MINISTRY OF EDUCATION

NATIONAL CENTRE FOR EDUCATIONAL RESOURCE DEVELOPMENT

NATIONAL SCHEME FOR SECONDARY SCHOOLS







GRADE 10

ADDITIONAL MATHEMATICS

ACKNOWLEDGEMENTS

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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 1
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Algebra	Students will: a. perform operations of addition, subtraction, multiplication, and division of polynomial and rational expressions.	Addition, subtraction, multiplication, division, and algebraic expressions. In Mathematics, an algebraic expression is an expression that is made up of variables, constants, coefficients, and arithmetic operations. Parts of an algebraic term $6x^4$ 6 – coefficient of x^4 x – variable 4 – power/index/exponent Like algebraic terms are defined as those algebraic terms which are represented by the same variable and power We can only add and subtract like algebraic terms.	Adding, subtracting, multiplying, and dividing polynomials and rational expressions.	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 1 – 5	Worksheet Oral exercise Written exercise Past exam papers

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Curriculum Area: Additional Mathematics **GRADE 10**

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	Students will: b. factorize polynomial expressions, of degree less than or equal to 4, leading to real linear factors.	Example: Simplify the following: 1. $6x + 4x + 2x = 12x$ 2. $0.5y^3 + 4.5y^3 - 3y^3 = 2y^3$ 3. $12a^4 \times 3a^2 = 36a^6$ 4. $40p^5 \div 5p^3 = 8p^2$ <u>Factorizing using the distributive law and Highest Common Factor (HCF).</u> Distributive law: $ax + ay = a(x + y)$ Example: Factorize the following: 1. $48 + 6m = 6(8 + m)$ 2. $96g + 80f = 16(6g + 5f)$ 3. $10x^4 - 25x^2 = 5x^2(2x^2 - 5)$ 4. $-8p^3 - p = -p(8p^2 + 1)$ <u>Factorizing by Grouping</u> Factorizing by grouping is normally used when we are given four algebraic terms to factorize. The polynomial is first factorized pairwise, thereafter, the factorization process is completed.	Factorizing polynomial expressions, of degree less than or equal to 4, leading to real linear factors	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 5 – 6 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 6 – 12	Worksheet Oral exercise Written exercise Past exam papers Worksheet Oral exercise Written exercise Past exam papers

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		Example: Factorize the following polynomial expressions. **(1)** $12a^3 - 9a^2 + 4a - 3$ **(2)** $12xy - 28x - 15y + 35$ $(3a^2 + 1)(4a - 3)$ $(4x - 5)(3y - 7)$ (3) $x^2 - x + 2x - 2$ **(4)** $3x^2 + 6x + x + 2$ $(x + 2)(x - 1)$ $(3x + 1)(x + 2)$ Division of a polynomial of degree less than or equal to 4 by a linear or quadratic polynomial. $\frac{p(x)}{g(x)} \equiv q(x) + \frac{r(x)}{g(x)}$, $p(x) \equiv g(x) \times q(x) + r(x)$ Dividend ≡ Divisor × Quotient + Remainder $p(x) =$ Dividend $g(x) =$ Divisor $q(x) =$ Quotient $r(x) = Remainder$ Example: **(1)** Divide $4x^2 - 25x^2$ by $2x + 5y$ **(2)** Divide $2x^3 + 3x^2 - 9$ by $x - 1$.			

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Curriculum Area: Additional Mathematics **GRADE 10**

WEEK 2

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra	Students will: a. determine the remainder when a polynomial is divided by a linear expression. b. use the Factor Theorem to find factors; and,	<u>Applications of the Remainder Theorem.</u> The remainder theorem states that when a polynomial p(x) is divided by a linear polynomial (x - a), then the remainder is equal to p(a). Example: If $p(x) = 2x^3 + 3x^2 - 9x + 6$, find the remainder when $p(x)$ is divided by $x - 1$. $x - 1 = 0, x = 1$ $p(1) = 2(1)^3 + 3(1)^2 - 9(1) + 6$ $p(1) = 2 + 3 - 9 + 6$ $p(1) = 2$ Hence, the remainder is 2, when $p(x)$ is divided by $x - 1$. Example: When $x^3 - 2x^2 + kx + 3$ is divided by $x - 1$, the remainder is 3. Find the value of the constant k. The factor theorem states that: 1. $ax - b$ is a factor of a polynomial $P(x)$ if and only if $P\left(\frac{b}{a}\right) = 0$ 2. $x - b$ is a factor of a polynomial $P(x)$ if and only if $P(b) = 0$ Example: 1. Show that $x + 5$ is a factor of $x^3 + 9x^2 + 23x + 15$.	Determining the remainder when a polynomial is divided by a linear expression. Using the Factor Theorem to find factors.	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 13 – 15 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 15 – 18	Worksheet Oral exercise Written exercise Past exam papers

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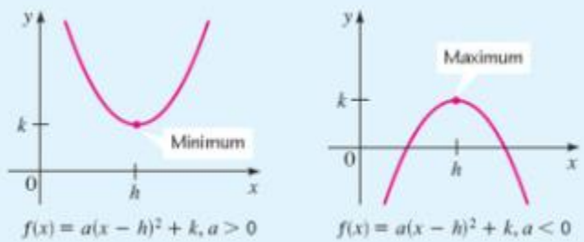
Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 3
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Algebra Quadratics	Students will: a. unknown coefficients using the Factor Theorem. ***End of Unit Assessment*** b. express the quadratic function $ax^2 + bx + c$ in the form $a(x + h)^2 + k$, where h and k are constants to be determined.	Example: If $x^3 - 2x^2 + px + q$ is divisible by $x^2 + x - 2$, evaluate the values of the constants of p and q. <u>Completing the square</u> Write $3x^2 + 10x - 8$ in the form $a(x + h)^2 + k$. $(3x^2 + 10x) - 8$ $3\left(x^2 + \frac{10}{3}x\right) - 8$	Evaluating unknown coefficients using Factor Theorem. Completing the square	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 15 – 18 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 28 – 36	Written exercise Past exam papers Worksheet Oral exercise Written exercise

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		$3\left[x^2+\frac{10}{3}x+\left(\frac{5}{3}\right)^2\right]-8$ $-3\left(\frac{5}{3}\right)^2$ $3\left(x+\frac{5}{3}\right)^2-8-\frac{25}{3}$ $3\left(x+\frac{5}{3}\right)^2-\frac{49}{3}$ OR $a=3, b=10\ and\ c=-8$ $h=\frac{b}{2a}=\frac{10}{2(3)}=\frac{10}{6}=\frac{5}{3}$ $k=\frac{4ac-b^2}{4a}$ $=\frac{4(3)(-8)-(10^2)}{4(3)}=-\frac{49}{3}$ Therefore $x^2+10x-8=3\left(x+\frac{5}{3}\right)^2-\frac{49}{3}$			

