| **วิชา(Subject) ....Mathematics (ICSE).......**  **ช่วงชั้น (Level) … 3 (M.1-4)…..**  **20 weeks (2 periods/week): Teaching 36 periods and Examination 4 periods** | | | | | | | |
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| **ชั้นมัธยมศึกษาปีที่ 1 (Secondary 1)** | | **ชั้นมัธยมศึกษาปีที่ 2 (Secondary 2)** | | **ชั้นมัธยมศึกษาปีที่ 3 (Secondary 3)** | | **ชั้นมัธยมศึกษาปีที่ 4 (Secondary 4)** | |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **ภาคเรียนที่ (Semester) 1** | **ภาคเรียนที่ (Semester) 2** | **ภาคเรียนที่ (Semester) 1** | **ภาคเรียนที่ (Semester) 2** | **ภาคเรียนที่ (Semester) 1** | **ภาคเรียนที่ (Semester) 2** | **ภาคเรียนที่ (Semester) 1** | **ภาคเรียนที่ (Semester) 2** |
| 1. **Numbers and operations**    1. **Number system(6 periods)**       1. Natural numbers       2. Integers and the number line       3. Opposite and Absolute value of an integers       4. Compare and arrange integers       5. Basic properties       6. Operation with integers       7. Application: Solving problems involving integers    2. **Factors and multiples(6 periods)**       1. Prime and composite numbers       2. Factors and common factors       3. Highest common factor       4. Multiples and common multiples       5. Lowest common multiples       6. Application: Solving problems involving factors and multiples    3. **Fraction, decimal and percentages(6 periods)**       1. Relationship between fractions, decimals and percentages       2. Rewrite fraction and decimal into percentages       3. Change percentages into fraction and decimal       4. Percent a number       5. Expressing one quantity as percentage of another       6. Application: Solving problems involving percentages    4. **Ratios and proportion(6periods)**       1. Ratio in its simplest form       2. Equivalent ratios       3. Increase and decrease of a number in a given ratio       4. Continued ratios       5. Proportion       6. Solving proportion using proportional relationships to solve multistep ratio.       7. Application: Solving problems involving ratios and proportion   **1.5.Powers: Exponents or Indices (7 periods)**   * + 1. Squares, Square roots, Cubes and cube roots     2. Bases and powers     3. Properties of exponents     4. Simplifying exponential expression using properties of exponents     5. Scientific notation(Exponential notation)  1. **Triangles (5 periods)**    * 1. Types and properties of triangle      2. Sum of the angles in a triangle      3. Exterior angles of a triangle      4. Solving unknown angle in a triangle using their properties      5. Perimeter and area of a triangle   **\*\*(Total 36 periods )\*\*** | 1. **Algebra**    1. **Linear Expressions(12periods)**       1. Rewrite statements into algebraic forms.       2. Evaluating algebraic expressions       3. Terms, coefficients and variables       4. Like and unlike terms       5. Addition and subtraction of algebraic expressions       6. Multiplication of algebraic expressions       7. Division of algebraic expressions    2. **Linear Equations(8 periods)**       1. Solve simple linear equations       2. Solve linear equations using algebraic techniques and verify solution by substitution       3. Application: Solving problems involving simple linear Equations 2. **Geometry and Measurement**     1. **Coordinates(4 periods)**       1. Scales of the coordinate axes       2. Distance between two points       3. Midpoint    2. **Quadrilaterals(6 periods)**       1. Types and properties of quadrilaterals       2. Sum of the angles in a quadrilateral       3. Solving unknown angles in a quadrilateral using their properties       4. Perimeter and area of square, rectangle, parallelogram and trapezium    3. **Basic Construction(6 periods)**       1. Points, lines and planes (Triangles and Quadrilaterals)       2. Parallel line and angles (Transversal)       3. Bisecting angles and copying angles using set squares   **\*\*(Total 36 periods )\*\*** | 1. **Numbers and operations**    1. **Ratio, proportion and variations (5 periods)**       1. Ratio of two quantities       2. Proportion       