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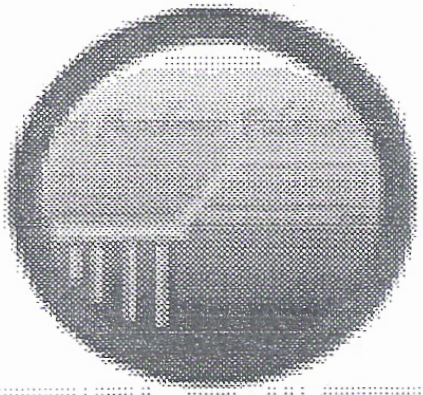

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Facts and figures constitutes life organogram of secondary school Mathematics curriculum & syllabus

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Abstract
This paper tried to look at varoius facts and figures that constitutes life organogram of secondary school Mathematics curriculum and syllabus. As a position paper, efforts were made to make prospective readers see the relevant of mathematics in real life situation, and to make convince inference on the need for everyone to see the subject as a tool that make life more meaningful rather than compulsive subject. For more innovative life sustannance along the school syllabus especially at the secondary school level topics of various types in mathematics were making reference towards with intention of differentiate their meta-cognitive to epistemological inclination, and arriving at diffusing old belief non-relevance of the subject to everyday activities in man's existence.
Key words: Facts, Figure, Secondary School, Mathematics, Organogram

Introduction

Mathematics is one of the oldest and most universal means of creating, communicating, connecting and applying structural and quantitative ideas. It allows the formulation and solution of real-world problems as well as the creation of new ideas, both as an intellectual in itself, and as a means to increase the success and generality of its application. This success could be measured by the quantum leap that occurs in the progress made in other disciplines in which Mathematics is introduced to describe and analyse the problems studied. It is, therefore essential that all should be taught not only how to use Mathematics, but also to understand it. It is an excellent vehicle for the development and improvement of a person's intellectual competence in logical reasoning, spatial visualisation, analysis and abstract thought. Students develop numeracy, reasoning, thinking skills, and problem solving skills through the learning and application of Mathematics. These are discernable not only in Science and Technology, but also in everyday living and in workplace. The development of a highly skilled scientifically and technologically based manpower requires a strong background in Mathematics; an emphasis on Mathematics education ensures an increasingly competitive workplace to meet the challenges of the 21st century. Mathematics is a subject of enjoyment and excitement, which offers students opportunities for creative work and moments of enlightenment with joy. When ideas are discovered and insights gained students are spurred to pursue Mathematics beyond the classrooms, and this makes Mathematics Education aimed at students to:

Acquire necessary Mathematical concepts and skills for everyday life, and continuous learning in Mathematics and related disciplines.
Develop the necessary process, skills for the acquisition and application of Mathematical concepts and skills.
Develop the Mathematical thinking and problem solving skills and apply these skills to formulate and solve problem.
Recognize and use connection among Mathematical ideas, and between Mathematics and other disciplines.
Develop positive attitudes towards Mathematics.
Make effective use of a variety of Mathematical tools (including information and communication technology tools) in the learning and application of Mathematics.
Produce imaginative and creative work arising from Mathematical ideas.
Develop the abilities to reason logically, to communicate Mathematically, and to learn cooperatively and independently.

