

# GRADE 8 INTEGRATED SCIENCE SYLLABUS

| <b>GRADE 8 SCOPE AND SEQUENCE</b>       |                               |                                  |
|---|-------------------------------|----------------------------------|
| <b>TERM 1</b>                           | <b>TERM 2</b>                 | <b>TERM 3</b>                    |
| Working Like a Scientist 2              | Human Nutrition               | Respiration & Gas exchange       |
| Photosynthesis and Energy Relationships | Physical and Chemical Changes | Space science                    |
| More about Matter                       | Forces & Motion               | Water and the Earth's atmosphere |

## ***UNITS OF WORK GRADE 8 TERM 1 UNIT 1: WORKING LIKE A SCIENTIST 2***

### **About the Unit**

In this unit students will, through hands-on activities, learn how to represent experimental data in pie charts. They will identify and classify experimental variables. They will learn how to analyse and interpret data in order to arrive at meaningful conclusions. They will also learn how to annotate drawings.

### **Range of Content**

- The construction of pie charts to present data;
- The classification of variables;
- The analysis and interpretation of experimental data;
- The annotation of diagrams

### **Objectives**

Students will:

- Construct pie charts using findings from observations /data.
- Classify variables as dependent, independent and control.
- Analyse and interpret displayed data.
- Annotate drawings.
- Show honesty in sharing findings.
- Demonstrate persistence in collecting and analysing data

## ***UNITS OF WORK GRADE 8 TERM 1 UNIT 2: PHOTOSYNTHESIS AND ENERGY RELATIONSHIPS***

### **About the Unit**

In this Unit students will learn that green plants are producers because they manufacture their own food during photosynthesis. Chloroplasts in leaf cells use the raw materials, carbon dioxide and water, in the presence of sunlight (light energy) and chlorophyll, to synthesize glucose/starch. Oxygen is released as a by-product of the process. Students will examine leaves to identify ways in which they are adapted for photosynthesis and investigate the presence of glucose and starch in leaves exposed to sunlight. They will learn that animals, as consumers, depend on green plants for their energy supply. They will explore ways in which energy is transferred from green plants directly or indirectly to animals, in food chains and webs. Students will construct food chains and webs using familiar organisms identified during their study of simple ecosystems and appreciate that humans can negatively affect terrestrial and aquatic ecosystems

### **Range of Content**

- During photosynthesis green plants use carbon dioxide and water, in the presence of sunlight and chlorophyll, to manufacture food.
- Photosynthesis takes place in chloroplasts and these are found in particular cells of the plant.
- Leaves are specially adapted to carry out photosynthesis.
- Energy is lost during transfer between trophic levels in food chains.
- Human activities can have negative effects on food chains and webs

### **Objectives**

Students will:

- Recall that plants are producers and are the source of energy for animals.
- Investigate the raw materials and conditions necessary for photosynthesis, controlling relevant variables.
- Construct the word equation for photosynthesis.
- Examine the external adaptations of the leaf for photosynthesis.

- Formulate definitions of the terms producer, consumer, carnivore, herbivore, omnivore, food chain and habitat.
- Construct terrestrial and aquatic food chains using familiar organisms.
- Create food webs using the constructed food chains.
- Explain energy flow in a food chain.
- Assess the impact of human activities on food chains and webs.

### ***UNITS OF WORK GRADE 8 TERM 1 UNIT 3: MORE ABOUT MATTER***

#### **About the Unit**

In this unit, students will use the Periodic Table as the means of classifying elements into metals and non-metals.

Students will apply the Kinetic Theory of Matter to explain the movement of particles. In addition, students will perform experiments and account for their observations using the kinetic theory of matter.

Students will learn additional information (building on grade 7) about atoms as the building blocks of elements. Students are introduced to the term subatomic particles and also the location, mass and charge of each subatomic particle.

