construct items out of wood. There is a great variety of hand tools, and each has its own use.

Answers

1.

Tool	Use
Carpenter's pencil	to mark and draw lines on wood
Dividers	to mark out circles
Marking gauge or scriber	to make a groove or mark on wood
Ruler	to measure shorter distances
Surface plate	to give a perfectly flat surface from which to work
T-square	to get exact right angles
Tape measure	to measure longer distances or objects

2. 'Measure twice and cut once' means it is better to measure your wood carefully and accurately before possibly cutting it in the wrong place.

Assessment

Individual or as a class

Activity 22.1: Marking tools

INDIVIDUAL (SB p. 134)

Resources

Marking and measuring tools

Guidelines

This activity can be undertaken by students after a demonstration of marking and measuring tools.

Activity 22.2: Driving and boring tools

INDIVIDUAL (SB p. 135)

Resources

Driving and boring tools

Guidelines

This activity can be undertaken by students after a demonstration of driving and boring tools.

Answers

1. a) Driving tools are used to secure nails, tacks, steel pins and screws. These come in different shapes and sizes, depending on what they are used for.
   b) Boring tools are used in woodwork to make holes. These could be large holes, through which another piece of wood has to pass, or small holes into which screws can be driven accurately.
2.

Tool	Use
Ball peen hammer	to hammer light tacks and small nails
Bradawl	to start a hole in wood
Claw hammer	to hammer in big nails and pull out bent nails
Mallet	to knock wooden pieces together
Phillips or star-headed screwdriver	to drive home screws with a star head
Ratchet brace	to hand bore, using a bit
Slotted head screwdriver	to drive home screws with a slotted head

3. Choosing the right screwdriver (length, size, weight) and screw size for the job is an important skill. Using the incorrect screwdriver tip can result in stripping the screw; bending/damaging the tip of your screwdriver or the surface of the wood; and, it will require more muscle power to drive the screw into the surface.

Assessment

Individual, or as a class

Activity 22.3: Cutting and paring tools

INDIVIDUAL (SB p. 137)

Resources

Cutting and paring tools

Guidelines

This activity can be undertaken by students after a demonstration of cutting and paring tools.

Answers

1.

Tool	Use
Chisel	to shape and carve wood
G-clamp	smaller woodworking clamp to make cuts at exact angles
Mitre box	helps the carpenter to cut wood at an angle
Plane	to smooth wood
Sash clamp	to hold big pieces of wood when they have been glued together
Saw	to shape wood; comes in a variety of types, depending on the type of cut to be made

2. A marking tool: This is a marking gauge that is used to mark or scratch a groove into the surface of a work piece.

Marking gauge

A measuring tool: This is a tape measure. These are usually 2-metre or 5-metre tapes, made of flexible metal, which retract into a plastic cover. Most tape measures are graded in metres, centimetres and millimetres. Longer tape measures for measuring very long pieces of timber, such as roof beams, are made of a special flexible material, which can roll up.

Tape measure

A driving tool: This is a woodworking mallet. Mallets are used to drive wooden pieces together, or to knock in wooden dowels or pegs, or to drive a chisel. The soft head of the wooden mallet (compared to the steel hammer) means it will not damage wood.

Woodworking mallet

A holding device: This is a G-clamp and is used to hold small pieces of wood.

G-clamp

A cutting tool: This is a hacksaw and is useful for cutting plastic or metal.

Hacksaw

Activity 22.4: Care of woodwork hand tools

GROUP (SB p. 139)

Resources

Tools from Activities 22.1 to 22.3

Guidelines

Ask students why they think certain practices are not acceptable in a workshop.

Answers

1.
   - A worker is lending a tool to a friend at the door
   - A worker is using a chisel as a screwdriver.
   - There is a plane lying blade down on the work bench.
   - Two small kids are playing with a dangerous saw and a chisel.
   - Someone is cleaning a hammer with acid.
2. Disciplined carpenters will:
   - buy the best tools they can afford (a good used tool is often better than a new, poorer quality tool)
   - keep all tools clean and free of sawdust and wood shavings
   - store tools so that they are not exposed to excess heat, or moisture
   - try to have a system for organising their tools to avoid wasting time hunting for the right tool for the job
   - keep the blades of all cutting and paring tools sharp (use a grindstone or oilstone) and keep all boring and drilling bits sharp

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

brace – something that is used to strengthen or support
bradawl – a small, simple tool used to start a hole
carpenter – a person who works with wood
chisel – a metal tool with a sharp edge, used to shape wood
clamp – a portable tool used to hold pieces of wood together after they have been glued together
hand tools – tools that do not use electricity
mallet – a wooden hammer with a large, flat driving surface
saw – a tool with a serrated edged blade used for cutting wood
screwdriver – a common tool used to screw in threaded screws in a rotating motion
woodwork – the skill of making wooden objects

Topic 22: Assessment

Question 1

- A measuring tool is used to measure the dimensions ✓ of an object before it is cut ✓. Examples include a tape measure ✓, ruler ✓, try square ✓, bevel square ✓, mitre square ✓, a straight edge ✓. (Any two examples.)
- Setting out and marking tools are used to mark or lay out ✓ a design or pattern ✓ from a plan or drawing or design ✓ onto a work piece. Examples include a surface plate ✓, angle plate ✓, carpenter's pencil ✓, scriber ✓, height gauge ✓, protractor ✓, a square, divider and measuring compass ✓. (Any two examples.) **[4]**

Question 2

2. Driving tools are used to secure ✓, or drive home ✓ nails, tacks, steel pins and screws ✓✓. They come in different shapes and sizes ✓. **[5]**

Question 3

3. A clamp is portable tool which is used to clamp ✓ pieces of glued wood together ✓. A vice is a heavy steel clamp, with serrated, adjustable jaws and is used to hold ✓ a piece of wood firmly while it is being sawn, or cut, or drilled ✓. A vice is usually mounted on a work bench ✓. **[5]**

Question 4

4. Do:
   - buy the best tools you can afford ✓
   - keep all tools clean ✓
   - store tools so that they are not exposed to excess heat or moisture ✓
   - organise your tools so that you do not waste time hunting for the right tool for the job ✓
   - keep the blades of all cutting and paring tools sharp and keep all boring and drilling bits sharp ✓
   - keep a first-aid box at hand when doing woodwork ✓. (Any four.)

   Don't:
   - use a tool for a job for which it is not intended ✓
   - lend out tools ✓
   - store planes with the blade facing downwards (in contact with a surface) ✓
   - use acid or other strong liquids to clean tools ✓
   - leave tools lying around where young children could pick them up and harm themselves ✓. (Any four.) **[8]**

Question 5

5. Chisels are used to shape ✓ and carve ✓ wood ✓ **[3]**

Total: [25]

TOPIC 23: Metalwork hand tools

Performance objectives

23.1 Identify the different hand tools used for metalwork.
23.2 Describe the hand tools used for metalwork.
23.3 Sketch the different hand tools used for metalwork.
23.4 Use the hand tools used in metalwork.
23.5 Care for and maintain metalwork hand tools.

Introduction

There are different types of metalwork hand tools, but most are similar to their woodwork counterparts. The use of hand tools in metalwork is explained.

Activity 23.1: Marking out and measuring tools

INDIVIDUAL (SB p. 142)

Resources

Various metalwork hand tools

Guidelines

As with woodwork tools exercises and activities, the purpose here is to familiarise students with different metalwork hand tools.

Answers

1. Metalwork hand tools are similar to those used for woodwork but are generally stronger and heavier than woodwork hand tools. This is because metal is harder than wood.
2. It is an odd-leg calliper and is generally used to scribe a line a set distance from the edge of a piece of metal or woodwork.

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 23.2: Metalwork tools

INDIVIDUAL (SB p. 143)

Guidelines

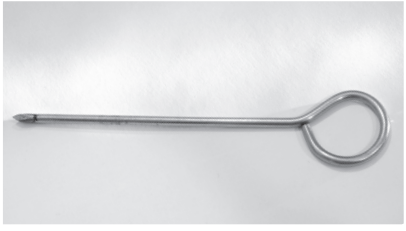
Facilitate: Supervise Question 3 by setting out various metalwork tools and demonstrate the use of each tool. Give students the opportunity to handle the different tools and see how each one works.

Answers

1.

Tool	Use
Chisel or cold chisel	hard tool used with a heavy hammer to cut, mark or shape metal
Odd-leg callipers	to measure distances accurately
Protractor	to measure angles on metal workpieces
Punch	to make a dent or small hole to guide the drill bit when drilling metal
Screwdriver	to drive home metal screws
Steel rule	to scribe a line a set distance from the edge of a metal workpiece

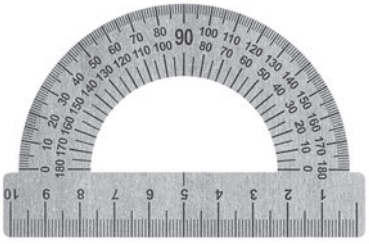
2. Examples could include:
A marking tool: A scriber is a hand tool used to mark lines on metal work pieces before cutting. The scriber is used instead of a pencil because it is easier to see scribe lines (scratches) on metal (or sketch and describe a surface plate or odd-leg calipers).



A scriber

A measuring tool: This is a protractor that is used for measuring angles, typically between 0° and 180°. Protractors are used for technical drawing, geometry and in

woodwork and metalwork for marking angles on a workpiece (or to sketch and describe a steel ruler).



A protractor

A driving tool: These metal punches are strong metal tools made of steel. They need to be strong to punch holes in steel or aluminium or copper sheets. The punches vary in size. The punch is struck hard with a hammer to make the hole in the work piece (or sketch and describe screwdrivers).

Metal punches

A cutting tool: Metalwork chisels are called cold chisels. They are much stronger, and not as sharp as woodworking chisels, but they do the same thing (or sketch and describe metal files).

Cold chisel

Activity 23.3: Care and maintenance of metalwork tools

GROUP (SB p. 144)

Guidelines

For Question 2, provide students with a variety of different metalwork tools. They must explain how and why they would clean and oil them before storing them.

Answers

1. • Tools must be cleaned, maintained and properly looked after if they are to last, and to provide good service.
   - When buying a new tool, read the instructions that come with it.
   - Keep all tools dry and stored away from moisture and heat.
   - Lightly oil moving parts of tools (for example, metal cutting shears) every few weeks (depending on how often you use them).
   - As with woodwork, always use the right tool for the job.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

cold chisel – a metal tool with a sharp edge that is used to shape metal.

file – a metal tool used to file down rough surfaces and edges and to finish off and shape edges before using waterpaper (a type of sandpaper suited to metal) to get a smooth surface

metalwork – the art and skill of shaping metal into useful objects or decorations

odd-leg callipers – a hand tool used to scribe a line a set distance from the edge of a metalwork piece

protractor – a piece of metal shaped in a half-circle that is used for technical drawing, geometry, and in woodwork and metalwork for marking angles on a work piece

punch – a strong tool made of steel that is struck hard with a hammer to make the hole in the workpiece

scriber – a hand tool used to mark lines on metalwork pieces before cutting

steel rule – an accurate measuring device for measuring straight-line distances on a technical drawing, or in woodwork or metalwork

surface plate – a solid, flat, cut- and scratch-resistant plate used as the main horizontal reference plane in metalwork

Topic 23: Assessment

Question 1

1. A surface plate ✓, scriber ✓, odd-leg calipers ✓, steel rule ✓, protractor ✓, punch ✓ and a screwdriver ✓. (Any three.) **[3]**

Question 2

2. A cold chisel is used specifically on metal ✓. It is much stronger ✓, but not as sharp ✓ as a woodworking chisel ✓. **[4]**

Question 3

3. a) Metalwork files are used to file down ✓ rough surfaces ✓, edges ✓ and to finish off and shape the edges ✓ to get a smooth surface ✓. (5)
   b) Flat files ✓, round files ✓, square files ✓, triangular files ✓ and half-round files ✓. (5)

[10]

Question 4

4. Read the instructions ✓ which come with any new tool ✓. Keep all tools dry ✓ and stored away from moisture ✓ and heat ✓. Oil moving parts of tools regularly ✓. Use the right tool for the job ✓. **[7]**

Question 5

5. A power tool is powered by mains electricity ✓ or a battery ✓, whereas a hand tool is driven by the power of the muscles of the operator ✓. **[3]**

Total: [27]

TOPIC 24: Maintenance of tools and machines

Performance objectives

24.1 Explain the meaning of maintenance.
24.2 Identify different types of maintenance practices.
24.3 Explain why tools and machines need regular maintenance.
24.4 Maintain and care for workshop tools and machines.

Introduction

Tools and machines used in a workshop need maintenance. This involves cleaning and servicing as necessary. Tools and machines can be dangerous, and will not work or operate properly if they are not maintained.

Activity 24.1: Types of maintenance

GROUP (SB p. 147)

Resources

Examples of objects described in this activity

Guidelines

Emphasise the difference between preventative, corrective and predictive maintenance.

Answer

1. A. Can opener: muscle power – regular cleaning, stored away from moisture.
   B. Screwdriver: muscle power – would need regular cleaning and to be stored away from moisture.
   C. Generator: mechanical power – would need preventative maintenance, such as keeping moving parts lubricated with grease or oil, changing dirty engine oil regularly (if used), cleaning filters, and keeping the machinery clean and free from dirt.
2. *Preventative maintenance* is undertaken on tools or machinery to prevent a breakdown or malfunction.
   Corrective maintenance is undertaken if something starts to give signs that it will go wrong; it does not involve major repairs but the correction of a problem with the machine before it leads to serious breakdown or mechanical failure.
   Predictive maintenance is undertaken to prevent problems that are expected to occur in the future: that is, undertaking maintenance before an issue occurs. Many manufacturers' instructions will state that predictive maintenance must be done after a certain number of hours or, with car engines, kilometres driven.