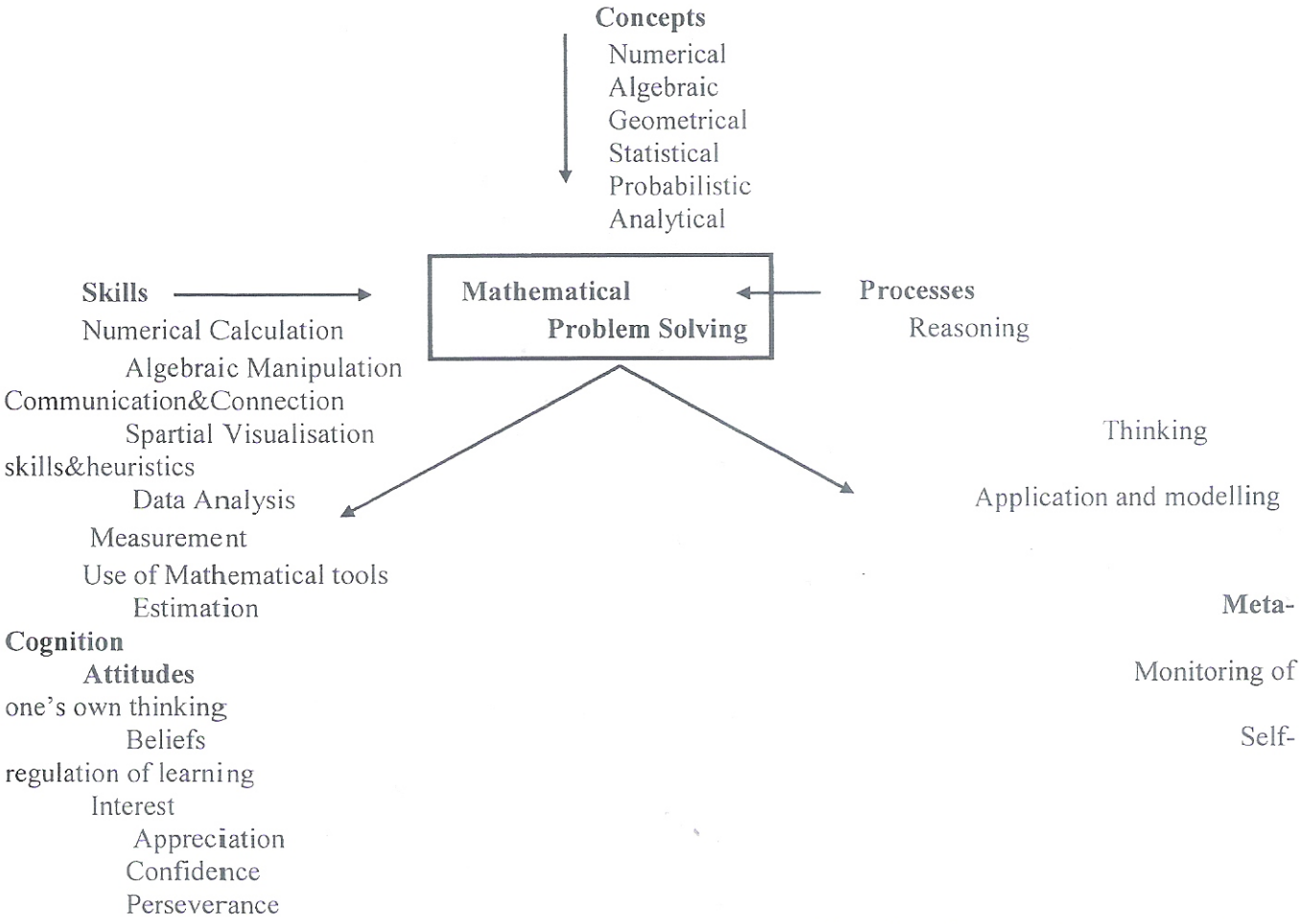
As important as the subject Mathematics is the study of quantity, structure, space and change with numerous uses of Mathematics nowadays. At a time when man is becoming more and more dependent on the use of Mathematicss for day-to-day activities of life, the role of Mathematics has become much more important. Right from getting up in early hours of the day to the ringing of an alarm, to calculating the amount of money one needs before going out for the shopping, almost every moment one does the simple calculations in mind. These, however, are done unconsciousness, as it has become a normal, and very vital part of lives. Other uses of Mathematicss include reading time on a watch, finding date on calendar, checking the speedometer of car, stopping at the petrol station, preparing a recipe in the kitchen, calculating the amount of days left in a month, using a phone, calculating which brand offers the best deal, calculating how much commission one makes on a sale and using everyday appliances such as oven to just mention a few. One could say the time by adding and subtracting, knows date as a result of astronomical calculations and dates next because of its multiples 7. One compares prices and knows what one *CAN* and *CANNOT* buys via the knowledge of Mathematics. One knows how much a discount is on a product through its percentages, estimation through manual processing unit(i.e brain), one knows if something is out of reach or if something is in ones way because of how ones brain deals with dimensions, body mass and general area. One knows the temperature via quantitative knowledge of Mathematics, feels feverish or not through quatitative reasoning in Mathematics. Blood pressure is determined by a ratio in heart palpitations. Binary code sysytem in computer is feasible through adaptability of Mathematical ideals.

Apart, one knows how fast ones car is moving as result of flexibility in Mathematics, One knows how much water to pour into ones glass as afforede by volume principle in Mathematics, One knows if something is bigger than other comparative object as display in the tenet of ratios, One knows the extent of weight lose through some arithmetic operation, weather one watches in the evening news is as a result of series of statistical projections–that are all Mathematically endowed.

