



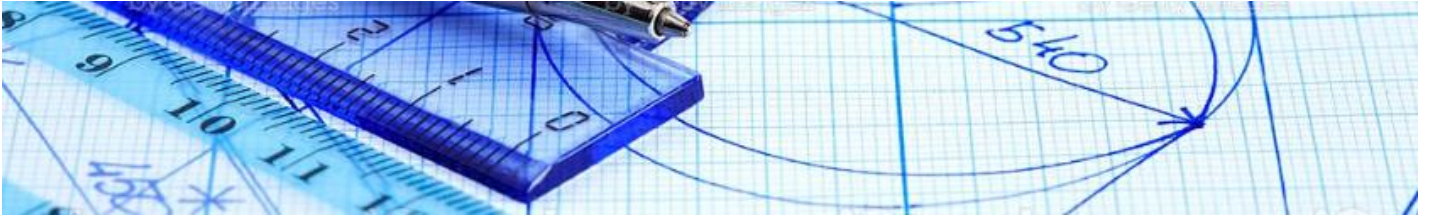
سلطنة عُمان
وزارة التربية والتعليم

المديرية العامة للمدارس الخاصة
دائرة برامج ومناهج المدارس الخاصة

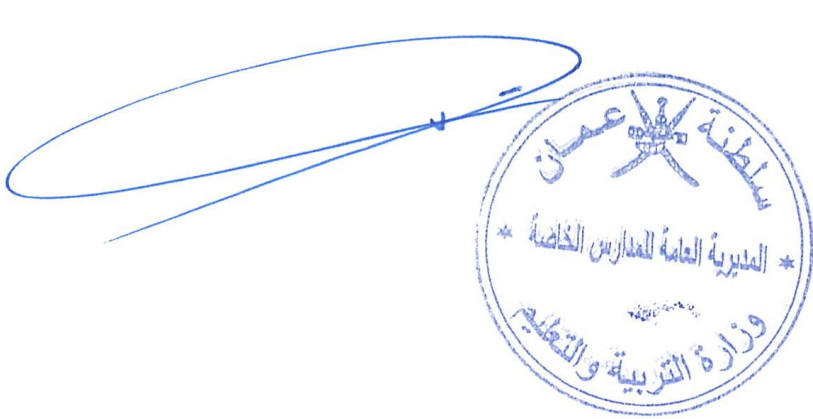
المخرجات والمواد التعليمية لمواد الرياضيات للمدارس الخاصة

برنامج ثنائي اللغة - للصفوف (١١-١٢)

Mathematics Learning Outcomes and Resources for Private Schools Bilingual Program - Grades (11-12)



2022/2023



المخرجات والمواد التعليمية لمواد الرياضيات للصفين (١١-١٢)

Mathematics Learning Outcomes and Resources - grades 11 & 12

2022/2023

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الفصل الأول: الموجهات العامة

Section (1): General Guidelines

تطبيق مواد الرياضيات كآتي:			تطبيق المواد الدراسية
المادة الدراسية	الصف	العام الدراسي	
الرياضيات المتقدمة والرياضيات الأساسية	الحادي عشر	م ٢٠٢٣/٢٠٢٢	
الرياضيات البحتة والرياضيات التطبيقية	الثاني عشر		
الرياضيات المتقدمة والرياضيات الأساسية	الحادي عشر والثاني عشر	م ٢٠٢٤/٢٠٢٣	
توفير نسخ أصلية من جميع المصادر التعليمية الموضحة في هذه النشرة التوجيهية لجميع الطلبة والمعلمين، مع مراعاة حقوق الطبع والملكية الفكرية في جميع استخدامات المصادر التعليمية.			توفير المصادر التعليمية
تحقيق المخرجات التعليمية للفصلين الدراسيين الأول والثاني للصفين الحادي عشر والثاني عشر الواردة في هذه الوثيقة.			الأهداف
تدريب المعلمين والذي يتعلق باستخدام المصادر التعليمية المعتمدة، يجب أن يكون ضمن خطط المدارس الخاصة للإتماء المهني، والمدارس هي الجهات المعنية بالتنسيق المباشر مع دور النشر أو عبر الموزعين المعتمدين حول توفير البرامج التدريبية لمعلميها.			التدريب