Activity 24.2: Cleaning and caring for tools and machinery

INDIVIDUAL (SB p. 149)

Resources

Examples of objects described in this activity

Guidelines

Ask students why tools should be kept clean. Can they think of a practical reason why clean tools are better than dirty tools?

Answers

2.

Tool or machine	Cleaning material or method
Dusty woodwork tools (mallet, chisels)	Duster cloth or feather duster
Engine covered in thick, dirty grease and oil	Powerful solvent, brush and rags
Slightly oily cutting blades	Cotton waste
Mud-covered excavator	Warm water and mild detergent
Rusted bolts	Aerosol lubricant and loosening spray

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

cleaning – the process of getting rid of dirt

corrective maintenance – undertaken if something starts to give signs that it might go wrong

lubricate – the process of putting oil or grease on something to make it move smoothly

machine – something that uses mechanical power and has few or many moving parts, each with a special function, and together as a whole they perform a particular task or a specific job of work

predictive maintenance – undertaken to prevent problems that are expected to occur in the future

preventative maintenance – undertaken on tools or machinery to prevent a breakdown or malfunction

Topic 24: Assessment

Question 1

1. A machine is something that uses mechanical power ✓ and has few ✓ or many ✓ moving parts ✓, each with a special function ✓, and, together as a whole, performs a particular task ✓ or does a specific job ✓. (Any five.) **[5]**

Question 2

2.
- Preventative maintenance is undertaken on tools or machinery ✓ to prevent a breakdown ✓ or malfunction ✓, usually referred to as servicing ✓ or routine maintenance ✓.
- Corrective maintenance is undertaken if something goes wrong ✓ or starts to give signs that it will go wrong ✓. It does not involve major repairs ✓ but rather the correction of a problem ✓ with the machine before it leads to serious breakdown ✓ or mechanical failure ✓.
- Predictive maintenance is undertaken to prevent problems ✓ that are expected to occur in the future ✓. This means looking ahead ✓ and undertaking maintenance ✓ before an issue occurs ✓. (Any three.) (3 × 4) **[12]**

Question 3

3. All maintenance including lubrication ✓ aims to keep the tool or machine in good condition ✓ so that it can work properly ✓ and not break down ✓. **[4]**

Question 4

- Skip or short-cut on the cleaning, servicing or maintenance of tools and machines ✓.
- Re-use old cleaning material or lubricants ✓.
- Clean machinery without a plan - work from the top down ✓.
- Clean machinery on a dirty, sandy or grassy surface ✓.
- Dispose of used detergent, dirty water, oil or grease by throwing it into a river or into a gutter ✓.
- Forget to check oil levels in a newly serviced engine ✓.
- Use the wrong lubricant just because you don't have anything else to use ✓.
- Breathe in solvent or cleaner fumes ✓. (Any three.) **[3]**

Question 5

5. Maintenance increases the durability of the equipment by reducing wear and tear ✓; it prevents sudden breakdown ✓; it can increase the efficient running of the machine ✓; it reduces the risk of accidents resulting from faulty or bad equipment/machines ✓, and it limits the cost of replacement of damaged equipment parts ✓. **[5]**

Total: [29]

Practice test: Answers

Topic 13

1. Technology is the application of scientific knowledge in industry and everyday life/ the use of scientific knowledge to improve life and make it convenient ✓. (1)
2. *Any two sets of points*:
   - Although landlines are still used, phone technology has generally changed from landlines (which use electrical cables) ✓ to cell phones (which use wireless technology satellites) ✓.
   - Phone instruments have changed from mechanical ✓ to electronic devices ✓.
   - The dialling mechanism has changed – from dial ✓ to keypad ✓.
   - The materials of phone instruments have changed from Bakelite ✓ to other plastics and metals ✓. (4)

[5]

Topic 14

1. A connection is where one component of an electrical system ✓ joins another ✓ to allow current ✓ to flow through the system ✓ and to provide energy in that system ✓. (5)
2. Ohm's law states that voltage (V) ✓ is equal to the current (I) flowing in a circuit ✓, times the resistance of the circuit (R) ✓ (V = I × R) ✓✓. (5)

[10]

Topic 15

1. Always wear a helmet ✓. The head is the most vulnerable part of the body in an accident ✓. (Other answers are acceptable if properly justified.) (2)
2. *Any three points*:
   - Drive only if you have a licence ✓.
   - Always wear your seat-belt ✓.
   - Follow the rules of the road ✓.
   - Concentrate while driving ✓.
   - Make sure your vehicle is roadworthy ✓. (3)

[5]

Topic 16

1. a) Poor housekeeping/not tidying up as you work or finish a job ✓✓. (2)
   b) Injury from tripping over cords or slipping on spilt liquid or falling tools ✓; electric shock/electrocution if spilt liquid is water-based ✓; fire if spilt liquid is flammable ✓. (3)

[5]

Topic 17

1. Hardwoods are much scarcer than softwoods, and often have to be cut deep inside a forest ✓. They are also slower growing than softwoods, which are grown in big commercial plantations ✓. (2)
2. True ✓ (1)
3. True ✓ (1)

[4]

Topic 18

1. Cement is the limestone-based powder that is mixed with sand and stone chips to make concrete ✓. (1)
2. Gravel is just chipped, or crushed stone. It is used in concrete and for gravel paths and roads ✓. (1)
3. Reinforced safety glass is actually two sheets of glass, with a thin layer of transparent plastic between them. The glass bonds to the plastic, so if the glass breaks, the pieces will be held together, rather than breaking into dangerous glass splinters ✓. (1)
4. Non-renewable building materials include cement, sand, glass, clay bricks and things like steel reinforcing. These things use up resources, which are not naturally replaced. Wood is an example of a renewable building material, because trees can be planted to produce more timber ✓. (1)

[4]

Topic 19

1. A = set square ✓; B = French curve ✓; C = dividers ✓; D = T-square ✓; E = compass ✓. **[5]**

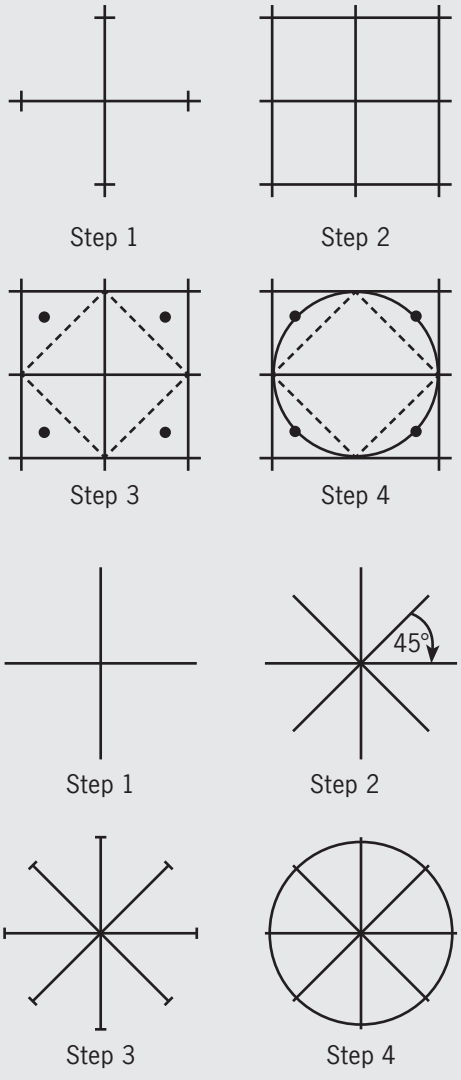
Topic 20

1. *Any two points*:
   - Name
   - A title or description of your drawing
   - The date (2)
2. a) A ✓ (1)
   b) B ✓ (1)

[4]

Topic 21

1. Student draws a straight, short line (2 cm) and a long line (20 cm) for drawn lines, short and long ✓✓.
   For short line, moved hand from wrist ✓ and for long line, moved hand from elbow ✓. (4)
2. Students use either one of the following methods to draw a freehand circle ✓✓:



(2)

[6]

Topic 22

1. A hand tool is driven by the power in the hands and arms of the user, while a power tool is usually driven by a small electric motor built into the tool ✓. (1)
2. To measure pieces of wood or the dimensions of a piece of wood very accurately, before sawing, drilling or cutting the wood ✓. (1)
3. *Any two of these*:
   So they will last a long time ✓.
   So that they will work properly and effectively ✓.
   Because clean, well looked after tools are usually a sign of a good worker ✓.
   Because properly maintained tools are safer tools ✓. (2)

[4]

Topic 23

1. For ensuring that you get an absolutely, perfectly flat surface on a sheet or piece of metal ✓. (1)
2. Cold glue ✓ (1)
3. False: metalwork tools take even more care and maintenance than woodwork tools because they have a tougher job to do ✓✓. (2)

[4]

Topic 24

1. *Any three of these*:
   rags ✓, oil ✓, solvents such as petrol ✓, cotton waste ✓ (3)
2. Fire ✓ (1)

[4]

Total: [60]

SECTION 3

Physical and health education

THEME 10

Basic human movement

TOPIC 25: Physical education and health education

Performance objectives

25.1 Describe the meaning and purpose of physical education.
25.2 Describe the meaning and purpose of health education.
25.3 Differentiate between physical education and health education.
25.4 Explain the scope of physical education.

Introduction

This topic describes the meaning and purpose of physical education and health education. It also describes the components of these two areas of study. The students learn the behaviours that are required for them to live healthy lives.

Activity 25.1: A call to action PAIRS (SB p. 157)

Guidelines

Remind students to give each other a turn to give an opinion. Students should substantiate their views. Students may have different opinions. Encourage them to hear, understand and respect the other person's opinion.

Activity 25.2: Healthy eating

INDIVIDUAL (SB p. 158)

Guidelines

Let the students identify the foods that they ate the day before. Help the ones who are struggling to identify the relevant food groups in the pyramid on page 157 of the Student's Book.

Activity 25.3: Personal health PAIRS (SB p. 158)

Guidelines

After the pairs have discussed the topic, ask them to share with the class anything that they thought was unusual.
As a fun activity, let the class select the three actions that they think are the most important to maintain good health. Let the class vote on what they think is the most important action of the three.

Activity 25.4: The components of health education and physical education

INDIVIDUAL (SB p. 159)

Answer

Health education	Physical education
Nutrition	A programme of fitness that includes cardiovascular work that improves coordination, flexibility and strength, builds muscle fitness, bone health and improves the health of your heart and lungs.
Hygiene	Helps manage obesity.
The environment	Rules and actions of different sports and physical activity, e.g. soccer.
Physical fitness	

Assessment

Group and individual assessment, based on directed class discussion.

Key words

physical education – learning about how to maintain our physical fitness, e.g. keeping physically fit by doing exercise
health education – learning about the different aspects, such as nutrition, hygiene, the environment and physical fitness, and how these can keep us healthy

Topic 25: Assessment

Question 1

1. a) Physical education is the learning and practice of physical activity ✓ so that one can be fit and in good health ✓. (2)

   b) The purpose of physical education is to become and remain fit, build muscle fitness, bone health, and improve the health of your heart and lungs ✓✓. (2)

   c) Health education is the process of teaching and learning the values, skills, knowledge and attitudes to promote, maintain and improve good health ✓. Physical education is the learning and practice of physical activity so that one can be fit and in good health ✓. (2)

   d) A programme of fitness ✓ that includes cardiovascular work that improves coordination, flexibility and strength, builds muscle fitness, bone health and improves the health of your heart and lungs ✓✓. Helps manage obesity ✓. Rules and actions of different sports and physical activity, e.g. soccer ✓. (5)

   e) It improves control over symptoms of anxiety and depression ✓, assists in social development by providing opportunities for self-expression ✓, builds self-confidence ✓ and also increases social interaction ✓. (Any one.) (1)

   f) Healthy musculoskeletal tissues (bones, muscles and joints) ✓; healthy cardiovascular system (heart and lungs) ✓; neuromuscular awareness (coordination and movement control) ✓; healthy body weight ✓. (Any two.) (2)

[14]

Question 2

2. a) Health education is a combination of learning experiences ✓ that share the values, skills, knowledge and attitudes to promote, maintain and improve good health ✓. (2)

   b) Eat healthily ✓, create an environment that is safe, clean and encourages good social relationships ✓, and practise good hygiene habits to prevent illness and disease ✓. (3)

   c) Health education teaches you how to maintain personal health with adequate activity, a nutritious diet, a clean environment and good hygiene habits ✓, which then extend to your school and community as well ✓. (2)

[7]

Question 3

3. a) A dirty environment breeds and spreads disease ✓. Good hygiene and cleanliness are important to maintain good health ✓. The environment should be safe, so that we are not at risk of injuring ourselves ✓. The environment should be one where everyone feels safe and free of abuse ✓. A safe environment encourages good social relationships and helps build good mental health ✓. (Any two.) (2)

3. b) Good nutrition provides our bodies with the vitamins and nutrients to maintain good health so that we may be physically active ✓. Good nutrition is also important to maintain body strength so that the body may fight off illness and disease ✓. (2)

[4]

Total: [25]

TOPIC 26: Physical fitness and body conditioning programme

Performance objectives

26.1 Explain the meaning of physical fitness.
26.2 List the components of physical fitness and differentiate between health and performance-related components.
26.3 Mention the characteristics of a physically fit person.
26.4 List appropriate exercises to develop different components of physical fitness.
26.5 Demonstrate exercises to develop strength, endurance and flexibility.
26.6 State safety precautions.