One understands if one can or cannot lift *object* because of the ratio between the amount force that one body executes and the force needed. With Mathematicss, one saves money especially in an atsosphere of shopping. The most important Mathematical concepts to use while shopping are ratios and percentages. For example if a product costs $2, and another bigger product in size is $5, and is 50% off, estimate of the differences in price helps to choose the cheaper product, and in turn saves money.Mathematics also helps in the psychological development of the brain in the sense that It helps in developing the mind and assists in better organisation of ideas and thoughts.The question usually asked is how do one uses Mathematicss in life – but the question should be, "Is there any way one DOES NOT use Mathematics on a daily basis?" One sees almost everything that one knows has to do with Mathematics. If it is not directly involved in it, Mathematics helps to create it. Mathematics is used in the field of Communication, Information and Technology (ICT) with varied and wide range of different sub-units. This is classified into three broad categories as related to ICT. At first, Mathematics describes the real worldin which many areas of Mathematics originated with attempts to describe and solve real world phenomena - from measuring farms (geometry) to falling apples (calculus), to gambling (probability) to mention a few. Secondly, Mathematics is widely used in modern Physics and Engineering, and this has been largely successful in helping man to understand more about the universe around him from its largest scales (physical cosmology) to its smallest (quantum mechanics). Indeed, the success of Mathematics in this respect has been a source of puzzlement for some philosophers. The third aspect of Mathematics along the ICT describes its abstract structures. This refers to areas of pure Mathematics which deal with abstract structures, with known or unknown physical counterparts at all. However, it is difficult to give any categorical examples here, as even the most abstract structures have been be co-opted as models in some branch of Physics. Philosophically, Mathematics describes Mathematics since Mathematics is used reflexively to describe itself, and this is an area of Mathematics called *Meta-Mathematics*.

Mathematical Framework

Mathematics framework sets the direction for the teaching, learning, and assessment of Mathematics.



Mathematical problem solving is central to Mathematics learning as it involves the acquisition and application of Mathematics concepts and skills in a wide range of situation, including non-routine, open-ended and real-world problems. The development of mathematical problem solving ability is dependent on five related components namely Concepts; Skills, Processes, Attitudes and Metacognition.

Concepts

Mathematical concepts cover numerical, algebraic, geometrical, statistical, probabilistic, and analytical cocepts. One develops and explores the Mathematical ideas in depth, and observe its integrated whole, and not merely isolated pieces of knowledge. At this point, variety of learning experiences help one to develop a deep understanding of Mathematical concepts, and to make sense of various Mathematical ideas as well as their

connection and application, which affords active learning and confident in exploring and applying it to daily activities. The use of manipulatives (concrete materials), practical work, and use of technological aids constitutes integral part of the learning experience for the students.

Skills

Mathematical skills include procedural ways for numerical calculation, algebraic manipulation, spatial visualisation, data analysis, measurement use of Mathematical tools and estimation. The development of skill proficiencies in students is essential in the learning and application of Mathematics. Although students become competent in the various Mathematical skills yet over-emphasising procedural skills without understanding the underlying Mathematical principals should be avoided in order to minimize or eradicate Mathsphobia. Skill proficiencies include the ability to use technology confidently where appropriate, for exploration and problem solving. It is important also to incorporate the use of thinking skills and heuristics in the process of the development of skills proficiencies.

Processes

Mathematics processes refer to the knowledge skills which involves in the process of acquiring and applying Mathematical knowledge. This includes reasoning, communication and connection, thinking skills and heuristics, and application and modelling.

Reasoning, Communication and Connections

Mathematical reasoning refers to the ability to analyse Mathematical situations and construct logical arguments. It is a habit of mind that develops through the applications of Mathematics in different contexts. Communication refers to the ability to use Mathematical language to express Mathematical ideas and arguments precisely, concisely and logically. It helps students to develop their own understanding of Mathematics and sharpen their Mathematical thinking. Infact, it refers to the ability to see and make linkages among Mathematical ideas, between Mathematics and other subjects and between Mathematics and everyday life. This helps students make sense of what they learn in Mathematics.

Thinking Skills and Heuristics

Students use various thinking skills and heuristics to help solving Mathematical problems. Thinking skills refer to thinking process, such as classifying, comparing, sequencing analysing parts and wholes, identifying patterns and relationships, induction, deduction and spatial visualisation. Some examples of heuristics are listed below and grouped in four categories according to how they are used.

