

Topic	Sub Topic	Objectives	Content
ALGEBRA	POLYNOMIALS	i. find the subject of the formula of a given equation. ii. apply factor and remainder theorem to factorize a given expression. iii. multiply and divide polynomials of degree not more than 3. iv. factorize by regrouping difference of two squares, perfect squares and cubic expressions, etc. v. solve simultaneous equations $\begin{cases} \text{one linear,} \\ \text{one quadratic.} \end{cases}$ vi. interpret graphs of polynomials including applications to maximum and minimum values.	(a) Change of subject of formula. (b) Factor and remainder theorems. (c) Factorization of polynomials of degree not exceeding 3. (d) Multiplication and division of polynomials. (e) Roots of polynomials not exceeding degree 3. (f) Simultaneous equations including one linear one quadratic. (g) Graphs of polynomials of degree not greater than 3.
	INEQUALITIES	i. solve problems on linear and quadratic inequalities. ii. interpret graphs of inequalities	Analytical and graphical solutions of linear inequalities.

			(b) Quadratic inequalities with integral roots only.
	MATRICES AND DETERMINANTS	i. perform basic operations ($\times, +, -, \div$) on matrices. ii. calculate determinants. iii. compute inverses of 2×2 matrices.	(a) Algebra of matrices not exceeding 3×3 . (b) Determinants of matrices not exceeding 3×3 . (c) Inverses of 2×2 matrices [excluding quadratic and higher degree equations].
	PROGRESSION	i. determine the n th term of a progression. ii. compute the sum of A. P. and G.P. iii. sum to infinity of a given G.P.	(a) n th term of a progression. (b) Sum of A. P. and G. P.
	VARIATION	i. solve problems involving direct, inverse, joint and partial variations. ii. Solve problems on percentage increase and decrease in variation.	(a) Direct. (b) Inverse. (c) Joint. (d) Partial.

			(e) Percentage increase and decrease.
	BINARY OPERATIONS	<p>i. solve problems involving closure, commutativity, associativity and distributivity.</p> <p>ii. solve problems involving identity and inverse elements.</p>	<p>(a) Properties of closure, commutativity, associativity and distributivity.</p> <p>(b) Identity and inverse elements (simple cases only).</p>
CALCULUS	DIFFERENTIATION	<p>i. find the limit of a function.</p> <p>ii. differentiate explicit algebraic and simple trigonometrical functions.</p>	<p>(a) Limit of a function.</p> <p>(b) Differentiation of explicit algebraic and simple trigonometrical functions \Rightarrow sine, cosine and tangent.</p>
	INTEGRATION	<p>i. solve problems of integration involving algebraic and simple trigonometrical functions.</p> <p>ii. calculate area under the curve (simple cases only).</p>	<p>(a) Integration of explicit algebraic and simple trigonometrical functions.</p> <p>(b) Area under the curve.</p>

	APPLICATION OF DIFFERENTIATION	solve problems involving applications of rate of change, maxima and minima.	(a) Rate of change. (b) Maxima and minima.
GEOMETRY AND TRIGONOMETRY	COORDINATE GEOMETRY	<p>i. Calculate the perimeters and areas of triangles, quadrilaterals, circles and composite figures.</p> <p>ii. Find the length of an arc, a chord, perimeters and areas of sectors and segments of circles.</p> <p>iii. Calculate total surface areas and volumes of cuboids, cylinders. Cones, pyramids, prisms, spheres and composite figures.</p> <p>iv. Determine the distance between two points on the earth's surface.</p>	<p>(a) Midpoint and gradient of a line segment.</p> <p>(b) Distance between two points.</p> <p>(c) Parallel and perpendicular lines.</p> <p>(d) Equations of straight lines.</p>

	EUCLIDEAN GEOMETRY	<p>i. identify various types of lines and angles.</p> <p>ii. solve problems involving polygons.</p> <p>iii. calculate angles using circle theorems.</p> <p>iv. Identify construction procedures of special angles, e.g. 30°, 45°, 60°, 75°, 90° etc.</p>	<p>(a) Properties of angles and lines.</p> <p>(b) Polygons: triangles, quadrilaterals and general polygons.</p> <p>(c) Circles: angle properties, cyclic quadrilaterals and intersecting chords.</p> <p>(d) Construction.</p>
	LOCI	identify and interpret loci relating to parallel lines, perpendicular bisectors, angle bisectors and circles.	Locus in 2 dimensions based on geometric principles relating to lines and curves.
	TRIGONOMETRY	<p>i. calculate the sine, cosine and tangent of angles between $-360^\circ = 0 = 6^\circ$.</p> <p>ii. apply these special angles, e.g. 30°, 45°, 60°, 75°, 90°, 105°, 135° to solve simple problems in trigonometry.</p>	<p>(a) Trigonometrical ratios of angles.</p> <p>(b) Angles of elevation and depression.</p> <p>(c) Bearings.</p> <p>(d) Areas and solutions of triangle.</p>

