



REPUBLIC OF ZAMBIA

MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

INTEGRATED SCIENCE SYLLABUS

GRADE 8 – 9



PREPARED AND PUBLISHED BY THE CURRICULUM DEVELOPMENT CENTRE

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LUSAKA

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VISION

Quality, life-long education for all which is accessible, inclusive and relevant to individual, national and global needs and value systems.

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PREFACE

Since the ability to think scientifically and understand scientific processes is becoming a condition for survival in Zambia, there is need for the national education policy to emphasise the need for learners to develop skills that they can apply in various ways in their environment.

The Basic Education Syllabus for Grade 8 and 9 emphasises that the approach to be used in teaching of Integrated Science should be learner centered. Therefore, the prime goal for science teaching at this level of education should develop processes of scientific thinking in learners. It is necessary, therefore, in integrated science for learners to be enabled to apply their own ideas, use their hands, and conduct their own investigations, however simple. This necessitates balancing the content of what learners learn with the processes by which they learn. This also implies an enhanced role for guided discovery teaching/learning methods/techniques.

This syllabus suggests that the development of scientific thought processes in learners can be approached from a number of starting points. The criterion should be the relevance of the material to the environment and to the possible later sphere of the employment of the learner.

Finally, it is hoped that the product of Integrated Science will be able to adapt and use scientific and technological developments and to generate new developments.

Chishimba Nkosha (Mr)

PERMANENT SECRETARY

MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

ACKNOWLEDGEMENT

The syllabus presented here is a result of broad-based consultation involving several stakeholders within and outside the education system.

Many individuals, institutions and organizations were consulted to gather their views on the existing syllabus and to accord them an opportunity to make suggestions for the new syllabus. The Ministry of Education wishes to express heartfelt gratitude to all those who participated for their valuable contributions, which resulted in the development of this syllabus.

The Curriculum Development Centre worked closely with other sister departments and institutions to create this document. We sincerely thank the Directorate of Teacher Education and Specialized Services, the Directorate of Planning and Information, the Directorate of Human Resource and Administration, the Directorate of Open and Distance Education ,the Examinations Council of Zambia, the University of Zambia, schools and other institutions too numerous to mention, for their steadfast support.

We pay special tribute to co-operating partners especially JICA in collaboration with Hiroshima University and UNICEF for rendering financial and technical support in the production of this syllabus.

C.N.M Sakala (Mrs.)

Director-Standard and Curriculum

MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

INTRODUCTION

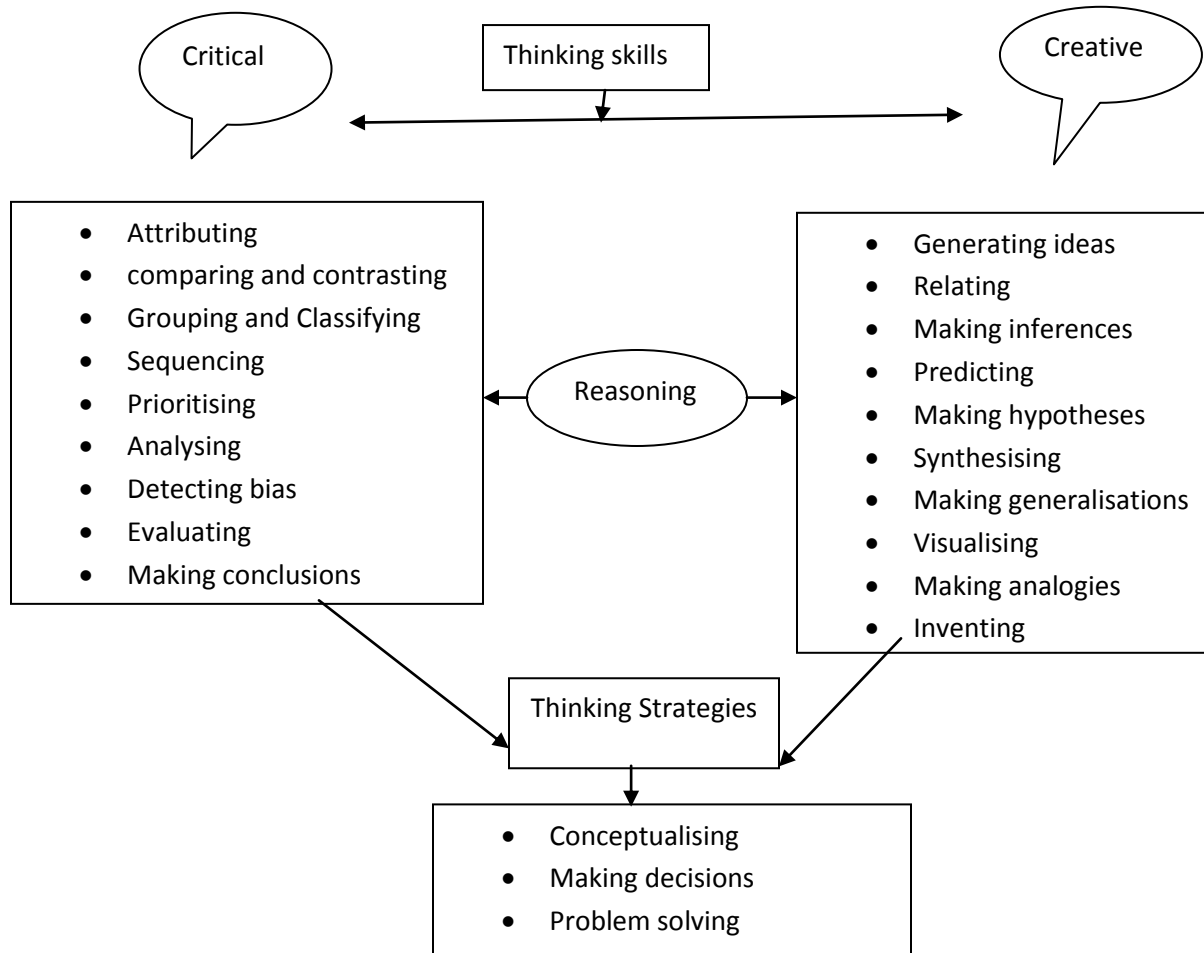
Integrated Science includes crosscutting issues such as Environmental, Reproductive Health, HIV and AIDS, Hygiene, Nutrition, Substance Abuse, Water and Sanitation.

METHODOLOGY

The success of Integrated Science can be achieved by maximum participation by learners. This subject, enhances creativity, analysis, problem solving and an investigative approach. It can be taught effectively using a variety of methods (techniques) both in the classroom and outside. It is advisable that these are integrated wherever possible. Learners are expected to conduct experiments, study tours, fieldwork and project work.

GENERAL OUTCOMES

Integrated Science is a subject in which learners are required to acquire knowledge, develop skills:-



Manipulative Skills

These enable learners to:

- Use and handle science apparatus and laboratory substances correctly;
- Handle specimens correctly and carefully;
- Draw specimens, apparatus and laboratory substances accurately;
- Clean science apparatus correctly;
- Store science apparatus and laboratory substances correctly and safely.

They also need to develop attitudes and values.

Attitudes and Values

These include:

- Having an interest and curiosity towards the environment;
- Being honest and accurate in recording and validating data;
- Being diligent and persevering;
- Being responsible about the safety of oneself, others and the environment;
- Realising that Integrated Science is a means to understand nature;
- Appreciating and practising clean and healthy living;
- Appreciating the balance of nature;
- Appreciating the contribution of Integrated Science and technology to society;
- Having critical and analytical thinking;
- Being flexible and open minded;
- Being kind hearted and caring;
- Being objective;

- Being systematic;
- Being cooperative;
- Being fair and just;
- Daring to try;
- Thinking rationally;
- Being confident and independent.

These will help learners to explore and understand their immediate environment and the world at large

General Aim

The main aim of the Integrated Science syllabus is to develop science competencies to assist learners contribute effectively in their own environment and also for their lifelong learning. These **competences** include:

- Attitudes that enable the responsible use of scientific knowledge and skills
- Communication and group work skills for use in collaborative team work
- The selection and application of appropriate science skills, apparatus/tools and strategies to understand and interpret the world around them
- An increased awareness of the importance of Science Technology, Society and the Environment (STSE)
- Application of science knowledge skills , values and positive attitudes to everyday life and situations

Each unit of the syllabus is introduced with its own broader general outcomes. The general outcomes are then broken down to specific outcomes which highlight the content in terms of knowledge, skills and values that a learner is expected to exhibit as a result of the learning experience.