To give a representative, e.g. drew a diagram and make a list via the use equation.
To make a calculated guess, e.g. guess and check, look for pattern, make supposition.
To go through the process e.g. act it out, work backwards, before-after.
To change the problem, e.g. restate the problem, simplify the problem, solve, part of the problem.

Application and Modelling

Applications and Modelling play a vital role in the development of Mathematical understanding and competencies. It is important that one applies Mathematical problem-solving skills and reasoning skills to tackle a variety of problems, including real-world problems. Mathematical modelling is the process of formaulating and improving a Mathematical model to represent and solve real-world problem. Through Mathematical modelling, one learns how to use a variety of representation of data, select and apply appropriate Mathematical methods including tools in solving real-world problem.

Attitudes

Attitudes refer to the affective aspects of Mathematics such as beliefs about Mathematics and its usefulness, interest and enjoyment in learning, appreciation of the beauty and power of Mathematics, confidence in using Mathematics and perseverance in solving a problem. Ones' attitudes towards Mathematics is sharpened by ones learning experiences. This informs the teachers of the need to making the learning of Mathematics fun, meaningful and relevant, as these go a long way to indicate positive attitudes towards the subject. Care and attention should be given to the design of the learning activities in order to build confidence and develop appreciation for the subject.

Metacognition

Metacognition, or "thinking about thinking", refers to the awareness and the ability to control one's thinking processes, in particular the selection and use of problem-solving strategies. It includes monitoring of one's own thinking, and self-regulation of learning. The provision of metacognition experience is necessary to help one develops ones problem-solving abilities. Variety of activities could used to develop the metacognitive, awareness of students and to enrich metacognitive experience of students, and these include:

Expose students to general problem solving skills, thinking skills and heuristics and how these skills can be applied to solve problems.

Encourage students to think aloud the strategies and methods they use to solve particular problems.

Provide students with problems that require planning (before solving) and evaluation (after solving).

Encourage students to seek alternative ways of solving the same problem and to check.

The aformentioned activites and step highlighted could fall in line with the structure of overview of the secondary school mathematics syllabus below

Overview of Secondary School Mathematics Syllabus (SS1-SS3)

Seniors Secondary 1		Senior Secondary 2		Senior Secondary 3	
Topics/sub-topics	**Content**	**Topics/sub-topics**	**Content**	**Topics/sub-topics**	**Content**
A. Number and Numeration					
1. Number Base System	1. Conversion from one base to base 10. 2. Conversion of decimal fraction in one base to base 10. 3. Conversion of number from one base to another base. 4. Addition, Subtraction, Multiplication and Division of number bases.	1. Logarithm	1. Revision of logarithm numbers greater than 1. 2. Comparison of characteristics of logarithms and standard form of numbers. 3. Logarithm of numbers less than one, including Multiplication Division Powers and roots. 4. Solution of simple	1. Surds	1. Meaning of rational and irrational numbers leading to the definition of surds. 2. The rules guiding the basic operation with surds i.e. $\sqrt{a} + \sqrt{b} \neq \sqrt{(a+b)}$ $\sqrt{a} - \sqrt{b} \neq \sqrt{(a-b)}$ $\sqrt{a} \times \sqrt{b} \neq \sqrt{(a \times b)}$ $\sqrt{a} \div \sqrt{b} \neq \sqrt{(a/b)}$ 3. Conjugate of a binomial surds using the idea of difference of two squares. 4. Application to solving traingles involving trigonometric ratios of special angles 30°,

			logarithms equations.		60^{o}, 45^{o}. 5. Evaluation of expression involving surds.
2. Modular Arithmetic	1. Revision of Addition, Subtraction, Multiplication and Division of integers. 2. Concept of module arithmetic. 3. Addition, Subtraction, Multiplication operation in module arithmetic: 4. Application to daily.	2. Approximations	1. Revision of approximation. 2. Accuracy of results using logarithm table and calculators. 3. Percentage Error 4. Application of approximation to every day life.	2. Matrices and determinants	1. Definition, order and notation of a matrix. 2. Types of matrices. 3. Addition and subtraction of matrices. 4. Scalar multiplication of matrices and multiplication of matrices. 5. Transpose of a matrix. 6. Determinants of 2×2 and 3×3 metrics.
3. Indices	1. Revision of standard form. 2. Introduce indices and examples: 3. Laws of indices: i. $a^{x} \times a^{y} =$	3. Sequence and Series	1. Meaning and types of sequence 2. Example of an A.P 3. Calculation of a. First Term	3. Logarithm	1. Revisions of laws of indices. 2. Laws of logarithms.

