National Assessment

At Form III

Handbook for Schools

Mauritius Examinations Syndicate

CONTENT

National Assessment at Form III

1.   Aims and Objectives

The National Assessment at Form III has specific aims and objectives. It serves to reflect achievement after three years of secondary education and is also meant to serve formative purposes to promote quality learning and teaching by helping to identify the strengths and weaknesses in the knowledge and skills that students have acquired after three years of secondary education.

The assessment objectives are in line with the learning objectives spelt out in the National Curriculum Framework (Secondary). It is expected that, along with the National Curriculum Framework (Secondary), the National Assessment at Form III will assist in the reshaping of Lower Secondary Education by impacting positively on classroom practices and promoting greater engagement in learning at school on the part of the students. The aims of the assessment are summarised below:

- Evaluate the skills and competencies acquired by students
- Identify the strengths and weaknesses of students
- Promote quality in the teaching and learning process

2.   What will be assessed in 2014?

The Assessment in 2014 will be carried out in the following subjects: English, French, Mathematics, Computer Studies/Literacy, Biology, Chemistry and Physics. Particular emphasis will be placed on:

- Communication skills related to reading and writing in English and French
- Mathematical skills and concepts
- Computer skills and competencies

- Scientific skills and concepts

For each of these skills, specific assessment objectives/learning outcomes have been defined.

3. Assessment Schemes and Formats of Question Papers

The assessment scheme and paper format for each learning area are given below.

3.1 Languages (English and French) – 100 marks

In both English and French, emphasis will be laid on reading and writing skills. Communicative competence in those languages will be assessed through a range of given situations and students will need to provide appropriate answers to these tasks. Knowledge and application of grammar will be assessed in context.

Single papers will be set and their duration will be 1 hour 45 minutes. Each paper will comprise two sections, Section A (Reading) and Section B (Grammar and Writing). A number of reading and writing tasks will be set and these will be graded in terms of difficulty, ranging from simple exercises to progressively more complex ones. A range of question types will be used, including True/False items, multiple choice items, structured and open ended questions. All the questions are compulsory but a choice will be given for the Essay question. A description of the papers is given in table 1.

Table 1: Paper Description for English and French

Section	Questions	Weighting
Section A (Reading)	A range of reading tasks, graded in terms of difficulty level	**40%**
Section B (Writing and Grammar)	A range of tasks, assessing grammatical knowledge and writing skills	**60%**

3.2 Mathematics – 100 marks

In Mathematics, emphasis will be laid on problem solving skills. Ability to apply mathematical concepts in given contexts will be tested in varied ways. The weighting of the two main assessment objectives is given in table 2.

Table 2: Paper Description for Mathematics

Assessment Objectives	Weighting
Knowledge and understanding	**70%**
Problem solving skills	**30%**

A single Mathematics paper will be set. The duration of the paper is 1 hour 45 minutes. The paper will consist of one section only. The questions set will be graded with questions assessing lower order skills at the beginning of the paper and more challenging questions at the end.

15 to 20 questions will be set and some questions may have sub-parts.

3.3 Computer Studies/Literacy – 100 marks

In Computer Studies/Literacy, the items will focus on the content knowledge and on the basic computer skills which students are expected to have acquired after three years of secondary schooling.

The paper will comprise two sections: **Section A** and **Section B**. **Section A** will carry a weighting of 55 %. The weighting for **Section B** will be 45 %. All the questions set in **Section A** will be compulsory and will consist of a range of types of questions, including Multiple Choice items, Fill – in – the – blanks, Matching, True/False items, Short Answer questions, Tick boxes and Structured questions. **Section B** will consist of four options based on the computer packages (Word Processing, Spreadsheet,

Database) and Program Flowchart. Students will be required to answer **all** questions from **any three options**. Each option will carry a weighting of 15%.

The Computer Studies/Literacy paper will be of **1 hour 45 minutes** duration and will carry **100 marks**.

Table 3: Paper Description for Computer Studies/Literacy

Section	Types of Questions	Marks
A **All** questions compulsory	Multiple Choice items, Fill – in – the – blanks, Matching, True/False items, Short Answer questions, Tick boxes and Structured questions	55
B Choice of **3 options** with all questions compulsory	Option A: Word Processing Option B: Spreadsheet Option C: Database Option D: Program Flowchart	45

3.4   Biology, Chemistry and Physics

Biology, Chemistry and Physics will be assessed through three different question papers. **Each paper will be of one hour duration and will carry 50 marks.** Students will have to attempt **all** the questions. The use of calculators is not allowed. Students are expected to bring along all materials such as mathematical instruments and rulers as may be required during the conduct of the examinations.