3. Ratio of three quantities       4. Rate       5. Speed       6. Average speed       7. Acceleration    2. **Percentages (4 periods)**       1. Relationship between percentages, fractions and decimals       2. Application: Computations and problems involving percentages    3. **Real numbers(9 periods)**       1. Rational and irrational numbers       2. Properties of irrational numbers       3. Surds (Laws of surds and classification of surds)       4. Simplifying surds       5. Simplifying radical and irrational numbers       6. Operation of radical expressions       7. Addition and subtraction of surds       8. Multiplication and division of surds       9. Rationalize the denominator       10. Simplifying radical expressions       11. Operation of radical expressions    4. **Squares, Square root, cubes and cube roots (4 periods)**       1. Square of numbers       2. Square roots of positive numbers       3. Cube of numbers       4. Cube root of numbers. 2. **Algebra**    1. **Algebraic expressions (4 periods)**       1. Expansion of expression using the distributive law       2. Factorization of algebraic expressions (Difference of two squares, 2 grouping)    2. **Algebraic fractions (4 periods)**       1. LCM and HCF of algebraic expressions       2. Addition and subtraction of algebraic fractions       3. Multiplication and division of algebraic fractions       4. Solving equations involving algebraic fractions       5. Application: Solving problems involving algebraic fractions   **2.3. Linear and quadratic equations (4 periods)**   * + 1. Solving linear equations     2. Applications: Solving problems involving linear equations   **\*\*(Total 36 periods )\*\*** | 1. **Numbers and operations (8periods)**    1. **Indices/Exponents**       1. Multiplication and division of numbers in index notation       2. Raising numbers and algebraic terms in index notation to a power       3. Negative integral indices       4. Fractional indices       5. Fractional Exponents       6. Computation involving laws of indices 2. **Geometry and Mensuration**    1. **Angle properties of polygon (4 periods)**       1. Regular and irregular polygons       2. Sum of interior angles of polygon       3. Sum of exterior angles of a convex polygon    2. **Triangles(4 periods)**       1. Congruent and similar triangles    3. **Solids-Volume and surface area(4 periods)**       1. Area and perimeter of plane figures       2. Volume and surface area of solid figures using formulae    4. **Congruence of triangles**(4 periods)       1. Congruency of triangles using triangle       2. congruence postulate       3. Similar triangles 3. **Statistics and Probability**     1. **Profit, loss and discount (6 periods)**       1. Calculate selling price (S.P.) and cost price (C.P.)       2. Discount-using the formulae (Selling price = Marked price - Discount)    2. **Simple interest(6 periods)**       1. What is a simple interest?       2. Calculation of simple interest   **\*\*(Total 36 periods )\*\*** | 1. **Algebra**    1. **Factorization ( 10 periods )**       1. Perfect square       2. Difference of two squares       3. Completing the square       4. Sum and difference of cubes       5. Remainder and factor theorem    2. **Simultaneous equations ( 6 periods )**       1. Standard from       2. Second or higher degree       3. Homogeneous equations 2. **Quadratic equations ( 6 periods )**    1. Nature of roots    2. Solving quadratic equations (factorization, formula)    3. Application: Solving problems involving quadratic equations 3. **Geometry and Menstruation ( 8 periods )**    1. **Surface area and volume**       1. Surface area of prisms, pyramids, cylinders, cones and spheres       2. Volume of cuboids, Right circular cylinder, right prisms, right pyramids, right circular cones, spheres, composite solids   4 Algebraic Fractions **( 6 periods )**  4.1 Multiplication and Division of Algebraic Fractions  4.2 Addition and Subtraction of Algebraic Fractions  4.3 Solving Equation of Algebraic Fractions  4.4 Word problems of Algebraic Fractions  **\*\*(Total 