CAMI Education links: Maths NQF Level 3

MATHEMATICS – NQF Level 3		
CONTENT	**LEARNING OUTCOME**	**CAMI LINK**
1.1 Represent Complex numbers in a form appropriate to the context	• Imaginary numbers written to its simplest form • Simplify negative roots into imaginary numbers • Simplify and perform addition, subtraction, multiplication and division on imaginary numbers • Construct Argand diagrams to find and represent the modulus and positive argument • Represent complex numbers in polar form with positive argument	**5.10.1.1** **5.10.1.2** **5.10.1.3** **5.10.1.4** **5.10.2.2** **5.10.2.3** **5.10.2.4**
1.2 Perform operations on complex numbers	• Perform addition, subtraction and multiplication on complex numbers in standard/rectangular form • Perform division on complex numbers in standard form introducing the concept of conjugate • Perform multiplication and division on complex numbers in polar form	
2.1 Sketch and interpret graphs of functions	• Use a variety of techniques to sketch and interpret information from graphs of functions. • Point-by-point plotting can be used as an option • Graphs included: $y = a(x-p)^2 + q; y = ax^2 + bx + c$ $y = \frac{a}{(x+p)} + q$ $y = ab^{x+p} + q; b > 0$ $y = a\sin(kx); y = a\cos(kx); y = a\tan(kx)$ $y = a\sin(x+p)$ $y = a\tan(x+p)$ $y = a\cos(x+p)$	**6.4.1.1** **6.4.1.2** **6.4.1.3** **6.5.5.1** **6.5.5.2** **6.7.2** **7.8.2.1** **7.8.2.3** **7.8.2.5** **7.8.2.9**

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	• Investigate and generalize the impact of k , p , a , b , c and q in the following functions $y = a(x-p)^2 + q; y = ax^2 + bx + c$ $y = \frac{a}{(x+p)} + q$ $y = ab^{x+p} + q; b > 0$ $y = a\sin(kx); y = a\cos(kx); y = a\tan(kx)$ $y = a\sin(x+p)$ $y = a\tan(x+p)$ $y = a\cos(x+p)$	**6.4.3** **6.5.5.3** **6.7.3** **6.7.4** **7.8.2.1** **7.8.2.3** **7.8.2.5** **7.8.2.9**
	• Identify the following characteristics of functions - domain and range - intercepts with axes - turning points, minima and maxima - asymptotes - shape and symmetry - periodicity and amplitude - functions or non functions - continuous or discontinuous - intervals in which a function increases / decreases	
	• Find the equation of the following graphs by calculations or using the method of inspection (investigating the transformation of the graphs) $y = a(x-p)^2 + q; y = ax^2 + bx + c$ $y = \frac{a}{(x+p)} + q$ $y = ab^{x+p} + q; b > 0$ $y = a\sin(kx); y = a\cos(kx); y = a\tan(kx)$ $y = a\sin(x+p)$ $y = a\tan(x+p)$ $y = a\cos(x+p)$	**6.4.4** **6.4.5.2** **6.4.5.3** **6.5.5.4** **6.5.5.5** **7.8.2.1** **7.8.2.3** **7.8.2.5** **7.8.2.9**
2.2	• Simplify algebraic fractions with	**4.5.1.5**

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Algebraic expressions	monomial, binomial and trinomial denominators where two or more fractions are added, subtracted, divided or multiplied to each other • Manipulate and simplify algebraic expressions by completing the square	**4.5.2.3** **4.5.3.5** **4.5.5.2** **4.5.7.1** **4.5.7.2** **4.7.6.4** **4.2.9.2**
2.3 Algebraic equations and inequalities	• Solve quadratic equations by means of: - factorization - completing the square - using the quadratic formula • Solve simultaneous equations with two unknowns algebraically and graphically, where the one equation is linear and the other equation is quadratic • Solve quadratic inequalities in one variable and represent the solution in the following ways: - set builder notation - interval notation - on a number line	**4.2.5.3** **4.2.5.4** **4.2.5.5** **4.2.5.6** **4.2.10.2** **4.2.10.4** **4.6.2.3** **6.8.3.2** **6.8.2**
2.4 Linear programming	• Solve linear programming problems by optimizing a function in two variables, subject to one or more linear constraints, by numeral search along the boundary of the feasible region. NOTE: Explicit constraints will be given in all examples. o Sketch the given functions/constraints o Determine and shade the feasible region o Complete a boundary search	**5.3.4.1** **5.3.4.2** **5.3.4.3**

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	to find the vertices of the feasible region Optimize the maximum or minimum from the given objective function	
2.5 Investigate and use instantaneous rate of change	• Determine limits of functions intuitively • Distinguish between the value of a function at a particular point and the limit of that function at that point • Establish the derivatives of the following functions from first principles: f(x) = b f(x) = x f(x) = ax + b f(x) = x^2 f(x) = $ax^2 + b$ • Find the derivative of functions in the form: f(x) = ax^n or y = ax^n where f '(x) = nax^{n-1} or $\frac{dy}{dx} = nax^{n-1}$ Examples to include are: $4x^2; \frac{3}{x^{-3}}; \frac{2}{\sqrt[3]{x^2}}; \frac{5}{3x^2}$ (All examples within this range) • Use the constant, sum and/or difference rule by first simplifying the expression - If $y = f(x) = a$ and a is a constant function, then $\frac{dy}{dx} = f'(x) = 0$ - If $y = kf(x)$ then $\frac{d}{dx}[kf(x)] = k\frac{d}{dx}[f(x)]$ - If $y = f(x) \pm g(x)$ then $\frac{d}{dx}[f(x) \pm g(x)] = \frac{d}{dx}[f(x)] \pm \frac{d}{dx}[g(x)]$	**5.6.3.2** **5.6.3.3** **5.6.3.4** **5.6.4.1** **5.6.4.2** **5.6.4.3** **5.6.4.4** **5.6.4.5** **5.6.4.6** **5.6.4.7**