The Biology, Chemistry and Physics papers will comprise different types of items, namely Multiple Choice Questions, Short Answer and Open-ended Questions.

The assessment objectives and their respective weighting for the three different papers are given in table 4.

Table 4: Assessment Objectives for Biology, Chemistry and Physics

Assessment Objectives	Weighting
Knowledge with understanding	60%
Handling information and problem solving	30%
Scientific investigation	10%

4. Syllabus Aims and Assessment Objectives

Overarching syllabus aims as well as more specific assessment objectives have been defined for each subject and these are detailed below.

4.1 ENGLISH

Syllabus Aims

1. Develop students' ability to communicate effectively in English.
2. Encourage students to enjoy and appreciate the variety of texts available in the English Language.
3. Develop imagination and creativity.

Assessment Objectives

Reading

Students will be assessed on their ability to:

1. respond to texts and organise information read;
2. understand explicit meanings;
3. identify central themes and ideas;
4. draw inferences;
5. identify characters and follow the sequence of events;
6. provide a personal response to the text;
7. interpret and evaluate the information read;
8. explain the meaning of words.

Writing

Students will be assessed on their ability to:

1. communicate and demonstrate adequate control of spelling, punctuation, grammar and syntax;
2. produce narrative and non-narrative texts (informal letters, simple and factual reporting);
3. use a varied range of vocabulary and sentence structures;
4. write for different purposes and different audiences (e.g. to inform, to describe, to entertain, etc.);
5. use stylistic devices to write for effects (e.g. create suspense, humour, irony, etc.);
6. display originality and creativity.

4.2   FRENCH

Objectifs Généraux

L'élève doit être capable:

1. de lire et comprendre une variété de textes;
2. de lire avec plaisir et intérêt des textes sur des sujets variés;
3. de communiquer efficacement à travers différents types d'écrits;
4. de faire preuve d'imagination et de créativité.

Objectifs Spécifiques

Lecture/Compréhension

L'élève doit être capable:

1. de reconnaître, lire et comprendre des textes de la vie de tous les jours (mode d'emploi, dépliant, programme de télé, …);
2. d'obtenir des informations de différentes sources (dictionnaire, encyclopédie, média, …), les organiser et s'en servir;
3. de lire une variété de textes, de différentes longueurs et sur des sujets différents et
   a) retrouver des informations spécifiques;
   b) identifier des personnages;
   c) suivre l'ordre logique et chronologique;
   d) comprendre les thèmes (idées/éléments principaux);
   e) identifier l'idée centrale;
   f) inférer et déduire;
   g) donner son opinion;
   h) expliquer des mots/expressions.

Production Ecrite

L'élève doit être capable:

1. d'écrire lisiblement et de manière soignée;

2. d'avoir une bonne orthographe;

3. de maîtriser les signes de ponctuation;

4. d'employer une variété de structures syntaxiques;

5. d'utiliser correctement les notions grammaticales se rapportant aux verbes et aux accords dans les productions écrites;

6. remplir une fiche;

7. d'écrire une lettre simple pour demander/donner des informations;

8. de produire de courts textes (carte de voeux, carte postale, mot d'excuse, petite annonce, …);

9. de produire des paragraphes/des textes cohérents (narration, description, …) sur des sujets variés;

10. de faire preuve d'originalité et de créativité dans ses écrits.

4.3   MATHEMATICS

Syllabus Aims

Students should:

1. acquire and apply knowledge and demonstrate skills related to number, measure, geometry, algebra, probability and statistics;
2. develop problem solving skills and an ability to reason logically;
3. develop mathematical language as a means of communication and investigation;
4. acquire a foundation appropriate for further studies in Mathematics as well as skills and knowledge pertinent to other disciplines.

Specific Objectives

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1. Numbers
- use whole numbers, integers (positive, negative and zero), prime, rational, irrational, and real numbers;
- represent integers on a number line;
- continue given number sequences, recognise patterns within and across different sequences and generalise to simple algebraic statements.