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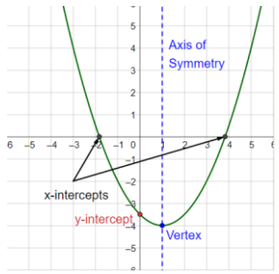
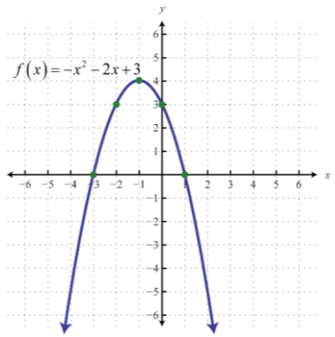
					WEEK 4
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Algebra Quadratics	Students will: a. determine maximum or minimum values and range of quadratic functions by completion of the square.	**Maximum or Minimum Value of a Quadratic Function** Let f be a quadratic function with standard form $f(x) = a(x-h)^2 + k$. The maximum or minimum value of f occurs at $x = h$. If $a > 0$, then the **minimum value** of f is $f(h) = k$. If $a < 0$, then the **maximum value** of f is $f(h) = k$.  If $a < 0$, then the range of $f(x)$ is $f(x) \leq k$ when $x \in R$. If $a > 0$, then the range of $f(x)$ is $f(x) \geq k$ when $x \in R$.	Finding maximum or minimum values and range of quadratic functions by completion of the square	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 36 – 52	Worksheet Oral exercise Written exercise Past exam papers

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WEEK 5

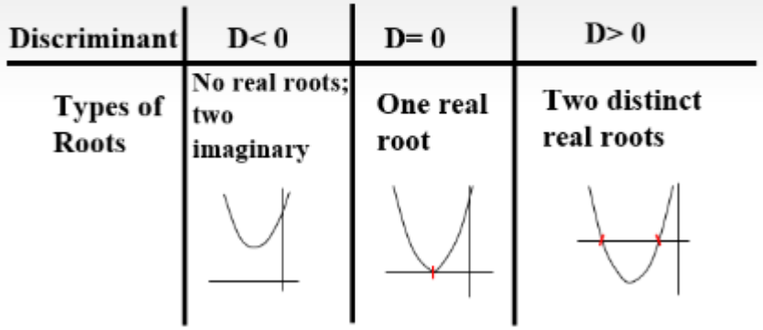
TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra Quadratics	Students will: a. sketch the graph of quadratic functions, including maximum or minimum points and intercepts on the axes;	Graphs of quadratic functions  	Sketching the graph of quadratic functions, including maximum or minimum points and intercepts on the axes	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 53 – 55	Worksheet Oral exercise Written exercise Past exam papers

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WEEK 6

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra Quadratics	Students will: a. determine the nature of the roots of a quadratic equation.	**Discriminant of a Quadric equation** **Given the quadratic equation $y=ax^2+bx+c$** **The discriminant $D=b^2-4ac$ tells the types of roots the equation has.**  	Using the discriminant $D = b^2$ – 4ac to determine the nature of the roots of a quadratic equation	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 55 – 57	Worksheet Oral exercise Written exercise Past exam papers

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	b. solve equations in x reducible to a quadratic equation.	Some equations can pose some difficulty to directly calculate their solutions directly. One type of problem of this kind is called disguised (hidden) quadratics. Such equations can be reduced to a quadratic equation in one unknown, by using a suitable substitution. Example: Solve the equation 2. $2^{2x+1} - 3(2^x) - 2 = 0$ 3. $x^4 - 6x^2 + 8 = 0$ 4. $x - 2\sqrt{x} + 1 = 0$	Solving equations in x reducible to a quadratic equation		

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WEEK 7

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra Quadratics	Students will: a. use the relationship between the sums and products of the roots and the coefficients of $ax^2 + bx + c = 0$; and,	<u>Vieta's root theorem</u> The sum of the roots, $\alpha + \beta = -\frac{b}{a}$ The product of the roots, $\alpha\beta = \frac{c}{a}$ Vieta's root theorem allows us to calculate the roots of quadratic equations, given in terms of, α and β, without actually solving the equations. A quadratic equation in x can be written in the form: $x^2 - (The\ sum\ of\ the\ roots)x + the\ product\ of\ the\ roots = 0$ $x^2 - (\alpha + \beta)x + \alpha\beta = 0$ For example, If α, β are the roots of $x^2 + 4x + 6 = 0$, find the equation whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}$.	Using the relationship between the sums and products of the roots and the coefficients of $ax^2 + bx + c = 0$	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 57 – 64	Worksheet Oral exercise Written exercise Past exam papers

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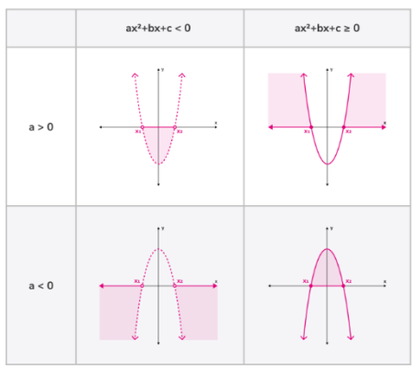
					WEEK 8
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Algebra Quadratics	Students will: a. solve two simultaneous equations in 2 unknowns in which one equation is linear and the other equation is nonlinear.	Solution of equations (one linear and one non-linear inclusive of quadratic and circle equations). For example: 5. $y = ax + b$ $(x + f)^2 + (y + g)^2 = r^2$ 6. $px + q = y$ $ax^2 + bx + c = y$ Solve the simultaneous equations: 1. $y - 15x - 3 = 0$ $y + 3 = 5x^2 + 2x$ 2. $y + 6x = 5$ $y + 7x + 9 = 3x^2$	Solving two simultaneous equations in 2 unknowns in which one equation is linear and the other equation is nonlinear.	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 65 – 67	Worksheet Oral exercise Written exercise Past exam papers

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WEEK 9

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra Quadratics	Students will: a. determine the solution sets of quadratic inequalities using algebraic or graphical methods; and, ***End of Unit Assessment***	Quadratic inequalities in one unknown. A quadratic inequality in one unknown, x, can be reduced to one of the following four forms: **(1)** $ax^2 + bx + c > 0$ **(2)** $ax^2 + bx + c < 0$ **(3)** $ax^2 + bx + c \geq 0$ **(4)** $ax^2 + bx + c \leq 0$  Example: Solve the quadratic inequality $x^2 + x + 6 > 0$	Determining the solution sets of quadratic inequalities using algebraic or graphical methods; and,	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 75 – 82	Worksheet Oral exercise Written exercise Past exam papers

