

Excellence in

Basic Science & Technology



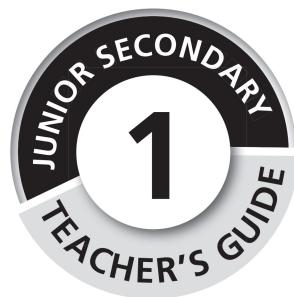
CURRENT
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Excellence in

Basic Science & Technology



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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 health and education
- Information technology.

This became necessary in order 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 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
- contents 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 3 or 4 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 good lessons to his or her students.

The teacher has to:

- be as well informed as possible on the scheme of work of the subject
- know the aims and objectives of each topic
- select appropriate content materials
- decide on the best methods of presentation such as PowerPoints, 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 do 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 involve being curious and 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 you 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 health and 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.

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

How to use the 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 and 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 vii to xv.

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.

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* 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 Scheme of work for JSS1

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 1	1-2	Theme 1 Learning about our environment	1. Family health	<ul style="list-style-type: none"> • 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. • State the effects of drug abuse. 	<ol style="list-style-type: none"> 1. Sanitation – the importance of sanitation, sanitation methods. Activity 1.1 How water is collected in a rural village. 2. Nutrition – a balanced diet. Activity 1.2 Different food groups. 3. Class, type and functions of different food groups. Activity 1.3 Plan a menu. 4. Drug and substance abuse – the effects of drug and substance abuse. Activity 1.4 Drugs amongst high school learners in Nigeria. Summary.
	1-2		2. Environmental pollution	<ul style="list-style-type: none"> • 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. 	<ol style="list-style-type: none"> 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.
	2-3		3. Living and non-living things	<ul style="list-style-type: none"> • Recognise that all living things 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. • State the importance of plants and animals to human beings in their environment. • Collect samples of some living and non-living things, sort out the materials and explain the uses. 	<ol style="list-style-type: none"> 1. Matter. Activity 3.1 Matter. Activity 3.2 Air and water. 2. States of matter – characteristics of living and non-living things. Activity 3.3 Characteristics of living things. 3. Importance of plants and animals – importance and uses of plants, importance and uses of animals. Activity 3.4 Importance of plants and animals. 4. Non-living things. Uses of non-metals. Properties of non-metals. Activity 3.5 Non-living things. Summary.

Term	Week	Theme	Topic	Performance Objectives (Students should be able to:)	Content/Suggested number of lessons
Term 1	2–3	Theme 2 You and energy	4. Energy	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> What is energy? Sources of energy – coal, natural gas, oil, wind, water, solar energy, wood. Activity 4.1 Sources of energy. Forms of energy. Activity 4.2 Forms of energy. Energy transformation – some examples of energy transformations – represent energy transformations as a system diagram. Activity 4.3 An energy transformation diagram. Activity 4.4 Energy transfer in a system. Uses of energy. Summary.
	3–4		5. Renewable and non- renewable energy	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> Energy systems. Energy sources. Activity 5.1 Energy sources. Renewable energy sources – wind power, solar power, biofuels, wood, hydropower. Activity 5.2 Renewable energy. Non-renewable energy sources – nuclear power, advantages and disadvantages. Activity 5.3 Non-renewable energy sources. Energy and society. Activity 5.4 Case study. Summary.
	4–5		6. Forces	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> Meaning of force. Activity 6.1 Mass and force. Types of force. Activity 6.2 Contact and non-contact forces. Gravitational and magnetic force. Calculation of gravitational force. Activity 6.3 Potential energy. Balanced and unbalanced forces. Activity 6.4 Balanced and unbalanced forces. Friction and its uses, Advantages and disadvantages of friction. Activity 6.5 Frictional resistance. Summary.