2. Factors and Multiples
- use common factors and multiples;
- perform and use prime factorisation;
- find H.C.F and L.C.M.

3. Squares, square roots, cubes and cube roots
- calculate square, square roots, cubes and cube roots of numbers.

4. Directed numbers	• use directed numbers in practical situations (e.g. temperature change, tide levels).
5. Vulgar and decimal fractions	• use the language and notation of simple vulgar and decimal fractions; • recognise equivalence and convert from one form into another.
6. Ordering	• order quantities by magnitude and demonstrate familiarity with the symbols: $=$, $\neq$, $>$, $<$, $\geq$, $\leq$.
7. Order and Properties of operations	• use the four operations for calculations with whole numbers, decimal fractions, vulgar and mixed fractions, including correct ordering of operations and use of brackets.
8. Measures	• use current units of mass, length, time, area, volume and capacity in practical situations; • express quantities in terms of larger or smaller units.
9. Time	• calculate time in terms of the 12-hour and 24-hour clock; • read clocks, dials and timetables.
10. Speed	• Calculate speed and average speed in practical situations.
11. Money	• solve problems involving money and convert from one currency into another.
12. Estimation	• make estimates of numbers, quantities and lengths; • give approximations to specified numbers of decimal places **[Upper bounds & lower bounds are excluded].**

13. Set language and notation

- use set language and set notation;
- use Venn diagrams to describe sets and represent relationships between sets as follows:

    Definition of sets, e.g. A = $\{x: x \text{ is a natural number}\}$

    $$B = \{(x, y): y = mx + c\}$$
    $$C = \{x: a \leq x \leq b\}$$
    $$D = \{a, b, c, \dots\}$$

    Notation:

Union of A and B	$A \cup B$
Intersection of A and B	$A \cap B$
Number of elements in set A	$n(A)$
"… is an element of…"	$\in$
"… is not an element of …"	$\notin$
Complement of set A	A'
The empty set	$\emptyset$
Universal set	ξ
A is a subset of B	$A \subseteq B$
A is a proper subset of B	$A \subset B$
A is not a subset of B	$A \nsubseteq B$
A is not a proper subset of B	$A \not\subset B$

14. Ratio, proportion, rate

- demonstrate an understanding of the elementary ideas and notations of ratio, direct and inverse proportion and common measures of rate;
- divide a quantity in a given ratio;
- solve simple word problems involving ratios, proportions and rates;
- use scales in practical situations
    [Limited to linear scale factor only].

15. Percentages

- calculate a given percentage of a quantity;
- express one quantity as a percentage of another;

- calculate percentage increase or decrease.

16. Personal and Household Finance

- use given data to solve problems on personal and household finance involving earnings, simple interest, discount, profit and loss;
- solve simple problems on commission and hire purchase.

17. Geometrical Terms and Relationships

- use and interpret geometrical terms: point, line, plane, parallel, perpendicular, right angle, acute, obtuse and reflex angles;
- use and interpret vocabulary of triangles, circles, special quadrilaterals
- draw circles and triangles using a protractor and a compass.

18. Angles

- use a protractor to find unknown angles;
- calculate unknown angles and give simple explanations using the following geometrical properties:

    (a) Angles on a straight line;
    (b) Angles at a point;
    (c) Vertically opposite angles;
    (d) Angles formed by parallel lines;
    (e) Supplementary and complementary angles.

19. Polygons

- use and apply angle properties of triangles and quadrilaterals;
- use and apply angle properties of polygons including angle sum;
- solve problems involving angles and number of sides of regular polygons.

20. Bearings
- interpret and use three-figure bearings measured clockwise from the north (i.e. $000^0 - 360^0$).
  [Diagrams will be given]

21. Circles
- use and interpret vocabulary of circles;
- solve problems involving the circumference and area of a circle;
- determine arc length and area of sector.

22. Algebraic Representation and Formulae
- use letters to express generalised numbers and express basic arithmetic processes algebraically;
- substitute numbers for words and letters in formulae.

23. Algebraic manipulation
- manipulate directed numbers;
- perform binomial expansions;
- factorise expressions of the form:

$$ax + ay$$
$$ax + bx + kay + kby$$
$$x^2 - y^2$$
$$a^2 + 2ab + b^2$$

$ax^2 + bx + c$ (**where *a* = 1**)
- manipulate simple algebraic fractions;
- transform simple and more complicated formulae.
  [Including cases where factorisation is required].

