INTEGRATED SCIENCE

FOR JAMAICA

4TH EDITION

NATIONAL STANDARDS CURRICULUM

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macmillan education

Integrated Science

for Jamaica Grade 9

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Contents

Scope and sequence

Section Title	Syllabus objectives
Unit 1 Working Like a Scientist	
1.1 Experimental variables	
1.2 Steps in the scientific method	• Identify and state problems • Formulate hypotheses
1.3 Fair testing	• Plan and design experiments (fair tests) to solve specific problems
1.4 Writing a report	
1.5 Physical quantities	• Formulate a definition for the term 'physical quantity' • Recall five fundamental quantities and their base units • Recognise that all other quantities and units are derived from fundamental quantities and base units
1.6 Standardisation	• Recognise a unit as a standard measure of a quantity • Use prefixes micro, milli, centi, deci, kilo, and mega appropriately and be able to carry out relevant calculations
1.7 Standard form	• Express measurements and calculated values in standard form ($a \times 10^n$)
1.8 Significant figures	• Determine the number of significant figures in the expressed value of a quantity • Determine the number of significant figures in a calculated value • Express measurements and calculated values to the correct number of significant figures
1.9 Graphs	• Recognise that quantities have effects on each other and that a graph is a pictorial representation of their relationship • Plot graphs according to accepted standards • Calculate gradients of graphs and determine their units • Create and interpret distance-time and velocity-time graphs for uniform motion
UNIT 2 Transport in Humans and Plants	
2.1 The importance of transport systems in living things	
2.2 Transport in and out of cells	• Investigate the process of osmosis • Explain the process of osmosis • Compare osmosis with diffusion • Prepare biological materials for investigation • Investigate the need for a transport system in multicellular organisms • Identify the types of substances which need to be transported in animals • Demonstrate interest in the outcomes of investigations • Make predictions using scientific knowledge and understanding

Section Title	Syllabus objectives
2.3 The human circulatory system	• Prepare biological materials for investigation • Annotate a simple diagram of the human heart • Relate the basic structure of the human heart to its function • Trace the flow of blood through the heart and around the body • Relate the structure of arteries, veins and capillaries to their functions • Identify the main components of blood and state their basic functions • Use scientific vocabulary and/to articulate concepts clearly and precisely
2.4 Transport systems in plants	• Identify the substances that are transported in plants • Describe how roots are adapted for taking in water • Identify the location of transport tissues in a dicotyledonous plant stem and root sections • Describe the basic functions of the xylem and phloem • Investigate the movement of substances from the soil to the leaves
UNIT 3 Electricity and Magnetism	
3.1 Static electricity	• Recall that atoms contain protons, neutrons and electrons and state their respective charges • Investigate the production of static electricity • Describe useful applications and hazards of static electricity • Conduct investigations with due regard for safety • Work cooperatively in groups
3.2 Electricity in the home	• Formulate a simple working definition for the term 'electric current' • Classify materials/substances as insulators and conductors of electricity
3.3 Electric current	• Construct simple circuits using lamps, insulated wires, dry cells, switches to distinguish between series and parallel circuits • Draw diagrams to represent series and parallel circuits • Investigate the relationship between voltage (V) and current (I) in a simple series circuit
3.4 Electricity, electronics and magnetism	• Perform simple activities to identify the poles of a bar magnet • Demonstrate that unlike poles attract and like poles repel
3.5 Electromagnetic induction	• Construct an electromagnet • Investigate the properties of an induced current
3.6 Safe use of electricity	• Conduct investigations with due regard for safety • Work cooperatively in groups

Section Title	Syllabus objectives
UNIT 4 Chemical Bonding, Formulae and Equations	
4.1 The first 20 elements	• Recall the symbols of the first 20 elements • Calculate the number of each sub-atomic particle present in an atom/ion • Deduce the pattern for determining electronic configuration of first 20 elements
4.2 Writing formulae for compounds	• Use the Octet Rule to explain why atoms bond • Write the formulae of simple binary compounds using symbols and valencies
4.3 Ionic bonding	• Draw dot and cross diagrams to represent ionic bonding • Formulate working definitions for ions, cation, anion and ionic bonding • Investigate physical properties of ionic compounds
4.4 Types of reactions	• Translate word equations for simple chemical reactions into symbol equations • Investigate the main types of reactions
4.5 Which type of reactions are endothermic or exothermic?	• Cite examples of exothermic and endothermic reactions • Use appropriate scientific language • Make sure they are working safely
4.6 Balancing equations	• State and apply the Law of Conservation of Mass to writing balanced equations • Investigate the Law of Conservation of Mass using precipitation reactions • Construct balanced symbol and ionic equations from given information
UNIT 5 Sensitivity and Coordination	
5.1 Detecting changes in our surroundings	• Deduce the importance of responding to changes in the environment
5.2 Sense organs	• State that each sense organ contains sensory / receptor cells that detect a specific type of stimulus
5.3 The nervous system	• State that the brain and spinal cord comprise the Central Nervous System (CNS) which coordinates the body's responses • Name the main parts of the human brain and state their basic functions
5.4 Different kinds of actions	• Differentiate between voluntary and involuntary /reflex actions • Explain the importance of reflex actions using examples
5.5 The endocrine system	• Describe the endocrine system as consisting of ductless glands that respond to internal stimuli by producing hormones • Identify selected endocrine glands, their location, the hormones they produce and their importance in maintaining the internal environment • Compare the nervous system with the endocrine system • Use appropriate scientific language to describe features of the nervous and endocrine systems