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 1	5–6	Theme 3 Science and development	7. The Earth in space	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> Gravitation and weightlessness. Activity 7.1 Gravity and weightlessness. Our solar system. Activity 7.2 Day and night. Eclipses. Activity 7.3 Eclipses. Seasons. Activity 7.6 Different seasons. Summary. Satellites. Uses of satellites. What is the International Space Station. Activity 7.5 Artificial satellites. Space travel. Activity 7.6 Space exploration. Practice test.
	7–9	Revision and Practice test			
9–10	Theme 4 Understanding basic technology	8. Understanding technology		<ul style="list-style-type: none"> Identify technology related occupations. State the importance of technology. 	<ol style="list-style-type: none"> What is technology about? Advantages of technology Technology-related occupations Why it is important to be technologically literate. Activity 8.1 Discuss technology. Summary.
9–10	Theme 5 Safety	9. Road safety		<ul style="list-style-type: none"> List safety guidelines for pedestrians. Demonstrate how pedestrians cross the road. Identify/List safety guidelines for cyclists. Explain/List safety guidelines for motorists. 	<ol style="list-style-type: none"> Safety for pedestrians. Safety for cyclists and motor cyclists. Safety for motorists. Alcohol and road safety. Activity 9.1 Discuss road safety. Summary.
10–11		10. Workshop safety		<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> Causes of workshop accidents. Types of workshop accidents. Workshop safety devices – protective gear, fire extinguishers, safety guards. 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. Accident prevention techniques. Activity 10.1 Workshop safety. Activity 10.2 Risk assessment. Summary.

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 1	10–11	Theme 6 Materials and processing	11. Properties of materials	<ul style="list-style-type: none"> 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. 	<p>1. Wood. Properties of wood. Activity 11.1 Properties of wood.</p> <p>2. Metals. Properties of metals. Ferrous and non-ferrous metals. Forms of metal. Activity 11.2 Metals and their uses.</p> <p>3. Ceramics and glass. Ceramics and glass: the big difference. Properties and uses of glass. Forms of glass. Activity 11.3 Ceramics and glass. Summary.</p>
	10–11		12. Building materials	<ul style="list-style-type: none"> 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. 	<p>1. Types of building material. Activity 12.1 Different building materials. Cement, sand, gravel. Activity 12.2 Uses of cement. Bricks. Metal. Activity 12.3 Uses of metal. Plastics. Wood. Activity 12.4 Uses of wood.</p> <p>2. Glass and ceramics. Leaves and grass. Uses of building materials. Summary.</p>
Term 2	1	Theme 7 Drawing practice	13. Drawing instruments and materials	<ul style="list-style-type: none"> 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. 	<p>1. Basic instruments and their uses. Activity 13.1 Drawing instruments.</p> <p>2. Basic handling techniques – T-square, set square, French curve, compass, dividers.</p> <p>3. Activity 13.2 Simple shapes.</p> <p>4. Care of equipment. Summary.</p>
	1		14. Board practice	<ul style="list-style-type: none"> 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. 	<p>1. Setting drawing paper on the board.</p> <p>2. Sharpening pencils. Activity 14.1 Two styles of sharpening pencils.</p> <p>3. Drawing a border, horizontal and vertical lines – the border, horizontal lines, vertical lines.</p> <p>4. Positioning and drawing the title block.</p> <p>5. Freehand writing of letters and numerals. Activity 14.2 Basic drafting techniques. Summary.</p>