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WEEK 10

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra Inequalities	Students will: a. determine the solution sets of inequalities of the form $\frac{ax+b}{cx+d} > 0; \geq 0, < 0, \leq 0$ using algebraic or graphical methods.	A rational inequality is an inequality which involves an algebraic fraction. Example: 7. $\frac{ax+b}{cx+d} > 0$, 8. $\frac{ax+b}{cx+d} \geq 0$, 9. $\frac{ax+b}{cx+d} < o$, 10. $\frac{ax+b}{cx+d} \leq 0$ The use of set builder notation to represent the solution set. Example 1: Solve $\frac{x-2}{x+3} > 0$ $(x+3)^2 \times \frac{x-2}{x+3} > 0 \times (x+3)^2$ $(x+3)(x-2) > 0$ Solution set $\{x < -3 \; or \; x > 2\}$ Example 2: Solve $\frac{5x-2}{x-3} \leq 2$ $(x-3)^2 \frac{5x-2}{x-3} \leq 2(x-3)^2$ $(x-3)(5x-2) \leq 2(x-3)^2$	Determining the solution sets of inequalities of the form $\frac{ax+b}{cx+d} > 0; \geq 0, < 0, \leq 0$ using algebraic or graphical methods. Explaining the importance of the denominator not being zero.	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 82 – 89	Worksheet Oral exercise Written exercise Past exam papers

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	End of Unit Assessment	$(x-3)(5x-2)-2(x-3)^2 \leq 0$ $(x-3)[5x-2-2(x-3)] \leq 0$ $(x-3)(5x-2-2x+6) \leq 0$ $(x-3)(3x+4) \leq 0$ Solution set $\left\{x: -\frac{4}{3} \leq x < 3\right\}$			

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					WEEK 11
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Algebra Surds, Indices, and Logarithms	Students will: a. perform operations involving surds.	<u>Addition, subtraction and multiplication of surds</u> A surd is an irrational number which is the root of a rational number. Example: $\sqrt{3}, \sqrt{5}, \sqrt{7}, \sqrt{11}$. The square root of a product of positive numbers is equal to the product of the square roots of the number. $\sqrt{a}\sqrt{b} = \sqrt{ab}$ The square root of a quotient is equal to the quotient of the square root of the numbers. $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$	Adding, subtracting, multiplying surds	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 145 – 152	Worksheet Oral exercise Written exercise Past exam papers

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		The simplest form of a square-root surd is of the form $k\sqrt{a}$, where k is a constant a contains no perfect-square factor other than 1. k is the coefficient of the surd. Simplify: 11. $2\sqrt{3} + 5\sqrt{3} + \sqrt{3} = 8\sqrt{3}$ 12. $11\sqrt{5} - 4\sqrt{5} = 7\sqrt{5}$ 13. $3\sqrt{2} \times 5\sqrt{2} = 15\sqrt{4} = 30$	Rationalizing the denominators of surds	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 153 – 155	Worksheet Oral exercise Written exercise Past exam papers

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		<u>Rationalization of denominators of surds</u> Rationalizing surds is where we convert the denominator of a fraction from an irrational number to a rational number. In more complex cases, it is useful to multiply the denominator by its conjugate to cancel out the surds in the denominator. <u>Conjugate of a surd</u> Given the surd $(\sqrt{a}+\sqrt{b})$, $(\sqrt{a}-\sqrt{b})$ is its conjugate. Example: Rationalize the denominator of $\frac{\sqrt{5}}{\sqrt{3}}$. The denominator can be rationalized by multiplying the numerator and denominator by $\sqrt{3}$.			

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TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		$\frac{\sqrt{5}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{5}\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{\sqrt{15}}{\sqrt{9}} = \frac{\sqrt{15}}{3}$ Example: Rationalize the denominator of $\frac{5\sqrt{3}+2\sqrt{7}}{\sqrt{3}+\sqrt{7}}$ $= \frac{5\sqrt{3}+2\sqrt{7}}{\sqrt{3}+\sqrt{7}} \times \frac{\sqrt{3}-\sqrt{7}}{\sqrt{3}-\sqrt{7}}$ $= \frac{15-5\sqrt{21}+2\sqrt{21}-14}{3-7}$ $= \frac{1-3\sqrt{21}}{-4}$ $= \frac{3\sqrt{21}-1}{4}$			

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WEEK 12

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra Surds, Indices, and Logarithms	Students will: a. use the laws of indices to solve exponential equations with one unknown.	Equations reducible to linear and quadratic forms. For example, Solve $2^{2x+1} - 3(2^x) - 2 = 0$ $2^1 \times 2^{2x} - 3(2^x) - 2 = 0$ $2 \times (2^x)^2 - 3(2^x) - 2 = 0$ Let $b = 2^x$ $2b^2 - 3b - 2 = 0$ $2b^2 - 4b + b - 2 = 0$ $(2b^2 - 4b)(+b - 2) = 0$ $2b(b-2) + 1(b-2) = 0$ $(2b+1)(b-2) = 0$ $b = -\frac{1}{2}$ or $b = 2$ $2^x = -\frac{1}{2}$ No solution or $2^x = 2$ $2^x = 2^1$ $x = 1$	Using the laws of indices to solve exponential equations with one unknown.	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 155 – 165	Worksheet Oral exercise Written exercise Past exam papers

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					WEEK 13
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Algebra Surds, Indices, and Logarithms	Students will: a. use the fact that: log b=c↔ $a^c = b$ where $a \in N$ and $b \in \cdot^+$ c. simplify expressions by using the laws:	<u>The relationship between indices and logarithms</u> $\log_9 b = c \leftrightarrow a^c = b$ <u>Common Logarithm</u> The logarithm of a number to base 10 is called a common logarithm. $\log_{10} x = lg\ x$ <u>Natural Logarithm</u> The logarithm of a number to base e $(where\ e = 2.7\dot{1}828\dot{})$ is called a natural (Napierian) logarithm. $x = ln\ ln\ x$ <u>Laws of Logarithm</u> a) $log(PQ) = logP + logQ$; b) $log\left(\frac{P}{Q}\right) = logP - logQ$	Using the fact that $\log_a b = c \leftrightarrow a^c = b$ where $a \in N$ and $b \in \cdot^+$ simplifying expressions by using the laws of logarithm	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 165 – 173	Worksheet Oral exercise Written exercise Past exam papers

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TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		a) $logP^b = blogP$; b) $\log_a 1 = 0$; c) $\log_a a = 1$ For example, $(2x + 5) - log_a$ $(3x - 10) = log_a (x - 14)$			

