NDOLA DISTRICT

MATHEMATICS O'LEVEL SCHEMES OF WORK 10 - 12

GRADE 10 TERM ONE					
WEEK	**TOPIC**	**SUB TOPIC**	**DETAILS OF TOPICS TO BE TAUGHT**	**OUTCOMES**	**REFERENCES**
1/2	SETS	Set operations	• Set operations • Carry out operations on sets • Numerical problems involving sets	• Carry out operations on sets.	Progress bk 10 pg: 1- 10
3			• Venn Diagrams ➢ Numbers of elements in sets ➢ Shading Venn Diagrams • Apply higher operations on sets.	• Apply higher operations on sets.	Progress bk 10 pg: 1- 10
4	INDEX NOTATION	Indices	• Laws of indices ➢ Double indices ➢ Multiplicative inverse ➢ Zero index ➢ Fractions with negative indices	• Apply laws of indices • Simplify positive, negative and zero indices • Simplify fractional indices	Pupils Book 10 Progress bk10
5			• Equations involving indices • Problems involving application of indices	• Solve equations involving indices	Progress bk 10
TEST ONE TO BE GIVEN					
6	ALGEBRA	Basic Processes	• Expansion and simplification of	• Expand and simplify	Pupils Book 10

			expressions • Factorisation by using common factors, grouping terms.	expressions • Factorise algebraic expressions	Progress bk10
7			• factors of quadratic expressions and difference of two square • Addition , subtraction , multiplication and division of algebraic fractions • Lowest common multiple	• Simplify Algebraic fractions • Algebraic fractions applying the four rules.	Pupils Book 10 Progress bk10
8	CALCULATOR	Functions on a Calculator	• Demonstrate the use of different functions on a calculator.	• Using different functions on a calculator.	Progress bk10 MK 10
9	MATRICES	• Transpose of a matrix • Multiplication of matrices • Inverse of a matrix	• Transpose of a matrix • Multiplying matrices (up to 3x3 matrices) • The null (zero) and identity matrices • Determinant and Inverse of a 2x2 matrix	• Find a Transpose of a matrix • Multiply matrices (up to 3x3 matrices) • Calculate the determinant of a 2 by 2 matrix • Find the inverse of a 2 by 2 matrix	Pupils BK 11 Progress 10
TEST TWO TO BE GIVEN					
10			• Singular matrices • Solving systems of linear equation in	• Solve systems of linear equations in two variables	Pupils BK 11

			two variables using matrices • Cramer's Rule • Applying matrices to solve real life problems	• Apply matrices to solve real life problems.	Progress 10
11	SIMILARITY AND CONGRUENCY	• Application of Ratio and Proportion • Areas and Volumes of Similar figures	• Representative Fraction (Scale) • Calculating length and area using a given scale and vice versa • Calculating areas and volumes of similar figures.	• Calculate the scale on a map • Calculate length and area using a given scale and vice versa • Calculate areas and volumes of similar figures.	Pupils BK 11 Progress 10
12			• Applying ratio, proportion, similarity and congruence in solving real life problems.	• Apply ratio, proportion, to solve problems on similarity and congruence.	Pupils BK 11 Progress 10
13	**END OF TERM ONE TESTS**				
GRADE 10 TERM TWO					
WEEK	TOPIC	SUB TOPIC	DETAILES OF TOPIC TO BE TAUGHT	OUTCOMES	REFERENCES
1	REVISION OF TERM ONE TESTS				
2	BEARINGS	• Bearings and Scale Drawing	• Scale drawing • Three figure bearings • Solving problems involving bearing and scale drawing from real life	• Draw/sketch diagrams to represent position and direction • Use bearing and scale drawing in real life	Pupils BK 11 Progress 10

