Curriculum Content Science/Biology

FORM 1

LEARNING OUTCOMES	CONTENT SCOPE	SUGGESTED TEACHING AND LEARNING STRATEGIES	SUGGESTED ASSESSMENT STRATEGIES
1.1 Science and Scientific Processes			
1.1.1 Differentiate between Science and Technology.	• Science - the systematic study of the structure and behavior of the physical and natural world through observation and experiment. • Technology – Applications of knowledge, tools and processes to address specific human needs and solve problems • Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives.	• Teacher and student discussions: Students research using the internet and compile a list of practical examples of using scientific knowledge to make decisions: Driving slowly on wet roads, opening a jam bottle with a metal cover, removing stains using lime juice, storage of foods, personal hygiene. Students compile a table of internet links to practical examples of real world applications on a word document.	• Student group project: power point presentation/video using movie maker/ information leaflet (publishing software) to be shared with the school body via a school blog or wiki: Important Scientific discoveries that affect everyday life: Discovery of gravity, electricity, evolution, penicillin, x-rays, DNA. Products shared with student body.

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	• Scientific knowledge is used to inform personal and community decisions. • Scientific knowledge is not complete but can be built on through research and investigations.		Projects to be marked using teacher-created rubric.
1.1.2 Demonstrate the use of the scientific method.	Introduction to problem solving using the scientific method: • Questioning (brainstorming) and hypothesizing • Planning and Conducting • Data collection • Recording and Reporting • Processing and analyzing data and information	• Using multimedia, teacher presents students with scenarios that can be investigated and understood using the scientific method. Teacher allows students to brainstorm and discuss the following statements: o Ants walk up the trunk of a tree in a straight line. o Tall people hold their breath longer than short people.	• Students select one scientific development or discovery and summaries the main steps followed by the scientist from identification of the problem to inferences from data collected. • Students review documentary of a scientific discovery and prepare a synopsis of how

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			the main skills scientists use was employed.
1.1.3 Recognize a scientific report as a means of communicating information from scientific investigations.	• Scientific format (headings and appropriate content): ❖ Aim ❖ Apparatus and materials (including diagrams) ❖ Method/Procedure ❖ Results/Observations (annotated drawings) ❖ Analysis ❖ Discussion ❖ Conclusion	• Teacher presents video of students conducting practical activity. • Teacher will provide a sample lab report and discuss all the relevant headings and its requirements.	• Teacher creates worksheets to assess students' understanding of scientific format. • In groups, students will perform a practical activity and prepare a lab report. • Teacher created rubric should include the following criteria: o Aim o Apparatus and materials (include diagrams) o Method/Procedure

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			○ Results/Observations (annotated drawings) ○ Analysis ○ Discussion ○ Conclusion • Using rubric students engage in peer assessment and provide relevant feedback to each other.

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1.2 Scientific Measurement and SI system			
1.2.1 Discuss the importance of the International System (SI) of units.	• Measurement is global and needs to be standardized. • Reasons for the importance of measurements: ❖ Accuracy. ❖ Standardization ❖ Unreliability of senses. • Identification of the International System of Units (SI) symbol and its conversion when measuring length, mass, volume, time, and temperature: ❖ Length – metre (m); kilometre (km);	• Teacher and student discussion exploring non-conventional methods of measuring e.g.: pinch of salt, hand span. • Teacher and student discussion about the unreliability of senses and the need for measuring instruments along with a practical activity e.g. students comparing the temperature of warm/cold water using touch.	• Create Mnemonic or acrostics or rhymes to aid memorization of the order of prefixes in the metric system, for every power of ten from 6 to -6, is: Megametre, Kilometre, Metre, Decimetre, Centimetre, Millimetre, Micrometre, • Multiple Choice items

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	centimetre (cm); millimetre (mm) ❖ Mass – grams (g); kilograms (kg) ❖ Volume – cubic centimetre (cm^3); litre (l); millilitre (ml) ❖ Time – seconds (s); minutes (min); hours (hr) ❖ Temperature – degree Celsius (ºC) and degree Kelvin (ºK) ❖ Express multiples and submultiples of units using appropriate prefixes and scientific notation.		

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	• Repetition, estimation with linear scale, no- parallax, zeroing.		
1.2.2 Demonstrate the correct procedures for use of common measuring instruments.	• There are standard instruments used for measurement in science: ❖ Length – metre rule, caliper, tape ❖ Mass – balance ❖ Volume – measuring cylinder, beaker ❖ Time – stop watch ❖ Temperature – thermometer • Some limitations in using instruments:	• Students use instruments to measure length, mass, volume, and time. • Students record in a word table the units used in each instrument and the abbreviated term used in measurement. • Students are given a variety of quantities to measure and prepare a report on difficulties incurred following classroom discussion. • Measurements should be recorded in a properly headed table.	• Circus of measurement tasks for which each student must record their readings in appropriate tables. A checklist is used to assess proper use of instruments. • Student project: o Describe the measurement requirements to prepare a cake using a recipe as outlined in the directions on the package/box- identifying necessary

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	❖ Error: zero/end error, parallax ❖ Range ❖ Precision – estimation of scale readings		measurements: mass, volume, time, temperature. o Students review recipe with appropriate substitutions for use with standard lab. measuring instruments.