Introduction

This topic covers all aspects of physical fitness. The characteristics of a physically fit person are described. Exercises to develop strength, endurance and flexibility are suggested.

Activity 26.1: Practise some exercises

GROUP (SB p. 164)

Guidelines

Arrange students in groups in an open space outside to do exercises for endurance, strength and flexibility. They can do sit-ups and push-ups for strength, jogging for endurance and stretching for flexibility.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

cardiorespiratory – the parts of the body that are involved in the heart, blood circulation and breathing
exercise – physical activities that a person does to keep healthy, fit and strong

Topic 26: Assessment

Question 1

1. a) Their age ✓ and their health ✓. (2)
   b) They look fit ✓, they are healthy ✓, they can take part in many activities ✓. (3)
   c) A person who is fit can be active ✓, they have better co-ordination ✓, they can respond better to different situations ✓ and they are less stressed ✓. (any 3 = 3)

[8]

Question 2

2. Cardiorespiratory endurance ✓, muscular strength ✓, muscular endurance ✓, flexibility ✓ and body composition ✓. **[5]**

Question 3

3. a) Cardiorespiratory endurance means how well your body is able to supply energy ✓ during physical exercise to the body's blood circulatory and respiratory systems ✓. (2)
   b) The efficiency of the heart and lungs ✓ and the efficiency with which the body can make energy ✓. (2)

[4]

Question 4

4. a) Muscular strength means how much <u>force</u> ✓ your muscles can exert. (1)
   b) Muscular <u>endurance</u> ✓ means how long your muscles can work. (1)
   c) If you can touch your toes, you have good <u>flexibility</u> ✓. (1)
   d) A combination of strength training and cardiovascular training is needed for an ideal body <u>composition</u> ✓. (1)

[4]

Question 5

5. A physically fit person is active ✓. He or she will have an ideal body mass ✓, will have good flexibility ✓, have a strong heart ✓, good coordination ✓ as well as strong and toned muscles ✓. (any 4 = 4)

[4]

Question 6

6. a) Pull-ups ✓, push-outs ✓, sit-ups ✓ and push-ups ✓. (any 4 = 4)
   b) Jogging, swimming, walking or cycling for 30 minutes. (any 3 = 3)
   c) Trunk flexion ✓, hip flexion ✓, trunk extension ✓, trunk rotation ✓, leg and arm stretches ✓. (any 4 = 4)

[11]

Question 7

7. a) Chest pains ✓, shortness of breath ✓, dizziness ✓, continuous fatigue ✓, or an irregular heartbeat ✓ after exercise. (any 4 = 4)
   b) False ✓ (1)
   c) True ✓ (1)

[6]

Total: [42]

TOPIC 27: Recreation, leisure and dance activities

Performance objectives

27.1 Define recreation, leisure and dance.
27.2 Differentiate between recreation, leisure and dance.
27.3 List some benefits derived from recreational and dance activities.

Introduction

This topic describes the difference between recreation and leisure. The importance and benefits of these activities are emphasised.

Activity 27.1: Distinguish between recreation and leisure INDIVIDUAL (SB p. 168)

Guidelines

Help students who have difficulties with the terms 'recreation' and 'leisure' to understand the difference in their meanings. Give lots of examples.

Answers

1. a) A time when a person does things that he or she likes to do.
   b) An activity that a person enjoys doing during their leisure time.
2. Schoolwork, eating and chores.
3. Recreational activities include reading, running and playing games.
4. People have more leisure time than in the past because they spend less time working and stop work at an earlier age.

Activity 27.2: Case study

INDIVIDUAL (SB p. 169)

Guidelines

Help students with reading difficulties to understand the passage and questions.

Answers

1. They originate from many different regions in Nigeria.
2. The Obong Dance Company comes from the Cross River State.
3. They performed at the Edinburgh Arts Festival.
4. Their dances represent events such as war, courtship, death and childbirth.
5. The dancers perform a ritual when putting on their costumes.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

leisure – activities that people want to do during their spare time
mechanisation – using machines to do jobs
recreation – doing things during leisure time that people enjoy doing

Topic 27: Assessment

Question 1

1. a) Recreation refers to something you do during your spare time ✓ and leisure means time spent doing things that you enjoy ✓. (2)
   b) Any recreation activity, such as walking, gardening ✓✓, etc. (2)
   c) Reading ✓✓, watching TV ✓✓, etc. (2)
   [6]

Question 2

2. People have more time for leisure as machines ✓ help them to do work ✓ and chores ✓. **[3]**

Question 3

3. a) Dance refers to movement of the body, usually to music ✓✓. (2)
   b) A solo ✓✓. (2)
   c) Ballet ✓, jazz ✓, ballroom dancing ✓, hip hop ✓, tap ✓, zumba ✓, break dancing ✓, house ✓, punk ✓, rave ✓, disco dancing ✓. (any 5 = 5)
   d) Traditional dances are important as they are often used to tell stories ✓ and are performed at events or ceremonies ✓. (2)
   [11]

Question 4

4. Recreation and dance activities improve fitness, coordination and flexibility ✓. They also reduce stress ✓ and improve a person's self-confidence ✓. Recreation activities help to improve social skills ✓ and improve family relations ✓. (any 5 = 5)
   [5]

Total: [25]

THEME 11

Sports and games

TOPIC 28: Athletics (track and field)

Performance objectives

28.1 Define athletics.
28.2 Describe basic skills in discus and shot put.
28.3 Perform the basic skills in discus and shot put.
28.4 Draw and label the sectors with dimensions.
28.5 Take part in warm-up activities.
28.6 List safety measures in shot put and discus.
28.7 Explain the benefits of taking part in athletics.

Introduction

This topic describes athletics events – discus and shot put in particular. The benefits of athletics participation are emphasised.

Activity 28.1: Practise discus throwing

GROUP (SB p. 173)

Guidelines

Arrange students in groups outside. Let them warm up and then explain how to hold the discus. Discuss safety aspects firmly as it is easy for an accident to happen and injury to occur. Demonstrate the throw of the discus in the discus circle.

Assessment

Informal: Self-assessment – Discuss the answers in class.

Activity 28.2: Practise shot put

GROUP (SB p. 174)

Guidelines

Arrange students in groups outside. Let them warm up and then explain the shot put throw. Discuss safety aspects firmly as it is easy for an accident to happen and injury to occur. Demonstrate the throw in the shot put circle.

Activity 28.3: Throwing sectors

INDIVIDUAL (SB p. 174)

Guidelines

Students should draw diagrams similar to Figures 28.4 (discus circle) and 28.8 (shot put circle).

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

centrifugal force – a force that acts outwards on an object that is moving around a point
put – throw a shot in a shot put event

Topic 28: Assessment

Question 1

1. a.) i) 100 m ✓ 200 m ✓ and 400 m ✓ (3)
   ii) 800 m ✓ and 1 500 m ✓ (2)
   iii) 3 000 m ✓, 5 000 m ✓ and 10 000 m ✓ (3)
   b) Long jump ✓, high jump ✓, triple jump ✓ and pole vault ✓. (4)
   c) Discus ✓, shot put ✓ and javelin ✓. (3)
   [15]

Question 2

2. a) 2 kg ✓✓ (2)
   b) 1 kg ✓✓ (2)
   [4]

Question 3

3. a) Inside the marked sector ✓✓. (2)
   b) No ✓ (1)
   c) Four ✓ or six ✓. (2)
   d) 2.5 m ✓✓ (2)
   e) The centrifugal force ✓✓. (2)
   [9]

Question 4

4. a) Within a 40° area ✓✓. (2)
   b) The shot must not drop below the line of the athlete's shoulders at any time ✓. It must land within the 40° area that is marked in front of the circle ✓. The athlete is not allowed to touch the top of the toe board around the circle or leave the circle before the shot has landed ✓. (3)
   [5]

Question 5

5. Throwing circles should be surrounded by a cage or fence ✓; spectators and judges must stay away from the throwing circle ✓; all athletes and spectators must be alert ✓. **[3]**

Question 6

6. Athletics helps people to get fitter, stronger and healthier ✓. It teaches competitive skills ✓ and how to become good sportsmen and women ✓ who can celebrate success as well as failure graciously ✓. It helps athletes to set and achieve goals ✓ using perseverance and determination ✓. It is a place where people can interact socially ✓ and make friends during training ✓. (any 4 = 4) **[4]**

Total: [40]

TOPIC 29: Ball games

Performance objectives

29.1 Give a brief history of soccer and volleyball.
29.2 Describe soccer and volleyball, including the equipment and surface needed for each game.
29.3 Demonstrate skills in soccer and volleyball.
29.4 Know something about the rules of each game.
29.5 Recognise who the officials are for each game.
29.6 Be aware of some of the common injuries in each game and safety measures.
29.7 Be aware of the values of each of these ball games.

Introduction

Soccer and volleyball are two popular sports. The skills involved in each are quite different, as are the rules and the duties of the officials. All these aspects are covered here.

Activity 29.1: Soccer skills

GROUP (SB p. 178)

Resources

Soccer balls, soccer field, goal posts

Guidelines

A practical outdoor activity of practising soccer skills.

Class activity (outdoors)

Activity 29.2: Soccer officials

INDIVIDUAL (SB p. 179)

Guidelines

This activity introduces students to the rules and laws of the game. Emphasise respect for the referee, even if a player feels the referee may be wrong.

Answers

1.

Situation	Referee's response
Ball goes out of play on side-line.	Throw-in
Defending team puts the ball over their own goal line but not into the goal itself.	Corner kick
Attacking team puts the ball into the defending team's goal.	Goal!
Attacking team misses the defending team's goal, but the ball goes out.	Goal kick
Player accidentally trips another player.	Free kick
Defending player trips an attacking player in the defending team's penalty area.	Penalty to attacking team
Player deliberately fouls an opposition player with a heavy tackle.	Yellow card
Same player does the same thing 20 minutes later.	Yellow card and then immediately a red card (player is sent off for two yellow cards)
Defending player turns the ball into his or her own net.	Own goal

2. Two assistants (linesmen) help the referee to decide who last touched the ball if it goes out of play and watch for foul play, such as kicking an opponent. Their most responsible task is to call an offside. Fourth officials act as timekeepers in big games, and will replace referees if they are injured.

Assessment

In pairs, or even in groups

Activity 29.3: Soccer injuries

GROUP (SB p. 181)

Resources

First-aid box, pictures of some common injuries

Guidelines

Make students aware that any contact sport holds the danger of injury. It is each player's duty to prevent dangerous or foul play.

Answers

1. Common injuries:
   Skull – concussion; Nose – broken; Lower back – strains, pulled muscles, disc injuries; Hips – joint pain due to muscle strain or weakness; bruising due to being kicked; arthritis; Thigh – pulled muscles, hamstring injuries, bruising due to kicks, tendonitis; Knee – ligament tears, dislocation, bursitis, meniscus tears, ITB syndrome; Ankle – sprains, stress fractures, bruising due to kicks; Toe – sprains and breaks.
2. Lower extremities
   Most injuries occur in the lower extremities because the game involves kicking, and tackling with the legs and feet.
3. Compound fracture of the leg
4. Suggested contents of first-aid box could be from the following list:
   Alcohol wipes; antibiotic cream; plasters; athletic tape; bandages; scissors; calamine lotion; chemical cold packs; contact lens container and solution; cotton swabs; elastic bandages; eye pads; gauze; hand sanitiser; hydrocortisone cream; hydrogen peroxide; insect sting relief pads: iodine; triangular cloth to be used as a sling; magnifying glass (plastic); nail clippers; nasal plugs; non-latex gloves; torch (waterproof); cotton buds; safety pins (for sling); saline solution; moistened towelettes; sewing needle (sterilised – for splinters); small mirror; soap; sterile water; sunscreen (SPF-30); tongue depressors for use as finger splints; trash bag; tweezers (metal) – sterilise before use; self-sealing plastic bag.

Assessment

Groups

Activity 29.4: Volleyball skills

GROUP (SB p. 183)

Resources

Volley balls, flat indoor surface, volley ball net

Guidelines

Supervise volleyball practice activities

Answers

2. Warm-up exercises from left to right:
   A: Hamstring
   B: Thigh (quadriceps) muscles
   C: Gluteus muscles
3. Warm-up before exercise is important to prevent muscular strain and connective injuries and will reduce the likelihood of muscle soreness after exercise.

Activity 29.5: Comparing ball games

INDIVIDUAL (SB p. 184)

Guidelines

Get students to think about the similarities, and differences, between soccer and volleyball, one played with the feet, one with the hands.

Answers

1.

Similarities	Differences
Two teams	Six players in volleyball vs 11 playing soccer.
Played with a round ball	Volleyball is played with the hands and soccer with the feet.

