DETAILED CONTENT

FORM I

Unit 1 Numbers and counting

1.1 Revision on arithmetic.

1.2 Primitive man's concept of numbers and the different systems of numerals used to represent counting numbers in the early civilizations.

1.3 The advantages of the Hindu-Arabic numerals over other systems and the creation of zero as a place holder.

1.4 Conversion of denary numbers into binary numbers and vice versa; addition and subtraction of binary numbers.

Unit 2 Formulae, open sentences and simple equations

2.1 The use of letters to represent numbers.

2.2 Formulae and substitution.

2.3 Open sentences.

2.4 Simple linear equations in one unknown, their construction and solution in practical problems.

Unit 3 Use of protractor and compasses and basic properties of angles and simple shapes

3.1 Use of the protractor and ruler to measure and construct angles in any position and use of the compasses to mark off length.

3.2 Acute and obtuse angles and the two scales of the protractor.

3.3 Illustration of angle sum of a triangle.

3.4 Congruence and similarity investigated through the construction of triangles.

Unit 4 Percentages

4.1 Meaning of percentage.

4.2 Practice in converting fractions to percentages and vice versa; decimalization of the fraction can be considered as an intermediary step.

4.3 Percentages in everyday problems: interest rate, discount, profit and loss, etc.

Unit 5 Simple areas and volumes

5.1 Comparison of areas, measurement of area and unit area.

5.2 Areas of simple polygons, including regular and irregular shapes; use of pin board for irregular polygons.

5.3 Unit volume.

5.4 Volumes of cuboids and solids with uniform cross-sections.

Unit 6 Approximation and measurement

6.1 Approximation; measurement.

6.2 Choice of appropriate unit for measurement.

Unit 7 Negative numbers and the extended number line

7.1 Introduction of negative numbers as a means to solve some linear equations.

7.2 The complete number line and calculation with the help of the number line.

7.3 Simple idea of ordering.

Unit 8 Introduction to coordinates

8.1 Locating a point in a plane by means of an ordered pair in a coordinate system.

8.2 Use of rectangular and polar coordinates.

8.3 Calculation of distance and area.

Unit 9 Algebraic expressions

9.1 Practice in translating word phrases into mathematical phrases.

9.2 The making and the use of linear algebraic expressions.

9.3 Linear equation in two unknowns and its graph.

Unit 10 Angle and line segment bisection

10.1 Angle bisection using compasses and ruler.

10.2 Construction of 90°, 60°, 45° and 30° using compasses and ruler.

10.3 The construction of the perpendicular bisector of a given line segment using compasses and ruler.

Unit 11 Angles and parallel lines

11.1 Adjacent angles on a straight line and angles at a point.

11.2 Vertically opposite angles.

11.3 Parallel lines and transversal.

11.4 The use of angles associated with parallel lines in calculations.

Unit 12 More about negative numbers

12.1 Operation with brackets: insertion and removal of brackets.

12.2 Intuitive approach to the multiplication and division of two negative numbers.

12.3 Justification of the above.

Unit 13 Statistical data

13.1 Frequency and collection of data.

13.2 Construction of bar charts, pictograms and pie charts from given data.

13.3 Construction and interpretation of histograms.

Unit 14 More about algebraic expressions

14.1 Simple idea of exponents.

14.2 Terms in an algebraic expression.

14.3 Coefficients and constant terms.

14.4 Addition, subtraction, multiplication of simple algebraic expressions.

FORM II

Unit 1 Rate, ratio and proportion

1.1 Meaning of rate, ratio and proportion.

1.2 The notion of a two-term ratio $a : b$ or $\frac{a}{b}$, where $b \neq 0$.

1.3 Examples from science and mensuration including similar triangles. Problems on direct and simple inverse proportion. Graphs in two variables.

Unit 2 Angles of triangles and polygons

2.1 The angle sum of the interior angles of a triangle is 180°。

2.2 The exterior angle of a triangle is equal to the sum of the two opposite interior angles.

2.3 利用小寫字母The use of small letters *x*, *y*, *z* etc. to denote angles in a diagram.