Subjects Implementation	Mathematics Subjects to be implemented as following:											
	<table border="1"> <thead> <tr> <th>Academic Year</th> <th>Grade</th> <th>Subject</th> </tr> </thead> <tbody> <tr> <td rowspan="2">2022/2023</td> <td>11</td> <td>Advance and Basic Mathematics</td> </tr> <tr> <td>12</td> <td>Pure and Applied Mathematics</td> </tr> <tr> <td>2023/2024</td> <td>11 & 12</td> <td>Advance and Basic Mathematics</td> </tr> </tbody> </table>	Academic Year	Grade	Subject	2022/2023	11	Advance and Basic Mathematics	12	Pure and Applied Mathematics	2023/2024	11 & 12	Advance and Basic Mathematics
	Academic Year	Grade	Subject									
	2022/2023	11	Advance and Basic Mathematics									
12		Pure and Applied Mathematics										
2023/2024	11 & 12	Advance and Basic Mathematics										
Resources Provision	To provide original copies of all the Resources for all students and teachers, and take in consideration the copyrights and intellectual properties in all uses of the educational recourses.											
Outcomes	To stick to "Learning Outcomes" during the two semesters of the academic year for both grades.											
Training	Teacher training related to the use of the selected coursebooks or learning resources should be part of all schools' commitment to the professional development of their teachers and should be made available to teachers by the schools either by direct contact the publishers or via their concerned distributors.											

المخرجات والمصادر التعليمية لمواد الرياضيات للصفين (١١-١٢)

Mathematics Learning Outcomes and Resources - grades 11 & 12

2022/2023

الفصل الثاني: الصف الحادي عشر

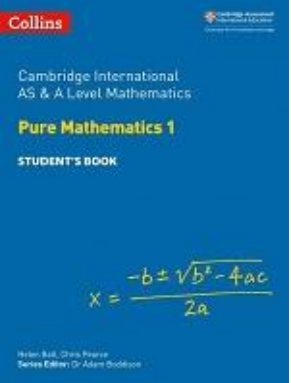
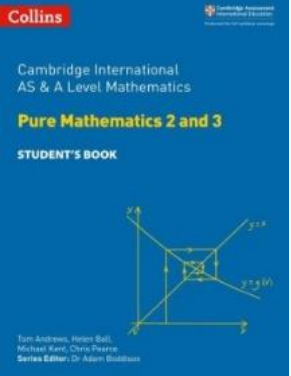
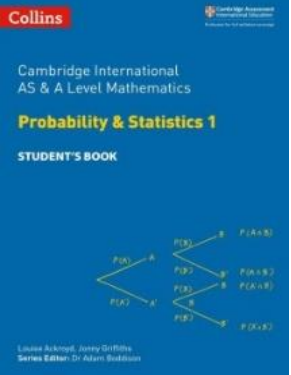
Section (2): Grade 11

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6	المخرجات التعليمية	
10	المصدر التعليمي المعتمد ورقم الـISBN	الرياضيات الأساسية
11	المخرجات التعليمية	

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المصادر التعليمية المعتمدة وأرقام الـ(ISBNs) لمادة الرياضيات المتقدمة - الصف (١١)

The Approved Resources and their ISBNs for Advance Math- Grade (11)

	Title	Publisher	ISBN	Book Cover
1	Cambridge International AS & A Level Mathematics Pure Mathematics 1 Student's Book	Collins	978-0-00-825773-6	
2	Cambridge International AS & A Level Mathematics Pure Mathematics 2&3 Student's Book	Collins	978-0-00-825774-3	
3	Cambridge International AS & A Level Mathematics Probability & Statistics 1 Student's Book	Collins	978-0-00-825776-7	

المخرجات والمصادر التعليمية لمواد الرياضيات للصفين (١١-١٢)

Mathematics Learning Outcomes and Resources - grades 11 & 12

2022/2023

Learning Outcomes of Advance Math– Grade (11)