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 2	1	Theme 7 Drawing practice	15. Freehand sketching	<ul style="list-style-type: none"> • Make neat freehand sketches of lines, curves and irregular shapes. 	<ol style="list-style-type: none"> 1. Freehand sketching. 2. Lines. 3. Curves and circles. 4. Irregular shapes. Activity 15.1 Freehand sketching. Summary.
2–3		Theme 8 Tools, machines and processes	16. Woodwork hand tools	<ul style="list-style-type: none"> • Identify woodwork handtools, 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. 	<ol style="list-style-type: none"> 1. Measuring tools – tape measure, ruler, Try square (T-square), other measuring tools. 2. Setting and marking out tools. Activity 16.1 Working tools. 3. Driving tools – hammers, mallets, screwdrivers. Holding devices – vices, clamps. Cutting and paring tools – saw. 4. Boring tools – wood braces, ratchet brace, bradawl. Activity 16.2 Driving and boring tools. 5. Cutting and paring tools – planes, chisels. Activity 16.3 Cutting and paring tools. 6. Care and maintenance of woodwork hand tools. Activity 16.4 Care of woodwork hand tools. Summary.
2–3			17. Metal work hand tools	<ul style="list-style-type: none"> • 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. 	<ol style="list-style-type: none"> 1. Marking out tools – surface plate, scribe, odd-leg callipers. 2. Measuring tools and gauges – steel rule, protractor. 3. Driving tools – punches, screwdrivers. 4. Cutting tools – chisels. Activity 17.2 Metalwork tools. 5. Care and maintenance of metalwork hand tools. Activity 17.3 Care and maintenance of metalwork tools. Summary.
4–5			18. Maintenance of tools and machines	<ul style="list-style-type: none"> • 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. 	<ol style="list-style-type: none"> 1. Maintenance. What is a machine? 2. Types of maintenance – preventative maintenance, corrective maintenance, predictive maintenance. Activity 18.1 Type of maintenance. 3. Importance of maintenance – cleaning. Activity 18.2 Cleaning and caring for tools and machinery. Summary. 4. Practice test.

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 2	5–7	Revision and Practice test	19. Physical fitness and body conditioning programme	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> What does physically fit mean? Importance of being physically fit. Components of physical fitness – cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, body composition. Characteristics of a physically fit person. Exercises to develop physical fitness – muscular strength, muscular endurance, flexibility. Activity 19.1 Exercises. Exercise and safety. Summary.
	8–9	Theme 9 Basic human movement	20. Recreation, leisure and dance activities	<ul style="list-style-type: none"> Define recreation, leisure and dance. Differentiate between recreation, leisure and dance. List some benefits derived from recreational and dance activities. 	<ol style="list-style-type: none"> Recreation and leisure. Activity 20.1 Recreation and leisure. Dance – types of dance, dance and culture. Activity 20.2 Case study. Benefits of recreation and dance. Summary.
	9–10		21. Athletics (track and field)	<ul style="list-style-type: none"> 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 discuss. Explain the benefits of taking part in athletics. 	<ol style="list-style-type: none"> Discuss skills. Activity 21.1 Discus throwing. Shot put – Shot put skills. Activity 21.2 Shot put. Safety when throwing. Activity 21.3 Throwing sectors. Benefits of athletics. Throw – discus. Summary.
	10–11				

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 3	1-2	Theme 10 Sports and games	22. Ball games	<ul style="list-style-type: none"> 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. 	<p>1. Soccer – history of soccer, basic skills and techniques. Activity 22.1 Soccer skills. Rules of the game, officials. Activity 22.2 Soccer officials. Facilities and equipment, common injuries, values. Activity 22.3 Soccer injuries.</p> <p>2. Volleyball – history of volleyball, basic techniques, rules of the game. Activity 22.4 Volleyball skills. Officials, facilities and equipment, common injuries, values.</p>
	2-3		23. Contact and non-contact forces	<ul style="list-style-type: none"> 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. List safety measures in contact and non-contact sports. 	<p>1. Contact sports – wrestling. Activity 23.1 Wrestling. Judo. Activity 23.2 Judo.</p> <p>2. Non-contact sports – gymnastics. Activity 23.3 Gymnastics. Swimming. Activity 23.4 Swimming. Summary.</p>
3-4		Theme 11 Health education	24. Personal, school and community health	<ul style="list-style-type: none"> 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. 	<p>1. Factors that affect your health – hereditary, environment, lifestyle.</p> <p>2. Characteristics of a healthy person.</p> <p>3. Sanitation – sewage disposal, refuse disposal, water supply. Activity 24.1 A simple water filter. Summary.</p>