Similarities	Differences
Team wear team kit	Volleyballs are passed over a net. Soccer balls are kicked into a net.
Special footwear is worn for both	Volleyballs may not touch the ground during play.
Controlled by a referee	Scoring is very different.
There are rules governing the sport	Soccer balls are harder than volleyballs.
A net or nets are used	Positional play is rotated in volleyball but fairly set in soccer.
Require fitness and skill	Net is in the middle versus a net at each end.

Students can work through Questions 2 and 3 as class activities.

Assessment

Informal: Self-assessment – Individual or pairs

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

attacking – when a player or group of players try to move forward to try to score goals or win points

ball games – usually a team sport that involves kicking, or hitting, or passing a ball with the aim of scoring a goal against an opponent

defending – when a player or group of players try to prevent the other team from scoring points

football – a team sport, played between two teams of eleven players, men or women, with a round ball

goal – the action of making a ball go into an area between two posts in order to score a point

referee – an official person who enforces the rules, decides if a goal has been scored and generally controls the players and the game

rules – an official instruction that says how things must be done or what is allowed

score – getting the goal into the opposing goal

soccer – a form of football, played between two teams of eleven players, men or women, with a round ball

team – a group of people who play a game together against another group of people

volleyball – a team sport played between two teams of six players (male or female) with a round ball and a high net

Topic 29: Assessment

Question 1

1. Ball games usually involve kicking ✓, or hitting ✓, or passing a ball ✓ with the aim of scoring a goal against an opponent ✓. Most ball games are team sports ✓, but some, such as tennis, are individual sports ✓. (Any five.) **[5]**

Question 2

2. a) The object of the game is to score ✓ by getting the ball into the opposing goal ✓ by kicking ✓ or heading it in ✓. (4)
   b) A player can use any part of their body, such as the feet and legs ✓, chest ✓ and head ✓ to pass and control the ball ✓, but not their arms ✓. (5)

[9]

Question 3

3. The referee is the only other person allowed on the field besides the players ✓. Referees must enforce the rules ✓, decide if a goal has been scored ✓ and generally control the players and the game ✓. A referee can warn a player ✓, or show a yellow or red card ✓ and send a player off (red card) ✓. The assistants help the referee ✓ to decide who last touched the ball ✓ if it goes out of play ✓. They also watch for foul play ✓, such as kicking an opponent ✓. Their most responsible task is to call an offside ✓. (Any 10.) **[10]**

Question 4

4. The kit consists of shorts ✓, a shirt ✓, long socks ✓, boots ✓ and ankle and shin pads ✓. **[5]**

Question 5

5. Volleyball is a team sport ✓ played both for recreation ✓, and by professionals ✓. There are six players in a team ✓. The aim is for the attacking (serving) ✓ team to get the ball over the net and have it touch the ground ✓. The other (defending) team will try to stop this happening ✓. (Any five.) **[5]**

Question 6

6. A full-size volleyball court is a rectangle ✓, 18 metres by nine metres ✓ divided into two halves by a centre ✓. The net along the centre line is 2.43 metres ✓ above the court and is 1 metre deep ✓. A volleyball is between 65 and 67 centimetres in circumference ✓ and must weigh between 250 and 260 grams ✓. (Any five.) **[5]**

Total: [39]

TOPIC 30: Contact and non-contact sports

Performance objectives

30.1 Differentiate between contact and non-contact sports.
30.2 Give examples of contact and non-contact sports.
30.3 List the benefits of taking part in contact and non-contact sports.
30.4 Demonstrate common skills in contact and non-contact sports.
30.5 List safety measures in contact and non-contact sports.

Introduction

Contact sports, where there is bodily contact between players, and non-contact sports, where there is no contact whatsoever, are explained. Various examples of each type of sport are given.

Activity 30.1: Wrestling INDIVIDUAL (SB p. 188)

Resources

Pictures or posters of different sports (see answers below)

Guidelines

Ask students what they understand by the terms 'contact' and 'non-contact', so as to initiate discussion.

Answers

1. Ice hockey – contact; Swimming – non-contact; Gymnastics – non-contact; Ice hockey – contact; Tennis – non-contact; Karate – contact; Football (soccer) – contact; Bowls – non-contact; Diving – non-contact; Cricket – non-contact; Golf – non-contact; Darts – non-contact; Volleyball – non-contact; Judo – contact.
2. The main objective of a wrestling match is to score points in the following ways:
   - Takedown: a wrestler gains control over an opponent from a neutral position.
   - Reversal: a wrestler gains control over an opponent from a defensive position.
   - Exposure (danger position): a wrestler exposes the opponent's back to the mat, even if the back is to the mat but the wrestler is not pinned.
   - Penalty: striking an opponent, brutality, intent to injure and illegal holds mean points for the opponent.
   - A wrestler stepping out of bounds while standing in the neutral position during a match is penalised by a point to the opponent.
3. • Throwing an opponent – allowed
   - Pinning an opponent – allowed
   - Kicking an opponent – not allowed
   - Holding an opponent – not allowed
   - Head-butting an opponent – not allowed
   - Performing a takedown – allowed.

Assessment

Informal: Self-assessment – Individual, or during a class discussion

Activity 30.2: Judo INDIVIDUAL (SB p. 189)

Resources

Judo clothes and belts as examples

Answers

1. Ranked judo grades in the correct order: white belt, yellow belt, orange belt, blue belt, red belt, 1st Dan, 8th Dan.
2. • Breaking your fall means falling directly to the ground dissipating the forces through your arms and legs, and secondly to blend with the ground by rolling. A combination of these two methods can be used.
   - Throwing techniques include those using the arms, hips and feet.
   - Potentially lethal means using dangerous throws or strikes – however, the judo techniques can train a person to avoid potentially lethal situations on the street.

- Striking techniques are when an opponent strikes a vital point – these are not permitted outside of Kata exercises.
- Kyu grades are those below Dan grades from white belt through to brown belt.

Assessment

Informal: Class discussion

Activity 30.3: Gymnastics GROUP (SB p. 190)

Resources

Any available gymnastics equipment as described below

Guidelines

Great caution must be exercised and a qualified teacher must supervise any activities.

Answers

1. Gymnastic activities:
   A: Still rings
   B: Pommel horse
   C: Parallel bars
   D: Balance beam
   E: Stepped (uneven) bars
   F: Freestyle floor work

Activity 30.4: Swimming

INDIVIDUAL (SB p. 192)

Resources

Swimming pool

Guidelines

While this is partly a theoretically-based activity, if there is the possibility of practical swimming, this could be considered. Swimming MUST be supervised, and the danger of drowning MUST be considered too.

Answers

1. a) Never swim with friends – false. – Never swim alone; if you get into trouble, there will be nobody to help you.
   b) Always eat something just before you swim – false. – Swimming straight after eating can cause cramps, and should be avoided.
   c) Don't swim with heavy clothing or while wearing shoes – true.
   d) If a beginner swimmer needs a flotation device to help their self-confidence, that is fine – true.
   e) Never check how deep a pool is before diving in – false. – Never, ever dive into water (even a swimming pool) before checking its depth.
   f) It is impossible to drown while swimming – false. – Any swimmer can get into trouble and drown.
2. A: Breaststroke B: Backstroke
   C: Crawl D: Butterfly

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

contact sport – sports where physical strength and direct contact with an opponent take place

gymnastics – a non-contact sport involving the performance of physical exercises

judo – a martial art or method of defence in which you try to throw your opponent to the ground

non-contact sport – sports where there is no physical contact between opponents

safety – not likely to cause any physical injury or harm

self-discipline – the ability to make yourself do the things you do, without someone making you do them

skills – an ability to do something well, especially because you have learnt and practised it

swimming – the sport of moving yourself through water by moving your arms and legs

wrestling – a sport where two people fight by holding each other and trying to make each other fall

Topic 30: Assessment

Question 1

1. Contact sport are sports where physical strength and direct contact with an opponent take place ✓, e.g. soccer wrestling and judo (any two) ✓✓. In non-contact sports, there is no contact with an opponent and competitors usually perform individually ✓. Examples are gymnastics ✓ and swimming ✓. **[5]**

Question 2

2. Judo is a martial art ✓ and it is a form of self-defence ✓. Wrestling is a contact sport ✓ and the aim is to pin the opponent to the ground ✓. **[4]**

Question 3

3. Only certain forms or types of strike are permitted ✓. Manipulation techniques are limited to those which focus on elbow joints ✓. Some throwing techniques are not allowed ✓ because they are too dangerous ✓. Judoka are trained to break their falls to prevent injury ✓. **[5]**

Question 4

4. Gymnasts should
   - wear wrist straps, guards and grips on bar and ring equipment ✓
   - wear the correct footwear ✓
   - wear safety belts when training high off the ground ✓
   - ensure equipment and safety mats are properly placed and in good condition ✓
   - never take chances or show off ✓. (Any four.) **[4]**

Question 5

5. Freestyle ✓, breaststroke ✓, butterfly ✓ and backstroke ✓. (Any three.) **[3]**

Question 6

6. Things you should do:
   - Never swim alone ✓.
   - Beginner swimmers should be supervised by an adult ✓.
   - Beginner swimmers must follow instructions from the coach or trainer ✓.
   - Use a flotation device if necessary ✓.
   - Behave responsibly in the water ✓. (Any three.) (3)

   Things you should not do:
   - Swim out of the depth of where you can stand ✓.
   - Never dive into any water without checking how deep it is ✓.
   - Swim straight after eating ✓.
   - Swim with heavy clothing on or wearing shoes ✓.
   - Dunk or push other swimmers ✓. (Any three.) (3)

   [6]

Total: [27]

THEME 12

Health education

TOPIC 31: Personal, school and community health

Performance objectives

31.1 List and explain the three determinants of health.
31.2 List four characteristics of a healthy person.
31.3 Explain the meaning of sewage and refuse.
31.4 List five methods of sewage disposal.
31.5 List three methods of refuse disposal.
31.6 List sources of water supply.

Introduction

This topic identifies the common characteristics of healthy people, and examines the determinants of health and the factors that regulate our health status. The topic also examines how community factors, such as sewage and refuse disposal, and access to clean water impact on our health.

Activity 31.1: A simple water filter

GROUP (SB p. 197)

Resources

An empty plastic bottle (a 2-litre cooldrink bottle), small stones, sand, a piece of cloth, muddied water

Guidelines

This activity can be done as a project by the students.

Answers

1. The water is clearer after being filtered and has hardly any suspended particles in it.
2. The length of time taken for the water to pass through the filter will vary between the experiments. Discuss the answers in class. Get students to compare their water filters and assess what made the water filter more or less rapidly. The longer the water took to filter, the more effective the filtration.
3. Boil it. Disinfect it by adding bleach.
4. Not yet. It must be boiled, disinfected and stored hygienically.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

compost – organic matter that has been decomposed and recycled as fertiliser
potable water – water that is treated and is safe for drinking by humans
refuse – everyday household waste items that are discarded by people
sewage – a mixture of human waste (faeces or urine), and wastewater
wastewater – any water contaminated by humans from domestic use, commercial properties, industry, and agriculture

Topic 31: Assessment

Question 1

Healthy people have the following characteristics:

- They pay attention to their diet and eat balanced meals ✓.
- They exercise regularly ✓.
- They take care of their spiritual and emotional well-being ✓.
- They have a strong social network, are community-oriented and have healthy relationships with people ✓. **[4]**

Question 2

2. a) Sanitation is a hygienic way of promoting health by preventing human contact with sewage and solid wastes through proper treatment and disposal ✓✓. (2)
   b) Sewage is a mixture of human wastes, such as faeces and urine, with wastewater ✓✓. (2)
   c) Potable water is treated water that is safe for human consumption ✓✓. (2)

[6]

Question 3

3. a) Pit latrines: sewage disposal ✓ (1)
   b) Composting: refuse disposal ✓ (1)
   c) Landfills: refuse disposal ✓ (1)
   d) Septic tanks: sewage disposal ✓ (1)
   e) Disposal into the sea: sewage disposal ✓ (1)
   f) Dumps: refuse disposal ✓ (1)

[6]

Question 4

Potable water

- is free of contaminants, such as toxins, metals, pathogens and additives ✓
- is rich in naturally occurring minerals from the source water ✓
- has an alkaline pH of between 7–9.5 ✓
- is clear and tastes good ✓. **[4]**

Total: [20]

TOPIC 32: Food, nutrition and health

Performance objectives

32.1 Explain the meaning of food and nutrition.
32.2 List the different types of food.
32.3 Classify food based on nutrients.
32.4 List the importance of each food nutrient.
32.5 State the importance of food.

Introduction

This topic focuses on food, nutrition and health. The different types and classes of food discussed and the importance of food and food nutrients is also studied.

Activity 32.1: Nutritional value of foods

INDIVIDUAL (SB p. 202)

Resources

Nutrition facts table in SB on page 202, at least five empty food packages with nutrition labels on them

Guidelines

Explain to the class how to read and understand the information in the table on page 202 of the SB.

This exercise can be done as a class homework exercise.

Answers

1. The information in the table will depend on the food labels brought in by the students.
2. Students fill in the information, depending on the food labels they brought in.
3. Yes/No
4. No
5. The answer depends on the type of food labels brought to class.
6. You get more nutrients if you eat more of the food and less nutrients if you eat smaller amounts of the food.
7. It provides information on the amount and type of nutrients that the food contains, so you can adjust your food portions to meet your daily nutritional requirements. People can also use nutritional tables to avoid foods high in certain nutrients if they have particular medical conditions. For example, people with diabetes can avoid eating foods with high sugar content.

