

**2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 1)**

TERM 1	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
TOPICS	Number patterns, sequences and series				Functions: Formal definition, inverses, exponential and logarithmic			Trigonometry			
DATE COMPLETED											
SBA	Investigation or project & test (content Term 1)										

**2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 2)**

TERM 2	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	
TOPICS	Euclidean Geometry		Analytical Geometry		Differential Calculus, including polynomials							
DATE COMPLETED												
SBA	Assignment								JUNE EXAM/CONTROL TEST			

**2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 3)**

TERM 3	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	
TOPICS	Finance, growth and decay (continuation)			Statistics		Counting and probability		Revision				
DATE COMPLETED												
SBA	Test								TRIAL EXAMINATION			

**2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 4)**

TERM 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	EXAM			
TOPICS	Revision				Final examination							PAPER 1 150 marks 3 hours		
SBA												Algebraic expressions, equations and inequalities		25
												Number patterns		25
												Functions and graphs		35
												Finance, growth and decay		15
												Differential Calculus		35
												Counting principle and probability		15
TOTAL NUMBER OF SBA TASKS 6										PAPER 2 150 marks 3 hours				
TERM 1 INVESTIGATION/PROJECT (15%) AND TEST (15%)										Statistics		20		
TERM 2 ASSIGNMENT (15%) AND JUNE EXAM/CONTROL TEST (15%)										Analytical Geometry		40		
TERM 3 TEST (15%) AND TRIAL (25%)										Trigonometry		40		
TERM 4 FINAL EXAMINATION										Euclidean Geometry		50		

## 2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 1)

TERM 1	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
TOPICS	PATTERNS, SEQUENCES AND SERIES				FUNCTIONS			TRIGONOMETRY			
	1. Patterns: Revise number patterns leading to those where there is a constant second difference between consecutive terms and the general term is therefore quadratic 2. Number patterns, including arithmetic and geometric sequences and series 3. Sigma notation 4. Derivation and application of the formulae for the sum of arithmetic and geometric series: 4.1 $S_n = \frac{n}{2}[2a + (n - 1)d]$ , $S_n = \frac{n}{2}(a + l)$  4.2 $S_n = \frac{a(r^n - 1)}{r - 1}; (r \neq 1)$ , and  4.3 $S_n = \frac{a}{1 - r}; (-1 < r < 1), (r \neq 1)$				1. Definition of a <i>function</i> 2. General concept of the <i>inverse of a function</i> and how the domain of the function may need to be restricted (in order to obtain a one-to-one function) to ensure that the inverse is a function 3. Determine and sketch graphs of the inverses of the functions defined by $y = ax + q,$ $y = ax^2,$ $y = b^x, b > 0, \quad b \neq 1$ Focus on the following characteristics: Domain and range, intercepts with the axes, turning points, minima, maxima, asymptotes (horizontal and vertical), shape and symmetry, average gradient (average rate of change), intervals on which the function increases/decreases 4. Revision of the exponential function and the exponential laws and graph of the function defined by $y = b^x$ where $b > 0$ and $b \neq 0$  5. Understand the definition of a logarithm: $y = \log_b x \Leftrightarrow x = b^y$ where $b > 0$ and $b \neq 1$  6. The graph of the function, $y = \log_b x$ for both the cases $0 < b < 1$ and $b > 1$ .			1. Compound angle identities: $\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \sin \beta \cos \alpha$ $\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \pm \sin \alpha \sin \beta$ $\sin 2\alpha = 2 \sin \alpha \cos \beta$ $\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$ $= 2 \cos^2 \alpha - 1$ $= 1 - 2 \sin^2 \alpha$ 2. Revise the proof of the sine, cosine and area rules 3. Solve problems in two and three dimensions applying the sine, cosine and area rules			
DATE COMPLETED											
SBA	Investigation or project				&			Test (content Term 1)			