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	• Solve maxima and minima problems about real life situations from given equations	**5.7.3.3** **5.7.3.4**
3.1 **Surface area and volumes of 2D and 3D shapes**	• Calculate the surface area and volume of the following geometrical objects: - right pyramids (with square, equilateral triangle or regular hexagonal bases) - right cones - spheres • Calculate the surface area and volume of a combination of the above mentioned geometrical objects	**9.4.4** **9.4.3** **9.4.2** **9.5.4.1** **9.5.5.1**
3.2 **Use the Cartesian co-ordinate system to derive and apply equations**	• Use the Cartesian co-ordinate system to derive the equation of a line through two given points • Use the Cartesian co-ordinate system to derive the equation of a line parallel or perpendicular to another line • Use the Cartesian co-ordinate system to derive and use the angle of inclination of a line	**6.3.2** **6.3.3** **8.8.4.1** **8.8.4.2** **8.8.3.3**
3.3 **Solve problems by constructing and interpreting trigonometric models**	• Derive and use the values of the trigonometric functions (in surd form where applicable) of 30° ; 45° and 60° • Use the reduction formulae and special angles to solve trigonometric equations and prove equations in all four quadrants (without the use of a calculator) for the following functions: - $\sin(90° \pm \theta); \cos(90° \pm \theta)$ - $\sin(180° \pm \theta); \cos(180° \pm \theta); \tan(180° \pm \theta)$	**7.3.1.1** **7.3.1.3** **7.3.1.5** **7.3.2.1** **7.4.1.1** **7.4.1.3** **7.4.1.5** **7.4.1.9** **7.4.2.4** **7.4.3.4**

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	- $\sin(360° - \theta); \cos(360° - \theta); \tan(360° - \theta)$ • Use the following trigonometric identities to simplify expressions and prove equations. $\tan\theta = \frac{\sin\theta}{\cos\theta}$; $\sin^2\theta + \cos^2\theta = 1$ • Solve trigonometric equations (with the use of a calculator) involving reduction formulae using special triangle for three trigonometric functions in all four quadrants - $\sin(90° \pm \theta); \cos(90° \pm \theta)$ - $\sin(180° \pm \theta); \cos(180° \pm \theta); \tan(180° \pm \theta)$ - $\sin(360° - \theta); \cos(360° - \theta); \tan(360° - \theta)$ • Apply the sine, cosine and area rule • Solve problems in two dimensions by using the sine, cosine and area rules by interpreting given geometric and trigonometric models	**7.5.1.1** **7.5.3.1** **7.5.3.3** **7.6.1.3** **7.6.2.1** **7.6.2.3** **7.6.3.1** **7.6.3.3** **7.6.3.5** **7.7.2.2** **7.7.3.2** **7.7.4.2** **7.7.5.1**
4.1 Calculate, represent and interpret measures of central tendency and dispersion in univariate numerical ungrouped data	• Work out the five number summary by: - Calculating the maximum, minimum and quartiles - Determining the fences - Constructing the box and whisker diagram - Indicating any outliers • Interpret the meaning of the representation of the box and whisker diagram with its outliers	**10.5.1** **10.5.2** **10.5.3** **10.5.4**
4.2 Calculate, represent and	• Construct a frequency distribution table by grouping data into classes	**10.1.1.4** **10.3.5.2**

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interpret measures of central tendency and dispersion in univariate numerical grouped data	• Calculate the Cumulative frequency and plot the Ogive curve • Use the Ogive curve to estimate quartile values • Construct histograms using tabulated grouped data • Calculate the mean ($\bar{x}$), median (Me) and modal (Mo) values of grouped data using the formulae: $\bar{x} = \frac{\sum f_i x_i}{n}$ $Me = l + \frac{(\frac{n}{2} - F)}{f} \times c$ $Mo = i + \frac{f_m - f_{m-1}}{2f_m - f_{m-1} - f_{m+1}}$	**10.3.1.4**
5.1 **Plan and describe how to manage finances of social clubs**	• Describe financial concepts related to social clubs, methods of financing and financial control RANGE: normal operating expenses telephone stationary, water & electricity, consumables plus specific income and expenses: membership fees, donations, sponsorships, affiliation fees, license fees, honorarium, function fees, cutlery and crockery, catering and other expenses to host specific events e.g. prize giving functions, year end functions, any club events. • Use given information to draw up a yearly budget for a social club • Use given information to record actual income and expenditure for a year • Compare actual income and expenses to the projected budget figures	

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	• Identify variances and provide possible corrective actions to be taken to control future finances of the club	
5.2 Simple and compound interest	• Construct and make use of time lines to solve problems relating to finance • Use the simple growth formula $A = P(1+in)$ to solve real life problems • Use the compound growth formulae $A = P(1+i)^n$ or $A_i = A_0(1+\frac{r}{100\times m})^{t\times m}$ to solve problems subject to the following compounding: o Annually o Semi-quarterly o Quarterly o Monthly o Daily RANGE: unknown values to calculate will only include A ; P ; i	**10.7.1.3** **10.7.2.5** **10.7.2.3**