Assessment

Informal: Self-assessment/peer assessment – Discuss the answers in class.

Activity 32.2: Food groups

INDIVIDUAL (SB p. 203)

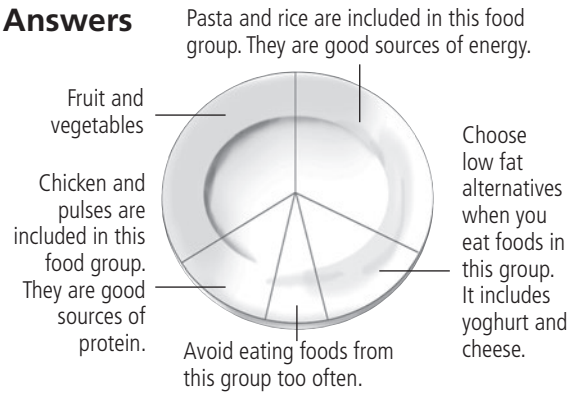
Resources

The Food Guide Plate in the SB on page 199.

Guidelines

Use this exercise to recap the principles of a balanced diet.

Answers



Assessment

Informal: Self-assessment/peer assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key word

nutrition – the process by which humans take in and use food in their bodies or the study of the diet as it relates to health

Topic 32: Assessment

Question 1

1.1 C ✓
1.2 D ✓
1.3 B ✓
1.4 D ✓
1.5 B ✓ **[5]**

Question 2

2.1 White bread ✓, coke ✓ and potato chips ✓. (3)

2.2 Peas ✓, lettuce ✓, tomato ✓ and apple ✓. (4)

2.3 Meal X ✓, because it has the highest total amount of kilojoules ✓ (2 900 kJ). According to the pie charts, the high energy content is due to its high lipid ✓ and carbohydrate ✓ content. (4)

2.4 Brown ✓ bread and bitter beer ✓. (2)

2.5 Meal Y:

- It is the lowest in kilojoules and, therefore, is unlikely to cause weight gain ✓.
- It has an excellent ratio of carbohydrates: fat: protein ✓.
- It has the highest concentration of calcium due to the milk rather than beer or Coke, as in the other 2 meals ✓.
- It has lettuce, tomato and apple, which contain many vitamins, and result in it having the highest concentration of vitamin C ✓.
- It also has a whole wheat roll, which takes longer to break down to sugar than white bread or coke in the other meals ✓.
- The whole wheat roll and lettuce, tomato and apple contain cellulose, which acts as roughage ✓.

(Any five of these reasons.) (7)

[20]

Total: [25]

TOPIC 33: Pathogens, diseases and their prevention

Performance objectives

33.1 Identify the diseases caused by pathogens.
33.2 List different types of diseases.
33.3 Mention the effect of diseases in athletes' performance in physical activities.
33.4 List types of diseases preventative measures.

Introduction

This topic identifies the common diseases caused by pathogens, and examines the effects of the diseases and the measures that can be taken to prevent the disease from being contracted.

Activity 33.1: Cholera INDIVIDUAL (SB p. 208)

Resources

Infographic in SB on page 208.

Guidelines

This activity can be done as a classwork or homework exercise by the students.

The teacher may either first discuss the infographic with the class or allow the students to work out the information conveyed by the infographic themselves before allocating time for the students to complete the questions.

Answers

1. Bacteria
2. People ingest water or food contaminated by the cholera bacteria.
   Contamination by the faeces of a person suffering from cholera.
3. Diarrhoea and dehydration
4. They should rehydrate by drinking fluids/salty solutions or by going to the doctor for an intravenous drip to be set up. They should also go on a course of antibiotics.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key word

communicable disease – a disease that spreads from one person to another or from an animal to a person
malnourishment – when someone is ill or weak because they have not had enough good food
pathogen – disease-causing organism

Topic 33: Assessment

Question 1

Answer	Column A	Column B
E	pathogen	A. A leading cause of death in Nigeria
G	fungal infection	B. Can only reproduce inside a host
I	virulence	C. Infectious or contagious diseases that spread from person to person
J	typhoid	D. The number of pathogens that entered a person's body
B	virus	E. A disease-causing organism
C	communicable disease	F. An example of an incurable sexually transmitted infection
D	dose	G. Athlete's foot
F	HIV	H. A disease caused by a protozoan
H	amoebic dysentery	I. The strength of a pathogen
A	malaria	J. An example of a bacterial disease

[10]

Question 2

2.1 55% ✓✓ (Acute respiratory infections + Diarrhoeal diseases + Malaria + Measles + HIV/AIDS + Other infectious and parasitic diseases) (2)

2.2 breastfeeding ✓ (1)

2.3 Ensure that children are vaccinated ✓ timeously in early childhood ✓. (2)

2.4 Protozoan or anopheles ✓ mosquito. Malaria is spread when a person is bitten by a mosquito carrying the disease ✓. (2)

2.5 Ensure that children are not allowed to play in dirty, polluted water ✓. Drinking water must be safe to drink ✓. If not piped, it must be collected properly in clean buckets, treated and stored hygienically to prevent ✓ the transmission of water-borne diseases. (Any two.) (2)

2.6
- Ensure that hands are washed with soap and water before eating meals and after using the toilet ✓.
- Avoid sharing personal items like toothbrushes, razors and towels ✓.
- Cough and sneeze into your elbow to reduce the chance of spreading diseases by hand ✓.
- Stay at home when you are sick to avoid spreading germs ✓.

(Any three reasonable answers.) (3)

[12]

Total: [22]

Practice test: Answers

Topic 25

1. Physical activity helps to build muscle fitness ✓, bone health ✓ and improve the health of your heart and lungs ✓. (Any two.) (2)
2. Health education lets you discover the things that are important for your personal health ✓, e.g. adequate activity, a nutritious diet, and a clean environment ✓. (2)
3. When your environment is dirty, it may breed diseases ✓. It is important that our environment is safe since a safe environment encourages good social relationships and helps to build good mental health ✓. (2)

[6]

Topic 26

1. When a person is 'physically fit' it means they can function efficiently at work ✓ and during leisure time ✓, is able to resist disease and can react to emergencies ✓. (3)
2. • muscular endurance – jogging, swimming, walking or cycling ✓
   • flexibility – stretching, yoga or pilates ✓ (2)
3. *Any two points* ✓✓:
   • Start slowly, check health with doctor, build up intensity slowly, stop immediately if you feel dizzy, have pains on your chest or experience shortness of breath. (2)

[7]

Topic 27

1. Leisure time is a time when a person does things that he or she likes to do ✓ and recreation is an activity that a person enjoys doing during their leisure time ✓. (2)
2. *Any three points* ✓✓✓:
   Improves level of fitness, reduces stress, improves social skills, helps families interact, improves confidence and self-esteem. (3)
3. Dancing is important in Nigerian culture as it is used to tell stories, or it may be part of an event or ceremony ✓. (1)

[6]

Topic 28

1. Running ✓, throwing ✓ and jumping events ✓ (3)
2. Throw only in the allocated circles ✓; make sure all spectators and other athletes are well away from the throwing circle ✓; make sure that everyone is observant and alert when someone is throwing ✓. (3)

[6]

Topic 29

1. Eleven on each side, so 22 altogether ✓. The two goalkeepers may use their hands ✓. (2)
2. One referee, and two assistant referees (linesmen) (2)
3. The Super Eagles (1)

Any two of these:
Leg ✓, muscle tendon ✓, knee and ankle injuries ✓. In soccer, occasionally, broken legs ✓. (2)

[7]

Topic 30

1. Gymnastics and judo ✓✓ (2)
2. Judo ✓ (1)
3. No, it is 50 metres long ✓. (1)
4. Because if the water is shallow, you can break your neck by hitting the bottom head first ✓. (1)

[5]

Topic 31

1. Accept any two answers common to students' community. For example: unsanitary disposal of solid wastes around homes ✓; irregular garbage pickups from the municipalities ✓; incorrect use of pit latrines ✓; defaecating in the open ✓; insufficient toilet facilities for the people ✓. (2)

2. Accept any three explanations, for example:
Humans may build pit latrines near water sources ✓ and these can collapse into the water body, contaminating it ✓. Pollution, such as the release of effluent from factories ✓, carries toxins that can harm aquatic life ✓. The release of untreated sewage directly into water bodies ✓ causes nutrient enrichment of the water body and this leads to eutrophication ✓. Land-based activities, such as farming and industrial activities ✓ may release chemicals, pesticides and fertilisers that runoff into water bodies and causes harm to aquatic organisms ✓. (3)
[5]

Topic 32

1. • bread, rice, potatoes, pasta and other starchy foods ✓
   • fruit and vegetables ✓
   • meat, fish, eggs, beans and other non-dairy sources of protein ✓
   • milk and dairy foods ✓
   • foods and drinks high in fat and/or sugar ✓ (5)

2. *Choose any three*:
   • for energy to keep warm, to move and to do work
   • to be able to perform its normal bodily functions such as digestion
   • to develop, replace and repair cells and tissues
   • to prevent sickness, fight infections and to recover from illnesses
   • to stay healthy. (3)
[8]

Topic 33

1. • Pathogen – a disease-causing organism ✓✓
   • Communicable diseases are diseases that spread from one person to another or from an animal to a person ✓✓.
   • Sanitation refers to the hygienic means of promoting health by preventing human contact with wastes through the proper treatment and disposal of sewage and solid wastes ✓✓. **[6]**

Total: [56]

SECTION 4

Information technology

THEME 13

Early technology

Topic 34: Technology of different information ages

Performance objectives

34.1 Understand what is meant by different information ages.
34.2 Explain and understand the technology and tools of the Stone Age, the Bronze Age and the Iron Age.
34.3 Describe the term Middle Ages.
34.4 Explain the Industrial Age, its technologies, and how it came about.
34.5 Discuss the Electronic Age and its impacts.
34.6 Outline the main features of the Information Age.

Introduction

This topic deals with and traces the advancement in human society from stone tool making through to the modern age we live in, where electronics and the spread of information electronically are so important. The topic also looks at the different ages or stages up to the Industrial Revolution and beyond.

Activity 34.1 (SB p. 217)

Resources

Student's Book, simple implements, such as a stone grinding tool, or a blade; some modern, sophisticated appliances, such as a cell phone

Guidelines

Introduce the activity by showing and explaining the different types of technology (the simple tools) and comparing them to the modern appliances. Ask students what has changed? Did the change happen overnight? Which technology do they prefer? Tell them they will now explore these changes in technology through the activity.

Answers

1. A = Middle Stone Age
   B = Bronze Age
   C = Iron Age
   D = Industrial Revolution
   E = Electronic Age (or Information Age)
2. Because time does not stand still, it continues into the future.
3. Copper
4. False. During the Middle Ages, the advancement of science and technology (and new knowledge) did not progress in the Western world.
5. New inventions and the harnessing of steam power (the steam engine) led to an increase in manufacturing output, known as industrialisation. In Europe and Great Britain, people moved from the countryside (rural areas) to the new industrial towns and cities to work in the factories.
6. Because it happened so quickly and there were such big changes (from a farming economy, to a manufacturing economy) in a short space of time.
7. Because electricity is the main source of power for everything, from lighting to heating, and because of the widespread use of computers and electronic appliances in the workplace and at home.

Assessment

Group and individual assessment, based on directed class discussion.

Key words

age – a period of time in history

economy – all the activities, work, goods and services which produce wealth in a society or country

Industrial Revolution – a time period that started in the 18th century and lasted into the 19th century, when the economies of Europe changed from agriculture to manufacturing

Topic 34: Assessment

Question 1

1. Technology refers to methods ✓, systems ✓ and devices ✓ that result from scientific knowledge and inventions ✓, resulting in practical applications ✓✓. (Any five.) **[5]**

Question 2

2. a) The Bronze Age ✓ (1)
   b) The Iron Age ✓ (1)
   [2]

Question 3

3. Stone Age ✓
   Bronze Age ✓
   Iron Age ✓
   Middle Ages ✓
   Industrial Age ✓
   Electronic Age ✓ **[6]**

Question 4

4. The Fourth Industrial Revolution ✓✓ or Information Technology (IT) Age ✓✓. **[2]**

Question 5

5. transistor ✓
   printed electronic circuit ✓
   personal computer ✓
   microprocessor ✓
   the cell phone ✓
   digital cameras ✓ (Any five.) **[5]**

Total: [20]

THEME 14

Basic computer operations and concepts

Topic 35: Historical development of computers

Performance objectives

35.1 List early counting devices.
35.2 State the problems with counting large numbers with early counting devices.
35.3 Name mechanical counting and calculating devices.
35.4 Name electro mechanical counting devices.
35.5 Compare electronic devices with modern computers.
35.6 State the contributions of named IT inventors.
35.7 Able to give the definition of a (modern) computer.
35.8 Identify the five generations of computers and describe their features.
35.9 Understand the difference between digital, analog and hybrid computers.

Introduction

In this topic, students learn about early counting and calculating devices and how they enabled people to keep track of the things they owned or wished to count. The shortcomings and the evolution of counting devices are also explored up to the development of computers.