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 3	4–5	Theme 11 Health education	25. Food, nutrition and health	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> Different types of food. Classes of food nutrients – carbohydrates, proteins, fats and oils, vitamins, minerals and salts, water. Activity 25.1 Nutritional food value. Importance of food. Activity 25.2 Food groups. Summary.
	5–6		26. Pathogens, diseases and their prevention	<ul style="list-style-type: none"> Identify the diseases caused by pathogens. List different types of diseases. Mention the effect of diseases in athletes' performance in physical activities. List types of preventative measures. 	<ol style="list-style-type: none"> Diseases caused by pathogens – bacterial diseases, viral diseases, fungal diseases, diseases caused by protozoans. Activity 26.1 Cholera. Effect of diseases on athletes' performance. 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 Practice test.
	6–7		Revision and Practice test		
	7–8	Theme 12 Basic computer operations and concepts	27. Historical development of computers	<ul style="list-style-type: none"> List early counting devices. State the problems with counting large numbers with early counting devices. Name mechanical counting and calculating devices. Name electro-mechanical counting devices. Compare electronic devices with modern computers. State the contributions of named IT inventors. Identify the five generations of computers and describe their features. 	<ol style="list-style-type: none"> Early methods of counting – body counting, collection counting, tally sticks, knotted strings. Mechanical counting devices. Electromechanical counting devices. Electronic counting devices. Generations of computers – first generation (1940 – 1956) vacuum tubes, second generation (1956 – 1963) transistors, third generation (1964 – 1971) integrated circuits, fourth generation (1971 – present) microprocessors, fifth generation (present and beyond) artificial intelligence. Activity 27.1 Contributions of an IT inventor. Summary.

Term	Week	Theme	Topic	Performance Objectives (students should be able to:)	Content/Suggested number of lessons
Term 3	8–9	Theme 12 Basic computer operations and concepts	28. Data processing	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> What is data processing – examples of data, types of data, qualities of good information. Data processing cycle – data gathering, Activity 28.1 Gathering data collation, input stage, processing stage, output stage, storage stage. Activity 28.2 Case study: Online data storage. Importance of computers as data processing tools. Summary.
8–9		Theme 13 Computer ethics	29. Basic knowledge of IT	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> Taking care of the computer room. Activity 29.1 A message in cartoons, Activity 29.2 How to care for the school's computer room. Rules and regulations of the computer laboratory. Activity 29.3 Computer laboratory rules. Summary.
9–10			30. Applications of IT in everyday life	<ul style="list-style-type: none"> State the use of IT in daily activities. Identify the impact of IT in daily activities. 	<ol style="list-style-type: none"> Uses of IT – communication. Activity 30.1 using IT to communicate. Timing and control – information processing or management. Activity 30.2 Different technologies in everyday life. IT and society. Summary.
9–10			31. Information transmission	<ul style="list-style-type: none"> Define information transmission. List ancient methods of transmitting information. Identify modern methods of transmitting information. 	<ol style="list-style-type: none"> Ancient methods of transmitting information – oral information, beating drums, Activity 31.1 Drum talk – Africa's 'wireless', town crying, firelighting, whistling, drawing diagrams, making representations. Modern methods of transmitting information – prints, telephone, telex/pager, radio, television, satellite, fax/facsimile, internet, GSM (Global System for Mobile Communication). Summary. Practice test.
10–11		Revision and Practice test			

**SECTION
1**

Basic science

Theme 1: Learning about our environment

Theme 2: You and energy

Theme 3: Science and development

Practice test: Answers



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.
- 1.6 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: How water is collected in a rural village

INDIVIDUAL (SB p. 3)

Resources

Article on 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. It could get contaminated from the dirty bucket, from being uncovered, or from leaves from the bush.
4. She could have used a clean container with a lid.
5. They should have boiled it or disinfected it.

6. Because the water had been contaminated from various sources and was not safe to drink

Assessment

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

Activity 1.2: 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

Criteria for poster	Marks
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 1.3: 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. meal plans as a class.

Activity 1.4: Drugs amongst high school students in Nigeria GROUP (SB p. 5)

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.