Advance Math Grade 11 - Semester 1

Area	Reference Chapter	Objectives	No. of weeks
Algebra, Equations and Functions	Quadratics PM1*	<ul style="list-style-type: none"> - Carry out the process of completing the square for a quadratic polynomial $ax^2 + bx + c$ and use a completed square form. - Find the discriminant of a quadratic polynomial $ax^2 + bx + c$ and use the discriminant. - Solve quadratic equations in one unknown by using completing square. - Solve quadratic inequalities in one unknown. - Solve by substitution a pair of simultaneous equations of which one is linear and one is quadratic. - Recognize and solve equations in x that are quadratic in some function of x. 	2
	Functions PM1*	<ul style="list-style-type: none"> - Understand the terms function, domain, range, one-one function, many-one function. - Identify the range of a given function in simple cases. - Determine whether a given function is one-one or many-one in simple cases. - Illustrate in graphical terms the relation between a one-one function and its inverse - Understand and use transformations of the graph of $y = f(x)$ given by $y = f(x) + a$, $y = f(x+a)$, $y = af(x)$, $y = f(ax)$ and simple combinations of these. 	2
	Algebra PM2&3*	<ul style="list-style-type: none"> - Understand the meaning of x, sketch the graph of $y = ax + b$ and use relations such as: $a = b \Leftrightarrow a^2 = b^2$ and $x - a < b \Leftrightarrow a - b < x < a + b$ in the course of solving equations. - Divide a polynomial by a linear or quadratic polynomial and identify the quotient and remainder. - Use the factor theorem and the remainder theorem. - Recall an appropriate form for expressing rational functions in partial fractions and carry out the decomposition. 	3

Area	Reference Chapter	Objectives	No. of weeks
Calculus	Differentiation PM1*	<ul style="list-style-type: none"> - Understand the gradient of a curve as the limit of the gradients of a sequence of chords (Note: differentiation by using first principle not included) - Use the notation $\frac{dy}{dx}$ and $f'(x)$ for first derivatives - Use the derivative of x^n together with multiples, sums and differences - Differentiate composite functions, using the chain rule - Locate stationary points and determine their nature - Identify increasing and decreasing functions - Apply differentiation to find gradients, tangents and normal - Use the notation $\frac{d^2y}{dx^2}$ and $f''(x)$ for second derivatives - Apply differentiation to rates of change 	3
Statistics	Representing of data P&S1*	<ul style="list-style-type: none"> - Choose suitable ways of presenting qualitative and quantitative raw data, discussing the advantages and disadvantages of your choice - Use discrete, continuous, grouped, and ungrouped data - Interpret, draw, and use stem-and-leaf diagrams, histograms, box-and-whisker plots (including outliers) and cumulative frequency diagrams - Calculate and use measures of central tendency: mean, median and mode - Calculate and use measure of variation: range, interquartile range and standard deviation - Work with grouped and ungrouped data when calculating the mean and standard deviation 	2
Revision			1 (Suggested)
* PM1: Pure Mathematics 1 * PM2&3: Pure Mathematics 2&3 * P&S1: Probability & Statistics 1			

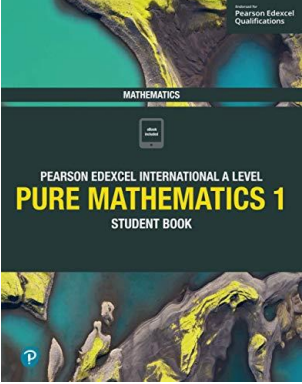
Advance Math Grade 11 - Semester 2

Area	Reference Chapter	Objectives	No. of weeks
Geometry	Coordinate Geometry PM1*	<ul style="list-style-type: none"> - Find the equation of a straight line, given sufficient information. - Interpret and use any of the forms $y = mx + c$, $y - y_1 = m(x - x_1)$, $ax^2 + bx + c = 0$ in solving problems. - Use algebraic methods to solve problems involving lines. - Understand the relationship between a graph and its associated algebraic equation and use the relationship between points of intersection of graphs and solutions of equations. 	1.5
Trigonometry	Circular Measure and Trigonometry PM1*	<ul style="list-style-type: none"> - Understand the definition of a radian and use the relationship between radians and degrees. - Use formulae for the arc length and sector area of a circle - Define the sine, cosine and tangent for any angle. - Sketch and use graphs of the sine, cosine and tangent functions for angles of any size. - Use the exact values of the sine, cosine and tangent of 30°, 45°, 60° and related angles. - Use two important identities connecting $\sin x$, $\cos x$ and $\tan x$. - Define the principal values of inverse trigonometric relations. - Find the solutions of simple trigonometric equations. 	2.5
Algebra	Series PM1*	<ul style="list-style-type: none"> - Expand expressions of the form $(a + b)^n$, where n is a positive integer. - Recognize arithmetic progressions and geometric progressions. - Use formulae for the nth term of an arithmetic progression or a geometric progression. - Use formulae for the sum of the first n terms of an arithmetic progression or a geometric progression. - Interpret and find the sum to infinity of a convergent geometric progression. 	2
Calculus	Integration PM1*	<ul style="list-style-type: none"> - Understand integration as the reverse process of differentiation. - Integrate $(ax + b)^n$ for rational values of n (except -1), together with constant multiples, sums and differences. - Solve problems involving the evaluation of a constant of integration. - Evaluate definite integrals. - Find areas bounded by curves and the coordinate axes or between a curve and a line or between two curves. - Use definite integration to find a volume of revolution. 	3