#### **Range and Content**

The key concepts, skills and knowledge students will learn in this subject:

- The atom.
- Subatomic particles -: location, charge and relative mass.
- Atomic number of an atom.
- The Periodic Table.
- Kinetic Theory.
- Diffusion

#### **Objectives**

Students will:

- Describe briefly, the development of the Periodic Table
- Show that the Periodic Table is a collection of elements
- Collect and display common everyday elements on the Periodic Table
- Match elements to their respective symbols
- Classify elements as metals or non-metals
- Distinguish between some selected properties of metals and non-metals
- Summarize uses of selected metals and non-metals
- Categorize the groups and periods in the Periodic Table
- Investigate the building blocks of elements (matter).
- Cite evidence for the kinetic theory of matter
- Use appropriate scientific language
- Differentiate between the sub-atomic particles in terms of their position in atom, relative mass and charge.
- Create models to represent different atoms.
- Deduce the basis for arrangement of elements on the Periodic Table.
- Construct a board game using the first 20 elements on the Periodic table based on their symbols and atomic number.
- Identify by name, some special groups in the periodic table
- Find novel ways to state conclusions from observations
- Complete their own activity even if others have already finished theirs

### ***UNITS OF WORK GRADE 8 TERM 2 UNIT 1: HUMAN NUTRITION***

#### **Objectives:**

Students will:

- Differentiate between mechanical and chemical breakdown of food
- Relate the structural adaptations of human teeth to their role in the mechanical breakdown of food (mastication)
- Draw and label a longitudinal section of a canine tooth
- evaluate different ways of taking care of the teeth

- Describe the processes involved in human nutrition as ingestion, digestion, absorption, assimilation, and egestion.
- Investigate the presence of protein, fat, starch and simple sugars in foods
- Explain the need for proteins, fats and some carbohydrates to be broken down during digestion.
- Recognise the importance and the site of secretion of digestive juices in the alimentary canal.
- Explain the role of selected enzymes (protease, lipase and amylase) in digestion.
- Identify the final products of digestion of protein, fat and starch

## ***UNIT OF WORK GRADE 8 TERM 2 UNIT 2: PHYSICAL AND CHEMICAL CHANGES***

### **About the Unit**

In this Unit students will group matter as pure and impure. Concepts of physical and chemical changes will be explored through experimentation and used to explain the formation of compounds and mixtures.

Students will use experiments to determine the differences in properties of elements, mixtures and compounds. In addition, students will investigate ways of separating impure matter particularly mixtures.

### **Range of Content**

- Physical and Chemical Changes
- Elements, compounds and mixtures

### **Objectives:**

- Classify substances as pure and impure
- Explain the differences between physical and chemical changes in terms of composition, reversibility and properties
- Perform investigations to distinguish physical and chemical changes
- Infer that chemical changes lead to formation of compounds and physical changes lead to formation of mixtures
- Collect and display information
- Set up simple comparative and fair tests
- Develop a logical argument for classifying substances
- Differentiate between elements, mixtures and compounds
- Investigate methods that can separate mixtures
- Predict how a given mixture can be separated based on solubility, particle size and structure
- Use appropriate scientific language
- Value individual effort and team work

## ***UNITS OF WORK GRADE 8 TERM 2 UNIT 3: FORCES AND MOTION***

### **About the Unit**

In this Unit students will investigate motion and forces. They will describe motion in one dimension and perform simple calculations involving distance, displacement, speed, velocity and acceleration. They will be able to identify various forces. They will investigate the origin and behavior of common forces in everyday experience and explore how knowledge of these forces can be utilized.

### **Range of Content**

- Distance, displacement, speed, velocity and acceleration
- Balanced and unbalanced forces in various media
- The effects of unbalanced forces on objects.
- Methods of reducing of resistive forces on objects

### **Objectives:**

Students will:

- Distinguish between vector and scalar quantities.
- Record situations in which unbalanced/balanced forces act
- Conclude that only unbalanced forces cause objects to change their motion or shape
- Recall that friction is the force which opposes motion
- Explain why some things are able to float in water and air, identifying all the forces involved
- Construct diagrams to show all the forces acting on moving objects, in given situations
- Perform investigations to determine how streamlined shapes influence the degree of resistance to motion in water and air

- Show curiosity in investigating forces
- Suggest innovative and relevant ways to solve problems
- Describe the motion of an object by its position, direction, and speed.
- Distinguish between displacement, distance, velocity, speed, and acceleration.
- Solve problems involving displacement, distance, velocity, speed, and constant acceleration.
- Work cooperatively in groups.
- Value individual effort and team work by respecting different perspectives.
- Show objectivity by using data and information to validate observations.