Keywords

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 water

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. 8)

Resources

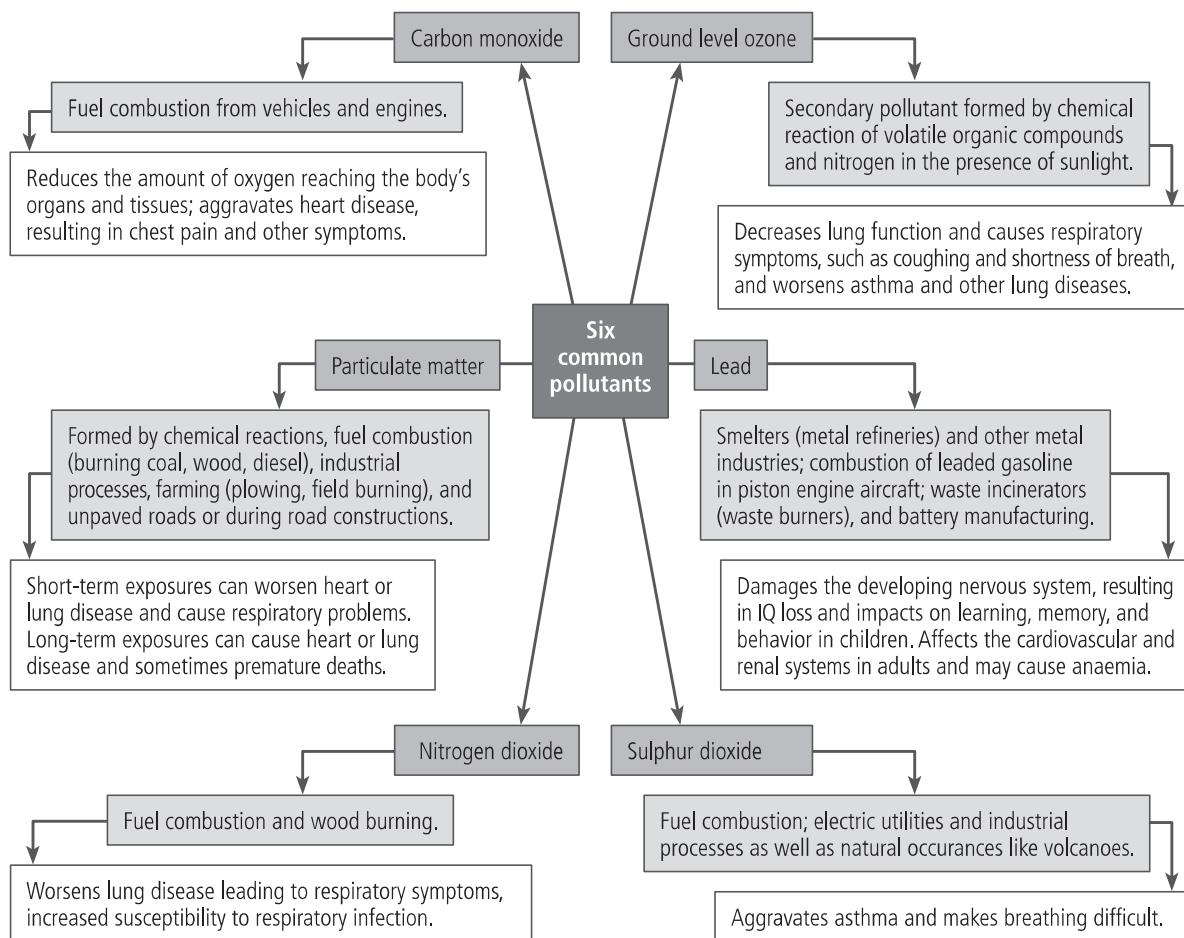
Mind map in SB, internet for research

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. 10)

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. 11)

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 cause aquatic plants, particularly algae, to grow rapidly and prolifically. High algal growth result 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.

Keywords

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

effluent – liquid waste or sewage discharged

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

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: Matter

GROUP (SB p. 13)

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

2. 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.
3. Answer depends on the samples that students have collected.