ASSESSMENT

Considering that the syllabus for intergraded science does emphasise teaching in a practical way, the assessment at this level will now include a practical part covering the areas of basic biological and physical sciences in addition to the two theory papers that learners sit for. It is hoped that this will form a sound foundation for learners to be grounded in doing science with hands on experience as well as build confidence in teachers in the way they conduct practical.

Continuous assessment will be emphasised by using various methods of testing according to topics and themes at various levels. The Examinations Council of Zambia (ECZ) will prepare detailed procedures on how continuous assessment will be conducted by the teachers. ECZ will also develop examination syllabus to provide teachers with guidelines on the Outcomes to be tested. The scheme of assessment will consists of school based assessment and final examination which includes the practical to be conducted by the Examinations Council of Zambia.

School based assessment will be in the form of tests. Tests will be in the form of diagnostic, aptitude, achievement, oral, practice attitude and performance, learners.

After studying this course learners are expected to develop the following:

- an attitude of scientific curiosity and enquiry;
- the ability to generate new ideas;
- ability to co-operate;
- willingness to share knowledge;
- an understanding of human beings and their environment;
- awareness of a variety of life;
- an understanding of the relationship of living things in their environment;
- Knowledge and skills in health and nutrition.

Therefore, it is envisaged that the product of this subject will be able to adapt and use scientific and technological developments and to generate new development.

TIME AND PERIOD ALLOCATION

Time allocation for the effective coverage of this syllabus is:

6 periods x 40 minutes. Four of the six periods must be doubles.

GRADE 8

General Outcomes:

- Demonstrate an understanding of the basic facts about the human body
- Develop investigative skills Recognise the importance of personal health
- Develop investigative skills on personal health
- Develop knowledge, values and positive attitudes for the immediate environment
- Develop investigative skills about the immediate environment
- Demonstrate an understanding of the basic facts about plants and animals
- Develop investigative skills about plants and animals
- Demonstrate investigative skills about materials and energy

Key competences

- Demonstrate the ability to measure mass, weight, temperature and volume
- Show basic skills and knowledge in determining density, real and apparent depth
- Demonstrate ability to record the breathing rate
- Show basic skills and knowledge in preparing oxygen , carbon dioxide and hydrogen

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.1 THE HUMAN BODY	8.1.1 Human Reproductive System and Puberty	8.1.1.1 Identify organs of the human reproductive system.	<ul style="list-style-type: none"> • Organs of reproduction; Male: testes, sperm duct, scrotum, urethra, penis. Female: ovaries, oviducts, uterus, cervix, vagina. • Functions of reproductive parts: penis-depositing sperms, ovary-producing ovules • Changes associated with puberty: Menstruation and Wet dreams. • Importance of personal hygiene E.g. avoid infections, diseases 	<ul style="list-style-type: none"> • Observing parts of reproductive system using a model • Communicating information on reproduction • Communicating information on changes in boys and girls at puberty using a variety of sources. 	<ul style="list-style-type: none"> • Appreciating one self • Applying knowledge on hygiene to stay healthy • Being aware of one's changes at puberty
		8.1.1.2 Explain the functions of the parts of the reproductive system.			
		8.1.1.3 Identify changes associated with puberty for both male and female			
		8.1.1.4 Explain the importance of observing personal hygiene of the reproductive organs			

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	8.1.2 Fertilization and Embryo development	<p>8.1.2.1 Describe the process of fertilisation in human beings.</p> <p>8.1.2.2 Explain the functions of the parts important for development of the embryo.</p> <p>8.1.2.3 Describe gestation period and birth.</p>	<ul style="list-style-type: none"> • Fertilisation: fusing of a sperm and an egg in oviducts to form a zygote • Functions of :placenta, amnion, amniotic fluids, umbilical cord, uterus and cervix • Gestation: Period in months or days from fertilization to birth. Stages of embryo development: Zygote; Embryo; Fetus and Baby. 	<ul style="list-style-type: none"> • Communicating functions of parts involved in embryo development • Predicting the birth date given the gestation period 	<ul style="list-style-type: none"> • Appreciating human life from conception to birth • Asking more questions for better understanding
8.2HEALTH	8.2.1 Nutrition	<p>8.2.1.1 Describe the different types of food nutrients.</p> <p>8.2.1.2 Describe the dietary needs for different persons.</p> <p>8.2.1.3 Identify common nutritional deficiency diseases of symptoms and their diseases.</p> <p>8.2.1.4 Describe the importance of children's clinics</p>	<ul style="list-style-type: none"> • The different types of food nutrients: carbohydrates, proteins, fats, minerals and vitamins • Dietary needs for different persons: e.g. Baby – more protein and minerals, Pregnant mother – more protein, calcium, iron and vitamin D, etc. • Nutritional deficiency diseases and their symptom such as kwashiorkor, marasmus, rickets, anemia, scurvy. • The roles of children's clinics for nutrition; growth monitoring and immunization, providing supplement and providing nutritional advice 	<ul style="list-style-type: none"> • Comparing the dietary needs of different people • Classifying deficiency diseases • Inferring the types of deficiency diseases. 	<ul style="list-style-type: none"> • Appreciating the need for different dietary requirements • Participating actively in group work • Being aware of different food nutrients

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.3. THE ENVIRONMENT	8.3.1 Water, Air and Land Pollution	8.3.1.1 Explain what pollution is.	<ul style="list-style-type: none"> • Pollution as the addition of harmful substances to the environment • Types of pollution: Water, Air and Land pollution. • Causes of pollution: Water pollution-Untreated sewage, washing clothes in rivers and streams, chemicals from factories and farmland. Air pollution-Smoke, dust, fumes etc. Land pollution-garbage, effluents from factories, garbage • Effects of pollution: water pollution- out breaks of diseases, poisonous, affects aquatic life. Air pollution- Breathing difficulties, global warming, and acid rain. Land pollution-outbreak of diseases, unpleasant smells, unproductive land. • Ways of preventing pollution: (conservation of resources-3Rs: Reduce, Re-use and Recycle of pollutants) 	<ul style="list-style-type: none"> • Communicating information on pollution. • Observing effects of pollution on the environment • Investigating ways of reducing, re-using and recycling of used materials. 	<ul style="list-style-type: none"> • Awareness of pollution • Applying knowledge on the three Rs to conserve materials
		8.3.1.2 Identify different types of pollution of the environment			
		8.3.1.3 Identify causes of pollution of the environment.			
		8.3.1.4 Describe the effects of pollution on the environment			
		8.3.1.5 Describe ways of preventing pollution of the environment			

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.4 PLANTS AND ANIMALS	8.4.1 Plant Cells	<p>8.4.1.1 Identify the main parts of a microscope</p> <p>8.4.1.2 Examine the plant cell structure using a microscope.</p> <p>8.4.1.3 Describe the functions of the parts of the cell</p>	<ul style="list-style-type: none"> • Parts of a microscope: mirror, Stem, lens, stage, eye piece, adjustment knob. • The structure of plant cell: Cell wall, cell membrane, cytoplasm, nucleus and chloroplast, vacuole • Functions of cell parts: cell wall- protection, cell membrane- selectively permeable to materials, nucleus- controls all cell activities, Chloroplasts- contain chlorophyll 	<ul style="list-style-type: none"> • Demonstrating how to use a microscope • Observing the cell structure using the microscope • Communicating information on the functions of the cell parts. 	<ul style="list-style-type: none"> • Cooperating in group activities • Asking more questions for better understanding • Respecting other people's ideas
	8.4.2 Plant Growth and Nutrients	<p>8.4.2.1 Identify regions of growth of a plant</p> <p>8.4.2.2 Demonstrate responses to stimuli in shoots and roots</p> <p>8.4.2.3 Describe nutrients important to plant growth</p> <p>8.4.2.4 Investigate how plants obtain dissolved mineral salts from the soil</p> <p>8.4.2.5 Identify sources of plant nutrients</p>	<ul style="list-style-type: none"> • Regions of plant growth: e.g. Shoot, roots, stem • Responses to stimuli: Phototropism and geotropism • Plant nutrients: potassium, nitrogen, phosphorous. • How plant obtain minerals: Roots to the stem to the leaves • Sources: Organic fertilisers (manures, compost) and Inorganic fertilizers (Urea, D Compound) 	<ul style="list-style-type: none"> • Investigating the movement of minerals salts in plants • Recording data on a planned investigations • Communicating sources of plant nutrients 	<ul style="list-style-type: none"> • Cooperating in group activities • Applying knowledge to care for the environment when using fertilisers • Asking more questions for better understanding