36 periods )\*\*** | **5.Circles ( 8 periods )**  5.1 Parts and properties  of circle  5.2 Circumference of a  circle   * 1. Area of a circle   2. Area and   circumference of a circle   * 1. Area of sector of a   circle   * 1. Angles in circle   5.7 Cyclic quadrilaterals   1. **Trigonometry ( 8periods )**    1. Pythagoras’ theorem (Relationship between the sides of a right-angled triangle, 2 Converse of Pythagoras’ theorem)    2. Trigonometric ratios and its reciprocal    3. Trigonometric ratios for special angles    4. Simplification of trigonometric equations involving common angles or special angles    5. Trigonometric ratios of complementary angles    6. Angle of elevation and depression   **7.Palabolas ( 8 periods )**  7.1 Quadratic graph in the form y = ax2  7.2 Quadratic graph in the form  y = ax2+ k  7.3 Quadratic graph in the form  y = (x-h)2  7.4 Quadratic graph in the form  y = (x-h)2+ k  7.5 Quadratic graph in the form  y = ax2+bx+c  **8. Coordinates Geometry (12 periods )**  8.1 Coordinate plane  8.2 Midpoint of a line segment  8.3 Distance between two points  8.4 Gradient  8.5 Vertices of a parallelogram  8.6 Collinear points  8.7 Area of triangle and quadrilateral with given vertices  8.8 Set of points and the equation of a straight line  8.9 Equation of a straight  8.10 Line y=mx+c (Gradient from)and: Equation of a  Straight line the form of: Parallel line,Perpendicular line and Intersection of two line  **\*\*(Total 36 periods )\*\*** | 1. **Matrices (6 periods)**   1.1. Basic concepts: Order of matrices, row and column matrices, type of matrices, equality of matrices**.(1 period)**  1.2 Operations with matrices: Transpose of matrices, matrix addition and scalar multiplication, matrix multiplication **(3 periods)**  1.3 Inverse of matrices and Applications **(2 period)**   1. **Sets(4 periods)**    1. Representation and type of sets**(2 period)**    2. Operations of sets   **(2 period)**   1. **Linear inequalities (4 periods)**     1. Representation of solution in set notation**(2 period)**    2. Representation of solution in on number line**(2 period)** 2. **Co-ordinate Geometry (6 periods)**    1. Distance between two points **(2 period)**    2. Section formulae: Midpoint, internal section, and centroid **(2 periods)**    3. Equation of a line **(2 periods)** 3. **Relations and functions (6 periods)**    1. Definitions and notations **(1 period)**    2. Inverse of functions **(1 periods)**    3. Exponential and logarithmic functions **(1 period)**       1. Laws of exponents and logarithms **(1 period)**       2. Laws of exponents and logarithms **(1 period)**       3. Applications of exponents and logarithms **(1 period)** 4. **Commercial arithmetic (10 periods)**    1. Compound interest without using formula   **(2 periods)**   * 1. Compound interest by using the formula   *A* =  **(2 periods)**   * 1. Sales tax and value added tax**(2 periods)**   2. Banking**(2 periods)**   3. Shares and dividend**(2 periods)**   **\*\*(Total 36 periods )\*\*** | 1. **Sequences and series**    1. Arithmetic and geometric progression**(2 periods)**   7.2 Arithmetic and geometric series**(2 periods)**   1. **Probability**    1. Random experiments and sample spaces**(2 periods)**    2. Counting(2 periods)       1. Tree diagrams       2. Fundamental principle rule of counting.    3. Events and types of event(2 periods)    4. Probability of an event**(2 periods)**    5. Mutually exclusive events(2 periods)    6. Addition rule of probability   **(4 periods)**   1. **Statistics**     1. Data and statistics **(1 period)**    2. Frequency distribution table of ungroupeddata and grouped data**(3 periods)**    3. Graphical representation of data (Histogram , ogives, tem-and-leaf diagram (2 periods)    4. Measure of central tendency: Mode, mean and median for both grouped data and ungrouped data(4 periods)    5. Partition values: Quartiles, and percentiles for both grouped data and ungrouped data(4 periods)    6. Dispersions: Range, standard deviation (2 period)    7. Normal distribution (2 periods)   **\*\*(Total 36 periods )\*\*** |