24. Solutions of equations and inequalities
- solve simple linear equations in one unknown;
- solve fractional equations with numerical and linear algebraic denominators;
- solve simultaneous equations in two unknowns by substitution and elimination methods
  [Application and formulation are excluded];

- solve quadratic equations by factorisation
  [Restricted to coefficient of $x^2 = 1$];
- formulate and solve linear equations in one unknown from given situations;
- formulate and solve quadratic equations from given situations;
- solve simple linear inequalities.

25. Mensuration
- solve problems involving the perimeter of squares, rectangles and triangles;
- solve problems involving the area of squares, rectangles, triangles, parallelograms and trapezia;
- find surface area using nets;
- calculate the surface area and volume of cubes, cuboids, cylinders and right-prisms.

26. Symmetry
- recognise and draw lines of symmetry in two dimensions.
  [Rotational symmetry is excluded]

27. Coordinate Geometry
- calculate the gradient of a straight line from the coordinates of two points on it;
- calculate the gradient of parallel lines;
- interpret the equation of a straight line graph in the form of $y = mx + c$ and obtain the equation of a straight line in any appropriate form;
- generate coordinate points using equations of straight lines.

28. Trigonometry
- apply Pythagoras Theorem and the sine, cosine and tangent ratios for acute angles;
- solve trigonometrical problems in two dimensions
  [Angles of elevation & depression are excluded].

29. Indices
- express numbers in index form;
- use and apply the multiplication and division laws;
- use and apply the power law of indices;
- use zero index

    [Negative and fractional indices are excluded].

30. Matrices
- display information in the form of a matrix of any order;
- solve problems involving the calculation of the sum and product (where appropriate) of two matrices and interpret the results;
- calculate the product of a scalar quantity and a matrix;
- solve matrix equations involving addition & subtraction

    [Algebra of 2×2 matrices is excluded].

31. Statistics
- collect, classify and tabulate statistical data;
- read, interpret and draw simple inferences from tables and statistical diagrams;
- construct and use bar charts, pie charts, pictograms and simple frequency distributions;
- calculate the mean, median and mode for individual data and for ungrouped frequency distributions.

32. Probability
- calculate the probability of simple and combined events in simple cases;
- construct and use possibility diagrams.

33. Vectors in two dimensions
- describe a translation by using a vector represented by $\binom{x}{y}$, $\overrightarrow{AB}$, $\underline{a}$;
- represent vectors graphically;
- demonstrate an understanding of the different types of vectors: equal vectors, negative vectors, displacement vectors, and parallel

vectors;

- add and subtract vectors;
- multiply a vector by a scalar;
- calculate the magnitude of a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ as $\sqrt{x^2 + y^2}$.

4.4 COMPUTER STUDIES/LITERACY

Syllabus Aims

Develop an understanding of basic computer techniques and foster confidence in the use of computer applications in everyday life.

Assessment objectives are organised around the following topics:

1. Computer System
2. Impact of ICT on society
3. Networking and Internet Applications
4. Program Flowchart
5. Application Packages

1)   Computer System

Students should be able to:

- distinguish the features and applications of the four types of computers: microcomputers (desktops, laptops, notebooks, PDAs), minicomputers, mainframes, supercomputers;
- distinguish between hardware and software and give examples of each;
- identify and state the function of the main components of a general-purpose computer: central processing unit, main/internal memory (including ROM, RAM), input & output devices [keyboard, mouse, joystick, microphone, bar code reader, scanner, monitor, printer (dot matrix, inkjet, laser), graph plotter, speakers, webcam, secondary/backing storage (hard disk, floppy disk, CD Rom, DVD, pen drive and memory cards)];
- state the different units of measurement of storage capacity: bit, byte, kilobyte (**KB**), megabyte (**MB**), gigabyte (**GB**), terabyte (**TB**).

2) Impact of ICT on society

Students should be able to:

- state the meaning of 'multimedia' and give some of its uses;
- show an understanding of the following ICT applications and their effects in everyday life: e-learning, e-commerce, e-banking, tele-working, video-conferencing and tools such as webcams and digital cameras;
- state the advantages and disadvantages of the use of the ATM;
- describe the potential health hazards related to the prolonged use of ICT equipment, for example, repetitive strain injury (RSI), back problems, eye problems;
- list ways of preventing the above health hazards;
- state the meaning of 'computer virus' and its effects;
- list ways of preventing a computer virus from infecting a computer.

