MATERIAL TAUGHT IN MATHEMATICS

FORM 2 TO FORM 3

2010-2011

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1. Algebraic Manipulation

- Expand and simplify the product of two linear expressions.

  e.g. Simplify $(2x + 3)(3x - 1)$, $(2x - y)(3x + y)$

- Manipulate algebraic fractions where the numerator and / or the denominator can be numeric, linear

  e.g. express as a single fraction:

  $$\frac{x+1}{3}+\frac{x-3}{4},\ \frac{3(4x-1)}{2}-\frac{2(5x+3)}{3},\ \frac{3}{1-x}+\frac{2}{1+x}$$

- Factorize by taking out single common factor, difference of two squares, grouping (simple).
- Simplifying algebraic fractions using factorization.

  e.g. Simplify: $\frac{2x^2-8}{x+1}, \frac{\boldsymbol{xy}-2\boldsymbol{x}-3\boldsymbol{y}+6}{\boldsymbol{x}^2-9}\div\frac{\boldsymbol{y}^2-4}{10\boldsymbol{x}+30}$

2. Linear Equations

- Solving simple linear equations with the unknown on both sides, with brackets, with negative or fractional coefficients, with combinations of these.
- Set up and solve linear equations to solve verbal problems.
- Solving equations with squares or square roots.
- Solving equations using factorization by common factor or involving a difference of two squares.

  e.g. Solve $a^2-4a=0$, $9\boldsymbol{x}^2-36=0$, $3(4-\boldsymbol{x})-\boldsymbol{x}(\boldsymbol{x}-4)=0$

3. Changing the Subject of given Expressions and Formulae

- Understand the process of manipulating formulae to change the subject where the subject may appear twice or a power of the subject occurs.

  e.g. $v^2=u^2+2gs$ (s), $m=\frac{1+at}{1-at}$ (t), $V=\frac{4}{3}\pi r^3$ (r), $T=2\pi\sqrt{\frac{l}{g}}$ (l)

4. Standard Form

- Express numbers in the form a x 10^n, where n is an integer and $1 \leq a < 10$.
- Write numbers expressed in significant figures as ordinary numbers.
- Solve problems involving standard form.
- Addition, Subtraction, Multiplication and Division of standard form numbers.

5. Electronic Calculators

- Use a calculator effectively to evaluate powers and roots
- Interpreting a calculator display
- Use a scientific electronic calculator to determine numerical results ($3.3^2 + \sqrt{4.3}$ correct to 2 significant figures)

6. Trigonometry and Pythagoras' Theorem

- Rounding Numbers: Decimal Places, Significant Figures, Nearest Whole Number
- Using Pythagoras' Theorem to find any of the missing sides of a right angle triangle.
- Identify the various sides of a right-angled triangle as hypotenuse, opposite and adjacent.
- Understand and use sine, cosine and tangent of acute angles to determine lengths and angles of any right-angled triangle.
- Apply trigonometric methods to solve problems in two dimensions.
- Solve problems including bearings.
- Understand and use angles of elevation and depression.
- Understand angle measure including three-figure bearings.

7. Symmetry

- Draw the lines of symmetry of a given shape
- Identify any lines of symmetry and the order of rotational symmetry of a given two-dimensional figure.

  e.g. Name a quadrilateral with no lines of symmetry and order of rotational symmetry 2.

8. Coordinates

- Understand use conversions for rectangular cartesian coordinates
- Plot points (x, y) in any of the four quadrants of the graph
- Locate points with given coordinates
- Determine the coordinates of points identified by geometrical information

9. Graphs (Straight lines)

- Recognise that equations of the form $x = a$ and $y = b$ corresponding to straight line graphs parallel to the y-axis and to the x-axis respectively.
- Complete tables of values and draw graphs of the form $y = mx + c$, where m and c are given and m may be an integer or a fraction.
- Draw straight line graphs with equations in which y is given implicitly in terms of x (e.g. $x + y = 7$)
- Recognize that equations of the form $y = mx + c$ are straight line graphs with gradient m and intercept $(0, c)$ on the y-axis.
- Calculate the gradient of a straight line given the coordinates of two points on it. $\boldsymbol{m} = \frac{\boldsymbol{y}_2 - \boldsymbol{y}_1}{\boldsymbol{x}_2 - \boldsymbol{x}_1}$
- Find the equation of a straight line parallel to a given line.
- Find the equation of a straight line given two points on the line.
- Find the x and the y intercept of a line and use them to sketch the line.

10. Simultaneous Equations

- Calculate the exact solution of two simple simultaneous equations in two unknowns by the elimination method and by the substitution method.

  e.g. Solve the following pair of simultaneous equations

  $y = 2x$ $\qquad$ $x + y = 14$ $\qquad$ $3x - 4y = 7$

  $x + y = 12$ $\qquad$ $x - y = 2$ $\qquad$ $2x - y = 8$
- Interpret the equations as lines and the common solution as the point of intersection (graphically).
- Construct simultaneous equations to solve verbal problems.

11. Set Language and Notation

- Understand sets defined in algebraic terms.
- Understand and use subsets.
  (if A is a subset of B, then $A \subset B$)
- Understand and use the complement of a set.
- Understand the definition of a set of numbers.
- Use the set notation $\cup$, $\cap$, $\in$ and $\notin$
- Understand the concept of the Universal Set, the Null Set and the Empty set and the symbols for these sets.
- Use Venn diagrams to represent sets and the number of elements in sets.
- Define sets of numbers by describing.
  (e.g. $\{$ first four odd numbers $\}$, $\{x : x$ is a factor of $12\}$ or by listing $\{1,3,5,7\}$)
- Use the notation $n(A)$ for the number of elements in the set (use the notation A')
- Use sets in practical situations.
- Inequality notation $\{x : 2 \leq x \leq 5\}$ may be used.

12. Indices – Powers

- Understand that algebraic expressions follow the generalised rules of arithmetic.
- Use index notation for positive and negative integer powers.
- Use index laws in simple cases.
  e.g. $a^3 = a \times a \times a$, $x^3 \times x^2 = x^5$, $\frac{x^7}{x^3} = x^4$, $(x^2)^3 = x^6$, $\frac{x^2}{x^5} = \frac{1}{x^3}$
- Order of operations including powers (BEDMAS).
- Simplify expressions using the laws of indices.
- Square and cube numbers.
- Squares and square roots. Cubes and cube roots.

13. Inequalities

- Understand and use the symbols >, <, $\leq$ and $\geq$.
- Understand and use the conversion for open and closed intervals on a number line.
- Solve simple linear inequalities in one variable including double-ended inequalities and represent the solution set on a number line.
- Find the integer, prime, even and odd solutions of simple linear inequalities.

14. Inequalities and Regions

- Represent simple linear inequalities on rectangular cartesian graphs.
- Identify regions in rectangular cartesian graphs by simple linear inequalities.

  e.g. shade the region described by the inequalities:

  $x \geq 0,\ y > 1,\ x + y < 5$
- Harder examples of regions defined by linear inequalities.

  e.g. shade the region defined by the inequalities:

  $x \leq 4,\ y < 2x + 1,\ 5x + 2y < 20$