			problems • Angles		
3	SOCIAL AND COMMERCIAL ARITHMETIC	• Investments	• Shares, dividends and Investment Bonds	• Carry out calculations that involve Shares, dividends and investment Bonds	Pupils BK 11 Progress 10
4	TRAVEL GRAPHS	• Distance time graphs	• Scalar and vector quantities • Average speed • Distance/ displacement • Acceleration and deceleration/retard ation	• Compute average speed, distance and time • Determine acceleration and retardation/decele ration	Pupils BK 11 Progress 10
TEST ONE TO BE GIVEN					
5		• Velocity Time graphs • Velocity - time graphs (Curves	• Drawing travel graphs • Distance/area under a velocity time graph • Concept of similarity • Explaining why the area under the graph represents distance travelled • Distance/area under the graph in a velocity - time graph	• Draw travel graphs • Calculate the distance under a velocity time graph • Relate area under the graph to distance travelled. • Calculate the displacement in a velocity - time graph	Pupils BK 11 Progress 10
6	SYMMETRY	Symmetry of solids	• Point, Rotational and Plane Symmetry • Centre of rotation • Order of symmetry	• Determine order of rotational symmetry • Determine symmetry of	Pupils BK 11 Progress 11

			in three dimension • Plane and axis of symmetry	solids • Determine plane symmetry	
7	APPROXIMATIOS	Relative and absolute error	• Relative error • Limits • Absolute error • Tolerance • Percentage error • Estimation	• Work with relative and absolute errors	Pupils BK 11 Progress 11
8	QUADRATIC EQUATIONS	• Introduction to Quadratic equations • Solutions of quadratic	• Meaning of quadratic equation • Solving quadratic equations by Factorisation.	• Explain the meaning of the quadratic equation • Solve quadratic equations by graphical method • Solve quadratic equations	Progress 11
TEST TWO TO BE GIVEN					
9	RELATIONS AND FUNCTIONS	• Inverse functions • Composite functions • Application	• Formula, functional notation, set builder notation • Inverse functions • Composite functions • Problems involving linear functions	• Find inverses of one- to- one functions • Simplify composite functions • Solve problems involving linear functions	Progress 11 PUPILS BK 10
10	C O O R D I	• Length of a straight line between two points • The mid-point Gradient	• Length (distance formula) • Mid point • Gradient • Gradient point form	• Calculate the length of a straight line • Calculate the mid-point of two points.	PROGRESS 11

	N A T E G E O M E T R Y				
11		• Equation of a straight line • Parallel and perpendicular lines	• Gradient Intercept form • Double intercept form • Parallel lines • Perpendicular lines	• Calculate the gradient of a line segment • Find the equation of a straight line • Find the gradients of parallel and perpendicular lines • Use gradients of parallel and perpendicular lines to find equations.	PROGRESS 11
	REVION WORK				
12-13	**END OF TERM TWO TESTS**				
TERM THREE					
WEEK	**TOPIC**	**SUB TOPIC**	**DETAILS OF THE TOPIC TO BE TAUGHT**	**OUTCOMES**	**REFERENCES**

1	REVISION OF TERM TWO TESTS				
1	SEQUENCES AND SERIES	• Arithmetic progression • Geometric progression	• Arithmetic and Geometrical Progressions.	• Identify an arithmetic progression (AP) • Find the nth term of the AP • Find the sum of an AP	PUPILS BK 11 PURE AND APPLIED 6TH ED
2			• The nth terms of AP and GP • Sums of APs and GPs • Arithmetic and geometric means	• Find the arithmetic mean • Identify a geometric progression (GP) • Find the nth term of a GP Find the geometric mean	PUPILS BK 11 PURE AND APPLIED 6TH ED
3			• Sum to infinity of a Geometric progression	• Find the sum of a geometric progression • Find the sum to infinity of a Geometric progression.	
4	**MID TERM BREAK – ECZ EXAMINATIONS BEGIN**				
GRADE 11 TERM ONE					
WEEK	TOPIC	SUB TOPIC	DETAILS OF TOPIC TO BE TAUGHT	OUTCOMES	REFERENCES
1	REVSION OF END OF TERM TESTS				
1	VARIATIONS	• Introduction to variation • Direct and Inverse Variation	• Describing variation (Notation and Constant) • Distinguishing	• Describe variation • Distinguish between direct and	PUPILS BK 11 PROGRESS