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1.3 Safety in Science			
1.3.1 Demonstrate safe practices when conducting investigations.	• Careful handling of apparatus and material. • Potential safety hazards in the laboratory • Precautionary measures to ensure personal safety. • Common safety symbols.	• Teacher and student discussion with the use of a suitable video, on general rules for using laboratory safely, personal protective equipment available in the laboratory. • Use "Think, Pair, Share" with students to discuss observations about laboratory safety from appropriate video that highlight: eyewash fountain, shower, fire blanket, washing spilled chemicals from skin. • Teacher display devices and containers bearing symbols commonly found on laboratory	• Students prepare chart of laboratory rules using collage- making software to be attached to notebooks. Chart to be marked using teacher-created rubric. • Students prepare poster using collage-making software showing chemical symbols and their corresponding hazards to be displayed in labs. • Students' role play on careful handling of apparatus and material

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		chemicals: corrosive, toxic, radioactive, flammable, explosive, harmful, irritating, oxidizing.	and precautions to ensure personal safety.
1.4 Characteristics of Living Things			
1.4.1 Describe the characteristics of living things.	Characteristics of living things: • Growth • Respiration • Irritability • Movement • Nutrition • Excretion • Reproduction	• Teacher uses pictures, specimens to elicit responses from students about characteristics that all living things display.	• Students use jigsaw approach to prepare a wall chart illustrating each of the terms represented by the acrostic GRIMNER

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1.5 Classify Life According to Cellular Structure			
1.5.1 Compare plant and animal cells according to their structure and function.	• A cell is the smallest structural unit of living things that can perform all the functions necessary for life. • All cells possess basic structures regardless of cell specialization. • There are a number of structures/organelles common to both plant and animal cells: nucleus, chromosomes, cytoplasm, cell membrane, and mitochondria. • There are a number of structures found in plant	• Teacher guides students in use of a light microscope to view prepared slides of plant and animal cells. • Students prepare slides with typical plant and animal cells for viewing using light microscope e.g. Onion cells and human cheek cells. • Teacher uses diagrams or drawings of a typical plant and animal cells. Students will compare and record the observations in a table.	• Students construct a table to summarize structure and function of parts of the cell from prepared slide. • Students conduct research using the internet and present findings in the form of a model of a plant and animal cell.

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	cells that distinguish plant cells from animal cells: cell walls, large central vacuole, chloroplasts, and starch grains. • Each part of the cell performs a specific function. • Relating the structures and functions of mitochondria and chloroplasts and nucleus to the overall function of the cell to include cellular respiration and photosynthesis.		

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1.6 Levels of Organization in Living Things			
1.6.1 Recognize the relationships between specialized cells, tissues, organs and organ systems.	• Cells vary widely in form and function. • Specialized cells perform specific functions in living organisms, e.g., neuron, blood cells, sperm, ovum, smooth muscle, palisade, guard cells, root hair. • Unicellular e.g. Yeast, Amoeba and multicellular organisms e.g. Humans and flowering plants. • Cells → Tissues → Organs → Organ systems. • The body of a large, complex organism is composed of	• Guided by the teacher, students will prepare a table listing some specialized cells and their roles in plants and animals. • Student view video clips or power point presentation of organ systems.	• Student construct plasticine models of organs and/or organ systems (no details of organs required). • Students refer to a model/jigsaw of the human and plant body to identify organs and organ systems that carry out different functions.

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	organ systems that carry out different functions. • Basic functions of the following human body systems: Circulatory, Digestive, Respiratory, Excretory, Skeletal, Muscular and Reproductive • The main organs in a plant: root, stem, leaf, flower, fruit.		
1.7 **Processes in cellular structures**			
1.7.1 Describe how substances move into and out of cells.	• The cell communicates with its environment by taking in and releasing materials. • Diffusion is the movement of particles from a region of higher concentration to a	• Teacher demonstrate examples of diffusion e.g., smelling perfume, and relate to gaseous exchange in organisms.	• Students conduct investigation of osmosis in living things, e.g., cucumber/potato/raisin and compose laboratory report.

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	region of lower concentration. • Osmosis is the movement of water particles from a region of higher water concentration to a region of lower water concentration through a selectively permeable membrane. Osmosis and diffusion are two processes by which this exchange takes place.	• Demonstrate the application of osmosis, e.g., in rehydrating dried fruits, potato strip	
1.7.2 Describe the process of photosynthesis	• Annotated drawing showing structure of a leaf noting the following: chloroplast and stomata. • Necessary conditions and raw materials for photosynthesis.	• Teacher demonstrates use of the light/stereo microscope to view stomata and chloroplast. • View video clips of photosynthesis.	• Students draw annotated diagrams of a simple leaf. • Students conduct an experiment to demonstrate the evolution of oxygen in *Elodea* and prepare a lab reports.

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	• Products of photosynthesis. • Photosynthesis sustain life: produces food and oxygen and controls the levels of carbon dioxide in the atmosphere	• Teacher demonstrates an experiment to test a leaf for starch.	• Students compose and perform song/rap based on photosynthesis.