		<p>iii. solve problems involving angles of elevation and depression.</p> <p>iv. solve problems involving bearings.</p> <p>v. apply trigonometric formulae to find area of triangles.</p> <p>vi. solve problems involving sine and cosine graphs.</p>	<p>(e) Graphs of sine and cosine.</p> <p>(f) Sine and cosine formulae.</p>
	MENSURATION	<p>i. calculate the perimeters and areas of triangles, quadrilaterals, circles and composite figures.</p> <p>ii. find the length of an arc, a chord, perimeters and areas of sectors and segments of circles.</p>	<p>(a) Lengths and areas of plane geometrical figures.</p> <p>(b) Lengths of arcs and chords of a circles.</p> <p>(c) Perimeters and areas of sectors and segments of circles.</p>

		<p>iii. calculate total surface areas and volumes of cuboids, cylinders, cones, pyramids, prisms, spheres and composite figures.</p> <p>iv. Determine the distance between two points on the earth's surface.</p>	<p>(d) Surface areas and volumes of simple solids and composite figures.</p> <p>(e) The earth as a sphere:- longitudes and latitudes.</p>
<p>NUMBER AND NUMERATION</p>	<p>FRACTIONS, DECIMALS, APPROXIMATION AND PERCENTAGES</p>	<p>i. perform basic operations ($\times, +, -, \div$) on fractions and decimals.</p> <p>ii. express to specified number of significant figures and decimal places.</p> <p>iii. calculate simple interest, profit and loss percent; ratio proportion and rate.</p> <p>iv. solve problems involving share and VAT.</p>	<p>(a) Fractions and decimals.</p> <p>(b) Significant figures.</p> <p>(c) Decimal places.</p> <p>(d) Percentage errors.</p> <p>(e) Simple interest.</p> <p>(f) Profit and loss percent.</p> <p>(g) Ratio, proportion and rate.</p> <p>(h) Shares and valued added tax (VAT).</p>

	<p>INDICES, LOGARITHMS AND SURDS</p>	<p>i. apply the laws of indices in calculation. ii. establish the relationship between indices and logarithms in solving problems. iii. solve problems in different bases in logarithms. iv. simplify and rationalize surds. v. perform basic operations on surds.</p>	<p>(a) Laws of indices. (b) Standard form. (c) Laws of logarithm. (d) Logarithm of any positive number to a given base. (e) Change of bases in logarithm and application. (f) Relationship between indices and logarithm. (g) Surds.</p>
	<p>SETS</p>	<p>i. identify types of sets, i.e empty, universal, complements, subsets, finite, infinite and disjoint sets. ii. solve problems involving cardinality of sets. iii. solve set problems using symbol.</p>	<p>(a) Types of sets. (b) Algebra of sets. (c) Venn diagrams and their applications.</p>

		iv. use venn diagrams to solve problems involving not more than 3 sets.	
	NUMBER BASES	i. perform four basic operations ($\times, +, -, \div$). ii. convert one base to another.	(a) Operations in different number bases from 2 to 10. (b) Conversion from one base to another including fractional parts
STATISTICS	MEASURES OF DISPERSION	calculate the range, mean deviation, variance and standard deviation of ungrouped and grouped data.	Range, mean deviation, variance and standard deviation.
	MEASURES OF LOCATION	i. calculate the mean, mode and median of ungrouped and grouped data (simple cases only). ii. use ogive to find the median, quartiles and percentiles.	(a) Mean, mode and median of ungrouped and grouped data (simple cases only). (b) Cumulative frequency.

	PERMUTATION AND COMBINATION	i. solve simple problems involving permutation and combination.	(a) Linear and circular arrangements. (b) Arrangements involving repeated objects.
	PROBABILITY	i. solve simple problems in probability (including addition and multiplication).	(a) Experimental probability (tossing of coin, throwing of a dice etc). (b) Addition and multiplication of probabilities (mutual and independent cases).
	REPRESENTATION OF DATA	i. identify and interpret frequency distribution tables. ii. interpret information on histogram, bar chart and pie chart.	(a) Frequency distribution. (b) Histogram, bar chart and pie chart.

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APPROVED BOOKS

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Anyebe, J. A. B (1998) Basic Mathematics for Senior Secondary Schools and Remedial Students in Higher/ institutions, Lagos: Kenny Moore.

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David Osuagwu, M. et al (2000) New School Mathematics for Senior Secondary Schools, Onitsha: Africana - FIRST Publishers.

Egbe. E et al (2000) Further Mathematics, Onitsha: Africana & FIRST Publishers.

Ibude, S. O. et al (2003) Algebra and Calculus for Schools and Colleges: LINCEL Publishers.

Tuttuh & Adegun M. R. et al (1997), Further Mathematics Project Books 1 to 3, Ibadan: NPS Educational.

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