			between direct and inverse variation	inverse variation.	11
2		• Joint and Partial Variation • Graphs • Applications	• Distinguishing between Joint and Partial variation • Graphs of variation • Solving problems involving variations	• Distinguish between joint and partial variation • Draw and Interpret graphs of variation • Solve problems involving variations	PUPILS BK 11 PROGRESS 11
3	CIRCLE THEOREM	• Properties of a circle • Angle properties	• Parts a circle (chord, segment, arc, sector, radius, diameter) • Angle in the same segment • Angle at the centre twice one at the circumference • Angle in a semicircle • Cyclic quadrilateral • (opposite sides)	• Analyse the parts of a circle • Solve problems using angle properties of a circles	PUPILS BK 11 PROGRESS 11
4			• Alternate segments • Tangent properties of a circle • External angle of a cyclic Quadrilateral equal to the opposite interior angle.	• Solve problems involving tangent properties.	
TEST ONE TO BE GIVEN					
5	CONSTRUCTIO N AND LOCI	• Construction • Locus • Loci in two	• Line and angle bisectors • Finding the centre	• Construct line and angle bisectors	PUPILS BK 11

		dimensions • Loci in three dimension	of circle. • Constructing a tangent from a point to a circle • meaning of Locus • Locus of points in two and three dimensions (equidistant from a Point and two fixed points, from two intersecting line, from a Straight line)	• Explain the meaning of Locus • Describe locus of point in two and three dimensions	PROGRESS 11
6			• Locus of points which subtends a constant angle • Locus of points such that the area of triangles is constant	• Construct locus of point in two dimensions	PUPILS BK 11 PROGRESS 11
7	TRIGONOMETRY	• Introduction to Trigonometry • Trigonometric ratios • Sine and Cosine rules • Area of a triangle	• Sine, cosine and tangent ratios on a right angled triangle (Opposite, adjacent and hypotenuse sides) • Three trigonometric ratios in quadrants	• Relate right angled triangle to the three trigonometric ratios • Describe the three trigonometric ratios on a right angled triangle • Calculate sides and angles of a right angled triangle.	PUPILS BK 11 PROGRESS 11
8			• Sides and angles of right angled triangles using the	• Work with special angles (60_o, 45_o and 30_o)	PUPILS BK 11

			three trigonometric ratios • Special angles (60^0,45^0 and 30^0) • Finding sides and angles of non right angled triangles using the sine and cosine rule.	• Find sides and angles of non right angled triangles	PROGRESS 11
9			• Calculating area of a non right angled triangle using the sine rule. • Using of Mathematical tables and scientific calculators	• Calculate areas of a non right angled triangle • Determine the signs of the three trigonometric ratios in the quadrants	PUPILS BK 11 PROGRESS 11
TEST TWO TO BE GIVEN					
10			• Determining signs of the three trigonometric ratios	• Draw graphs for sine, cosine and tangent curves • trigonometric equations • Use trigonometry to solve practical problems	PUPILS BK 11 PROGRESS 11
11			•	•	
12-13			•	•	
	GRADE 11 TERM TWO				
WEEK	TOPIC	SUB TOPIC	DETAILS OF TOPIC TO BE TAUGHT	OUTCOMES	REFERENCES
1	REVISION OF END OF TERM TESTS.				
1	MENSURATION	• Area	• Area of a sector	• Calculate the area	PUPILS BK

		• Volume	• Surface area of three dimensional figures (pyramid and cone) • Volume of solids (cone, rectangular and triangular pyramids. Include: frustum)	of a sector • Calculate surface area of three dimensional figures • Calculate volume of prisms	11 PROGRESS 11
2			• Solving problems involving area and volume	• Solve problems involving area and volume	
3	PROBABILITY	• Laws of probability • Tree Diagrams and grid	• Addition and Multiplication Laws • Calculating probabilities using tree diagrams and grids.	• Compute probabilities using the laws of probability • Calculate probabilities using tree diagrams and grids.	PUPILS BK 11 PROGRESS 11
4		•	• Calculating expected values, Independent and dependent events, mutually exclusive events, conditional events and Compound events. • Continuous sample space.	• Calculate probabilities of mutually exclusive events and compound events • Find probabilities of independent events • Apply probability to real life problems	PUPILS BK 11 PROGRESS 11
TEST ONE TO BE GIVEN					
5	STATISTICS	• Cumulative frequency tables • Measures of dispersion	• Constructing Cumulative frequency tables • Drawing	• Construct cumulative frequency tables using grouped and	PUPILS BK 11 PROGRESS