## 2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 2)

TERM 2	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
TOPICS	EUCLIDEAN GEOMETRY		ANALYTICAL GEOMETRY		DIFFERENTIAL CALCULUS, INCLUDING POLYNOMIALS				JUNE EXAMINATION/CONTROL TEST		
	1. Revise earlier work on the necessary and sufficient conditions for polygons to be similar 2. Prove (accepting results established in earlier grades): <ul style="list-style-type: none"> <li>That a line drawn parallel to one side of a triangle divides the other two sides proportionally (and the Mid-point Theorem as a special case of the converse of this theorem)</li> <li>That equiangular triangles are similar</li> <li>That triangles with sides in proportion are similar</li> <li>The Pythagorean Theorem by similar triangles</li> </ul>		1. Revise the following, including Grade 10 concepts: <ul style="list-style-type: none"> <li>The equation of a line through two given points</li> <li>The equation of a line through one point and parallel or perpendicular to a given line</li> <li>The inclination (<math>\theta</math>) of a line, where <math>m = \tan \theta</math> is the gradient of the line (<math>0^\circ \leq \theta \leq 180^\circ</math>)</li> </ul> 2. Apply the equation $(x - a)^2 + (y - b)^2 = r^2$ that defines a circle with radius $r$ and centre $(a, b)$ . 3. Determine the equation of a tangent to a given circle		1. Factorise third-degree polynomials. Apply the remainder and factor theorems to polynomials of degree at most 3 (no proofs required) 2. An intuitive understanding of the limit concept, in the context of approximating the rate of change or gradient of a function at a point 3. Use limits to define the derivative of a function $f$ at any $x$ : $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ Generalise to find the derivative of $f$ at any point $x$ in the domain of $f$ i.e., define the derivative function $f'(x)$ of the function $f(x)$ Understand intuitively that $f'(a)$ is the gradient of the tangent to the graph of $f$ at the point with $x$ -coordinate $a$ 4. Using the definition (first principle), determine the derivative, $f'(x)$ where $a$ , $b$ and $c$ are constants: <ol style="list-style-type: none"> <li>4.1 <math>f(x) = ax^2 + bx + c</math>,</li> <li>4.2 <math>f(x) = ax^3</math>,</li> <li>4.3 <math>f(x) = \frac{a}{x}</math> and</li> <li>4.4 <math>f(x) = c</math></li> </ol> 5. Use the formula, $\frac{d}{dx}(ax^n) = anx^{n-1}$ (for any real number $n$ ) together with the rules <ol style="list-style-type: none"> <li>5.1 <math>\frac{d}{dx}[f(x) \pm g(x)] = \frac{d}{dx}[f(x)] \pm \frac{d}{dx}[g(x)]</math> and</li> <li>5.2 <math>\frac{d}{dx}[kf(x)] = k \frac{d}{dx}[f(x)]</math>, (<math>k</math> a constant)</li> </ol> 6. Determine equations of tangents to graphs of functions 7. Introduce the second derivative $f''(x) = \frac{d}{dx}(f'(x))$ of $f(x)$ and how it determines the concavity of a function 8. Sketch graphs of cubic polynomial functions using differentiation to determine the coordinates of stationary points, and points of inflection (where concavity changes). Also, determine the $x$ -intercepts of the graph using the factor theorem and other techniques 9. Solve practical problems concerning optimisation and rate of change, including calculus of motion						
DATE COMPLETED											
SBA	Assignment								JUNE EXAM/CONTROL TEST		

## 2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 3)

TERM 3	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	
TOPICS	FINANCE, GROWTH AND DECAY			STATISTICS		COUNTING AND PROBABILITY		REVISION	TRIAL EXAMINATION			
	1. Revise and use simple and compound growth and decay formulae: $A = P(1 \pm in)$ and $A = P(1 \pm i)^n$  to solve problems (including straight line, depreciation and depreciation on a reducing balance) 2. Solve problems involving present value and future value annuities 3. Make use of logarithms to calculate the value of $n$ , the time period, in the equations  $A = P(1 + i)^n$ or $A = P(1 - i)^n$ .  4. Critically analyse investment and loan options and make informed decisions as to best option(s) (including pyramid)			1. Revise: <ul style="list-style-type: none"> <li>Histograms</li> <li>Frequency polygons</li> <li>Ogives (cumulative frequency curves)</li> <li>Variance and standard deviation of ungrouped data</li> <li>Symmetric and skewed data</li> <li>Identification of outliers</li> </ul> 2. Use statistical summaries, scatterplots, regression (in particular the least squares regression line) and correlation to analyse and make meaningful comments on the context associated with given bivariate data, including interpolation, extrapolation and discussions on skewness		1. Revise, <ul style="list-style-type: none"> <li>The identity:  <math>P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)</math></li> <li>The addition rule for mutually exclusive events:  <math>P(A \text{ or } B) = P(A) + P(B)</math></li> <li>The complementary rule:  <math>P(\text{not } A) = 1 - P(A)</math></li> <li>Identifying dependent and independent events and,</li> <li>The product rule for independent events:  <math>P(A \text{ and } B) = P(A) \times P(B)</math></li> <li>The use of Venn diagrams to solve probability problems, deriving and applying formulae for any three events A, B and C in a sample space S</li> <li>The use of tree diagrams for the probability of consecutive or simultaneous events, which are not necessarily independent</li> </ul> 2. Apply the fundamental counting principle to solve probability problems 3. Probability problems using Venn diagrams, tree diagrams, two-way contingency tables and other techniques (like the Fundamental Counting Principle) to solve probability problems (where events are not necessarily independent)						
DATE COMPLETED												
SBA	Test								TRIAL EXAMINATION			

**2023/24 ANNUAL TEACHING PLANS: MATHEMATICS: GRADE 12 (TERM 4)**

TERM 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	EXAM	
TOPICS	REVISION				FINAL EXAMINATION						PAPER 1 150 MARKS 3 HOURS	MARKS
											Algebraic expressions, equations and inequalities	25
											Number patterns	25
											Functions and graphs	35
											Finance, growth and decay	15
											Differential Calculus	35
											Counting principle and probability	15
TOTAL NUMBER OF SBA TASKS 6											PAPER 2 150 marks 3 hours	Marks
TERM 1 INVESTIGATION/PROJECT 15% AND TEST (15%)											Statistics	20
TERM 2 ASSIGNMENT (15%), JUNE EXAM/CONTROL TEST (15%)											Analytical Geometry	40
TERM 3 TEST (15%) AND TRIAL (25%)											Euclidean Geometry	40
TERM 4 FINAL EXAMINATION											Trigonometry	50