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
		8.4.2.6 Explain the advantages and disadvantages of inorganic and organic fertilisers	<ul style="list-style-type: none"> Advantages and disadvantages of inorganic and organic fertilizers 	<ul style="list-style-type: none"> Identifying ways of reducing the adverse effects of fertiliser use 	<ul style="list-style-type: none"> Applying knowledge to care for the environment when using fertilizers Asking more questions for better understanding
		8.4.2.7 Explain the effect of excessive use of inorganic fertiliser to the soil.	<ul style="list-style-type: none"> Effects of excessive fertilisers: plants die, soil become acidic, over growing of plants 		
	8.4.3 Animal Cell	<p>8.4.3.1 Describe the basic structure of an animal cell</p> <p>8.4.3.2 Describe the functions of the parts of the cell</p> <p>8.4.3.3 Identify different features in the basic structure of an animal cell and plant cell</p>	<ul style="list-style-type: none"> Structure of an animal cell: Cell membrane, cytoplasm, nucleus Functions of cell parts: cell membrane-selectively permeable to materials, nucleus- controls all cell activities Differences between plant and animal cell: Cell wall, chloroplast and vacuole 	<ul style="list-style-type: none"> Comparing plant and animal cells Observing parts of cells Recording findings during the observation 	<ul style="list-style-type: none"> Appreciating the structure of cells Participating actively in class activities

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.5 MATERIALS AND ENERGY	8.5.1 Composition of Matter	8.5.1.1 Describe the composition of matter	<ul style="list-style-type: none"> • Composition of matter: All matter is made up of particles called atoms (basic building block of matter). Most atoms can combine with other atoms to form molecules. An element is a form of matter made up of only one kind of atom. • Structure of an atom: Nucleus(centre) surrounded by electrons in shells • Common Atoms such as Carbon(C), Hydrogen(H), Oxygen(O), Nitrogen(N), Copper(Cu), Iron(Fe), Aluminium(Al). • Molecules: Oxygen(O₂), Hydrogen(H₂), Nitrogen (N₂), Water(H₂O), Carbon dioxide(CO₂) 	<ul style="list-style-type: none"> • Communicating the composition of matter. • Observing the basic structure of the atom using a model. • Formulating models of simple molecules 	<ul style="list-style-type: none"> • Participating actively in class activities • Questioning new ideas, concepts and models
		8.5.1.2 Describe the basic structure of an atom.			
		8.5.1.3 Identify common atoms using symbols			
		8.5.1.4 Demonstrate the formation of simple molecules using models of atoms.			

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	8.5.2 Physical Change of State	<p>8.5.2.1 State what physical change is</p> <p>8.5.2.2 Describe the arrangement of atoms in the three states of matter</p> <p>8.5.2.3 Identify the temperatures at which water changes state.</p>	<ul style="list-style-type: none"> • What Physical change is: change from one state to another • Arrangement of Atoms: Solid- Atoms very close together; Liquid- Close together; Gas- Atoms spread far apart. • Temperatures at which water changes state: Melting and boiling points(plotting a graph of temperature against Time) 	<ul style="list-style-type: none"> • Communicating the arrangement of atoms in the three states of matter. • Experimenting change of state of water. • Measuring accurately the temperature of water. • Recording data • Organising data in tables and graphs • Inferring the melting and boiling points. 	<ul style="list-style-type: none"> • Applying safety rules when experimenting • Cooperating during group work • Participating actively in class activities

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	8.5.3 Mixtures	8.5.3.1 Explain what a mixture is 8.5.3.2 Identify different types of mixtures 5.3.3 Identify methods of Separating mixtures. 8.5.3.4 Explain some of the industrial applications of separation techniques	<ul style="list-style-type: none"> Substance made up of two or more substances that are not chemically combined. Mixtures such as soil, air, corks and marbles, sea water ,fruit salads Methods of separating mixtures: Filtration, Simple distillation, evaporation, magnetisation, Industrial application of separation techniques: E.g. making sugar, salt from sea water, scrap metal 	<ul style="list-style-type: none"> Communicating different types of mixtures Investigating the separation of mixtures Planning an investigation to separate mixtures 	<ul style="list-style-type: none"> Applying the separation of mixtures in everyday life Cooperating in class activities Taking precautions when carrying out investigation
	8.5.4 Mass and Weight	8.5.4.1 State what mass is 8.5.4.2 Measure the mass of different objects 8.5.4.3 State what weight is 8.5.4.4 Measure the weight of a given object correctly 8.5.4.5 Calculate the weight of a substance given the mass 8.5.4.6 Distinguish between mass and weight	<ul style="list-style-type: none"> Mass as the amount of matter in a substance. Recording mass and its units(flour, rice, salt) in Kg and g Weight as the pull of gravity on a mass($\text{Weight} = \text{mass} \times \text{acceleration due to gravity}$) <p>Note that the acceleration due to gravity is 10N/kg on earth</p> <ul style="list-style-type: none"> Recording weight and its units in Newton(N) Calculating the weight of different substances given the masses Difference between mass and weight in terms of; nature, measuring instruments, units, and mass is constant while weight varies from place to place. 	<ul style="list-style-type: none"> Measuring mass and weight of given objects Comparing mass and weight Calculating the weight of different objects given the mass. 	<ul style="list-style-type: none"> Applying the measuring of mass and weight in everyday life Participating actively in group activities Participating actively in group activities

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	8.5.5 Density	<p>8.5.5.1 Explain the meaning of density</p> <p>8.5.5.2 Demonstrate how to determine the densities of different substances.</p> <p>8.5.5.3 Demonstrate that an object will sink or float on a liquid.</p> <p>8.5.5.4 Describe how vessels float.</p> <p>8.5.5.5 Explain the effects of over loading vessels.</p>	<ul style="list-style-type: none"> • Density as mass per unit volume: Mass/volume and its units(cubic centimeter) • • Factors of density such as mass and volume to calculate densities of: stone, wood water • Sinking and floating: Denser objects sink and less denser objects float in relation to the density of liquid • How vessels float: Larger volume-less dense • Effects of overloading vessels: sinking, accidents 	<ul style="list-style-type: none"> • Designing the experiment to determine densities • Measuring the mass and volume of objects • Investigating the densities of different materials • Observing the sinking and floating of materials • Inferring sinking and floating based on observations • Classifying materials into floating and sinking 	<ul style="list-style-type: none"> • Appreciating densities of different materials • Cooperating in class activities • Asking more questions for better understanding

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	8.5.6 Heat transfer	<p>8.5.6.1 Demonstrate the types of heat transfer</p> <p>8.5.6.2 Investigate the movement of heat in matter</p> <p>8.5.6.2 Describe how the vacuum flask works.</p>	<ul style="list-style-type: none"> Types of heat transfer: conduction, convection and radiation Movement of heat in solid (conduction), liquid (convection) and air (convection) The application of heat transfer; How a vacuum flask works: Maintaining temperature constant, etc 	<ul style="list-style-type: none"> Communicating information on heat transfer and its use Experimenting on the heat transfer Observing the movement of heat transfer 	<ul style="list-style-type: none"> Applying the use of heat transfer in everyday life Cooperating in class activities Participating actively in class activities
	8.5.7 Heat and expansion of substances	<p>8.5.7.1 Demonstrate expansion of substances</p> <p>8.5.7.2 Describe the use of the expansion of different substances in everyday life</p> <p>8.5.7.3 Explain the effect of expansion and contraction of Substances.</p>	<ul style="list-style-type: none"> Expansion of substances such as copper, aluminum, steel, brass, bronze Use of expansion in everyday life: E.g. thermometers, thermostats, engines Effects of expansion and contraction: e.g. fracture of bridges, glass breaks, rail tracks buckle 	<ul style="list-style-type: none"> Investigating the expansion of different substances Comparing the expansion of different substances Recording data on expansion correctly 	<ul style="list-style-type: none"> Participating actively in class activities Applying knowledge on the expansion of substances