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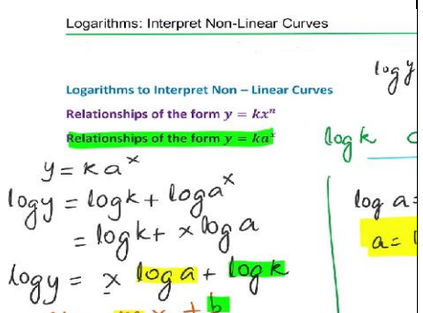
Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 14
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Algebra Surds, Indices, and Logarithms	Students will: a. solve logarithmic equations.	$\left(\frac{2x+5}{3x-10}\right) = log_a(x - 14)$ $\frac{2x+5}{3x-10} = x - 14$ $2x + 5 = (x - 14)(3x - 10)$ $2x + 5 = 3x^2 - 10x - 42x + 140$ $3x^2 + 54x - 135 = 0$ $x = 2.22$ or $x = -20.23$ $x = 2.22$ is a valid solution, however $x = -20.23$ is an invalid solution, because when $x = -20.23$ is substituted into $\left(\frac{2x+5}{3x-10}\right) = log_a(x - 14)$, a negative number will be obtained in the bracket, and a logarithm of a negative number is not defined/invalid.	Solving logarithmic equations	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 173 – 176	Additional Mathematics A Complete Course for CSES Raymond Toolsie Pg. 173 – 176

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WEEK 15

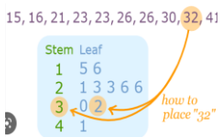
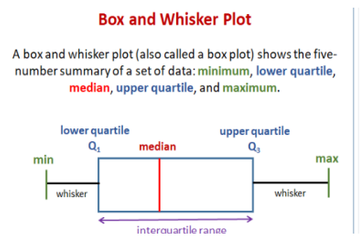
TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Algebra Surds, Indices, and Logarithms	Students will: a. use logarithms to solve equations of the form $a^x = b$; and, b. apply logarithms to problems involving the transformation of a given relationship to linear form. ***End of Unit Assessment***	Example: Solve the equation $2^x = 5$ $lg\ 2^x = lg\ 5$ $x\ lg\ 2 = lg\ 5$ $x = \frac{lg\ 5}{lg\ 2}$ $x = 2.32$ Linear reduction. 	Using logarithms to solve equations of the form $a^x = b$ Applying logarithms to problems involving the transformation of a given relationship to a linear form	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 176 – 177 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 178 – 185	Worksheet Oral exercise Written exercise Past exam papers

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WEEK 16

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Statistics	Students will: a. distinguish between types of data. b. represent numerical data diagrammatically.	Qualitative Data Quantitative Data- Discrete or Continuous Stem and leaf diagram  	A common activity for creating a stem and leaf diagram is to have students collect data on a specific TOPIC/ SUB-TOPIC, such as the heights of their classmates or the number of siblings they have. Choose a TOPIC/ SUB-TOPIC Collect data Create a stem and leaf diagram:	A concise course in Advanced level statistics with worked examples by Crawshaw and Chambers fifth edition https://quizizz.com/admin	Concept of rates of change and how it can be used in different contexts. Peer evaluation: Have students evaluate each other's work or presentations on types of data.

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Curriculum Area: Additional Mathematics **GRADE 10**

WEEK 17

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Statistics	Students will: a. determine quartiles and percentiles from raw data, grouped data, stem and leaf diagrams, box and whisker plots.	The Quartile Formula for Q1 = $\frac{1}{4}(n+1)^{th}$ term The Quartile Formula for Q3 = $\frac{3}{4}(n+1)^{th}$ term The Quartile Formula for Q2 = Q3 – Q1 (Equivalent to Median) $P_i = i \cdot \left(\frac{N+1}{100}\right)$, where: P_i = Percentile value (20, 40, 60, 80); i = 20, 40, 60, 80; N = Number of observations in the dataset (DCLP positives) = 84	Gather your data set: First, you need a set of data that you want to calculate percentiles for Sort the data: Arrange the data in ascending order. Calculate the percentile rank. Calculate the percentile value. Repeat for other percentiles	Additional Mathematics A complete course for CSEC by Raymond Toolsie A Concise Course in Advanced Level Statistics with worked examples by Crawshaw and Chambers fifth edition	Applicability: Check if the activity applies to different types of data sets. Make sure that the activity is not specific to a certain type of data or context and that the steps can be applied to a wide range of data sets.

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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 18
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Statistics	Students will: a. calculate measures of central tendency and dispersion. b. explain how the standard deviation measures the spread of data. ***End of Unit Assessment***	Mode, mean, median, range, interquartile range, semi-inter quartile range, variance, and standard deviation of ungrouped and grouped data;	Gather your data set: First, you need a set of data that you want to calculate measures of location for grouped and ungrouped data. Calculate measures of spread for grouped and ungrouped data.	https://www.mathsisfun.com/data/percentiles.html https://www.mathsisfun.com/data/mean-frequency-table.html https://quizizz.com/admin	Engagement: Check if the activity is engaging and interactive. To make the activity more engaging, you can include visuals, such as graphs or charts, and provide examples of real-life scenarios where percentiles are commonly used.

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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 19
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Statistics Probability Theory	Students will: a. distinguish among the terms experiment, outcome, sample space and event, and concept of probability. b. Calculate the probability of event A, P(A), as the number of outcomes of A	Sample space: The set of all possible outcomes of an experiment is called the sample space. For example, if you roll a six-sided die, the sample space would be {1, 2, 3, 4, 5, 6}. **Event**: An event is a subset of the sample space, which represents a particular outcome or a group of outcomes.	For a challenge, have the students calculate the probability of rolling a sum of two numbers, such as 7, by listing all the possible combinations of two numbers and calculating the probability of each combination. This activity reinforces the concept of the multiplication rule. One suggested activity for understanding the laws of probability is to create a simple experiment and analyze its results using probability theory.	Additional Mathematics A complete course for CSEC by Raymond Toolsie A Concise Course in Advanced Level Statistics with worked examples by Crawshaw and Chambers fifth edition	One suggested evaluation strategy for assessing the effectiveness of a learning program is to use a combination of formative and summative evaluation methods.

	divided by the total number of possible outcomes, when all outcomes are equally likely, and the sample space is finite.	For example, the event “rolling an even number” for the die would be {2, 4, 6}.			