			Cumulative frequency curves (ogive) • Drawing Relative cumulative frequency curves	ungrouped data • Draw cumulative frequency curves • Draw relative cumulative curves	11
6			• Calculating the range, inter quartile range, semi inter quartile range and Percentiles • Calculating variance and standard deviation for ungrouped and grouped data	• Calculate the range, inter quartile range, and semi inter quartile range • Calculate the percentiles • Calculate variance and standard deviation for ungrouped and grouped data	PUPILS BK 11 PROGRESS 11
7	QUADRATIC FUNCTIONS	• Introduction to Quadratic Functions	• Explain the quadratic function and its graph • Sketch the graph of a quadratic function	• Meaning of quadratic function and its graph • Sketching the graph • Maximum and minimum Roots/zeros	PUPILS BK 11 PROGRESS 11
TEST TWO TO BE GIVEN					
8	GRAPHS OF FUNCTIONS	• Cubic functions • Inverse functions	• Draw graphs of cubic functions • Use graphs to find solutions • Determine gradients of curves	• Drawing Graphs of cubic functions • Finding Zeros of the function, Solutions of graphs • Determining Gradients of	PUPILS BK 11 PROGRESS 11

				curves	
9			• Estimate areas under curves • Draw graphs of inverse functions • Application of graphs of functions	• Turning points and their nature (Maximum and minimum) • Area under the graph (Counting square, Trapezium) • Drawing Graphs of inverse functions • Exponential graphs • Applying graphs of functions.	PUPILS BK 11 PROGRESS 11
10	LINEAR PROGRAMMING	Linear programming	• Drawing graphs of linear equations and inequations in one and two variables (as a recap) • Shading the wanted and unwanted regions	• Draw graphs of linear equations and inequations in one and two variables (as a recap) • Shade the wanted and unwanted regions	PROGRESS 12 SMG BK 7
11			• Describing the wanted or unwanted region • Finding Values in the feasible region	• Describe the wanted or unwanted regions. • Determine maximum.	PROGRESS 12 SMG BK 7
12	**REVISIO**N				
13	**END OF TERM TESTS**				
GRADE 12 TERM ONE					
WEEK	**TOPIC**	**SUB TOPIC**	**DETAILS OF TOPIC TO BE TAUGHT**	**OUTCOMES**	**REFERENCES**
1	REVISION OF END OF TERM TESTS				

1	VECTORS IN TWO DIMENSIONS	• Introductions to vectors	• Describing a vector (direction and magnitude) • Zero and Free vectors • Representing and denoting	• Describe a vector • Represent and denote a vector	PROGRESS 12 PUPILS BK 12
2		• Addition and subtraction • Translations • Scalar multiplication •	• Adding and subtracting vectors (triangular and parallelogram laws) • Resultant vectors • Multiplying vectors by scalars • Translation (Position vectors) • Component form • Calculating Magnitude/Modulus of vectors.	• Add and subtract vectors • Apply translations on vectors and find magnitude • Multiply vectors by scalars	PROGRESS 12 PUPILS BK 12
3		• Collinearity • Vector geometry	• Collinearity and parallelism • Ratios (Mid - point theorem) • Vector geometry	• Determine collinearity of points • Solve geometrical problems involving vectors	PROGRESS 12 PUPILS BK 12
4	EARTH GEOMETRY	• Introduction to Earth Geometry • Small and great circles • Latitudes and Longitudes • Distance along latitudes and longitudes • Speed in Knots	• Explaining the concept of Earth Geometry and its significance • Southern and Northern hemispheres (South and North Poles) • Great Circles(the	• Explain the concept of Earth Geometry • Distinguish between small and great circles • Calculate distance along parallels of latitudes and longitude in	PROGRESS 12 PUPILS BK 12

		and time	equator and all longitudes) • The Greenwich and Equator • Small Circles(latitudes)	kilometres and nautical miles	
TEST ONE TO BE GIVEN					
5			• Centre of the earth • Length ,chord , arc and sector • Angular distance • Line of axis of the Earth • Circumference of the earth • Standard units of distances in degrees and miles (1_o of latitude represents 60 nautical miles/or 110.9 Km)	• Calculate the shortest distance between two points on the surface of the earth • Calculate speed in knots and time	PROGRESS 12 PUPILS BK 12
6			• Conversion of distance in kilometre and nautical mile • Longitude and time • Greenwich Mean Time • Solving problems involving Earth Geometry in real life		
7	GEOMETRICAL TRANSFORMATION	• Introduction to transformation • Translation	• Explaining the concept of transformation	• Explain the concept of transformation	PROGRESS 12