Area	Reference Chapter	Objectives	No. of weeks
Probability	Probability, permutations and combinations P&S1*	<ul style="list-style-type: none"> - Solve problems involving permutations and combinations of a set of objects. - Model situations involving probability and explain any assumptions made. - Evaluate probabilities in simple cases. - Use sample spaces in simple cases. - Add and multiply probabilities in appropriate cases - Use both Vann diagrams and tree diagrams to calculate probabilities. - Show that events are independent or mutually exclusive. - Use conditional probability in simple cases. - Use the conditional probability formula $P(A/B) = \frac{P(A \cap B)}{P(B)}$ 	3
Revision			1 (Suggested)
*PM1: Pure Mathematics 1			
*P&S1: Probability & Statistics 1			

المصدر التعليمي المعتمد ورقم الـ (ISBN) لمادة الرياضيات الأساسية – الصف (١١)

The Approved Resource and its ISBN for Basic Math– Grade (11)

	Title	Publisher	ISBN	Book Cover
1	PEARSON EDEXCEL INTERNATIONAL A LEVEL PURE MATHEMATICS 1 Student Book	Pearson	9781292244792	

المخرجات والمصادر التعليمية لمواد الرياضيات للصفين (١١-١٢)

Mathematics Learning Outcomes and Resources - grades 11 & 12

2022/2023

المخرجات التعليمية لمادة الرياضيات الأساسية – الصف (١١)

Learning Outcomes for Basic Math– Grade (11)

Basic Math Grade 11 - Semester 1

Area	Reference Chapter	Objectives	No. of weeks
Algebra	<u>Chapter (1)</u> Algebraic Expressions	After completing this chapter, students should be able to: <ul style="list-style-type: none"> - Multiply and divide integer powers (pages 2-4) - Expand a single term over brackets and collect like terms (pages 2-4). - Expand the product of two or three expressions (pages 4-6). - Factorise linear, quadratic and simple cubic expressions (pages 6-9). - Know and use the law of indices (pages 9-11). - Simplify and use the rules of surds (pages 12-13). - Rationalise denominators (pages 13-15). 	3
	<u>Chapter (2)</u> Quadratics	After completing this chapter, students should be able to: <ul style="list-style-type: none"> - Solve quadratic equations using factorization, the quadratic formula and completing the square (pages 19-24). - Read and use $f(x)$ notation when working with functions (pages 25-27). - Sketch the graph and find the turning point of a quadratic function (pages 27-30). - Find and interpret the discriminant of a quadratic expression (pages 30-32). 	4
	<u>Chapter (3)</u> Equations and Inequalities	After completing this chapter, students should be able to: <ul style="list-style-type: none"> - Solve linear simultaneous equations using elimination or substitution (pages 37-38). - Solve simultaneous equations: one linear and one quadratic (Pages 39-40). - Solve linear inequalities (pages 44-46). - Solve quadratic inequalities (pages 46-49). 	3
	<u>Chapter (5)</u> Straight Line Graphs	After completing this chapter, students should be able to: <ul style="list-style-type: none"> - Calculate the gradient of a line joining a pair of points (pages 86-87). - Understand the link between the equation of a line, and its gradient and intercept (pages 87-89). 	2
Revision			1 (Suggested)
Note: Total weeks of Semester1 is 13 weeks.			