3) Networking and Internet Applications

Students should be able to:

- state the meaning of 'network' and list its advantages and disadvantages;
- differentiate between Local Area Network (LAN) and Wide Area Network (WAN);
- define the terms 'Internet', 'www', 'e-mail';
- list the advantages and disadvantages of e-mail over postal systems;
- state the meaning of a 'search engine' and its uses.

4) Program Flowchart

Students should be able to:

- identify and use common flowchart symbols: start and end boxes, process box, input/output box, decision box;
- draw flowcharts (involving the use of sequence and selection constructs) to solve simple problems;
- dry run flowcharts to determine their outputs.

5) Application Packages

Students should be able to:

- name and describe the uses of various computer applications such as word processing, spreadsheet and database;
- state the advantages of using a word processor, a spreadsheet and a computerised database over manual methods;
- identify the different features of different application packages (word processing, spreadsheet, database) and state their functions (for example, title bar, scroll bar and status bar).

I. Word Processing

Students should be able to:

- apply basic skills to edit and format a text such as:
  - set page orientation;
  - change margins (top, bottom and sides);
  - change the font type (e.g. Arial, Courier, Times New Roman, etc.), font size, font style (bold, italic, underline) and font colour;

- o do paragraph formatting – change line spacing, alignment, indentation;
- o apply bullets and numbering;
- o cut and paste and copy and paste;
- o do search and replace based on keywords;
- o insert graphics, pictures and textboxes in the document body;
- o add and manipulate tables in the main body of the document;
- o make use of spell checkers and the thesaurus;
- o insert page number, header and footer;
- o save a document;
- o save a document under a different name using Save As;
- o preview a document.

II. Spreadsheet

Students should be able to:

- show an understanding of the concept of cell, active cell, range, spreadsheet, workbook, formulae and functions;
- apply the following skills when using spreadsheet:
  - o set page orientation;
  - o change margins (top, bottom and sides);
  - o identify cell content: label, number and date;
  - o format cells, e.g., changing font type, style, size, alignment, row height, column width, borders and numbers;
  - o add and delete: rows, columns, sheets;
  - o rename, move and copy worksheets;
  - o use formulae and functions (Sum, Average, Min, Max);
  - o replicate formula using Copy & Paste and Drag & Drop;
  - o sort data;
  - o save a workbook.

III.   Database

Students should be able to:

- state the meaning of the terms 'database', 'file', 'record', 'field' and 'key field';
- show an understanding of the structure of a database (field name, field type and field width);
- create and modify a database structure;
- set primary key;
- create, modify and save: tables, queries, forms and reports;
- carry out simple query search;
- append and browse data;
- sort data.

4.5   SCIENCE

The aims of the National Assessment at Form III in the three Science subjects are to encourage the laying of strong foundations in Science education. Wherever possible, these aims are reflected in the assessment objectives. However, some are not because they cannot be assessed directly.

The aims are to:

1.   provide a relevant and meaningful educational experience for all students, irrespective of whether they go on to study science beyond this level or not;
2.   help students gain sufficient understanding and knowledge to develop an informed interest in scientific matters;
3.   help students develop an awareness of the value and limits of scientific methods;
4.   nurture students' appreciation of science and its application in other disciplines as well as in their everyday life;
5.   enable students to develop abilities and skills that are relevant to the study and practice of science;
6.   promote the development of healthy attitudes relevant to the learning of science, such as a concern for accuracy and precision, objective thinking, a sense of inquiry and resourcefulness;
7.   promote interest in and care for both the local and global environment.

Assessment Objectives

The assessment objectives describe the knowledge, skills and competencies that students are expected to demonstrate.

A   Knowledge with Understanding

Students should be able to demonstrate knowledge with understanding in relation to:

1. scientific phenomena, facts, laws, definitions, concepts;

2. scientific vocabulary, terminology, conventions (including symbols, quantities and units);

3. scientific instruments and apparatus, including techniques of operation and aspects of safety;

4. scientific quantities and their determination.