Activity 3.2: Air and water CLASS (SB p. 14)

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: Characteristics of living things

PAIRS (SB p. 16)

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. 17)

Guidelines

Allow students to work and research in pairs on 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: Non-living things

GROUP (SB p. 19)

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.

Keywords

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 4: Energy

Performance objectives

- 4.1 Explain the meaning of energy.
- 4.2 State and describe the sources of energy.
- 4.3 Name forms of energy.
- 4.4 Explain how energy is transformed from one form to another.
- 4.5 State the uses of energy.

Introduction

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

Activity 4.1: Sources of energy

GROUP (SB p. 21)

Guidelines

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

Activity 4.2: Forms of energy

PAIRS (SB p. 22)

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

Activity 4.3: An energy transformation diagram

INDIVIDUAL (SB p. 24)

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)

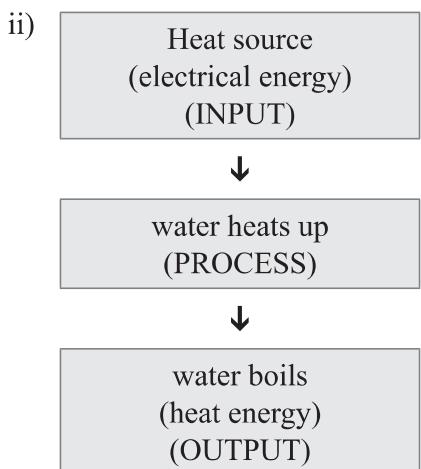
Kicker (potential energy) (INPUT)



kicks the ball
(PROCESS)



ball moves through the air
(kinetic energy)
(OUTPUT)



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

Activity 4.4: Energy transfer in a system

GROUP (SB p. 24)

Resources

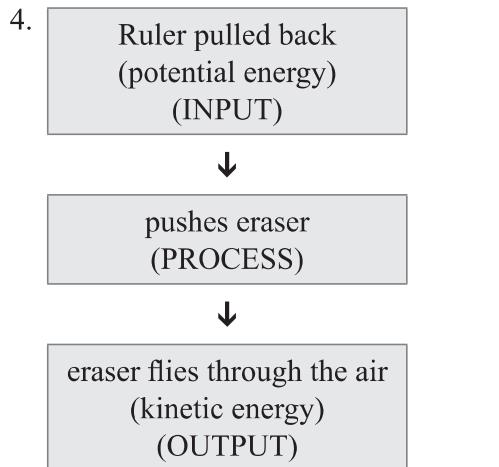
Flexible plastic ruler, measuring tape, eraser

Guidelines

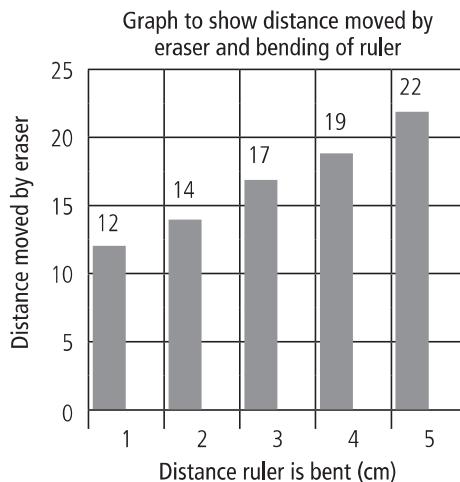
Arrange students in groups and read through the instructions for the activity. Students record their results before answering the questions.

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.



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 graph 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.

Keywords

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

system – a set of interacting parts that work together

transformed – changed or converted

TOPIC 5: Renewable and non-renewable energy

Performance objectives

- 5.1 Explain the meaning of renewable and non-renewable energy.
- 5.2 Give examples of renewable and non-renewable energy.
- 5.3 State the implications of misuse of non-renewable energy.
- 5.4 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 5.1: Energy sources

INDIVIDUAL (SB p. 26)

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 5.2: Renewable energy sources

GROUP (SB p. 27)

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

Activity 5.3: Non-renewable energy sources

INDIVIDUAL (SB p. 28)

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 radiation

How are you doing?