		• Reflection. • Rotation. •	(Object and Image) • Translation • (Translation vector, Mediator) • Reflection (mirror lines and matrices of reflections) • Rotations (by construction and matrix methods) • Rotations (Finding centre, angle and direction) • Finding matrix of rotation	• Use a column vector to translate an object • Reflect objects by different methods • Rotate objects by different methods	PUPILS BK 12
8		• Enlargement • Stretch • Shear	• Enlargement (by construction and matrix methods) • Finding the centre, scale factor and matrix of enlargement • Stretch (by construction and matrix methods) • Finding the centre, scale factor, invariant line and matrix of stretch • Shear (by construction and matrix methods) • Finding the shear factor, invariant line and matrix of shear	• Enlarge objects by different methods • Stretch objects by different methods • Shear objects by different methods	PROGRESS 12 PUPILS BK 12
9		• Combined	• Area scale factor	• Solve problems	PROGRESS

		transformations	• Determinant of a matrix • Inverse transformations	involving combined transformations • Find area scale factors of a stretch by determinant method	12 PUPILS BK 12
TEST TWO TO BE GIVEN					
10	COMPUTERS	• Basic components of a computer • Algorithms	• Using different functions on a calculator • Describing Components of a computer (i.e. Input, Process and Output Parts/devices) • Definition of an algorithm • Algorithm (sequence , decision loops)	• Describe various methods of implementing an algorithm	MK 10 PROGRESS 10
11		• Methods of implementing an algorithm	• Methods of implementing an algorithm (flow charts and pseudo codes) • Stages of problem solving (define a problem , analysis method of solution, write a computer program.	• Outline problem solving stages.	MK 10 PROGRESS 10
12	REVISION OF TERMS WORK				
13	END OF TERM ONE TESTS				

GRADE 12 TERM TWO					
WEEK	**TOPIC**	**SUB TOPIC**	**DETAILS OF TOPIC TO BE TAUGHT**	**OUTCOMES**	**REFERENCES**
1	REVISION OF END OF TERM				
2	INTRODUCTIONS TO CALCULUS	• Differentiation • Integration	• Explaining the concept of differentiation • Differentiating functions from first principles (Limits) • Product rule; chain rule and quotient rule (y $=ax^n$; = nax^{n-1})	• Explain concept of differentiation • Differentiate functions from first principles.	PROGRESS 11 PROGRESS 12 PUPILS BK 12
3			• Indefinite integrals • Arbitrary constant • Definite integrals • Stationary points	• Use the formula for differentiation	PROGRESS 11 PROGRESS 12 PUPILS BK 12
4			• Secant • Tangents • Normal • Explain integration as the reverse of differentiation	• Calculate equations of tangents and normal. • Explain integration • Find Indefinite integrals • Evaluate simple definite integrals	PROGRESS 11 PROGRESS 12 PUPILS BK 12

5			• Rule of integration (= ax ^{n} ; ∫ = + c • Area under the curve	• Find the area under the curve	PROGRESS 11 PROGRESS 12 PUPILS BK 12
	TEST ONE TO BE GIVEN				
6	**REVISION WORK AND PAST PAPERS**				
7 - 8	**MOCK EXAM PREPARATIONS (INTENSE REVISION)**				
9 - 13	**MOCK EXAMS**				
GRADE 12 TERM THREE					
WEEK	TOPIC	SUB TOPIC	DETAILS OF TOPIC TO BE TAUGHT	OUTCOMES	REFERENCES
1 - 4	REVISION	REVISION	ALL TOPICS FROM 10 - 12		Past papers
ECZ EXAXAMINATIONS BEGIN (PRACTICALS)					
ECZ EXAMINATIONS BEGIN (THEORY PAPERS)					