B   Handling Information and Solving Problems

Students should be able – using visual and written (including symbolic, diagrammatic, graphical and numerical) information – to:

1. locate, select, organise and present information from a variety of sources including everyday experience;

2. translate information from one form to another;

3. manipulate simple numerical and other data;

4. use information to identify patterns, report trends and draw inferences;

5. present reasoned explanations for phenomena, patterns and relationships;

6. make predictions and hypotheses;

7. solve simple problems.

C   Scientific Investigation

Candidates should be able to:

1. make and record observations, measurements and estimates with due regard to precision, accuracy and units;

2.   interpret, evaluate and report on observations and experimental data.

Other Competencies

Besides the learning outcomes given for each of the science subjects (Biology, Chemistry and Physics), it is also expected that students will be able to demonstrate ability in:

- developing a plan of action to solve a given problem;
- evaluating the solutions proposed to solve the problem;
- solving numerical problems;
- supporting ideas with appropriate justifications;
- looking for relevant information;
- following instructions;
- planning and designing a simple investigation.

These competencies cut across all the three Science subjects and may be assessed in all the three examination papers.

5.5.1 BIOLOGY

1. **CELLS**

Students should be able to:

(a) define cell as the basic unit of life consisting of various structures performing specific functions;

(b) identify, draw and label the cell membrane, nucleus and cytoplasm of an animal cell;

(c) identify, draw and label the cell wall, cell membrane, sap vacuole, cytoplasm, nucleus and chloroplasts of a plant cell;

(d) state that the genetic material, consisting of DNA, chromosomes and genes, are found in the nucleus;

(e) state that chromosomes are made up of genes and outline the role of the genes.

2. **DIFFUSION AND OSMOSIS**

Students should be able to:

(a) define *diffusion as* the movement of molecules from a region of their higher concentration to a region of their lower concentration, down a concentration gradient;

(b) define *osmosis* as the passage of water molecules from a region of their higher concentration to a region of their lower concentration, through a partially permeable membrane.

3. **LIFE PROCESSES**

A) **Transport in Organisms (Humans)**

Students should be able to:

(a) describe the circulatory system as a system consisting of blood, heart and blood vessels (arteries, veins and capillaries);

(b) list the components of blood as red blood cells, white blood cells, platelets and plasma;

The topic 'Food and Digestion' has been removed.

(c) state the functions of blood:

    i.   red blood cells   – haemoglobin and oxygen transport;

    ii.   white blood cells   – phagocytosis, antibody formation;

    iii.   platelets   – causing clotting;

    iv.   plasma   – transport of blood cells, ions, soluble food substances, carbon dioxide, urea, vitamins and plasma proteins etc;

(d) give a brief description of the structure of the veins, arteries and capillaries in terms of wall elasticity and thickness and the lumen size;

(e) describe the main functions of each type of blood vessel;

(f) label the different parts of the heart, namely the chambers, valves and associated blood vessels;

(d) list the factors that may lead to cardiovascular diseases, e.g. thrombosis, stroke, heart attack and hypertension;

(e) list preventive measures for cardiovascular diseases.

B) **Transport in plants**

Students should be able to:

(a) identify the xylem and the phloem in the root, stem and leaf;

(b) explain the movement of water from the soil to the leaves with reference to osmosis;

(c) define the process of transpiration;

(d) list the factors affecting the rate of transpiration;

(e) state the role of the phloem in transporting food.

C) **Breathing and Gas Exchange**

Students should be able to:

(a) identify and label the nostrils, pharynx, larynx, trachea, bronchi, bronchioles, alveoli and associated capillaries in a given diagram;

(b) state that breathing is a physical process taking place in both aquatic and terrestrial organisms;

(c) name the organs involved in breathing in a terrestrial organism (e.g. in humans) and in an aquatic organism (e.g. in fish);

(d) describe the sequence of events occurring during inspiration and expiration;

(e) state the causes and health effects of common respiratory diseases such as bronchitis, emphysema, asthma and tuberculosis.

D) Respiration

Students should be able to:

(a) state the need for energy in humans;

(b) define *respiration;*

(c) give the equation (in words) for aerobic respiration.

E) Reproduction

Students should be able to:

(a) define reproduction as a process in maintaining the continuity of life;

(b) define *sexual reproduction* as the production of a new individual by the fusion of two sex cells;

(c) identify on diagrams the parts of the male reproductive system;

(d) identify on diagrams the parts of the female reproductive system;

(e) describe the menstrual cycle, with reference to the alternation of menstruation and ovulation, the natural variation in its length and the fertile and infertile phases of the cycle;

(f) describe fertilisation and early development of the zygote simply in terms of the formation of a ball of cells that becomes implanted in the wall of the uterus;

(g) describe the symptoms, signs, effects and treatment of sexually transmitted diseases such as Syphilis and AIDS.