2.4 Polygon: interior and exterior angles of a polygon. Calculation of angles in a polygon by using the formulae: $\sum i = (2n-4)$ rt. $\angle$s , $\sum e = 360°$ 。

Unit 3 Approximation

3.1 Idea of rounding off.

3.2 Significant figures.

Unit 4 Pythagoras' Theorem: use of square root tables

4.1 Illustration of the veracity of Pythagoras' Theorem.

4.2 Use of square root tables.

4.3 Application of Pythagoras' Theorem.

Unit 5 Polynomials

5.1 From monomials to polynomials-viewed as number-producing machines.

5.2 Simple operations with polynomials.

5.3 Factorization of polynomials by grouping terms.

5.4 Simplification of algebraic fractions.

Unit 6 The sine, cosine and tangent ratios

6.1 Introducing the sine, cosine and tangent ratios for angles in $0° < \theta < 90°$.

6.2 Use of trigonometric tables.

6.3 Solution of practical problems reducible to right-angled triangles.

Unit 7 Trigonometric relations

7.1 Introducing the relations $\sin(90° - \theta) = \cos\theta$, $\cos(90° - \theta) = \sin\theta$, $\tan(90° - \theta) = \frac{1}{\tan\theta}$, $\tan\theta = \frac{\sin\theta}{\cos\theta}$, $\sin^2\theta + \cos^2\theta = 1$.