	a^{x+y} ii. $a^x \div a^y = a^{x-y}$ iii. $(a^x)^y = a^{xy}$ etc. 4. Application of indices, simple indicial equation.		b. Common Difference c. nth term d. Arithmetic mean sum of an A.P 4. Practical problems involving real life situations. Examples of geometric progression. Calculation of: a. First term b. Common ratio(r) c. nth term d. Geometric mean e. Sum of terms of geometric progression. f. Sum of Infinity g. Practical problems involving real life situation.		

4. Logarithm	1. Deducing logarithm from indices and standard form. 2. Definition of logarithm. 3. Graph of $y = 10^x$ 4. Reading of logarithm and the antilogarithm tables. 5. Use of logarithm tables in calculation, division, powers and roots. 6. Application of logarithm in capital market and other real life problems.			4. Arithmetic of Finance	1. Simple Interest (Revision) 2. Compound Interest 3. Depreciation 4. Annuities 5. Amortization 6. Further use of logarithm table in problems involving: Bonds and debentures Shares Rales Income tax Value added tax
5. Sets	1. Definition of sets				

	2. Set notation 3. Types of sets 4. Set operation 5. Venn diagram and application up to 3 set problem.				
B. Algebraic Processes					
1. Simple Equations and Variations	1. Change of subject of formalae. 2. Subject of formula and substitution. 3. Types of variation. 4. Application of variation.	1. Quadratic Equation	1. Revision of factorization of perfect squares. 2. Making quadratic expression perfect squares by adding a constant K 3. Solution of quadratic equation by the method of completing the square. 4. Deducing the quadratic formula from	1. Application of linear and quadratic equations to capital market etc.	1. Revision of solution of simultaneous linear and quadratic equations e.g. $y + x = c$ $y + x^2 + k$ 2. Word problems on Linear equations, Simultaneous linear equation Quadratic equations One linear one quadratic. 3. Application to capital market.

			completing the square. 5. Construction of quadratic equation from sum and product of roots. 6. Word problems leading to quadratic equation.		
2. Quadratic Equation	1. Revision of factorization. 2. Obtain roots from a quadratic graph. 3. Solve word problems involving real life situations.	2. Simultaneous linear and Quadratic Equations.	1. Simultaneous linear equations (Revision) 2. Solution of linear and quadratic equation. 3. Graphical solution of linear and quadratic equation. 4. Use of the graphical methods to solve other		

			related equation. 5. Word problems leading to simultaneous equations.		
3. Logical Reasoning	1. Simple statements. 2. Meaning of simple statement.	3. Gradient of a curve	1. Straight line graphs. 2. Gradient of straight line. 3. Drawing of tangents to a curve.		
		4. Logical Reasoning (Revision)	1. Simple and compound statement. 2. Logical operation and the truth tables. 3. Conditional statements and Indirect proofs. 4. Gradient of a curve.		
		5. Linear Inequalities	1. Revise linear inequalities in one variable. 2. Solutions of		

			inequalities in two variables. 3. Range of values of combined inequalities. 4. Graphs of linear inequalities in two variables. 5. Maximum and minimum values of simultaneous linear inequalities. 6. Application of linear inequalities in real life. 7. Introduction to linear programming.		
		6. Algebraic fractions	1. Simplification of fractions. 2. Operation in algebraic fractions.		

			3. Equation involving fraction. 4. Substitution in fraction. 5. Simultaneous equation involving fractions. 6. Undefined value of a fraction.		
C. Geometry					
1. Constructions	1. Revision of: Construction of triangles with given sides. 2. Construction of lines.	1. Chord property	III. Riders based on the circle theorems include: Angles Subtended by chords in a circles; Angles subtended by hordes at the centre. Perpendicular bisectors of chords; Angles in alternate segments.	1. Trigonometry Graphs of Trigonometry Ratios	1. Graphs of: Sine: $0 \leq x \leq 360$ Cosine: $0 \leq x \leq 360$ 2. Graphical solution of simultaneous linear and trigonometric equations.