Activity 35.1: Inventions INDIVIDUAL (SB p. 224)

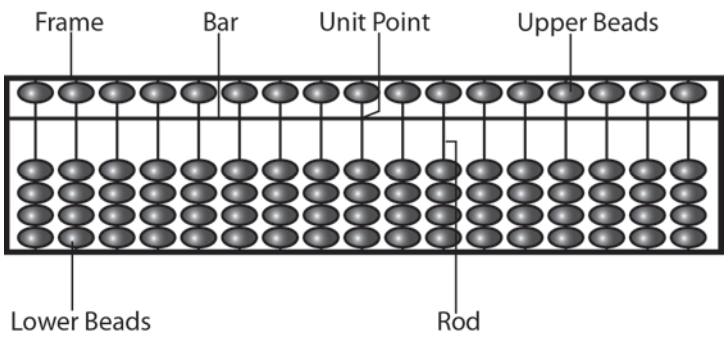
1. Herman Hollerith (punched cards)
2. Charles Babbage (analytical engine)
3. John Napier (Napier's bones)
4. John Von Neumann (EDVAC)
5. Blaise Pascal (the first mechanical calculator)

Activity 35.2: The abacus

PAIRS (SB p. 224)

Answers

1.



2. 5
3. 1
4. People who are blind can use the abacus to calculate. It helps children become more proficient in mathematics.

Activity 35.3: Contributions of an IT inventor

PAIRS (SB p. 225)

Guidelines

This activity can be done as a project. Each group of students are to choose an inventor who made a contribution towards the evolution of counting devices. The group must then prepare a poster that contains the information:

- Who is the inventor?
- The contribution that the named inventor made to the evolution of counting devices.
- What was the importance of the contribution towards science and technology?

Answers

The poster can be marked using the following rubric:

Criteria for poster	Marks
The contribution of the named inventor	5
The importance of the contribution towards science and technology	5
The poster is concise with relevant and interesting information	3
Well structured with effective use of headings	2
Written in student's own words	2
Presented in an eye-catching/ attractive/creative/lively/ way	3
Total	**20**

Activity 35.4: Technological development of the computer

INDIVIDUAL (SB p. 225)

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

Activity 35.5: Computers and everyday life

INDIVIDUAL (SB p. 225)

Students' own answers about how computers influence their lives. They must also identify some disadvantages.

Assessment

Informal: Self-assessment/peer assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

microprocessor – the central chip in a computer that controls most of its operations
transistor – a small piece of electronic equipment that controls the flow of electricity
diode – a two-terminal electronic component that only conducts current in one direction

Topic 35: Assessment

Question 1

1.1 B ✓
1.2 B ✓
1.3 A ✓
1.4 A ✓
1.5 C ✓ **[5]**

Question 2

2.1 Body counting ✓, collection counting ✓, tally sticks ✓, knotted strings ✓. (4)
2.2 They could not be used for counting large numbers efficiently ✓ and accurately ✓. (2)
[6]

Question 3

3.1 A mechanical counting device is a manual counting ✓ device, while an electromechanical counting device is powered by electricity ✓. (2)
3.2 a) Electromechanical ✓
b) Mechanical ✓
c) Mechanical ✓
d) Electromechanical ✓
e) Electromechanical ✓ (5)
[7]

Question 4

4.1
- First generation: 1942–1958 ✓, vacuum tubes ✓
- Second generation: 1959–1964 ✓, transistors ✓
- Third generation: 1964–1971 ✓, integrated circuits ✓
- Fourth generation: 1971–present ✓, microprocessors ✓
- Fifth generation: Present and beyond ✓, artificial intelligence ✓

(10)

4.2 Fourth generation ✓ (1)
[11]
Total: [29]

TOPIC 36: Basic computer concepts

Performance objectives

36.1 Define computer system.
36.2 List the parts of a computer system.
36.3 Mention the categories of the parts of a computer system.
36.4 Describe the computer as an input-processing-output (IPO) system.

Introduction

This topic categorises the different parts of a computer system and is useful in that it assists the student in understanding how the different parts of a computer relate to each other.

Activity 36.1: Types of keyboards

INDIVIDUAL FOLLOWED BY A CLASS DISCUSSION
(SB p. 230)

Resources

Access to a computer room or computers. It is suggested that a practical, hands-on approach be adopted for this topic and that, as students are taught the various parts of a computer, they have an opportunity, if possible, to use/touch/see the relevant part of the computer.

Guidelines

Allow the students to have practical experience with using a QWERTY keyboard before doing Activity 36.1. The students could be given pictures of other types of keyboards or directed to look them up on the internet to compare them and discover why they are of value to different users.

Answers

The **Dvorak** keyboard has letters positioned for speed typing. Unlike the traditional QWERTY keyboard, this keyboard is designed so that the middle row of keys includes the most commonly used letters in the alphabet.

The **Colemak** keyboard is a modern alternative to the QWERTY and Dvorak layouts, designed for efficient and ergonomic touch typing in English. The layout is designed to make typing more efficient and comfortable by placing the most frequent letters on the home row.

The **AZERTY** keyboard is commonly used in France and other parts of Europe. It is another version of the QWERTY keyboard in that the Q and W keys have been interchanged with the A and Z keys.

Assessment

Informal: Self-assessment – discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

input device – devices that allow users to communicate with the computer
output device – devices that communicate the results of data processing
storage device – devices that store information when offline
central processing unit (CPU) – processes the information that is entered into the computer using computer programs
motherboard – the point of connection for the CPU, memory, input and output devices, allowing all the parts of the computer to receive power, communicate and work together
computer system unit – an upright case that contains all the main interior components of a computer; it is also known as the computer tower

Topic 36: Assessment

Question 1

a)	Input devices	Keyboard, pointing devices (mouse, touchpad, trackball, touch pad, joystick, light pen)
b)	Processing device	Central processing unit (CPU)
c)	Output devices	Monitor, printer, speakers
d)	Storage devices	Hard disc drive, CD, USB flash drive

Only one example needed of each device. **[4]**

Question 2

2.1 QWERTY keyboard ✓ (2)

2.2 1 – Alphanumeric keys ✓
2 – Cursor movement keys ✓
3 – Numeric keypad ✓
4 – Function keys ✓ (4)

[6]

Question 3

3. a) To wait ✓. (1)
b) Ready for typing ✓. (1)
c) To select a link ✓. (1)

[3]

Question 4

4. The CD ✓. The other items are pointing devices and the CD is a storage device ✓. **[2]**

Question 5

Column A	Column B
ALU	a. Performs arithmetic and logical functions
Power supply	b. Converts AC power to low voltage DC power
Motherboard	c. Connects all the parts of the computer together
USB port	d. Allows USB compatible devices to be connected to the computer
Control unit	e. Coordinates the transfer of data between different units of a computer system

[5]

Total: [20]

TOPIC 37: Data processing

Performance objectives

37.1 Define data processing.
37.2 State the stages of data processing and describe what it entails.
37.3 State the features of a computer that make it an ideal tool for data processing.
37.4 Discuss the advantages and disadvantages of computers.

Introduction

This topic examines how a computer functions, and processes data and explores the features that computers have that allow it to process data efficiently.

Activity 37.1: Gathering data

PAIRS (SB. p. 237)

Resources

SB, the internet, the library

Guidelines

This activity can be done as a brief activity in the class. Allow pairs of students about 5–10 minutes to make a list of ways in which data can be gathered.

Answers

Answers may not include filling out forms, or by conducting interviews. Answers may include:

- Direct observation
- Experiments
- Census
- Surveys
- Face-to-face questioning
- Polls
- Focus groups
- Telephonically.

Assessment

Informal: Answers can be shared in class.

Activity 37.2: Case study: Online data storage

GROUP (SB p. 238)

Answers

1. The practice of storing electronic data via the internet.
2. Data can be accessed from anywhere in the world. There is a fee associated with online storage.
3. Flash drives, tape drives, disk drives
4. The need to be able to access data from anywhere in the world as businesses become increasingly globalised; the need to share files easily; the importance of being able to recover data more easily from cloud-based servers.
5. Security of cloud storage services; reliability of internet access; time taken to upload and download files; cost associated with online storage.

Activity 37.3: Handling Data: Chuku Emekwa's Petrol Station

INDIVIDUAL (SB p. 240)

Resources

Use a computer

Guidelines

The following activity is designed to give students practice with handling and manipulating data and using the results to make informed decisions.

Answers

1. a)

Types of vehicles driven	Number of people
Motorcycle	8
Car	13
Minibus	8
Pick-up truck	7
Heavy vehicle	5

b) Most common to least common vehicle: Car, minibus, heavy vehicle, motorcycle, pick-up truck. The car remained the most common type of vehicle in both sample groups. The percentage of people using motorcycles and bakkies decreased in the larger sample group. The percentage of people driving minibuses and heavy vehicles increased.

2. a)
- take-away: 37.5%
- sit-down restaurant: 27.5%
- public telephone: 15%
- grocery store: 25%
- playpark for children: 20%

b)

Types of service people use at the garage	% of people out of 40	% of people out of 200
Take-away	37.5	26
Sit-down restaurant	27.5	17.5
Public telephone	15	22.5
Grocery store	25	20
Playpark	20	14.5

3. a) He could provide options from which people could choose answers.

b) **Question 2:**
How often do you buy petrol at Chuku's Petrol Station?

Once a ☐ week Twice a ☐ week

Twice a ☐ month Once a ☐ month

Question 3:
How much do you usually spend on fuel each time you stop at Dumisani's?

< 500 NGN ☐

500NGN – 1000NGN ☐

>1000NGN ☐

4. Recommendation that Chuku expands his business to include a restaurant with sit-down and take-away options, a public telephone and a playpark.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

data – pieces of information, for example, a collection of words, numbers, graphics or sounds

data collation – the arrangement of data in a proper sequence to make it more useful

data gathering – a system of gathering information from a variety of sources to get a complete and accurate picture of an area of interest

data processing – the conversion of data into useful information

Topic 37: Assessment

Question 1

a) Accurate information ✓ is collected from a variety of sources ✓. (2)

b) Data collation is the arrangement of data in a proper sequence ✓ to make it more meaningful ✓. (2)

c) Data input stage ✓. (1)

d) Data is manipulated ✓ using computer programs ✓. (2)

e) Tables, videos, graphs, printouts, etc. ✓✓✓. (Any three.) (3)

f) Printers, monitors, documents, speakers ✓✓. (Any two.) (2)

g) Data storage ✓. (1)

[13]

Question 2

a) Numeric data ✓ (1)

b) Alphabetic data ✓ (1)

c) Alphanumeric data ✓ (1)

[3]

Question 3

3. a)	Input devices	Keyboard, pointing devices (mouse, touchpad, trackball, touch pad, joystick, light pen)
b)	Processing device	The central processing unit (CPU)
c)	Output devices	Monitor, printer, speakers
d)	Storage devices	Hard disc drive, CD, flash drive

[4]

Total: [20]

THEME 15

Computer ethics

TOPIC 38: Basic knowledge of IT

Performance objectives

38.1 Define computer ethics and provide examples of ethical computer practices.
38.2 List ways of taking care of a computer room/laboratory.
38.3 State the rules and regulations of the computer laboratory.
38.4 Observe computer room rules and regulations.

Introduction

In this topic, students study how to care for computers and how to behave appropriately when in a computer laboratory.

Activity 38.1: Ethical situations

GROUP (SB p. 245)

Place the students in groups for 15 minutes to discuss the ethical dilemmas of the situations described in the activity. Thereafter, hold a class discussion to discuss their judgements.

1. Unethical
2. Criminal
3. Criminal
4. Ethical

Activity 38.2: A message in cartoons

PAIRS (SB p. 247)

Resources

Cartoons in SB on page 247

Guidelines

This activity can be done as class exercise. Allow each pair of students about five minutes to study each cartoon and comment on the effectiveness of the message portrayed.

Answers

Cartoon A:
The message is that computers can heat up when in use.

The cartoon is effective in showing how hot computers can get (hot enough to fry an egg on it) and refers to how vitally important it is for computers to be well ventilated and to have a cooling system.

Cartoon B:
The message is that we should not eat or drink in front of computers.

The cartoon is effective – it shows that we should practise caution even when drinking a cup of tea in front of a computer as even drink spills can cause damage to computers.

Activity 38.3: How to care for the school's computer room

GROUP (SB p. 247)

Resources

A4 blank paper, pictures/colouring-in pencils, permanent markers, glue

Guidelines

Allocate each group of students a tip on how to care for computers. Allow the students to work in their group to make a poster to communicate the importance of the tip in caring for the computer room at school.

Answers

Criteria for poster	Marks
The poster is concise with relevant and interesting information and conveys the message effectively	5
Well structured with effective use of headings	2
Written in student's own words	1
4. Presented in an eye-catching/ attractive/creative/lively/ way	2
Total	**10**

Activity 38.4: Computer room rules

INDIVIDUAL (SB p. 247)

Resources

Poster in SB on page 247

Guidelines

This exercise can be done as a homework task or a class task. The students should be instructed to write down each rule and explain the importance of having the rule.