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	8.5.8 Reflection and refraction of Light	<p>8.5.8.1 Describe what reflection is.</p> <p>8.5.8.2 Investigate the characteristics of reflection of light on mirror.</p> <p>8.5.8.3 Describe what refraction is.</p> <p>8.5.8.4 Identify the real and apparent depths of an object under water.</p> <p>8.5.8.5 Explain the application of reflection and refraction.</p>	<ul style="list-style-type: none"> • Reflection of light: Bouncing of light off a smooth surface such as a mirror • The characteristics of reflection of mirror • Refraction of light: The bending, or changing of direction, of light rays when they pass from one material into another • Refraction in water: Real and apparent depth • Application of reflection and refraction: Reflection-. Searchlights, headlamps, magnifying mirrors. Refraction-in lenses 	<ul style="list-style-type: none"> • Observing reflection and refraction of light • Predicting the path of light during refraction and reflection • Communicating information on the characteristics of light • Accurately recording the angles of incidence and refraction • Planning to confirm real and apparent depth 	<ul style="list-style-type: none"> • Appreciating the use of light in everyday life • Applying knowledge on light in everyday life • Participating actively in class work • Cooperating in group work • Listening to friends' opinion with respects

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	8.5.9 Composition of Air	<p>8.5.9.1 Identify the components of air</p> <p>8.5.9.2 Investigate the proportion of each substance in air</p> <p>8.5.9.3 Describe the nature of each substance in air</p> <p>8.5.9.4 Describe the uses of each substance in air</p>	<ul style="list-style-type: none"> • Components of air: Nitrogen, carbon dioxide, oxygen and water vapour • Proportion of substances in air : Oxygen 21%, Nitrogen 78% and other gases 1% • Properties in terms of colour, odour, solubility, density • The use of substances: Oxygen; in hospitals, steel works ,etc, Carbon dioxide; fire extinguisher, fizzy drinks etc ,hydrogen; ‘Harden’ vegetable oils, 	<ul style="list-style-type: none"> • Communicating the components of air • Investigating the % of oxygen in air • Communicating uses of substances of air 	<ul style="list-style-type: none"> • Applying knowledge on components of air in everyday life • Participating actively in group work • Asking more questions for better understanding

GRADE 9

General Outcomes:

- Demonstrate an understanding of the basic facts about the human body
- Develop investigative skills
- Recognise the importance of personal health
- Develop knowledge, values and positive attitudes for the immediate environment
- Demonstrate an understanding of the basic facts about plants and animals
- Acquire knowledge, values and positive attitudes about materials and energy

Key competences

- Demonstrate the ability to record the pulse rate, electric current and voltage
- Demonstrate the ability to purify water
- Show understanding and knowledge on the formation of images, rainbow
- Demonstrate the ability to care and protect plants and animals

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
9.1 THE HUMAN BODY	9.1.1Circulatory System	9.1.1.1 Describe the blood circulatory system.	<ul style="list-style-type: none"> The circulatory system involves the movement of blood in vessels around the body. It involves organs such as the Heart and lungs. 	<ul style="list-style-type: none"> Communicating the organs of the circulatory system 	<ul style="list-style-type: none"> Appreciating the circulatory system Applying the recording of the pulse rate in everyday life Cooperating in group work Asking more questions for better understanding
		9.1.1.2 Identify the components of blood and their functions	<ul style="list-style-type: none"> Components of blood: Red Blood Cells-Transport oxygen and carbon dioxide, White Blood Cells- Fight disease; Platelets-For clotting; and Plasma-Transports water, body wastes, Food nutrients(glucose, amino acids, lipids) 	<ul style="list-style-type: none"> Comparing veins and arteries 	
		9.1.1.3 Describe the internal structure of the heart.	<ul style="list-style-type: none"> Internal structure of the heart: Atria, Ventricles, Valves, Vessels, muscle 	<ul style="list-style-type: none"> Predicting the pulse rate when at rest and after an exercise 	
		9.1.1.4 Illustrate the movement of blood in the double circulatory system.	<ul style="list-style-type: none"> Movement of blood: Heart to lungs, and vice versa; Heart to rest of the body, and vice versa. 	<ul style="list-style-type: none"> Investigating the pulse rate 	
		9.1.1.5 Identify the role of the heart, lungs and blood vessels in blood circulation	<ul style="list-style-type: none"> Functions of organs in the circulatory system such as heart: pump blood, valves prevent back flow of blood; Lungs add oxygen to the blood and remove Carbon Dioxide; Arteries carry blood from the heart to the body while veins take blood to the heart. 		
		9.1.1.6 Take the pulse rates at rest and after physical exercises.	<ul style="list-style-type: none"> Pulse rates: taking pulse at rest and after exercising 		

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	9.1.2 Respiratory System	<p>9.1.2.1 Identify organs of the respiratory system of a human being.</p> <p>9.1.2.2 Explain the functions of the organs of the respiratory system</p> <p>9.1.2.3 Demonstrate the mechanism of ventilation in a human being.</p> <p>9.1.2.4 Describe the exchange of oxygen and carbon dioxide in the lungs.</p> <p>9.1.2.5 Explain tissue respiration</p> <p>9.1.2.6 Explain the effect of cigarette smoking on the respiratory system</p>	<ul style="list-style-type: none"> • Organs of respiration: Mouth, nose, trachea, bronchi, lungs, ribs, diaphragm and air sac. • Functions of: nose, lungs, ribs, diaphragm, air sac • Mechanism of ventilation: Inhaling- Diaphragm contracts; External Intercostal muscles contract and pull rib cage upwards and outwards; Lungs expand drawing air inside. Exhaling- The opposite of inhaling happens • Gaseous exchange in the lungs: Diffuses out into the blood stream and carbon dioxide diffuses into the lungs from the blood. • Tissue respiration: Chemical process in cells by which energy is produced from food (glucose). • Effects of smoking: Lung cancer, Bronchitis. 	<ul style="list-style-type: none"> • Communicating information on the organs of the respiratory system • Investigating the process of ventilation using a model • Communicating information on the diffusion of oxygen and carbon dioxide across the lungs. • Investigating effects of smoking on health. 	<ul style="list-style-type: none"> • Appreciating the respiratory system • Cooperating in group work • Asking more questions for better understanding

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
9.2 HEALTH	9.2.1 Sexually Transmitted Infections (STIs)	9.2.1.1 Identify the common sexually transmitted infections 9.2.1.2 Explain transmission of Sexually Transmitted Infections 9.2.1.3 Describe the prevention of STIs. 9.2.1.4 Explain the impact of HIV and AIDS on the population.	<ul style="list-style-type: none"> • Common STIs: e.g. HIV, syphilis, gonorrhoea, warts • Transmission of Sexually Transmitted Infections: E.g. unprotected sex, blood transfusion with contaminated blood • Prevention of Sexually Transmitted Infections : E.g. correct and consistence of condom use, one faithful partner, avoiding casual sex • Impact of HIV and AIDS: E.g. poverty, increase of orphans, pressure of health services. 	<ul style="list-style-type: none"> • Identifying common STIs • Inferring the trend of STI infections given relevant data 	<ul style="list-style-type: none"> • Awareness of the prevalence of infectious diseases i.e. HIV and AIDS in Zambia • Cooperating in group activities
9.3 THE ENVIRONMENT	9.3.1 Cycles in the Biosphere	9.3.1.1 Describe what Oxygen and Carbon cycle are 9.3.1.2 Identify factors affecting Oxygen and Carbon cycle. 9.3.1.3 Describe the nitrogen cycle 9.3.1.4 Explain the natural balance of gases in the atmosphere	<ul style="list-style-type: none"> • What oxygen and carbon dioxide cycle in the environment is • Factors of Oxygen and Carbon cycle; Plants: taking in Carbon dioxide and giving off Oxygen, Others: taking in Oxygen and giving off Carbon Dioxide • Nitrogen cycle: Lightning, nitrogen fixing bacteria, planting of legumes, use of nitrogen rich fertilisers • Correct proportions of oxygen, nitrogen and carbon dioxide in the atmosphere 	<ul style="list-style-type: none"> • Comparing the process of photosynthesis and respiration • Investigating the processes that contribute to the balance of nature 	<ul style="list-style-type: none"> • Asking more questions for better understanding • Applying knowledge on cycles to avoid harming the environment • Participating actively in class activities