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Curriculum Area: Additional Mathematics **GRADE 10**

WEEK 20

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Statistics Probability Theory	Students will: a. use the basic laws of probability: (i) the sum of the probabilities of all the possible outcomes in a sample space is equal to one. (ii) $0 \leq P(A) \leq 1$ or any event A (iii) $P(A') = 1 - P(A)$, where $P(A')$ is the probability that event A does not occur.	**The addition rule:** This law states that the probability of either of two mutually exclusive events occurring is equal to the sum of their probabilities. For example, the probability of rolling a 3 or a 4 on a six-sided die is the sum of the probabilities of rolling a 3 (1/6) and a 4 (1/6), which is 1/3. **The multiplication rule**: This law states that the probability of two independent events both occurring is equal to the product of their probabilities.	For example, you could create an experiment where you flip a coin 10 times and record how many times it lands on heads and how many times it lands on tails. Then, using the laws of probability, you can calculate the probability of getting a certain number of heads or tails in the 10-coin flips. Another example is to roll a die and record the number that comes up. Then, you can calculate the probability of rolling each number and compare it to the theoretical probability.	A Concise Course in Advanced level statistics with worked examples by Crawshaw and Chambers fifth edition.	One suggested evaluation strategy for assessing the effectiveness of a learning program is to use a combination of formative and summative evaluation methods.

		For example, the probability of rolling a 2 and then a 5 on two successive rolls of a six-sided die is (1/6) x (1/6) = 1/36.			

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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 21
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Statistics Probability Theory	Students will: a. use $P(A \cup B) = P(A)+P(B)- P(A \cap B)$ to calculate probabilities b. Identify mutually exclusive events A and B such that P(AB)= 0. Mutually exclusive events.	Mutually exclusive events are events that cannot occur at the same time. For example, if you toss a coin, the event of getting a head and getting tails are mutually exclusive events because only one of these events can happen at a time.	Choose a real-world scenario that involves multiple stages or decisions with different outcomes.	Additional Mathematics A Complete Course for CSEC by Raymond Toolsie https://quizizz.com/admin	Draw and interpret: Ask students to draw a tree diagram to represent a given scenario and then interpret the diagram by calculating probabilities and identifying possible outcomes. This will assess their ability to apply the concepts and skills involved in creating and analyzing tree diagrams.

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Curriculum Area: Additional Mathematics **GRADE 10**

WEEK 22

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Statistics Probability Theory	Students will: a. calculate the conditional probability P(A|B) where P(A|B) $=\frac{P(A\cap B)}{P(B)}$ c. identify independent events. Use the property P(A∩B) = P (A) × P(B) or P(A|B) = P(A) where A and B are independent events	**Conditional probability** can be used to make predictions or estimates about future events based on prior knowledge or observations. It is important to note that the calculation of conditional probability depends on the assumption that the events are dependent. If the events are independent, then the conditional probability is simply the probability of the event occurring.	Calculating conditional probability Identifying independent events	A concise course in Advanced level statistics with worked examples by Crawshaw and Chambers fifth edition **https://quizizz.com/admin**	Identify errors: Provide students with a partially completed tree diagram or a diagram with errors and ask them to identify and correct the errors. This will assess their ability to recognize and correct mistakes in tree diagrams and to apply the rules and principles of probability.

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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 23
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Statistics Probability Theory	Students will: a. construct and use possibility space diagrams, tree diagrams and Venn diagrams to solve problems involving probability. **End of Unit Assessment** **School-Based Assessment should commence.** **(Tasks 1 to 3 should be completed by the end of**	A tree diagram consists of branches and nodes. Each node represents a decision point or an event, and the branches represent the different possible outcomes of that decision or event. The branches are labelled with probabilities, and the probabilities of all the branches that lead to a particular outcome are added together to determine the probability of that outcome	Draw a tree diagram to represent the scenario. Start with a node that represents the first decision point and add branches for each possible outcome. Label each branch with the probability of that outcome occurring. Calculate the probability of each possible outcome.	A concise course in Advanced level statistics with worked examples by Crawshaw and Chambers fifth edition	

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TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	term two and tasks 4 to 7 by the end of term three)		Discuss the results and consider how they might impact your decision-making in the scenario		

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					WEEK 24
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Coordinate Geometry	Students will: a. determine the equation of a straight line. b. determine whether lines are parallel or mutually perpendicular using the gradients.	The equation of a straight line can be written in any form. For example, $y = mx + c$ $ax + by + c = 0$ <u>Gradient–intercept form</u> The equation of a straight line m and $y-$ intercept c is $y = mx + c$ <u>Point–gradient form</u> $y - y_1 = m(x - x_1)$ Parallel lines Two lines are parallel to each other if they have equal gradients, $m_1 = m_2$. Example: $y = 3x + 2$ and $y = 3x - 8$	Finding the equation of a straight line Determining whether lines are parallel or mutually perpendicular using the gradients.	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 221 – 227 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 227 – 234	Worksheet Oral exercise Written exercise Past exam papers

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		The two lines are parallel because both have a gradient of 3. Two lines are perpendicular to each other if the product of their gradients is -1, that is, $m_1 \times m_2 = -1$. Example: $y = -4x + 5$ and $y = \frac{1}{4}x + 3$ The two lines are perpendicular because $-4 \times \frac{1}{4} = -1$			

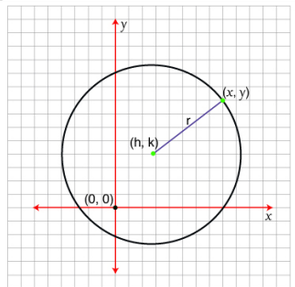
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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 25
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Coordinate Geometry	Students will: a. determine the point of intersection of two straight lines. b. write the equation of a circle, given: • centre and radius • centre and point on the circumference. • endpoints of diameter	<u>Point of intersection of two straight lines</u> If two straight lines intersect, the coordinates of the point of intersection can be found by solving the two equations simultaneously. Example: Find the coordinates of the point of intersection of the two straight lines with equations $3y = x + 25 \; and \; 3x = y + 9$ <u>Equation of a circle</u> The equation of the circle can be written in the forms: • $(x - f)^2 + (y - g)^2 = r^2$ (Standard)	determining the point of intersection of two straight lines writing the equation of a circle	Additional Mathematics A Complete Course for CSES Raymond Toolsie Pg. 234 – 235 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 236 – 239	Worksheet Oral exercise Written exercise Past exam papers

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TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	b)	 $r^2 = (x - h)^2 + (y - k)^2$ *here,* r = radius, (h, k) = center, (x, y) = a point on the circumference • $x^2+y^2 + 2fx + 2gy + c = 0$, where $f, g, c, r \in \cdot$ (General)			

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Curriculum Area: Additional Mathematics