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

Keywords

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

greenhouse gases – gases like carbon dioxide that are produced when fossil fuels are burnt

nuclear fission – splitting the nucleus of an atom
sustainable – able to use something continuously

Activity 5.4: Case study INDIVIDUAL (SB p. 29)

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 like welding.
b) They had to find other work.
4. Improved supply of power to cities and towns; greater production of power.

TOPIC 6: Forces

Performance objectives

- 6.1 Explain the meaning of force.
- 6.2 Identify contact and non-contact forces.
- 6.3 Differentiate between magnetic and gravitational forces.
- 6.4 Measure and calculate gravitational force when mass and height are provided.
- 6.5 Describe how to set up a balanced force.
- 6.6 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 6.1: Mass and force

INDIVIDUAL (SB p. 30)

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 6.2: Contact and non-contact forces

INDIVIDUAL (SB p. 32)

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 6.3: Potential energy

INDIVIDUAL (SB p. 33)

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 6.4: Balanced and unbalanced forces

INDIVIDUAL (SB p. 35)

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 6.5: Frictional resistance

INDIVIDUAL (SB p. 36)

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 which 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

How are you doing?

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

Keywords

- 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 7: The Earth in space

Performance objectives

- 7.1 Explain the terms gravitation, weightlessness, satellite and space travel.
- 7.2 State the effects of gravitation.
- 7.3 Identify the different bodies in the solar system.
- 7.4 Explain rotation and revolution of the Earth and moon.
- 7.5 Explain and illustrate solar and lunar eclipses.
- 7.6 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 7.1: Gravity and weightlessness

INDIVIDUAL (SB p. 38)

Resources

Round objects of different size to demonstrate the concept of bigger objects exerting greater gravitational attraction, 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. A marble; baseball, cricket or snooker ball; the Earth; the sun. Arranged by size – the

bigger the object, the bigger the force of gravity which it exerts.

3. A parachutist 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).

Assessment

Informal: Self-assessment

Activity 7.2: Day and night

GROUP (SB p. 39)

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

1. and 2. are setting 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 making one half of Earth to be in shadow and one in light.

Activity 7.3: Eclipses

GROUP (SB p. 40)

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 40 for the finished model). The two could be divided between the groups.

Assessment

Informal: Self-assessment

Activity 7.4: Different seasons

INDIVIDUAL (SB p. 41)

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 7.5: Artificial satellites

INDIVIDUAL (SB p. 42)

Resources

Model of a satellite, NASA home page on internet

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; International Space Station

Activity 7.6: Space exploration

INDIVIDUAL (SB p. 44)

Resources

Internet (NASA web site) <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.

Keywords

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, the planets which move around the sun in their orbits, moons that revolve around many (but not all) the planets, other heavenly bodies, such as asteroids, comets and meteors

space travel – the exploration of space by both unmanned satellites and space probes

weightlessness – experienced when an object is free of all contact forces

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)
[10]

2. It puts a person at risk of getting ill with disorders such as obesity, diabetes, cancer, high blood pressure and heart disease. ✓✓ (2)

Topic 2

1. a) iii ✓
b) iv ✓
c) i ✓
d) ii ✓

(4)

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. ✓✓

1. Refer to SB page 9.

(4)

[8]

Topic 3

1. a) 140 cm tall ✓✓
b) 168 cm tall ✓✓
c) 16 cm ✓✓
d) Zeenat ✓✓

(8)

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

(2)

[10]

Topic 4

1. a)
- Striking match
kinetic energy
(input) ✓
- ↓
- match lights
(process) ✓
- ↓
- flame
heat and light ✓
(output)
- (3)

- b) Students should draw a similar diagram to the one above using their own example.

(3)

[6]

Topic 5

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 6

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)

Topic 7

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 which 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)

Total: [50]