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	9.3.2 Water Management	<p>9.3.2.1 Describe the importance of water management in our daily life.</p> <p>9.3.2.2 Describe effective water management system</p>	<ul style="list-style-type: none"> The importance of water management; source of water, generating electricity, etc Water management system; construction of dam, reservoir, purification plant 	<ul style="list-style-type: none"> Communicating information on water management Comparing the different water management systems 	<ul style="list-style-type: none"> Appreciating water management system in their life Participating actively in class activities
9.4 PLANTS AND ANIMALS	9.4.1 Conservation of animals and Plants	<p>9.4.1.1 Explain the importance of domesticating animals and plants.</p> <p>9.4.1.2 Explain ways of improving domestic breeds of animals and plants.</p> <p>9.4.1.3 Identify animals and plants threatened by extinction.</p> <p>9.4.1.4 Describe the importance of protecting endangered animals and plants.</p> <p>9.4.1.5 Explain methods of protecting endangered animals and plants.</p>	<ul style="list-style-type: none"> Importance of domesticating animals and plants: conserving, food, pets Ways of improving plant and animal breeds: E.g. crossing, cross-pollination, Animals and plants near extinction: e.g. Rhino, elephant (animals), sausage, mutondo, mukwa (plants). Importance of protecting endangered plants and animals E.g. tourism, food, shelter Methods of protection: game parks, forest reserves, game management areas(GMA) 	<ul style="list-style-type: none"> Communicating the importance of plants and animals Investigating ways of improving plant and animal breeds Investigating animals and plants threatened with extinction Recording data from the observations made Communicating information on the methods of protecting endangered animals and plants 	<ul style="list-style-type: none"> Appreciating plants and animals Participating actively in class work Asking more questions for better understanding

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	9.4.2 Photosynthesis	<p>9.4.2.1 Identify the conditions necessary for photosynthesis</p> <p>9.4.2.2 Identify the products of photosynthesis in a leaf</p> <p>9.4.2.3 Relate the process of photosynthesis to respiration</p>	<ul style="list-style-type: none"> • Conditions: Sunlight, carbon dioxide, water and temperature. • Products of photosynthesis: Starch (Note: test for starch using iodine solution) • Process of Photosynthesis (uses carbon dioxide from air and releases oxygen) while Respiration(uses oxygen and releases carbon dioxide) 	<ul style="list-style-type: none"> • Experimenting on factors necessary for photosynthesis • Investigating the presence of starch in plants • Observing the blue-black colour • Recording data from the observations made • Inferring the presence of starch in leaves. • Comparing photosynthesis and respiration 	<ul style="list-style-type: none"> • Appreciating photosynthesis • Cooperating in group work • Asking more questions for better understanding • Appreciating respiration • Participating actively in class work • Asking more questions for better understanding
	9.4.3 Transpiration	<p>9.4.3.1 Describe the process of transpiration.</p> <p>9.4.3.2 Investigate the factors that affect the rate of transpiration</p> <p>9.4.3.3 Explain the importance of transpiration in plants</p>	<ul style="list-style-type: none"> • Transpiration: Loss of water by plants through the stomata. • Factors affecting transpiration: E.g. .humid, stomata, temperature • Importance of Transpiration: Transportation of water and minerals from roots to the upper part of the plant 	<ul style="list-style-type: none"> • Investigating the factors that affect the rate of transpiration in plant • Recording data from observations made 	<ul style="list-style-type: none"> • Appreciating transpiration • Participating actively in class work • Asking more questions for better understanding

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
9.5 MATERIALS AND ENERGY	9.5.1 Chemical reaction	9.5.1.1 Describe what chemical reaction is	<ul style="list-style-type: none"> • What chemical reaction is; Formation of new substances such as burning of sugar paper • Nature of chemical reactions such as endothermic and exothermic • Different Types of chemical reactions: Synthesis, Decomposition, Single replacement, Double Replacement • The synthesis of copper: Copper combined with Oxygen. Copper + Oxygen → Copper Oxide • The electrolysis of acidified water: splitting water into its component (twice as much hydrogen as oxygen) by means of an electric current • The law of conservation of matter; the total mass of substances before a chemical reaction is equal to the total mass of the substances that are produced. 	<ul style="list-style-type: none"> • Communicating the formation of new substances and nature of chemical reactions • Classifying different types of chemical reactions • Recording data from the observations • Observing the chemical reaction of synthesis • Measuring the mass of substances before and after chemical reaction • Formulating the models of chemical equation • Observing the amount of each gas collected through the electrolysis of acidified water 	<ul style="list-style-type: none"> • Applying safety rules when experimenting • Cooperating in group work • Asking more questions for better understanding • Listening to others with respect
		9.5.1.2 Describe the nature of chemical reactions			
		9.5.1.3 Classify different types of chemical reactions			
		9.5.1.4 Describe the chemical reaction of synthesis			
		9.5.1.5 Demonstrate the chemical reaction of water with electricity			
		9.5.1.6 Explain the law of conservation of matter			

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	9.5.2 Light and its nature	9.5.2.1 Describe the different types of lenses. 9.5.2.2 Demonstrate the location of the focal point and focal length of a lens. 9.5.2.3 Explain the mechanism of a converging lens to produce real and virtual images. 9.5.2.4 Explain the uses of converging and diverging lenses 9.5.2.5 Demonstrate the production of a spectrum from white light. 9.5.2.6 Demonstrate the combination of colours of the spectrum to produce white light. 9.5.2.7 Describe the production of a rainbow. 9.5.2.8 Explain why sunsets and sunrise appear red.	<ul style="list-style-type: none"> • Types of lenses: Converging and diverging lenses • Locating the positions of Focal point and focal length • Real and virtual images of converging lenses • Uses of: Converging lens- microscope ,film projector; Diverging lens-spectacles • Production of a spectrum of light: Dispersing of white light using a prism • Combining spectrum colours into white light: Two prisms ,one upside down to disperse white light • Formation of a rainbow: Splitting of sun light by a rain drops. • Why sunsets appear red: Red is reflected, other colours are absorbed • Why the colour of objects depends on the colour it reflects • The effects of colour filters: Filtering of colours on light rays 	<ul style="list-style-type: none"> • Investigating the focal length and position of the focal point • Planning an experiment to find real and virtual images of an object using converging lenses • Experimenting to see the colours of white light • Investigating the combination of the seven colours into white light • Communicating information on colour filters 	<ul style="list-style-type: none"> • Participating in experiments actively • Cooperating in group work • Taking precautions when using light sources • Respecting the views of others • Applying knowledge on spectrum in everyday life
	9.5.3 Colour Filters	9.5.3.1 Explain that colours of an object depend on the colour of light it reflects. 9.5.3.2 Describe the effects of colour filters on light rays.			