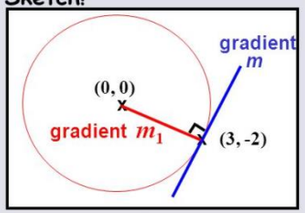
GRADE 10

WEEK 26

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Coordinate Geometry	Students will: a. determine the centre and radius of a given circle.	From the **General Equation** $x^2 + y^2 + 2gx + 2fy + c = 0$ By completing the square; $(x+g)^2 + (y+f)^2 - g^2 - f^2 + c = 0$ $(x+g)^2 + (y+f)^2 = g^2 + f^2 - c$ By comparing to **Standard Equation** $(x-h)^2 + (y-k)^2 = r^2$ Centre , $C = (-g, -f) = (h, k)$ Radius , $r = \sqrt{g^2 + f^2 - c}$	finding the centre and radius of a given circle	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 239 – 240	Worksheet Oral exercise Written exercise Past exam papers
	b. determine equations of tangents and normals at given points on circles; and,	<u>Tangents and Normals to the circle</u>	determining equations of tangents and normals at given points on circles	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 240 – 245	Worksheet Oral exercise Written exercise Past exam papers

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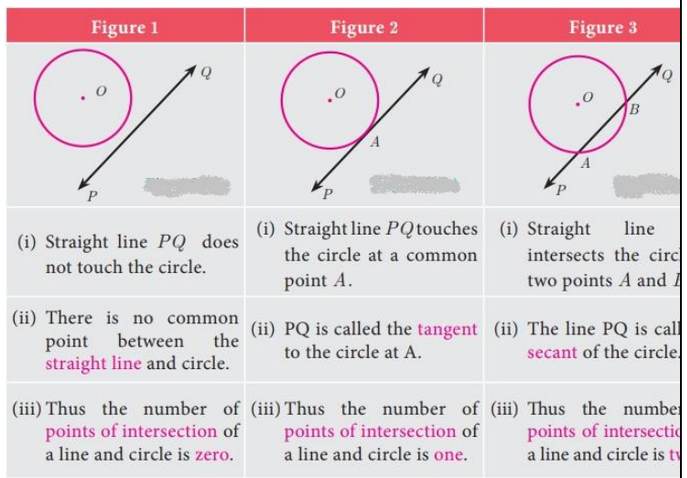
TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		1. Find the equation of the tangent at the point $A(3,-2)$ on the circle $x^2+y^2=13$ Solution: Centre is (0, 0). Sketch! Gradient of radius, $m_1=\frac{y_2-y_1}{x_2-x_1} \Rightarrow m_1=\frac{-2}{3}$  $\Rightarrow$ Gradient of tangent, $m_2=-\frac{1}{m_1} \Rightarrow m=\frac{3}{2}$ $y=mx+c \Rightarrow -2=\frac{3}{2}(3)+c \Rightarrow -\frac{13}{2}=c$ $\Rightarrow$ Equation of tangent is $y=\frac{3}{2}x-\frac{13}{2}$ or $2y-3x+13=0$			

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Curriculum Area: Additional Mathematics

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WEEK 27

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Coordinate Geometry	Students will a. determine the point(s) of the intersection of a circle with a straight line. ***End of Unit Assessment***	<u>Point(s) of intersection of a circle with a straight line.</u>  **Figure 1** (i) Straight line PQ does not touch the circle. (ii) There is no common point between the straight line and circle. (iii) Thus the number of points of intersection of a line and circle is zero. **Figure 2** (i) Straight line PQ touches the circle at a common point A. (ii) PQ is called the tangent to the circle at A. (iii) Thus the number of points of intersection of a line and circle is one. **Figure 3** (i) Straight line intersects the circ two points A and (ii) The line PQ is call secant of the circle. (iii) Thus the numbe points of intersecti a line and circle is t **▲ Point(s) of Intersection of a Circle and a Straight Line** • The pair of simultaneous equations, the equation of a circle and the equation straight line are solved using the method of substitution. • The linear equation is used to substitute for either x or y in the equation of circle. • After simplification a quadratic equation in either x or y is obtained. • The quadratic equation is then solved using an acceptable method. If the line is a tangent to the circle then one coordinate is obtained. If the line is a secant or chord then two distinct coordinates are obtained. • The corresponding coordinate(s) are then calculated using the linear subst • Finally, the point(s) of intersection are stated.	Determining the point(s) of intersection of a circle with a straight line	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 246 – 249	Worksheet Oral exercise Written exercise Past exam papers

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WEEK 28

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Sequences and Series	Students will: a. define a sequence of terms $\{a_n\}$ where n is a positive integer.	A sequence is a succession of terms $a_1, a_2, a_3, \ldots, a_n, \ldots$ where each term is formed by a rule given by the n^{th} term (general term) and $n \in Z^+$. <u>Arithmetic sequence</u> An arithmetic sequence is an ordered set of numbers that have a common difference between each consecutive term. $The\ general\ term = a_n$ $= a + (n-1)d$ $a =$ the first term $d = the\ common\ difference$	Defining a sequence of terms $\{a_n\}$ where n is a positive integer.	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 191 – 193	Worksheet Oral exercise Written exercise Past exam papers

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TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	b. write a specific term from the formula for the n^{th} term of a sequence.	<u>Geometric sequence</u> A geometric sequence is a sequence of numbers in which the ratio between consecutive terms is constant. $The\ general\ term = a_n = ar^{n-1}$ $a =$ the first term $r = the\ common\ ratio$ Example: If the first 3 terms in an arithmetic sequence are 8, 5, 2 then what is the 16th term? In this sequence a = 8 and $d = -3$.	writing a specific term from the formula for the n^{th} term of a sequence		

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WEEK 29

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Sequences and Series	Students will: a. define a series, as the sum of the terms of a sequence b. identify arithmetic and geometric series.	A Series is the sum of the terms of a sequence. Summation (∑) Notation The Greek letter, capital sigma, ∑, is used as a summation symbol; it means 'the sum of an infinite number of terms that follow a pattern. $\sum_{i=1}^{n} k\,a_i = k\sum_{i=1}^{n} a_i$ The sum of an arithmetic sequence is known as an arithmetic series, while the sum of a geometric sequence is known as a geometric series	Defining a series, as the sum of the terms of a sequence identifying arithmetic and geometric series	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 194 – 197 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 197 – 203	Worksheet Oral exercise Written exercise Past exam papers

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TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		Examples: State whether the series is arithmetic or geometric. 1. $1 + 5 + 9 + ... + 49 + 53$ 2. $3 + 6 + 12 + 24 + 48 + \cdots$			