Answers

- Do not eat or drink in the computer lab to prevent spills on the computer that could damage it.
- Keep your workstation clean and neat to maintain the neatness of the lab and attract other students to use it to study.
- Be respectful of others and work quietly so that all students can work productively in the lab.
- Do not change the settings on the computers so that the computer can be accessed in the most effective and beneficial way by all users.
- Keep your files organised to find them easily.
- Surf the internet safely so that you don't infect the computers with viruses.
- Save your work regularly to ensure that your work is not lost should the lights trip or the computer shuts down.
- Print only when necessary to save paper and ink and be ecologically responsible.
- Log off when done so that people cannot use your log-in details and access your files.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

ventilation – allowing fresh air into a room
computer ethics – a set of moral principles that regulate the use of the computer

Topic 38: Assessment

Question 1

1.1 C ✓ (1)
1.2 C ✓ (1)
1.3 D ✓ (1)
[3]

Question 2

For example: Breaking into a computer to retrieve needed digital medical data to save somebody's life because the authorised user cannot be found. Consider other reasonable and applicable answers ✓✓✓. **[3]**

Question 3

3. a) Covering the computers to keep them free of dust ✓.
   Acceptable ✓. (2)
   b) Eating and drinking in the computer room ✓.
   Unacceptable ✓. (2)
   c) Noise and disruption to other students in the computer room ✓.
   Unacceptable ✓. (2)
   [6]

Question 4

4.
- Computer ethics is a set of moral principles that regulates the use of the computer ✓.
- Do not use a computer to bully or hurt others ✓.
- Do not use copyrighted software without purchasing it or requesting permission to use it ✓.
- Do not access other people's files and documents and/or interfere with it ✓.
- Do not use another person's computer without their permission ✓.
- Respect another person's privacy ✓.
- Do not use a computer to steal information or money from another person ✓.
- Do not copy someone else's content without acknowledging it ✓.

[8]
Total: [20]

TOPIC 39: Applications of IT in everyday life

Performance objectives

39.1 State the use of IT in daily activities.
39.2 Identify the impact of IT in daily activities.
39.3 Mention some ICT devices in the home, school and environment.

Introduction

Information technology (IT) is an important part of everyday life and IT literacy is fast becoming a functional requirement for people's work, social, and personal lives. In this topic, students study the use and impact of IT in our daily lives.

Activity 39.1: Using ICT to communicate

INDIVIDUAL (SB p. 251)

Resources

Word cloud in SB on page 251

Guidelines

This activity can be done as a classwork or homework exercise. Students should be allocated a period of time to study the word cloud and answer the questions.

Answers

2. Television, radio, internet (any two).
3. For example: Telephone, microphone, cellular phone, loudspeaker.
4. For example: Camera, photocopying, television, computer, cellular phone, fax.

Assessment

Informal: Self-assessment/peer assessment – Discuss the answers in class.

Activity 39.2: Different technologies in everyday life

INDIVIDUAL (SB p. 251)

Resources

Pictures of different types of technology used in everyday life.

Guidelines

This activity can be done as a classwork or homework exercise.

Answers

A. Microwave – for heating and cooking
B. Email – to communicate

Assessment

Informal: Self-assessment/peer assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

Information and communication technology (ICT) – the specific area of IT that has to do with communications

Information technology (IT) – all forms of technology used to create, store, exchange, and use information in various forms

simulation – producing conditions that are similar to real ones

Topic 39: Assessment

Question 1

1.1 Information technology refers to the use of technology to create, store and exchange information ✓, while information and communication technology refers to the use of technology for the purpose of communication ✓. (2)

1.2 IT devices (any two): personal computers, scanners, digital cameras, software programs ✓✓. ICT devices (any two): cameras, mobile phones, DVDs, CDs, photocopying machines/ printers ✓✓. (4)

[6]

Question 2

2.1 Answers may include the following: The following technologies make people feel more connected to each other: Online groups in social media, instant chats/messaging on mobile phones, applications that enable easy communication across the world, e.g. Skype, video calls, email, ease of playing online games using a personal computer, ease of communication for educational purposes, etc. ✓✓✓✓✓. (5)

2.2 IT can contribute towards lowering stress levels as it allows people to easily access entertainment, such as music and books, to occupy themselves. Shopping and banking online reduce the stress of having to wait in long queues. The use of IT to control traffic lights, air conditioning and even security systems appliances, makes life less complicated and eases stress. IT can contribute towards increasing stress as people may suffer from information overload due to the inflow of information and communication from various sources. Exposure to online fraud as well as keeping up with social media and technological trends, can also be stressful ✓✓✓✓✓. (5)

[10]

Question 3

- Computers allow for large amounts of information to be stored and transported easily ✓.
- Data can be organised into folders so that it can be found easily ✓.
- Information can be edited and printed for distribution with ease ✓.
- Information can be secured by using passwords ✓. **[4]**

Total: [20]

TOPIC 40: Information transmission

Performance objectives

40.1 Define information transmission.
40.2 List ancient methods of transmitting information.
40.3 Identify modern methods of transmitting information.
40.4 Differentiate between electronic and non-electronic methods of communication.
40.5 Classify information by its mode of transmission using examples.

Introduction

In this topic, students study ancient and modern methods of transmitting information in Africa.

Activity 40.1: Drum talk – Africa's 'wireless' INDIVIDUAL (SB p. 255)

Resources

Article on SB page 255

Guidelines

This activity can be done as a classwork or homework exercise by the students.

Answers

1. The drum beat could travel across the forests and communicate messages. There were no roads or telecommunication services that would otherwise allow messages to be relayed.
2. The drum beat did not require a physical connection. The drum beat could be used at any time of the day or night to rapidly communicate a message across physical barriers, such as forests, to a large number of people simultaneously.

Assessment

Informal: Self-assessment – Discuss the answers in class.

How are you doing?

Use the Practice test to check if there is anything you do not understand. Ask your teacher to explain.

Key words

information transmission – the movement or transfer of information from one person to another or from one place to another
representation – the use of signs that take the place of something else

Topic 40: Assessment

Question 1

Table of electronic and non-electronic communication devices and their modes of receiving information. **[7]**

Mode in which information is received	Type of communication device	
	Electronic	Non-electronic
Audio	Telephone, radio, GSM	
Visual	Telex/pager, fax	Print media, e.g. newspapers, brochures
Audio-visual	Television, internet, satellite	

Question 2

2.1 a) Oral communication ✓ (1)

b) Speech, songs, stories or chants ✓ were used to convey information on culture, history, traditions, law ✓, etc. The information resided in the memory of people ✓. (3)

c) Print media, television documentaries, radio discussions, internet (any two) ✓✓. (2)

d) Modern ✓. The information can be stored, whereas in ancient times, the death ✓ of a knowledgeable person resulted in the loss of the information ✓. (3)

OR

If the student answers that the ancient means are better his/her reasoning could be that ancient oral cultures built communities and allowed for a two-way system of communication rather than modern technological devices which don't entertain a discussion.

2.2 a) Beating of drums ✓. (1)

Answers to b) and c):

- They allowed communication to occur across distances ✓. In modern times, this is done by email, telephone, fax ✓. (2)
- They were used to issue warnings, invitations to ceremonies and to communicate news ✓.In modern times, this has been replaced by print media, letters, email ✓. (2)
- They brought people together to settle disputes ✓. In modern times, this mostly happens via email and letters ✓. (2)

2.3 a) In ancient times, people painted in caves to keep a record ✓ of weather patterns,animal migrations, history and culture. They had a religious and ceremonial purpose ✓. Cave paintings were used to warn ✓ people and teach them how to hunt and protect themselves ✓. (5)

b) Cave paintings provide valuable insight into the cultures and practices of ancient people and help us understand ancient civilisations ✓. It is a record of our history and must be preserved ✓. (2)

[23]

Total: [30]

Practice test: Answers

Topic 34

1. It happened so quickly and there were such big changes (from a farming economy, to a manufacturing economy) in a short space of time ✓. (1)
2. False ✓. During the Middle Ages, the advancement of science and technology (and new knowledge) did not progress in the Western world ✓. (2)
3. Information Age ✓✓. (2)

[5]

Topic 35

1. a) i) ✓
   b) iii) ✓
   c) ii) ✓ (3)
2. Fill in the blanks.
   a) punched cards ✓
   b) Charles Babbage ✓
   c) counting boards ✓, the abacus ✓and the slide rule ✓ (5)
3. First generation – Vacuum tubes ✓
   Second generation – Transistors ✓
   Third generation – Integrated circuits ✓
   Fourth generation – Microchips ✓ (4)
4. Accept *any two* reasonable answers such as:
   - The devices could not do calculations.
   - Large numbers could not be added.
   - They were cumbersome to carry around ✓✓. (2)

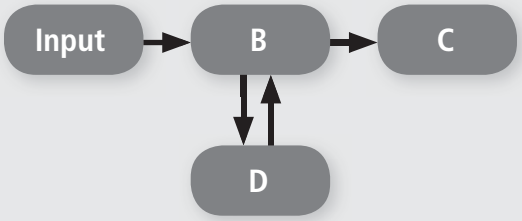
[14]

Topic 36

1. a) Keyboard and pointing devices (mouse, touchpad, trackball, touch pad, joystick, light pen). (Any one.)
   b) Central processing unit (CPU)
   c) Monitor, printer and speakers. (Any one.)
   d) Hard disc drive, CD and USB flash drive. (Any one.) (4)
2. The CD. The other items are pointing devices and the CD is a storage device (2)

[6]

Topic 37

1. Data is raw facts, numbers or text ✓. Information is processed data, data with context, or data that has been summarised, organised and analysed ✓. (1)
2. 

   a) B – processor ✓, C – output ✓, and D – storage ✓ (3)
   b) See diagram ✓✓ (2)
   c) *Any three devices*:
   flashdrives ✓, mobile phones ✓, hard drive ✓, memory sticks ✓, CDs ✓, DVDs ✓, tapes ✓ (3)
   d) *Any two forms*:
   Printer ✓, screen ✓, headphones, speakers ✓, audio ✓, visual ✓, text ✓, print ✓ (2)

[11]

Topic 38

Any five rules:

- Do not eat or drink in the computer lab – to prevent spills on the computer that could damage it.
- Keep your workstation clean and neat to maintain the neatness of the lab and attract other students to use it to study.
- Be respectful of others and work quietly so that all students can work productively in the lab.
- Do not change the settings on the computers so that the computer can be accessed in the most effective and beneficial way by all users.
- Keep your files organised to find them easily.
- Surf the internet safely so that you don't infect the computers with viruses.

- Save your work regularly to ensure that your work is not lost should the lights trip or the computer shuts down.
- Print only when necessary to save paper and ink and be ecologically responsible.
- Log off when done so people cannot use your log-in details and access your files. (5)

[5]

Topic 39

Mohammed could name his files ✓.
He could also organise his files into folders ✓. (2)

[2]

Topic 40

1.

Type of method	Why was the method used
Town crying	to make public announcements in the streets or marketplace of a village
Beating drums	to send messages across distances and villages in Africa. See SB page 154 for alternate answers
Type of method	**Why was the method used**
Cave paintings	to keep a record of animal migrations and weather patterns
Folktales	to pass on information about the history, law and traditions across generations without a writing system
Whistling	to communicate in mountainous areas or places as the sound can travel a larger distance than ordinary speech as it bounces off the mountain
Making representations	to keep records

(12)

2. Advantages of the internet: The internet contains a wealth of knowledge on any topic ✓. The information is up to date ✓, available instantly ✓ upon any search and is accessible in various forms ✓, such as video, text and animations.
Disadvantages of the internet: As anyone can post information about any topic, people have to be cautious about the validity of the information they get and must ensure that their sources are trustworthy ✓.
The internet can be used for criminal activities and to scam people. Therefore the internet must be used wisely ✓. (6)

[18]

Total: [61]

Glossary

Please note that the page numbers listed in this Glossary refer to the pages in the Student's Book where the key words appear.

abort – deliberately stopping a pregnancy and causing the embryo or foetus to leave the uterus p. 40
AC – abbreviation for alternating current, a way in which electricity moves along a wire p. 88
adolescence – period following puberty during which a young person develops from a child to an adult p. 26
addiction – a psychological and physical inability to stop consuming a chemical, drug or substance p. 6
adolescence – period following puberty during which a young person develops from a child to an adult p. 26
age – a period of time in history p. 214
amperage – measure of the amount (rather than the strength) of an electrical current p. 90
atoms – small particles that make up matter p. 17
attacking – when a player or group of players try to move forward to try to score goals or win points p. 178
autotrophic – organisms like plants that are able to make their own food p. 19
balanced diet – a diet consisting of the proper quantities and proportions of foods needed to maintain good health and sustain normal growth and development p. 4
balanced force – any pushes and pulls are balanced by another force in the opposite direction p. 67
ball games – usually a team sport that involves kicking, or hitting, or passing a ball with the aim of scoring a goal against an opponent p. 177
biodegradable – a substance or object capable of being decomposed by bacteria p. 11
border – lines drawn around the edge of the drawing sheet p. 124
brace – something that is used to strengthen or support p. 135
bradawl – a small, simple tool used to start a hole p. 135
bricks – a type of rectangle block made of clay or cement; mainly used to build walls in a house p. 113
caesarean section – using surgery to deliver the baby, rather than a vaginal, or normal, birth p. 45
cardiorespiratory – the parts of the body that are involved in the heart, blood circulation and breathing p. 162
carpenter – a person who works with wood p. 132
cement – a building material used in the foundations of houses to make concrete, to cement bricks together and to plaster walls; it is mixed with water and then it hardens p. 113
central processing unit (CPU) – processes the information that is entered into the computer using computer programs p. 231
centrifugal force – a force that acts outwards on an object that is moving around a point p. 172
ceramics – an inorganic, non-metal solid made from clay (very fine-grained earth, with its own special mineral properties) p. 102
chisel – a metal tool with a sharp edge, used to shape wood p. 134
chlorophyll – a green pigment that is found in plants p. 19
circuit – a collection of connected electrical components or parts of objects p. 88
clamp – a portable tool used to hold pieces of wood together after they have been glued together p. 136
cleaning – the process of getting rid of dirt p. 148
cleft lip and palate – a birth defect that causes the foetus to develop with a split in the upper lip and roof of the mouth p. 40
climate change – changes to the temperature and rainfall patterns as a result of too much gas in the atmosphere p. 59
cold chisel – a metal tool with a sharp edge that is used to shape metal p. 143