Basic Math Grade 11 - Semester 2

Area	Reference Chapter	Objectives	No. of weeks
Trigonometry	(Chapter6) Trigonometric Ratios	After completing this chapter students should be able to: <ul style="list-style-type: none"> - Use the cosine rule to find a missing side or angle (pages 105-110). - Use the sine rule to find a missing side or angle (pages 110-116) - Find the area of a triangle using an appropriate Formula (pages 116-118). - Solve problems involving triangles (pages 118-122). 	4
	(Chapter7) Radians	After completing this chapter students should be able to: <ul style="list-style-type: none"> - Convert between degrees and radians, and know exact values of angles measured in radians (Exercise 7A) All. (Pages 134-135). - Find an arc length using radians (Exercise 7B) Q1only (pages135-139). - Find areas of sectors and segments using radians (Exercise 7C) Q1,2 and 3. (pages139-145). 	1.5
Calculus	(Chaptr8) Differentiation	After completing this chapter students should be able to: <ul style="list-style-type: none"> - Find the derivative, $f'(x)$ or $\frac{dy}{dx}$, of a simple function (pages157-163). - Use the derivative to solve problems involving gradients tangents and normals. (pages 163-165). - Find the second derivative, $f''(x)$ or $\frac{d^2y}{dx^2}$ of a simple Function (pages 165-166). 	4
	(Chapter9) Integration	After completing this chapter students should be able to: <ul style="list-style-type: none"> - Find y given $\frac{dy}{dx}$ for x^n. (pages171-173). - Integrate polynomials (pages 172-175). - Find $f(x)$, given $f''(x)$ and a point on the curve (pages176-178). 	2.5
Revision			1 (Suggested)
Note: Total weeks of Semester 2 is 13 weeks			

الفصل الثالث: الصف الثاني عشر

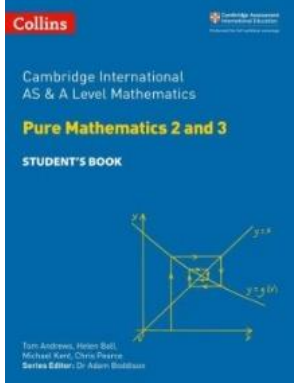
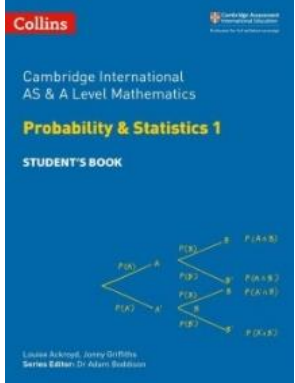
Section (2): Grade 12

الفهرس		
الصفحة	الموضوع	المادة
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المصادر التعليمية المعتمدة وأرقام الـ (ISBNs) لمادة الرياضيات البحتة - الصف (١٢)

The Approved Resources and their ISBNs for Pure Math- Grade (12)

	Title	Publisher	ISBN	Book Cover
1	Cambridge International AS & A Level Mathematics Pure Mathematics 2&3 Student's Book	Collins	978-0-00-825774-3	
2	Cambridge International AS & A Level Mathematics Probability & Statistics 1 Student's Book	Collins	978-0-00-825776-7	

المخرجات والمصادر التعليمية لمواد الرياضيات للصفين (١١-١٢)

Mathematics Learning Outcomes and Resources - grades 11 & 12

2022/2023

Learning Outcomes for Pure Math – Grade (12)