Section Title	Syllabus objectives
UNIT 6 Acids and Alkalis	
6.1 Acids, bases and alkalis	• State that compounds can be classified as acids and alkalis • Identify common acids, alkalis and salts • Create a safety booklet dealing with the handling of acids and alkalis • Investigate selected reactions of acids and alkalis • Cite practical examples of neutralisation in daily life
6.2 Indicators and pH scales	• Use pH paper and universal indicator solutions to determine pH of different substances • Show that acid-base indicators change colour in acids and alkalis • Synthesise homemade indicators using materials found in the kitchen and garden • Analyse and synthesise information from multiple sources • Investigate household chemicals using acid-base indicators • Create individual pH scale from household substances
6.3 Acidic and basic oxides	
6.4 Salts	
6.5 Preparation of salts	• Base conclusions and suggestions on evidence • Show interest in the outcomes of experiments and investigations
UNIT 7 Sexual Reproduction and Birth Control	
7.1 Embryo development and birth	• State that the fertilised egg (zygote) undergoes repeated cell divisions to produce an embryo which becomes implanted in the uterus • Identify key structures in a pregnant uterus (placenta, amniotic sac, amniotic fluid, umbilical cord and uterine wall) and state their basic functions in the growth and development of the human embryo/foetus • Describe how the embryo obtains nutrients and oxygen and eliminates waste
7.2 A healthy pregnancy	• Describe the effects of negative maternal behaviour during pregnancy on the development of the embryo/foetus • Explain the importance of prenatal care during pregnancy
7.3 Teenage pregnancy	• Evaluate problems associated with teenage pregnancy
7.4 Birth control methods	• Critique methods of birth control • Assess the importance of family planning • Show respect for each other's views

About this book

This fourth edition of Macmillan Education's market-leading series for Grades 7 to 9 has been improved and updated to follow the new National Standards Curriculum. The **Integrated Science for Jamaica** series supports the changing needs of learners at the lower secondary level, and helps prepare them for assessment with activities designed to meet the different levels of Webb's Depth of Knowledge: Recall and Reproduction; Basic Application of Skills and Concepts; Strategic Thinking; and Extended Thinking.

The Student Books combine the acquisition of science content, skills and attitudes to enable students to work like scientists and apply what they have learned to other areas of their lives. This focus is fostered through the four key skill areas of critical thinking, collaboration, communication and creativity.

Unit openers: each unit is introduced with a list of key words and overview of learning outcomes to help structure teaching.

Engaging photographs and illustrations: colourful photographs provide connections to students' own experiences and lives in Jamaica. Detailed scientific illustrations and diagrams support content learning and the development of student creativity and drawing skills.

A wide variety of activities:

STEAM Numerous ideas for hands-on classroom activities to help teachers apply a STEAM approach to foster science and engineering practices. These include designing and carrying out experiments, developing and using models and debating and arguing based on evidence.

EBL Research and enquiry-based learning activities that engage students' natural curiosity. Students are given the opportunity to suggest areas of learning and collect, assess and synthesise information to achieve objectives.

ICT Activities that meet the new curriculum ICT-attainment targets. The use of ICT enhances learning, encourages productivity and creativity and prepares students for working in the 21st century.

Review questions and Summaries: each unit ends with review questions and a summary to ensure learning outcomes and key skills have been achieved, and to highlight areas that need reinforcing.

Knowledge boxes: throughout each unit, scientific language and concepts are carefully introduced. Student learning is supported through knowledge boxes for key items.

> **Renewable energy** sources can be replenished in a very short period and they never run out. Examples of renewable energy sources include solar, water, wind, tide power and geothermal

Free additional content: unit content is supported by free online resources and activities for further study (visit https://www.macmillaneducationeverywhere.com/register/ to register using the following access code: **ISJG9624056020166**). Resources include interactive questions, audio-based activities and a mark book to track your progress.