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	9.5.4 Electric Current and Voltage in Circuit	<p>9.5.4.1 Explain the difference between electric current and voltage</p> <p>9.5.4.2 Demonstrate the use of an ammeter to measure electric currents in a circuit.</p> <p>9.5.4.3 Demonstrate how to measure potential difference in a circuit.</p> <p>9.5.4.4 Describe the relationship between potential difference and current.</p> <p>9.5.4.6 Explain the use of electric current in the local environment.</p>	<ul style="list-style-type: none"> • The definition of electric current and voltage • Use of an ammeter to measure current in amperes(A) • Measuring potential difference in a circuit in volts(V) • Relationship between current and potential difference • Uses of electric current: E.g. lighting, heating, cooking 	<ul style="list-style-type: none"> • Comparing current in a series and parallel circuit • Investigating the relationship between current and potential difference • Measuring electric current and voltage in a circuit • Accurately recording information from an experiment • Plotting graphs given relevant data from experiment • Inferring the relationship between electric current and voltage 	<ul style="list-style-type: none"> • Applying information on current and potential difference in everyday life • Cooperating in group work • Participating in class works actively • Applying safety rules when experimenting
	9.5.5 Pressure	<p>9.5.5.1 State what pressure is</p> <p>9.5.5.2 Identify factors affecting pressure in gases</p>	<ul style="list-style-type: none"> • Pressure as force per unit area,(pressure= force/area) in N/m^2 • Factors affecting pressure: temperature and volume. 	<ul style="list-style-type: none"> • Observing how pressure depends on the surface area and force applied • Investigating how pressure is affected by temperature and volume. 	<ul style="list-style-type: none"> • Applying pressure in everyday life • Cooperating in group work

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	9.5.6 Energy and its conservation	<p>9.5.6.1 Explain what energy is.</p> <p>9.5.6.2 Identify different forms of energy</p> <p>9.5.6.3 Describe how different forms of energy can be changed</p> <p>9.5.6.4 Explain the law of energy conservation</p> <p>9.5.6.5 Explain the effects of energy production on the environment.</p> <p>9.5.6.6 Explain ways of conserving energy.</p>	<ul style="list-style-type: none"> • Energy as the ability to do work • Forms of energy: e.g. Potential energy, Kinetic energy, Chemical energy, Electric energy and Heat energy • Conversion of energy • Law of energy conservation • Effects of energy generation e.g. land degradation, pollution. • Conserving energy: use of alternative sources, avoid wastage energy, use three Rs of conservation. 	<ul style="list-style-type: none"> • Comparing different energy resources • Communicating information on different forms of energy sources • Investigating the conversion of energy from one form into different forms 	<ul style="list-style-type: none"> • Applying forms of energy conservation in everyday life • Participating actively in class work • Appreciating different forms of energy • Applying safety rules when experimenting with different forms of energy
	9.5.7 Communication	<p>9.5.7.1 Identify ways of sending and receiving information over long distances.</p> <p>9.5.7.2 Describe the advantages and disadvantages of the different ways of sending messages</p>	<ul style="list-style-type: none"> • Ways of receiving and sending messages: E.g. Cell phones, radios, television, mail • Advantages and disadvantages of each device: refer to distance, signal strength, network failure. 	<ul style="list-style-type: none"> • Communicating information on sending and receiving messages • Comparing different ways of sending messages 	<ul style="list-style-type: none"> • Awareness of different ways of communicating • Applying ways of sending messages in everyday life group work • Cooperating in group work

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
	9.5.8 Digital and Analogue Transmission	<p>9.5.8.1 Describe the transmission of radio and television signals</p> <p>9.5.8.2 Explain the amplification of sound.</p> <p>9.5.8.3 Explain the difference between digital and analogue transmission information.</p>	<ul style="list-style-type: none"> • Transmission: radio transmits sound signals and television transmits sound and image signals • Amplification of sound: Strengthening of the signal. • Differences between: Digital and Analogue transmission 	<ul style="list-style-type: none"> • Observing the stages of TV and radio broadcasting • Comparing digital and analogue transmission 	<ul style="list-style-type: none"> • Appreciating both TV and radio transmission • Applying ways of storing data in everyday life • Cooperating in group work
	9.5.9 Satellite Communication	<p>9.5.9.1 Explain the use of satellite in long distance communication.</p> <p>9.5.9.2 Describe the transmission of a live broadcast of an event from Africa to Europe using raw block diagrams</p>	<ul style="list-style-type: none"> • Use of Satellite: in long distance communication. • Transmission of a Live broadcast of an event 	<ul style="list-style-type: none"> • Communicating information on satellite communication • Comparing live and recorded broadcasting 	<ul style="list-style-type: none"> • Awareness of satellite communication • Awareness of digital and analogue transmission • Participating actively in class activities

Integrated Science Practical Data

The following points should be considered during practical in Integrated Science:

- (i) The learner should have the knowledge in measurement of substances.
The learner is expected to comprehend recording of breathing rate, measurement of mass, weight, temperature and volume. Experiments of this nature will rely on the use of ordinary apparatus in the laboratory.
- (ii) Experiments involving testing of gases or separating mixture could be set. A learner is expected to observe and investigate the expected outcome. This may comprise elementary distillation, chromatography, Magnetism, Flootation and Filtration . Detailed analysis is not necessary but a learner is expected to have the knowledge on how mixtures can be separated . A learner should also carry out the tests for Chemical tests for gases which should include carbon dioxide, hydrogen and oxygen dioxide. Organic substances and ions not mentioned above may be included in the practical sessions. A learner is expected to have sufficient knowledge in this area. Examination involving different substances similar to the ones specified above may be set but candidates are expected to draw out their conclusions from the observations.

N.B. No note books, course books, information booklets and text books will be allowed in the practical examination.

A learner shall be expected to perform simple calculations as outlined by the Integrated Science syllabus.

Apparatus

The following apparatus should be stocked for teaching and examination purposes. Each learner should be provided with the necessary apparatus to conduct the experiments.

Test-tubes

Measuring cylinder calibrated 25cm^3 or 50cm^3 .

Filter funnel.

Beaker (polystyrene, glass) volume of 250cm^3 .

Conical flasks with volume of 250cm^3 .

Thermometers calibrated -10°C to 110°C at intervals of 1°C .

Stop clocks/stop watches which record time in seconds.

Wash bottles.

Pyrex test tubes are essential for heating purposes with capacities $125\text{mm} \times 16\text{mm}$.

Boiling tubes i.e. of dimension 150mm x 25mm.

Stirring rods for stirring or mixing purposes.

Electronic balances /triple beam balances.

Lenses, Ammeters, Voltmeters

Reagents

The following standard reagents should be stocked among others. These are of paramount importance during practical.

Sulphuric acid. 0.5 mol/dm^3

Aqueous sodium hydroxide 1.0 mol/dm^3

Lime water (a solution of calcium hydroxide)

Aqueous Hydrogen peroxide

Dilute Hydrochloric acid

Iodine solution

Test for gases

Gas	Test	Test result
Carbon dioxide	Bubble the gas through limewater	White precipitate formed
Hydrogen (H_2)	Introduce a lighted splint into the gas	Puts out the lighted splint with a 'pop' sound
Oxygen (O_2)	Introduce a glowing splint into the gas	Glowing splint relighted

APPENDIX 1: SCOPE AND SEQUENCE

The following table shows the “Scope and Sequence” of integrated science syllabus from G1 to G9.

	Sub-Topics & Knowledge								
	G1	G2	G3	G4	G5	G6	G7	G8	G9
UNIT1: The Human Body	1.1.1 External parts of the human body • External parts of human body	2.1.1 The Internal parts of the human Body • Major internal parts • Functions of major parts			5.1.1 The Heart • Function of the heart • Structure of the heart • How to take the pulse	6.1.1 The Blood • Composition of blood • Functions of blood • Double circulation of blood in the body: Artery and Veins			9.1.1Circulatory System • The blood circulatory system • Components of blood • Internal structure of the heart • Movement of blood • Functions of organs in the circulatory system
	1.1.2 The senses • Parts associated with the five senses		3.1.1 Mouth • Functions of mouth				7.1.1 The Digestive System • What Digestive system is • Organs of digestive system • The parts of alimentary canal • Undigested food		
		3.1.2 Nose • Function of the nose			5.1.2 Breathing • The roles of breathing; • The types of organs in breathing • The function of organs in breathing				9.1.2Respiratory System • Organs of respiration • Functions of organs in the respiratory system • Mechanism of ventilation • The function of lungs • Tissue respiration • Effects of smoking
			4.1.1 Eyes • Basic parts of eyes • Function of eyes						
			4.1.2 The Ear • Basic parts of ears • Function of ears						