			II. proof of: Angles in the same segment of a circle are equal. Angle in a semi-circle Cyclic quadrilaterals Tangents to a circle		
2. Proofs of some basic theorems	1. Proofs of: angle sum of a triangle is 180^{o}. 2. The exterior angle of a triangle is equal to the sum of two interior opposite angles. 3. Riders	2. Trigonometry	1. Derivation of sine rule 2. Application of sine rule 3. Derivation and application of cosine rule.	2. Surface Area and volume of sphere	1. Surface area of a sphere. 2. Volume of a sphere.
3. Trigonometric Ratios	1. Basic trigonometric ratios. 2. Trigonometric	3. Bearings	1. Revision of; Trigonometric ratios. Angles of elevation and	3. Longitude and Latitude	1. Earth as a sphere. 2. Identification of: North and South poles Longitudes Latitudes

	ratio of: Angle 30° Angle 45° Angle 60° 3. Graphs of sine and cosine.		depression. 2. Definition and drawing of: 4 cardinal points A cardinal point 16 cardinal points 3. Notation for bearings. Cardinal notation N30°E, S45°W 3-digits notation e.g. 075°, 350° 4. Practical problems on bearing.		Small circles and great circles Meridian and equator Parallel of latitude Radius of parallel of latitude Radius of Earth. 3. Revision of: Arc length of a curve 4. Calculations of distance between two points on the earth. 5. Knotical rules, time variation.
4. Mensuration	1. Length of arcs of circles. 2. Perimeter of sectors and segments. 3. Areas of sectors of a circle. 4. Areas of			4. Coordinates geometry of straight lines	1. The Cartesian rectanglar coordinates. 2. Plotting the linear graph. 3. Distance between two coordinate points. 4. Midpoint of line joining two points.

	segment of a circle. 5. Relationship between the sector of a circle and the surface area of a cone. 6. Surface area and volume shapes. 7. Surface area and volume of frustum of a cone and pyramid. 8. Surface area and volume of compound shapes.				5. Practical application of coordinate geometry. 6. Gradients and intercept of a straight line. 7. Determination of equation of a straight line. 8. Angle between two intersecting straight lines. 9. Application of linear graphs to real life student
D. Statistics					
1. Data presentation	1. Revision on collection, tabulation and presentation	1. Measures of Central Tendency	1. Meaning and computations of mean, median, mode		

	of data. 2. Frequency distribution. 3. Linear graph, Bar graph and Histogram. 4. Pie chart. 5. Frequency polygon.		or ungrouped data.		
		2. Measures of dispersion	1. Definitions of: Range Variance Standard deviation 2. Calculation of: Range Variance Standard deviation 3. Practical application in capital market reports. Home Health studies Population		

			studies 4. Using graph of cumulative frequencies to estimate: Median Quartiles Percentiles Other relevant estimates. 4. Application of o give to everyday life.		
		3. Measures of central tendency for grouped data.	1. Determination of the mean, median and the mode of grouped frrequency data.		
E. Introductory Calculus					
		4. Probability	1. Definitions and examples of: Experimental outcomes. Random experiment	1. Differentiation of Algebraic fractions.	1. Meaning of differentiation/derived function. 2. Differentiation from the first principle. 3. Standard

			Sample space Sample points Event spae Probability 2. Chance Instruments: The dice The coin Park of playing cards 3. Theoretical: Probability Relative Limited values of relative frequency. 4. Equiprobable sample space. Definition Unbiasedness Simple probable on equiprobable sample space. 5. Addition and multiplication rules of probability: Mutually		derivatives of some basic functions. 4. Rules of differentiation such as: a. Sum and difference b. Product rule c. Quotient rule 5. Application to real life situation such as maxima and minima, velocity, acceleration and rate of change.

			Exclusive events and addition ("or") rule. Complementary events and probability rule. Independent events and multiplication ("and") rules. 6. Solving simple problems on mutually exclusive, Independent and Complementary events 7. Expt with or without replacement 8. Practical application of probability.		
				2. Integration of simple Algebraic	1. Integration and evaluation of definite simple Algebraic

				functions.	functions. 2. Application of integration in calculating area under the curve. 3. Use of Simpson's rule to find area under the curve.

Going by all aformentined analyses as well as the Mathematics curriculum at the secondary school level to pin-point the facts and figures that constitutes life organogram of secondary school Mathematics curriculum & syllabus, one is not left with iota of doubt to say that mathematics itself constitute life which everybody should embrace without compulsion.

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