## ***UNITS OF WORK GRADE 8 TERM 2 UNIT 3: RESPIRATION AND GAS EXCHANGE***

### **About the Unit**

In this Unit students will learn that all living cells require energy to function and that the energy is released from food substances during respiration. Aerobic respiration uses oxygen obtained from the atmosphere during breathing, takes place inside the mitochondria of cells and produces carbon dioxide and water as by products. In anaerobic respiration energy is released without oxygen.

### **Range and Content**

**The key concepts, skills and knowledge students will learn in this Unit are:**

- Breathing is the process of drawing air into and out of the lungs.
- During respiration energy is released from food for use by cells.
- There are two types of respiration, aerobic and anaerobic.
- In aerobic respiration oxygen is used to release energy from food.
- Carbon dioxide and water are by products of aerobic respiration.
- In anaerobic respiration energy is released in the absence of oxygen.
- Gaseous exchange is the process by which oxygen and carbon dioxide diffuse across the alveoli.

### **Objectives:**

Students will:

- Describe the structure and basic function of the human respiratory system
- Trace the pathway of oxygen from the atmosphere to the alveoli
- Describe respiration as the process in which energy is released from food either in the presence or absence of oxygen.
- State that mitochondria are required for aerobic respiration
- Describe the exchange of oxygen and carbon dioxide across the alveoli
- Write a simple word equation to describe the process of aerobic respiration.
- Explain the importance of energy to organisms
- Distinguish between respiration and breathing.
- Perform investigations to identify the products of aerobic respiration.
- Compare photosynthesis and respiration and explain how they are linked.
- Make observations and present these in a suitable format

## ***UNITS OF WORK GRADE 8 TERM 3 UNIT 2: SPACE SCIENCE***

### **About the Unit**

In this Unit students will study outer space and some technologies that are used in space exploration. Through fun hands-on activities and simulations, they will explore planets, stars, and the solar system. They will become familiar with the light-year as a unit of astronomical distance, and discover the role of gravity

### **Range of Content**

- The solar system: the sun, the planets, moons, comets, asteroids, and meteoroids.
- Deep space: the universe, galaxies, and stars
- Space exploration
- Gravity
- The light year

**Objectives:**

Students will:

- Construct a model of a technological tool/device needed for space exploration (e.g. telescope, gyroscope, robot, camera, detector, rocket)
- Determine the connections between the concepts universe, galaxy, and star.
- Recognise that some stars have planetary systems
- Describe, in qualitative terms, the physical characteristics of selected components of the solar system (the sun, the planets, moons, comets, asteroids, and meteoroids)
- Construct simple models and diagrams to explain eclipses of the Sun and Moon
- Explain the role of gravity in determining the motions of the planets, stars, and solar system
- Use the light year, as a unit of astronomical distance, in solving simple problems
- Formulate relevant questions about the Universe and produce correct answers to them
- Work cooperatively in groups
- Show respect in responding to other persons' reports
- Communicate scientific information

***UNITS OF WORK GRADE 8 TERM 3 UNIT 3: WATER AND THE EARTH'S  
ATMOSPHERE***

**About the Unit**

In this Unit students will explore the importance of water and air to survival. They will investigate some properties, sources, and uses of water and air. They will explore how water and carbon is cycled in the atmosphere. They will also examine the constituents of air and relate their properties to their uses. They will also explore methods of water conservation and purification.

**Range of Content**

- Properties, uses, sources of water, and chemical tests for water
- Water cycle
- Water conservation and purification
- Properties, uses, and composition of air
- Carbon cycle

**Objective:**

Students will:

- Relate the properties of water to its uses
- Investigate selected properties of water
- Identify different sources of water
- Describe a chemical test for water
- Summarize various methods of water conservation
- Explain how water is cycled in nature.
- Describe common methods of water purification
- State the composition of clean air
- Use appropriate statistical graphs to represent the percentage composition of gases in air
- Describe the chemical tests for oxygen and carbon dioxide
- Relate the properties of the gases in air to their uses
- Describe the carbon cycle in simple terms to include the processes of combustion, respiration and photosynthesis
- Make a model to illustrate the processes involved in the carbon cycle
- Value individual effort and team work
- Show interest in the outcomes of investigations