	Sub-Topics & Knowledge								
	G1	G2	G3	G4	G5	G6	G7	G8	G9
				4.1.3 The skin • Parts of the skin • Functions of the skin					
			3.1.3 Structure of the Body • Movement of arms and legs • Movable joints • Function of bones and muscles • Broken arm or leg • Parts of the human skeleton						
	1.1.3 Stages of human life • Stages in the human life cycle • Activities at different stages of human growth • Role of clinics				5.1.3 Puberty • Male and female parts of the body • Changes of human body at puberty	6.1.2 Features of pregnancy • Features of pregnancy • Signs and symptoms of pregnancy		8.1.1 Human Reproductive System and Pubert • Organs of reproduction • Functions of reproductive parts • Changes associated with puberty • Importance of personal hygiene	
						6.1.3 Health risks • Health and social risks for teenage pregnancy • Health risks associated with early sexual debut		8.1.2 Fertilization and embryo development • The Process of Fertilisation • Functions of the parts • Gestation period and birth	
UNIT 2: Health		2.2.1 Food Hygiene • Importance of food hygiene • Danger of exposed food • The importance of clean and safe water	3.2.1 Food • Importance of food • Food nutrients • Composition of balanced diet			6.2.1 Food Nutrients • Sources of vitamins and minerals • Roles of vitamins and minerals • Well-balanced diets • Food labelling • Common dietary diseases • Interpreting the children's clinic cards	7.2.2 Fruits • Fruits used as food • Seeds used as food • Importance of fruits and seeds for health	8.2.1 Nutrition • The different types of food nutrients • Dietary needs for different persons • Nutritional deficiency diseases and their symptom • The roles of children's clinics for nutrition	
	1.2.1 Hygiene • Importance of clean bodies in Prevention of diseases • Ways of Cleaning • Importance of hand			4.2.1 Personal Hygiene • How to care for Eyes, ears, Feet and skins					
	washing								

Sub-Topics & Knowledge									
	G1	G2	G3	G4	G5	G6	G7	G8	G9
	• Importance of clean surrounding			4.2.2 Water in the body • Importance of water for the body • Effects of dehydration • Prevention and treatment of dehydration					
					5.2.1 Fresh Air • The importance of ventilation • The ways of good ventilation • First Aid treatment for a suffocated person				
	1.2.2 Common Diseases • Communicable diseases				5.2.3 Malaria • Causes of malaria • Symptoms of malaria • Ways of preventing malaria				
			3.2.3 Illnesses and diseases • Common causes of diseases • Common diseases in the community • Infection and Non-infection disease • The ways for preventing disease		5.2.2 Air and water borne Diseases • Common air and waterborne diseases • Symptoms of common air borne and water borne diseases • Ways of preventing air and waterborne diseases		7.2.1 Diseases • Differences between a virus and bacteria • Effect of viruses and bacteria • Effect of disease prevalence on health services		9.2.1 Sexually Transmitted Infections (STIs) • Common STIs • Transmission of Sexually Transmitted Infection • Prevention of Sexually Transmitted Infections • Impact of HIV and AIDS
		2.2.2 HIV and AIDS • The meaning of HIV and AIDS • HIV Transmission • Prevention of HIV			5.2.4 HIV and AIDS and STIs • Ways of STIs and HIV transmission • Ways of prevention • Care and treatment of AIDs patients	6.2.3 Living with HIV and AIDS • Challenges of living with HIV and AIDS			
			3.2.2 Drug Abuse • Common drugs • Effects of too much drugs		5.2.5 Harmful Substances and their effects • Harmful substances • Harmful effects • Effects of alcohol	6.2.2 Effects of harmful Substance • Effect of substance abuse on lives • How to Help substance addicts			
				4.2.3 Medicines • Traditional Medicines					

	Sub-Topics & Knowledge								
	G1	G2	G3	G4	G5	G6	G7	G8	G9
UNIT3: The Environment	1.3.1 The Environment • Features of the local environment • Urban and Rural Environment • Importance of environment	2.3.1 Our environment • Harmful things in environment • Wastes in environment • Effects of harmful things • Keeping homes and schools clean • Caring of surrounding by cleaning	3.3.1 Soil formation • Weathering • Agents of weathering • Soil layers		5.3.1 Soil • Importance of water in the soil • Retention of water in soil • Drainage rates of soils				
				4.3.3 Fertile Soils • Types of soils: • How to improve soil fertility • The superiority of natural methods	5.3.2 Fertilizers • What organic and inorganic fertilizers are • Way of Preparing compost manure • Importance of maintain a supply of composted materials • Advantages and disadvantages of chemical fertilizers in agriculture				
				4.3.1 Forests • Importance of forests • Human activities • Ways of conserving forests					
				4.3.2 Game Management Areas (GMA) • Control of wild animals • Threats to wildlife • The importance of Conserving wild life					
				4.3.4 Pollution • Types of pollution • Sources of pollution • Conserving resources				8.3.1 Water, Air and Land Pollution • What Pollution is • Types of pollution • Causes of pollution • Effects of pollution • Ways of preventing pollution	

	Sub-Topics & Knowledge								
	G1	G2	G3	G4	G5	G6	G7	G8	G9
						6.3.1 The water cycle • The water cycle system • The process of Evaporation and Condensation of water in the environment • Effects of water cycle	7.3.1 Water supply system • Sources of water for our life • Water treatment in urban and rural areas • Importance of water treatment • Water conservation		9.3.2 Water management • The importance of water management • Water management system
									9.3.1 Cycles in the Biosphere • What oxygen and carbon dioxide cycle in the environment is • Factors of Oxygen and Carbon cycle • Nitrogen cycle • The nature balance of oxygen, nitrogen and carbon dioxide in the atmosphere
UNIT4: Plants and Animals	1.4.1 Local Plants • Local plants • Plant growth stages	2.4.1 Parts of Plants • Plant parts • The life cycle of a plant	3.4.1 Plant Classification • Classification of plants in Flowering and Non-Flowering; Flowering Plants		5.4.1 Non Flowering Plants • Types of non-flowering plants • The use of Ferns and Fungi for our life			8.4.1Plants Cells • Parts of a microscope • The structure of plant cell • Functions of cell parts	
				4.4.1 Flowering plants • Function of parts of the flowering plant			7.4.1 The flower • Parts of a flower • Functions of parts of flower		
							7.4.2 Pollination and fertilization in flowering plant • Pollination • Agents of pollination • Fertilisation in plants		
							7.4.3 Fruits and seeds • The roles of seeds • The process of seed growth • Importance of improving seed varieties		
							7.4.4 Seed dispersal • Seed dispersal • Ways of seed dispersal • Importance of seed dispersal		

Sub-Topics & Knowledge									
G1	G2	G3	G4	G5	G6	G7	G8	G9	
						7.4.5 Propagation <ul style="list-style-type: none"> • What plant propagation is • Methods of plant propagation • Plant propagation in local area 			
			4.4.2 Plant Growth <ul style="list-style-type: none"> • Conditions required for seed germination • Factors for plant growth • Steps in growing maize 		6.4.1 Photosynthesis <ul style="list-style-type: none"> • The movement of water/mineral • Process by which plants make food The presence of starch in a leaf: 		8.4.2 Plant Growth and Nutrients <ul style="list-style-type: none"> • Regions of plant growth • Responses to stimuli • Plant nutrients • How plant obtain minerals • Sources of plant nutrients • Advantages and disadvantages of inorganic and organic fertilizers • Effects of excessive fertilisers 	9.4.2Photosynthesis <ul style="list-style-type: none"> • Conditions necessary for photosynthesis • Products of photosynthesis • Process of Photosynthesis 	
								9.4.3Transpiration <ul style="list-style-type: none"> • Process of Transpiration • Factors affecting transpiration • Importance of Transpiration 	
1.4.2 Animals around us <ul style="list-style-type: none"> • Wild animals • Common Activities of animals 	2.4.2 Types of Animals <ul style="list-style-type: none"> • Different types of animals • Animals and food • Places where animals are found • Protection of animals from enemies • Conserving animals 	3.4.2 Animal Classification <ul style="list-style-type: none"> • Classification of animals in Vertebrate and Invertebrate • Groups of vertebrates 		5.4.2 Invertebrate Animals <ul style="list-style-type: none"> • Different types of Invertebrate Animals; • Basic Structures of insects and spiders • Usefulness of insects 	6.4.3 Vertebrate animals <ul style="list-style-type: none"> • The different types of Vertebrate animals • Adaptation of vertebrates • Life cycle of vertebrate animals • The ways of conserving vertebrates 		8.4.3Animal Cell <ul style="list-style-type: none"> • Structure of an animal cell • Functions of cell parts • Differences between plant and animal cell 		
		3.4.3 Homes of living things <ul style="list-style-type: none"> • Place of living 	4.4.3 Domestic Animals <ul style="list-style-type: none"> • The types of domestic animals • Favourable pasture and conditions • Importance of domestic animals 	5.4.3 Pest and Parasites <ul style="list-style-type: none"> • Common pests and parasites • Harm caused by pests and parasites • Parasite and pests control • Harm on environment caused by Chemical pesticides 	6.4.2 Care for Domestic Animals <ul style="list-style-type: none"> • Basic needs of livestock • Importance of cleanliness in the care of livestock • Farming Procedure of domestic animals 			9.4.1 Conservation of animals and Plants <ul style="list-style-type: none"> • Importance of domesticating animals and plants • Ways of improving plant and animal breeds • Animals and plants near extinction • Importance of protecting endangered plants and animals • Methods of protection 	