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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 30
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Sequences and Series	Students will: a. derive expressions for the general terms and sums of finite arithmetic, and finite and infinite geometric series.	These formulae can be used to calculate the first n terms of an arithmetic series. • $S_n = \frac{n}{2}[2a + (n-1)d]$ Last term $= l = a + (n-1)d$ • $S_n = \frac{n}{2}(a + l)$ These formulae can be used to calculate the first n terms of a finite geometric series. • $S_n = \frac{a(1-r^n)}{1-r}$ $if\ r < 1$ • $S_n = \frac{a(r^n-1)}{r-1}$ $if\ r > 1$ S_∞ is the sum of a series to an infinite number of terms. $$S_\infty = \frac{a}{1-r}$$	Deriving expressions for the general terms and sums of finite arithmetic, and finite and infinite geometric series Showing that all arithmetic series (except for zero common difference) are divergent and that geometric series are convergent only if -1 < r < 1,	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 197 – 203	Worksheet Oral exercise Written exercise Past exam papers

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Curriculum Area: Additional Mathematics **GRADE 10**

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	b. show that all arithmetic series (except for zero common difference) are divergent and that geometric series are convergent only if -1 < r < 1, where r is the common ratio.	Divergent Series 1. The sum of an arithmetic series is divergent. 2. The sum of a geometric series is divergent when $\|r\| > 1$, that is, $r < -1$ and $r > 1$. Convergent Series 1. The sum of a geometric is convergent when $\|r\| < 1$, that is, $-1 < r < 1$.			

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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 31
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Sequences and Series	Students will: a. calculate the sum of arithmetic and geometric series to a given number of terms; and,	Application of the concepts of arithmetic and geometric series to solve real-world problems such as investments. Examples: 1. On commencing employment, a man is paid a salary of $ 16,000 per annum and receives annual increments of $480. Determine his salary in the ninth year and calculate the total he will have received in the first 12 years.	Where r is the common ratio calculating the sum of arithmetic and geometric series to a given number of terms Finding the sum of a convergent geometric series	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg.207– 214	Worksheet Oral exercise Written exercise Past exam papers

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
	b. find the sum of a convergent geometric series. ***End of Unit Assessment***	2. If the value of a vehicle originally valued at \$3000000 depreciates 15% per annum. Calculate its value after 4 years. The vehicle is sold when its value is less than \$550000. After how many years will the lathe be sold? <u>Convergent Geometric Series.</u> S_∞ is the sum of a series to an infinite number of terms. $$S_\infty = \frac{a}{1-r}$$ Example: Find the common ratio and sum it to the infinity of the geometric series $\frac{3}{5} - \frac{2}{5} + \frac{4}{15} - \cdots$			

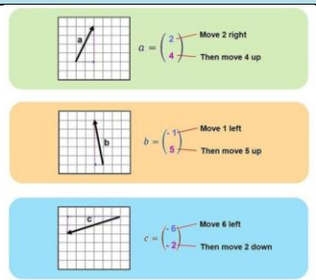
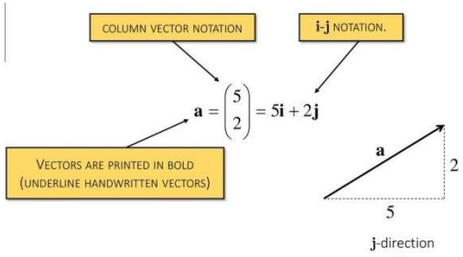
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Curriculum Area: Additional Mathematics **GRADE 10**

					WEEK 32
TOPIC/ SUB-TOPIC	**GENERAL OBJECTIVE**	**CONTENT**	**ACTIVITY**	**RESOURCE**	**EVALUATION STRATEGY**
Vectors	Students will: a. distinguish between scalar and vector quantities. b. express a vector in the form $(x\ y)$ or $x\mathbf{i} + y\mathbf{j}$; $x, y \in R$; c. define equal vectors.	Physical quantities are divided into two types: scalars and vectors. A scalar quantity has only a magnitude (size). Examples: mass, length, temperature, speed and time. A vector quantity has both magnitude and direction. Examples: weight, displacement, velocity, acceleration, and force. Geometrically, a vector is represented by a line segment with an arrow which is called a directed line segment. Vectors can also be represented on a Cartesian plane using rectangular coordinates where it is stated as a column vector.	Distinguishing between scalar and vector quantities Expressing a vector in the form $(x\ y)$ or $x\mathbf{i} + y\mathbf{j}$; $x, y \in R$;	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 257 – 263	Worksheet Oral exercise Written exercise Past exam papers

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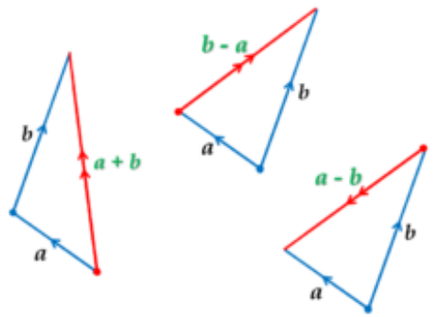
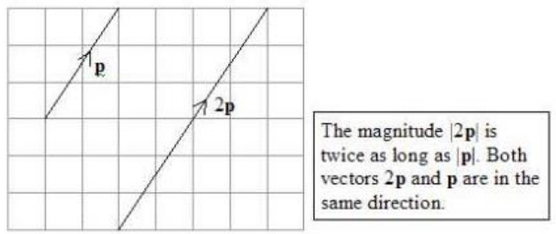
TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		  Two vectors are equal if they have the same magnitude and direction.			

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Curriculum Area: Additional Mathematics

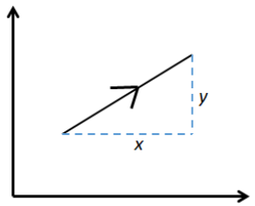
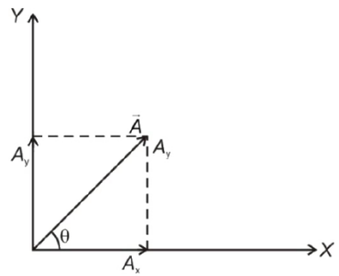
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WEEK 33

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Vectors	Students will: a. add and subtract vectors. b. multiply a vector by a scalar quantity. c. find the magnitude and direction of a vector.	**ADDITION & SUBTRACTION OF VECTORS:**  Suppose we have a scalar 2 and a vector $\mathbf{p} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$. Then $2\mathbf{p} = 2 \times \begin{pmatrix} 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 4 \\ 6 \end{pmatrix}$. Note that in scalar multiplication, each component of the vector is multiplied by the scalar.  The magnitude $\lvert 2\mathbf{p} \rvert$ is twice as long as $\lvert \mathbf{p} \rvert$. Both vectors $2\mathbf{p}$ and $\mathbf{p}$ are in the same direction. Magnitude of a vector	Defining equal vectors Adding and subtracting vectors Multiplying a vector by a scalar quantity Finding the magnitude and direction of a vector	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 265 – 271 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 271 – 273 Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 275 – 279	Worksheet Oral exercise Written exercise Past exam papers Worksheet Oral exercise Written exercise Past exam papers