4. **BIODIVERSITY**

Students should be able to:

(a) explain the term biodiversity and its importance;

(b) outline the threats such as deforestation, pollution, degradation of habitat and invasive alien species towards biodiversity;

(c) give ways to reduce the impact of these threats (*including conservation)*.

5. **HEALTH AND SAFETY**

Students should be able to:

(a) define non-communicable diseases as diseases which are non-infectious or non-contagious;

(b) define communicable/infectious diseases as illnesses caused by microorganisms and transmitted from an infected person to another person or animal;

(c) describe malaria and influenza as communicable/infectious diseases, including their modes of transmission and hosts.

5.5.2 CHEMISTRY

1. CHEMICAL SUBSTANCES

Students should be able to:

(a) define the following terms:
   - o Element
   - o Mixture
   - o Compound
   - o Atom
   - o Molecule

(b) recall and use formulae and symbols;

(c) distinguish between elements, mixtures and compounds and give examples of each;

(d) recall that some metals are reactive and others are not;

(e) demonstrate an understanding of the reactivity series;

(f) arrange metals in order of reactivity (Sodium, Calcium, Magnesium, Zinc, Iron, Copper, Silver and Gold);

(g) define acids and bases;

(h) state the importance of acids and bases;

(i) recall the colours of indicators (methyl orange, phenolphthalein, litmus) in acids and alkalis.

2. THE LANGUAGE OF CHEMISTRY

Students should be able to:

(a) describe physical changes and give examples;

(b) describe chemical changes and give examples;

(c) give the symbols and valencies of common elements;

(d) work out the formulae of compounds;

(e) define the term radical and give the names and valencies of the following radicals:
hydroxide, carbonate, sulfate, ammonium and nitrate;

(f) demonstrate an understanding of chemical reactions, reactants and products;

(g) represent chemical reactions by word equations;

(h) convert word equations to balanced chemical equations;

(i) write and balance chemical equations.

3. CHEMICAL REACTIONS IN GENERAL

Students should be able to:

(a) describe the reaction of selected metals (sodium, magnesium, iron and copper)with oxygen;

(b) describe the reaction of selected metals with water and/or steam;

(c) describe the reaction of selected metals with dilute acids;

(d) describe displacement reactions using selected metals;

(e) predict the reaction of a particular metal using its position in the reactivity series;

(f) explain displacement reactions;

(g) explain the thermal decomposition of metal carbonates with respect to their position in the reactivity series;

(h) describe how hydrogen, oxygen and carbon dioxide can be prepared in the laboratory;

(i) state the conditions for the rusting of iron;

(j) discuss ways to prevent the rusting of iron (oiling, greasing, painting, galvanizing, alloying);

(k) write word equations and balanced chemical equations for the reactions mentioned above.

4. IMPORTANT CHEMICAL REACTIONS

Students should be able to:

(a) define neutralisation reaction;

(b) define 'salt' and 'acid salt';

(c) classify salts as 'soluble salts' and 'insoluble salts';

(d) describe the preparation of soluble salts by reactions of:

- o Metals with acids;
- o Metal oxides with acids;
- o Metal carbonates with acids;

(e) draw labelled diagrams to show the steps in preparing a salt with safety;

(f) state the uses of salts, for example:

- o Sodium chloride for food preservation and enhancement of taste;
- o Sodium bicarbonate in baking and indigestion treatment;
- o Ammonium sulfate in fertilisers;
- o Calcium sulfate in plaster of Paris;
- o Sodium fluoride in toothpaste;

(g) explain the importance of neutralisation reaction in cases of indigestion, insect stings, in agriculture and in the prevention of acid rain;

(h) describe the process of combustion, respiration and photosynthesis;

(i) give the importance of combustion, respiration and photosynthesis in everyday life;

(j) recall the percentage composition of air;

(k) state the importance of respiration and photosynthesis in maintaining the composition of air;

(l) identify carbon monoxide, oxides of nitrogen, sulfur dioxide, CFCs and smoke as pollutants;

(m) state the sources, effects and prevention of air pollution caused by the pollutants listed above;

(n) describe the greenhouse effect with reference to carbon dioxide (causes, effects and prevention);

(o) demonstrate an understanding of global warming, its causes, effects and ways to prevent it.