7.2 Trigonometric ratios of special angles: 30°, 45°, 60°.

Unit 8 Use of formulae

8.1 Change of subject (radicals may be used).

8.2 Application of formulae: the method of substitution.

Unit 9 More about coordinates

9.1 Distance.

9.2 Gradient.

Unit 10 Circle, rectangular block, prism and cylinder

10.1 Circumference of a circle. The approximate value of π. Length of an arc.

10.2 Area of a circle and area of a sector.

10.3 Surface areas and volumes of rectangular block, prism and cylinder.

Unit 11 Using percentages

11.1 Simple interest using direct proportion and the simple interest formula. Inverse problems on simple interest.

11.2 Compound interest as repeated simple interest.

11.3 Knowledge of fixed deposit account.

11.4 Growth and depreciation.

Unit 12 Simultaneous linear equations in two unknowns

12.1 Simple algebraic methods: substitution and elimination.

12.2 Graphical method.

Unit 13 Equations and identities

13.1 Meaning of an identity and the making of simple identities.

13.2 The difference of two squares.

13.3 Expansion of $(x \pm y)^2$.

Unit 14 Frequency distribution and its graphical representations

14.1 Frequency distribution, histograms, frequency polygons and curves.

14.2 Cumulative frequency polygons and curves.

14.3 Interpretation of the above graphs.

FORMS III

Unit 1 More about percentages

1.1 Use of percentages in solving problems such as the calculation of rates and direct taxes.

1.2 Use of percentages in solving problems such as the calculation of errors, percentage increase and decrease.

Unit 2 Laws of indices

2.1 Indices and properties of indices.

2.2 Calculation involving rational indices.

Unit 3 Common logarithms

3.1 Powers of 10 leading to common logarithms.

3.2 Practice in using common logarithms.

Unit 4 More about congruence, similarity and parallels

4.1 Congruence.

4.2 Similarity.

4.3 Parallels.

4.4 Mid-point theorem and intercept theorem.

Unit 5 Coordinate geometry of straight lines

5.1 Section formula (internal division):

$$x = \frac{sx_1 + rx_2}{r+s} \qquad y = \frac{sy_1 + ry_2}{r+s}$$

5.2 Different standard forms of straight lines:

$ax + by + c = 0$, $y = mx + c$,

$\frac{x}{a} + \frac{y}{b} = 1$, $y - y_1 = m(x - x_1)$,

$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$ 。

5.3 Application: determination of laws.

Unit 6 Mensuration

6.1 Volumes and surface areas of pyramids.

6.2 Volumes and surface areas of right circular cones.

6.3 Volumes and surface areas of spheres with formulae given.

6.4 Ratio of volumes of similar solids.

Unit 7 Inequalities in algebra

7.1 Simple inequality and its solution on the number line.

7.2 Graphical solution of two linear inequalities in one variable.

Unit 8 Quadratic equations

8.1 Factorization of quadratic polynomials.

8.2 Solution by factor method.

8.3 Solution by graphical method.

Unit 9 Simple idea of probability

9.1 Meaning of probability.

9.2 Experimental probability and theoretical probability.

單元10 Using trigonometry

10.1 The use of gradients, angle of depression and angle of elevation.

10.2 Bearings on a plane.

10.3 Two dimensional problems soluble by analysis into right-angled triangles.

Unit 11 Measures of central tendency

11.1 Mean, median and mode of discrete data.

11.2 Mean, median and modal class of grouped data.

Unit 12 Uses and abuses of statistics

12.1 Statistics in everyday life.

12.2 Misrepresentation of data.

12.3 Telling lies with averages.

FORMS IV AND V

Unit 1 More about quadratic equations; surds

1.1 Completing the square.

1.2 Formula.

1.3 Simple problems using quadratic equations.

1.4 Simultaneous equations: one linear and one quadratic.

1.5 Rationalization of surds.

Unit 2 Basic properties of a circle

2.1 Chords and arcs of a circle.

2.2 Angles in a circle.

2.3 Properties of cyclic quadrilateral and the tests for concyclic points.

2.4 Tangent to a circle at a point and angles in the alternate segments.

2.5 A circle passing through three non-linear points.

Unit 3 Functions

3.1 Number systems: integers, rational numbers, irrational numbers and real numbers.

3.2 Concept of a function.

3.3 Notation for a function: $f(x)$ and $y = f(x)$.

Unit 4 More about polynomials

4.1 Manipulation of polynomials.
4.2 Remainder theorem and factor theorem.
4.3 Factorization by factor theorem.
4.4 H.C.F. and L.C.M.
4.5 Manipulation of simple fractions.

Unit 5 Proportion and variation

5.1 More on rate, ratio and proportion.
5.2 Algebraic manipulation of ratio and proportion.
5.3 Direct and inverse variation.
5.4 Joint and partial variation.

Unit 6 More about trigonometry

6.1 Measurement of angles in radians.
6.2 Arc length and area of sector.
6.3 The functions sine, cosine, tangent and their graphs in the interval 0 to 2π, i.e. 0° to 360°.
6.4 Easy trigonometric equations (solutions in the interval 0 to 2π, i.e. 0° to 360°).
6.5 Area of triangle as $\frac{1}{2}bc\sin A$.
6.6 The sine and cosine formulae of a triangle.

Unit 7 Arithmetic and geometric progressions

7.1 Sequence and series.
7.2 A.P. and G.P.
7.3 Summation notation.
7.4 Summation of A.P. and G.P.

Unit 8 Probability and statistics

8.1 Addition and multiplication laws.
8.2 Weighted averages.
8.3 Measures of dispersion: range, mean deviation, variance and standard deviation (grouped and ungrouped data).
8.4 Method of computing standard deviation (grouped and ungrouped data).
8.5 Application of standard deviation.

Unit 9 Inequalities

9.1 The number line and the solution of linear inequalities in one variable.
9.2 Quadratic inequalities in one variable.
9.3 Solution of linear inequalities in two variables.
9.4 Application to linear programming.

Unit 10 Application of trigonometry

10.1 True bearings.
10.2 Easy problems in two and three dimensions.

Unit 11 Coordinate treatment of straight lines and circles

11.1 Establishing the concept of locus.
11.2 Construction of loci within a plane.
11.3 Straight line, gradient, parallel and perpendicular lines.
11.4 Equation of a circle with centre at the origin.
11.5 Equation of a circle in general position.
11.6 Intersection of a straight line and a circle.

Unit 12 Approximate solution of simple equations

12.1 Graphical solution of equations.
12.2 Method of bisection.