	Sub-Topics & Knowledge								
	G1	G2	G3	G4	G5	G6	G7	G8	G9
UNIT5: Materials and Energy	1.5.1 Types and properties of Materials • Different types of Materials • Properties of materials • Uses of materials	2.5.1 Soluble and insoluble Materials • Matter in Solid and liquid form • Dissolving and non-dissolving substances • The different rate of dissolution of materials	3.5.2 Solutions • Saturated and unsaturated solution	4.5.1 Making Mixtures • The differences between a substance and a mixture • The nature of mixtures • The types of mixtures	5.5.1 Separating substances • Separating of a soluble and an insoluble solid from water • Separation of iron fillings from sand			8.5.3 Mixtures • What a mixture is • Types of Mixtures • Separating methods of Mixtures • Industrial application of separation techniques	9.5.1 Chemical reaction • What chemical reaction is • Nature of chemical reactions • Different Types of chemical reactions • The synthesis of copper • The electrolysis of acidified water • The law of conservation of matter
			3.5.1 Three States of matter • Effects of heating and cooling on matter • Process of change of states					8.5.1 Composition of Matter • Composition of matter (Atoms & Molecules) • Structure of an atom • Symbols of Common Atoms • Models of Molecules:	
				4.5.3 Air • What Air is • Uses of air • Advantages and disadvantages of winds		6.5.1 Nature of Air • Composition of air • Physical properties of air • Characteristics of air		8.5.9 Compositions of Air • Components of air • Proportion of substances in air • The nature of air • The use of substances in air	
								8.5.2 Physical Change of State • What Physical change is • Arrangement of Atoms in the three states of matter • Temperatures at which matter changes state	
							7.5.5 Metals and Non-metals • Types of metals & Non-metals • Conduction and non-conduction of electricity		

Sub-Topics & Knowledge									
G1	G2	G3	G4	G5	G6	G7	G8	G9	
						7.5.6 Mining <ul style="list-style-type: none"> Minerals mined in Zambia Properties of copper Extraction of copper Items made from copper Impact of mining 			
						7.5.1 Energy <ul style="list-style-type: none"> What Energy is Types of energy Energy conversion 		9.5.6 Energy and its conservation <ul style="list-style-type: none"> The definition of Energy Forms of energy Conversion of energy Law of energy conservation Effects of energy generation Conserving energy 	
	2.5.2 Sources of Sound <ul style="list-style-type: none"> Sources of sound Different sounds 				6.5.2 Sound <ul style="list-style-type: none"> What sound is How sound can make Transmission of sound Making sound louder 				
	2.5.3 Light <ul style="list-style-type: none"> Sources of light Light & Shadow 		4.5.5 Nature of Light <ul style="list-style-type: none"> Movement of light Passage of light through material 				8.5.8 Reflection and refraction of Light <ul style="list-style-type: none"> Reflection of light The characteristics of reflection of mirror Refraction of light Refraction in water Application of reflection and refraction 	9.5.2 Light and its nature <ul style="list-style-type: none"> Types of lenses Location of the positions of Focal point and focal length of lens Real and virtual images of converging lenses Uses of converging and diverging lenses Production of a spectrum of light Spectrum Formation of a rainbow Why sunsets appear red? The nature of colour of objects The effects of colour filters 	

Sub-Topics & Knowledge									
G1	G2	G3	G4	G5	G6	G7	G8	G9	
			4.5.4 Magnets <ul style="list-style-type: none"> • The nature of magnet • Types of magnets • Magnetic Materials • Two types of poles of a magnet • The laws of repulsion and attraction • The uses of magnet 						
				5.5.2 Electricity <ul style="list-style-type: none"> • What electricity does • Sources of electricity • The application of electricity in our life • Conductors of electricity • Uses of good and bad conductors in our life 					
				5.5.3 Heat Conductors <ul style="list-style-type: none"> • What heat is • Temperature measurement • Good and bad conductors of heat • Good insulators • The uses of good and bad conductors of heat in our life 			8.5.6 Heat transfer <ul style="list-style-type: none"> • Types of heat transfer: conduction, convection and radiation • Movement of heat in solid, liquid and air • The application of heat transfer 		
							8.5.7 Heat and expansion of substances <ul style="list-style-type: none"> • Expansion of substances • Use of expansion in everyday life • Effects of expansion and contraction 		
						7.5.2 Electric current and Circuits <ul style="list-style-type: none"> • What Electric current is • How to make a simple circuit • Two types of circuits • Action of a switch 		9.5.4 Electric Current and Voltage in Circuit <ul style="list-style-type: none"> • The definition of electric current and voltage • How to use an ammeter and its unit • How to use a Voltmeter and its unit • Relationship between current and potential difference • Uses of electric current 	

Sub-Topics & Knowledge									
G1	G2	G3	G4	G5	G6	G7	G8	G9	
							7.5.3 Lightning <ul style="list-style-type: none"> • Causes of lightning • Effects of lightning • Preventing damage from lightning • Importance of lightning 		
			4.5.2 Forces <ul style="list-style-type: none"> • Types of forces • What forces do • Use of force in daily life 	5.5.6 Simple Machines <ul style="list-style-type: none"> • What simple machine is • 6 Kinds of simple machines • Application of simple machines 					
				5.5.4 Measuring Matter <ul style="list-style-type: none"> • Instruments for measuring mass and weight • Effect of gravity • Difference between mass and weight 			8.5.4 Mass and Weight <ul style="list-style-type: none"> • Mass and Weight • Measurement of mass and its units • Measurement of weight and its units • Calculating the weight of different substances given the masses • Difference between mass and weight 		
					6.5.3 Pressure <ul style="list-style-type: none"> • Effects of pressure • The relation between area and force • Application of pressure in our life 		8.5.5 Density <ul style="list-style-type: none"> • What Density is • Factors of density • Sinking and floating • How vessels float • Effects of overloading vessels 	9.5.5 Pressure <ul style="list-style-type: none"> • The definition of Pressure • Factors affecting pressure 	
				5.5.5 Volume <ul style="list-style-type: none"> • Instruments for measuring volume • Measuring Volume of given liquids • Measuring Volume of regular and irregular solid objects. 					
					6.5.4 Communication <ul style="list-style-type: none"> • Methods of communication • Importance of communication • Use of sound waves 			9.5.7 Communication device <ul style="list-style-type: none"> • Ways of receiving and sending messages • Advantages and disadvantages of each device 	

Sub-Topics & Knowledge									
G1	G2	G3	G4	G5	G6	G7	G8	G9	
									9.5.8 Digital and Analogue Transmission <ul style="list-style-type: none"> • Transmission of radio and television signals • Amplification of sound • Differences between Digital and Analogue transmission
									9.5.9 Satellite communication <ul style="list-style-type: none"> • Use of Satellite • Transmission of a Live broadcast of an event
						7.5.4 The solar system <ul style="list-style-type: none"> • The formation of Solar system • Difference between sun and the planets • Source of light in the solar system • The movement of the earth and the moon • The cause of day & night • The cause of seasons • Formation of solar and lunar eclipse • Uses of solar energy 			