5. EXPERIMENTAL TECHNIQUES IN CHEMISTRY

Students should be able to:

(a) define the terms 'solute', 'solvent', 'solution' and 'suspension';

(b) recall what are 'mixtures';

(c) recall the different changes in state happening in: evaporation, freezing, melting, boiling and condensation;

(d) define the terms boiling point, melting point and freezing point;

(e) identify a suitable technique to separate a given mixture based on the properties of the components:

- o   Magnetic separation for mixtures containing iron;
- o   Decantation for a mixture of solid and liquid with the solid having a higher density;
- o   Filtration for a mixture of a solid and liquid forming a suspension;
- o   Crystalisation to obtain pure crystals of solute from a solution;
- o   Distillation to obtain pure solvent from a solution;
- o   Sublimation to separate mixtures of solids where one of the solids can sublime;
- o   Chromatography to separate different components dissolved in a solvent;

(f) show an appreciation of the relevance and importance of separating techniques in everyday life.

5.5.3 PHYSICS

1. MEASUREMENTS

Students should be able to:

(a) choose the appropriate apparatus to measure length, mass, volume, time and temperature in different situations;

(b) read measuring scales from devices such as metre rules, measuring tapes, vernier callipers, electronic balances, measuring cylinders, digital and analogue stop-watches and thermometers accurately;

(c) record measurements in their correct units;

(d) explain a few types of errors in measurement and their prevention (end error, zero error, parallax error);

(e) list a few precautions taken during the measurement of simple quantities;

(f) determine the volume of irregular solids using the displacement method.

2. MOTION

Students should be able to:

(a) distinguish between scalar and vector quantities;

(b) distinguish between distance and displacement;

(c) calculate distance and displacement in different contexts;

(d) distinguish between speed and velocity;

(e) calculate speed and velocity using $speed = \dfrac{distance}{time}$ and $velocity = \dfrac{displacement}{time}$;

(f) define acceleration;

(g) calculate acceleration for uniform motion using $a = \dfrac{change\ in\ velocity}{time}$;

(h) sketch speed-time graphs to illustrate and interpret motion.

3. ENERGY

Students should be able to:

(a) explain the meaning of energy as the capacity to do work;

(b) list some forms of energy (heat energy, light energy, sound energy, chemical energy, kinetic energy, potential energy and electrical energy)

(c) state the law of conservation of energy giving simple examples;

(d) define work done and use the formula $W = Fd$, where d is the distance travelled in the direction of the force, to calculate work done;

(e) define kinetic and potential energies and use the appropriate formulae,

$E_k = \frac{1}{2}mv^2$ and $E_p = mgh$, to calculate kinetic energy and potential energy respectively;

(f) define power and use the formula $Power = \frac{work\ done}{time}$, to calculate power.

4. REFLECTION AND REFRACTION

Students should be able to:

(a) show an understanding that light travels in a straight line;

(b) differentiate between luminous and non-luminous objects;

(c) state the laws of reflection of light;

(d) illustrate and/or construct simple ray diagrams for a plane mirror to show reflection of light;

(e) show an understanding of the characteristics of an image formed by a plane mirror;

(f) state the laws of refraction of light (no calculation required);

(g) illustrate refraction of light at a boundary by means of ray diagrams;

(a) describe simple applications of refraction of light (dispersion of light is not required).

5. ELECTRICITY

Students should be able to:

(a) show an understanding that:

   (i) matter consists of charges;

   (ii) an electric current is a flow of charges;

(b) distinguish between conductors and insulators;

(c) identify the symbols of basic components of a circuit (cell, battery, bulb, open-switch, closed switch, connecting wires and resistor);

(d) set up and draw simple circuits;

(e) explain what is meant by potential difference;

(f) explain resistance as opposition to current flow in a conductor;

(g) define resistance as the ratio of the potential difference across a conductor to the current flowing through it and use the formula $R = \dfrac{V}{I}$ to calculate resistance;

(h) determine effective resistance of a combination of resistors arranged in series and in parallel;

(i) calculate the current, potential difference and resistance in simple circuits.