communicable disease – a disease that spreads from one person to another or from an animal to a person p. 207
compass – an instrument for drawing arcs and circles p. 120
compost – organic matter that has been decomposed and recycled as a fertiliser p. 196
computer ethics – a set of moral principles that regulate the use of the computer p. 245
computer system unit – an upright case that contains all the main interior components of a computer; it is also known as the computer tower p. 231
concrete – a mixture of cement, sand and gravel; mainly used to build foundations in a building p. 113
construction – to build something p. 113
contact force – a force where objects touch p. 64
contact sport – sports where physical strength and direct contact with an opponent take place p. 187
corrective maintenance – undertaken if something starts to give signs that it might go wrong p. 147
data – pieces of information, for example, a collection of words, numbers, graphics or sounds p. 236
data collation – the arrangement of data in a proper sequence to make it more useful p. 237
data gathering – a system of gathering information from a variety of sources to get a complete and accurate picture of an area of interest p. 237
data processing – the conversion of data into useful information p. 236
DC – abbreviation for direct current (see also AC) p. 88
defending – when a player or group of players try to prevent the other team from scoring points p. 178
diode – a two-terminal electronic component that only conducts current in one direction p. 222
dividers – an instrument for measuring or dividing lines p. 120
drafting board – a smooth board that paper is placed on while making drawings p. 123
drug abuse – the repeated use of illegal drugs or the misuse of medication that causes harm to the body p. 5
drug misuse – the use of a drug for purposes it was not intended for, or using too much of it p. 6
eclipse – when the shadow of a planet or satellite falls on another planet or satellite p. 74
economy – all the activities, work, goods and services which produce wealth in a society or country p. 216
effluent – liquid waste or sewage discharged into water p. 13
electrical appliance – article used in the home and powered by electricity, such as a kettle p. 89
electrical current – the actual, measurable flow of electricity through a circuit p. 88
electricity – flow of electrons; a source of power p. 90
electrocution – death by electric shock p. 97
embryo – developing baby in the early stages of pregnancy p. 36
environmental pollution – the addition of substances to the environment that may be harmful to living organisms p. 9
eutrophication – excessive nutrient enrichment of a body of water, frequently due to run-off from the land, which causes a dense growth of aquatic plant life p. 14
excrete – to remove waste products from chemical reactions in the body p. 20
exercise – physical activities that a person does to keep healthy, fit and strong p. 161
fermented – when the sugar in something (for example, a plant) has changed to alcohol p. 58
ferrous – contains lots of iron p. 104
fertilised – an egg and sperm cell that have joined together p. 31
file – a metal tool used to file down rough surfaces and edges and to finish off and shape edges before using waterpaper (a type of sandpaper suited to metal) to get a smooth surface p. 143
foetus – developing baby in the later stages of pregnancy p. 36
football – a team sport played between two teams of eleven players, men or women, with a round ball p. 177
force – any interaction that changes the motion of an object p. 63
fossil fuels – fuels like coal, oil and natural gas that were formed millions of years ago by dead plants and animals p. 58
freehand sketching – drawing without using instruments p. 128
French curve – a template for drawing curved lines p. 119

friction – a force that holds back the movement of an object with which it is in contact p. 68
gamete – male or female reproductive cell (egg and sperm in humans) p. 36
glands – a structure in the body that produces and releases substances p. 31
glass – an amorphous, transparent solid material without a chemical structure; made from silica quartz (sand) p. 102
global warming – a gradual increase in the overall temperature of the Earth's atmosphere due to increased levels of carbon dioxide and other pollutants in the atmosphere p. 10
goal – the action of making a ball go into an area between two posts in order to score a point p. 177
gravel – chipped stones or aggregate; mixed with cement and sand to make concrete p. 113
gravitational force – a force driven by the mass of an object p. 64
gravity – a force that acts on all objects, big or small p. 71
greenhouse gases – gases that trap heat that would otherwise escape from Earth p. 10
gymnastics – a non-contact sport involving the performance of physical exercises p. 187
hand tools – a tool that does not use electricity p. 132
health education – learning about the different aspects, such as nutrition, hygiene, the environment and physical fitness, and how these can keep us healthy p. 157
heterotrophic – organisms like animals that eat other organisms p. 19
hormones – special chemicals that travel in the bloodstream and carry messages to other parts of the body p. 39
hygiene – conditions and practices that help to maintain health and prevent the spread of diseases p. 2
Industrial Revolution – a time period that started in the 18th century and lasted into the 19th century, when the economies of Europe changed from agriculture to manufacturing p. 216
Information and Communication Technology (ICT) – the specific area of IT that has to do with communications p. 250
Information Technology (IT) – all forms of technology used to create, store, exchange, and use information in various forms p. 250
information transmission – the movement or transfer of information from one person to another or from one place to another p. 254
input device – devices that allow users to communicate with the computer p. 229
judo – a martial art or method of defence in which you try to throw your opponent to the ground p. 187
leaves and grass – cheap natural building materials that are easy to work with (wattle and daub) p. 115
leisure – activities that people want to do during their spare time p. 167
lubricate – the process of putting oil or grease on something to make it move smoothly p. 147
machine – something that uses mechanical power and has few or many moving parts, each with a special function, and together as a whole they perform a particular task or a specific job of work p. 146
magnetic force – a force driven by electrical properties p. 64
mallet – a wooden hammer with a large, flat driving surface p. 134
malnourishment – when someone is ill or weak because they have not had enough good food p. 209
matter – anything that takes up space and has mass p. 17
mechanisation – using machines to do jobs p. 167
menstrual cycle – the cycle that prepares the body for pregnancy p. 27
menstruation – also known as having a period; the loss of blood from the vagina during the monthly cycle p. 26
metal – a hard, opaque element or compound, often shiny in appearance, that is mined p. 102
metalwork – the art and skill of shaping metal into useful objects or decorations p. 141
microprocessor – the central chip in a computer that controls most of its operations p. 223
motherboard – the point of connection for the CPU, memory, input and output devices, allowing all the parts of the computer to receive power, communicate and work together p. 232
non-biodegradable – substances that cannot be decomposed by bacteria or other living organisms, thereby causing pollution p. 12
non-contact force – a force where objects are not in contact p. 64

non-contact sport – sports where there is no physical contact between opponents p. 187
non-ferrous – does not contain much iron; more expensive than ferrous metal p. 104
non-renewable sources of energy – sources of energy that cannot be replaced once they have been used, for example coal and oil p. 50
nuclear fission – splitting the nucleus of an atom p. 59
nutrition – the process by which humans take in and use food in their bodies or the study of the diet as it relates to health p. 4
odd-leg calipers – a hand tool used to scribe a line a set distance from the edge of a metalwork piece p. 141
output device – devices that communicate the results of data processing p. 233
ovulation – the release of an egg from the ovary p. 28
pathogen – disease-causing organism p. 207
pedestrian – someone walking along a road or place where vehicles drive p. 94
pelvis – the bony structure that is shaped like a bowl and made up of the hip bones and lower back bones p. 39
photosynthesis – the process that plants use to make food p. 19
photovoltaic cells – special panels that can absorb light energy and convert it into electricity p. 51
physical education – learning about how to maintain our physical fitness, for example, keeping physically fit by doing exercise p. 155
placenta – the organ where the foetus is joined to the uterus of the mother; it provides the foetus with food and oxygen and removes wastes from it p. 40
plastic – an artificial building material made mainly from polyurethane that, in turn, is made from crude oil p. 102
plastic – a malleable material made from both natural and artificial raw materials; can be pressed or moulded into different shapes without breaking p. 102
pollutants – substances that cause pollution p. 9
potable water – water that is treated and is safe for drinking by humans p. 196
potential energy – energy that is stored in a system p. 53
potential source – a source of, for example, energy that could be used at some time in the future p. 51
predictive maintenance – undertaken to prevent problems that are expected to occur in the future p. 147
premature baby – a baby that is born more than three weeks before its due date p. 41
preventative maintenance – undertaken on tools or machinery to prevent a breakdown or malfunction p. 146
properties – special characteristics or features of a substance or material p. 102
protractor – a piece of metal shaped in a half-circle that is used for technical drawing, geometry, and in woodwork and metalwork for marking angles on a workpiece p. 142
puberty – a time in the life of young people when their bodies change to become sexually mature and able to reproduce p. 26
punch – a strong tool made of steel that is struck hard with a hammer to make the hole in a workpiece p. 142
put – throw a shot in a shot put event p. 173
recreation – doing things during leisure time that people enjoy doing p. 167
referee – an official person who enforces the rules, decides if a goal has been scored and generally controls the players and the game p. 179
reflectors – a piece of plastic that is fastened to a bicycle or to a piece of clothing, so that it can be seen more easily at night p. 94
refuse – everyday household waste items that are discarded by people p. 196
renewable sources of energy – sources of energy that can be replaced, for example wind energy p. 50
representation – the use of signs that take the place of something else p. 256
resistance – anything, including electrical components, which act to slow down, or prevent, the flow of electricity in a circuit p. 90
respiration – chemical reactions in all living cells that produce energy using food and oxygen p. 20
rubber – an elastic material used to make various items, such as tyres p. 102
rules – an official instruction that says how things must be done or what is allowed p. 178

safety – not likely to cause any physical injury or harm p. 94
safety guard – a physical barrier over moving machine parts, such as blades p. 97
sand – silica dioxide (SiO_2), which is used in the building industry to make cement and concrete p. 113
sanitation – the provision of facilities and services for the safe disposal of human urine, faeces and wastes p. 2
satellite – a natural or artificial (made by humans) object that orbits a larger object (usually a planet) in space p. 71
saw – a tool with a serrated-edged blade used for cutting wood p. 136
score – getting the goal into the opposing goal p. 178
screwdriver – a common tool used to screw in threaded screws in a rotating motion p. 135
scriber – a hand tool used to mark lines on metalwork pieces before cutting p. 141
seasons – the different conditions experienced as the Earth revolves around the Sun and the different hemispheres (north and south) receive different amounts of energy (light and heat) from the Sun p. 75
secretions – useful substances produced and released, usually by a gland, in the body p. 32
self-discipline – the ability to make yourself do the things you do, without someone making you do them p. 188
semen – fluid and sperm cells p. 28
set square – a right-angled triangle used for drawing lines, especially at 90º, 45º, 60º and 30º angles p. 119
sewage – a mixture of human waste (faeces or urine), and wastewater p. 195
simulation – producing conditions that are similar to real ones p. 252
sketch – a rough or preliminary drawing p. 128
skills – an ability to do something well, especially because you have learned and practised it p. 188
soccer – a form of football played between two teams of eleven players, men or women, with a round ball p. 177
society – a group, or collection of people, in an area or a country, which make up the population of that area, or country p. 254
solar system – the Sun and the planets that move around the Sun in their orbits p. 71
space travel – the exploration of space by both unmanned satellites and space probes p. 71
state – whether an object is a solid, liquid or gas p. 18
STD – a sexually transmitted disease; most often spread during sex p. 45
steel rule – an accurate measuring device for measuring straight-line distances on a technical drawing, or in woodwork or metalwork p. 142
sterilised – made free of bacteria and other micro-organisms p. 45
storage device – devices that store information when offline p. 234
surface plate – a solid, flat, cut- and scratch-resistant plate used as the main horizontal reference plane in metalwork p. 141
sustainable – able to use something continuously p. 57
swimming – the sport of moving yourself through water by moving your arms and legs p. 187
system – a set of interacting parts that work together p. 49
technical drawing – the act and practice of drawing something to show how it functions or is constructed, p. 118
T-square – a T-shaped instrument for drawing straight lines and right angles p. 119
team – a group of people who play a game together against another group of people p. 177
technical drawing – the act and practice of drawing something to show how it functions or is constructed p. 118
technological literacy – the ability to use technology tools or knowledge p. 86
technology – to do with machines, including electronics, and improvements or progress linked to those machines p. 84
technology – the use of scientific knowledge for practical purposes p. 84
title block – a block at the bottom of a technical drawing that contains important information, such as the title and date p. 125
transformed – changed or converted p. 53
transistor – a small piece of electronic equipment that controls the flow of electricity p. 222

unbalanced force – a force that causes a change in the motion of an object p. 67
vaginal flora – useful bacteria that live in the vagina p. 27
ventilation – allowing fresh air into a room p. 246
virus – a very small particle that causes disease p. 44
visible – can be seen p. 94
volleyball – a team sport played between two teams of six players (male or female) with a round ball and a high net p. 177
voltage – the strength of an electric current (see also amperage) p. 90
wastewater – any water contaminated by humans from domestic use, commercial properties, industry, and agriculture p. 195
weightlessness – experienced when an object is free of all contact forces p. 71
wood – an organic (from living trees), fibrous (made up of fibre) and porous (absorbs and holds water) plant tissue found in the stems and roots of trees p. 102
woodwork – the skill of making wooden objects p. 132
wrestling – a sport where two people fight by holding each other and trying to make each other fall p. 187
zygote – cell formed when a male and female gamete join together p. 36