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Curriculum Area: Additional Mathematics **GRADE 10**

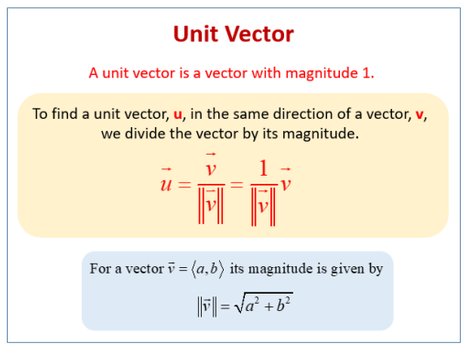
TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		The magnitude of vector $\vec{a}$ is written as $\lvert\vec{a}\rvert$. The magnitude of vector $\overrightarrow{AB}$ is written as $\lvert\overrightarrow{AB}\rvert$. If $\vec{a}=\begin{pmatrix}x\\y\end{pmatrix}$ then the magnitude $\lvert\vec{a}\rvert=\sqrt{x^2+y^2}$ (using Pythagoras theorem)  <u>Direction of a vector</u>  $\tan\theta=\frac{A_y}{A_x}$ $\theta=\tan^{-1}\left(\frac{A_y}{A_x}\right)$			

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WEEK 34

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Vectors	Students will: a. use unit vectors. b. find displacement vectors.	A unit vector has a unit magnitude (length) in the direction of the vector that it represents.  **Unit Vector** A unit vector is a vector with magnitude 1. To find a unit vector, **u**, in the same direction of a vector, **v**, we divide the vector by its magnitude. $\vec{u} = \frac{\vec{v}}{\|\vec{v}\|} = \frac{1}{\|\vec{v}\|}\vec{v}$ For a vector $\vec{v} = \langle a, b \rangle$ its magnitude is given by $\|\vec{v}\| = \sqrt{a^2 + b^2}$ Example: Find the unit vector having the same direction as v. $v = -5i + 12j$ $\|v\| = \sqrt{(-5)^2 + (12)^2} = 13$ $v = \frac{-5}{13}i + \frac{12}{13}j$ Find the unit vector having the same direction as v. $v = 2i - j$ $\|v\| = \sqrt{(2)^2 + (-1)^2} = \sqrt{5}$ $v = \frac{2}{\sqrt{5}}i - \frac{1}{\sqrt{5}}j$	Using unit vectors	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 273 – 275	Worksheet Oral exercise Written exercise Past exam papers

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TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		A position vector describes the position of a point in relation to the origin. A displacement vector is the difference between two position vectors.	Finding displacement vectors	Additional Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 275 – 279	

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GRADE 10

WEEK 35

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Vectors	Students will: a. define the scalar product of two vectors. b. in terms of their components. c. in terms of their magnitudes and the angle between them. d. find the angle between two given vectors; and,	**Scalar Product of Two Vectors** Given two vectors in the coordinate plane, $\boldsymbol{a} = x_1\boldsymbol{i} + y_1\boldsymbol{j}$ and $\boldsymbol{b} = x_2\boldsymbol{i} + y_2\boldsymbol{j}$, then their scalar (dot) product is: $\boldsymbol{a} \cdot \boldsymbol{b} = (x_1\boldsymbol{i} + y_1\boldsymbol{j}) \cdot (x_2\boldsymbol{i} + y_2\boldsymbol{j})$ $= x_1x_2(\boldsymbol{i} \cdot \boldsymbol{i}) + x_1y_2(\boldsymbol{i} \cdot \boldsymbol{j}) + x_2y_1(\boldsymbol{j} \cdot \boldsymbol{i}) + y_1y_2(\boldsymbol{j} \cdot \boldsymbol{j})$ $= x_1x_2(1) + x_1y_2(0) + x_2y_1(0) + y_1y_2(1)$ $= x_1x_2 + y_1y_2$ Also $\boldsymbol{a} \cdot \boldsymbol{b} = \lvert\boldsymbol{a}\rvert \lvert\boldsymbol{b}\rvert \cos\theta$ $= \sqrt{x_1^2 + y_1^2}\sqrt{x_2^2 + y_2^2}\cos\theta$ Thus $\sqrt{x_1^2 + y_1^2}\sqrt{x_2^2 + y_2^2}\cos\theta = x_1x_2 + y_1y_2$ So $\cos\theta = \frac{x_1x_2 + y_1y_2}{\sqrt{x_1^2 + y_1^2}\sqrt{x_2^2 + y_2^2}}$ In general: $\cos\theta = \frac{\boldsymbol{a} \cdot \boldsymbol{b}}{\lvert\boldsymbol{a}\rvert \lvert\boldsymbol{b}\rvert}$ The angle between the two vectors, θ, is defined as the angle formed where the • two vectors meet at a point • two vectors leave a common point. If two vectors a *and* b are parallel and pointing in the same direction, the angle between a *and* b is $\theta = 0^\circ$. If two vectors a *and* b are parallel and pointing in the opposite direction, the angle between a *and* b is $\theta = 180^\circ$. If two vectors a *and* b are perpendicular, $a \cdot b = 0$	Defining the scalar product of two vectors Finding the angle between two given vectors	Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 280 – 283 Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 281 – 282	

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Curriculum Area: Additional Mathematics **GRADE 10**

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
Vectors	Students will: a. apply properties of parallel and perpendicular vectors	Example: Find the real number k so that the points A (-2, k), B(2, 3) and C(2k , -4) are the vertices of a right triangle with a right angle at B. Solution: ABC is a right triangle at B if and only if vectors BA and BC are perpendicular. Two vectors are perpendicular if and only if their scalar product is equal to zero.	Applying properties of parallel and perpendicular vectors	Mathematics A Complete Course for CSEC Raymond Toolsie Pg. 282 – 285	

TOPIC/ SUB-TOPIC	GENERAL OBJECTIVE	CONTENT	ACTIVITY	RESOURCE	EVALUATION STRATEGY
		Let us first find the components of vectors BA and BC given the coordinates of the three points. BA = (-2 - 2 , k - 3) = (-4 , k - 3) BC = (2 k - 2 , -4 - 3) = (2 k - 2 , -7) The scalar product BA· BC = 0 is written using the components of the two vectors (-4)(2k - 2) + (k - 3)(-7) = 0 Expand, simplify and solve for k $k = \frac{29}{15}$			
	End of Unit Assessment ***Collection of completed School Based Assessments***				