Advance Math Grade 12 - Semester 1

Area	Reference Chapter	Objectives	No. of weeks
Trigonometry	Trigonometry PM2&3*	<ul style="list-style-type: none"> - Use the expansions of $\sin(A \pm B)$, $\cos(A \pm B)$ and $\tan(A \pm B)$. - Use the formulae for $\sin 2A$, $\cos 2A$ and $\tan 2A$. - Use the formulae for $\sin \frac{1}{2}A$ and $\cos \frac{1}{2}A$ (Notes: (1) $\tan \frac{1}{2}A$ not included, (2) Teachers should cover this objective from another resource). - Use the expression of $a \sin \theta + b \cos \theta$ in the forms $R \sin(\theta \pm \alpha)$ and $R \cos(\theta \pm \alpha)$. - Understand the relationship of the secant, cosecant and cotangent functions to cosine, sine and tangent. - Use the properties and graphs of all six trigonometric functions for angles of any magnitude. - Use trigonometric identities for the simplification and exact evaluation of expressions, in particular, $\sec^2 \theta \equiv 1 + \tan^2 \theta$ and $\operatorname{cosec}^2 \theta \equiv 1 + \cot^2 \theta$. 	4
Calculus	Differentiation PM2&3*	<ul style="list-style-type: none"> - Differentiate e^x, $\ln x$, $\sin x$, $\cos x$, $\tan x$ and $\tan^{-1} x$. - Differentiate products and quotients. - Differentiate functions defined implicitly only (Note: parametrically not included). 	3
Complex numbers	Complex numbers PM2&3*	<ul style="list-style-type: none"> - Understand the idea of a complex number, recall the meaning of the terms real part, imaginary part, modulus, argument, conjugate, and use the fact that two complex numbers are equal if and only if both real and imaginary parts are equal. - Carry out operations of addition, subtraction, multiplication and division of two complex numbers expressed in Cartesian form $x + iy$. - Use the result that, for a polynomial equation with real coefficients, any non-real roots occur in conjugate pairs. - Represent complex numbers geometrically by means of an Argand diagram. - Carry out the operations of multiplication and division of two complex numbers expressed in polar form: $r(\cos \theta + i \sin \theta) \equiv re^{i\theta}$. - Find the two square roots of a complex number 	3

Area	Reference Chapter	Objectives	No. of weeks
Probability and Statistics	Discrete random variables P&S1*	<ul style="list-style-type: none"> - Construct a probability distribution table for a discrete random variable X. - Calculate the expectation, $E(X)$, and variance, $\text{Var}(X)$, of a discrete random variable. 	2
Revision			1 (Suggested)
*PM2&3: Pure Mathematics 2&3 P&S1: Probability & Statistics 1			

Advance Math Grade 12 - Semester 2

Area	Reference Chapter	Objectives	No. of weeks
Exponents & Logarithms	Logarithms and exponential functions PM2&3*	<ul style="list-style-type: none"> - Understand the relationship between logarithms and indices and use the laws of logarithms. - Understand the definition and properties of e^x and $\ln x$, including their relationship as inverse functions, and their graphs. - Use logarithms to solve equations of the form $a^x = b$, and similar inequalities. (Note: Applications of logarithms not included). 	2.5
Calculus	Integration PM2&3*	<ul style="list-style-type: none"> - Use the trapezium rule to estimate a definite integral. - Recognize integrals in particular forms. - Use trigonometrical relationships in carrying out integration. - Integrate using partial fractions. - Integrate using a substitution. - Use integration by parts. 	4.5
Vectors	Vectors PM2&3*	<ul style="list-style-type: none"> - Use standard notation for vectors, i.e. $\begin{pmatrix} x \\ y \end{pmatrix}$, $xi + yj$, $\begin{pmatrix} x \\ y \\ z \end{pmatrix}$, $xi + yj + zk$, \overrightarrow{AB}, \mathbf{a} - Carry out addition and subtraction of vectors and multiplication of a vector by a scalar, and interpret these operations in geometrical terms. - Find the mid-point of a line as a vector. - Calculate the magnitude of a vector, and use unit vectors, displacement vectors and position vectors. 	2
Probability	Normal Distribution P&S1*	<ul style="list-style-type: none"> - Understand and use the normal distribution to model continuous random variables. - Analyze the shape and symmetry of the normal distribution. - Find probabilities using the normal distribution table, given the values of μ and σ. - Find μ and σ given probabilities. 	3
Revision			1 (Suggested)
*PM2&3: Pure Mathematics 2&3 P&S1: Probability & Statistics 1			

المصدر التعليمي المعتمد ورقم الـ (ISBN) لمادة الرياضيات التطبيقية – الصف (١٢)

The Approved Resource and its ISBN for Applied Math – Grade (12)

	Title	Publisher	ISBN	Book Cover	Comments
1	Mathematics for the International Student Mathematical Studies (SL) for use with IB Diploma Programme	Haese Publications	9781921972058		Last Year of Approval

المخرجات والمواد التعليمية لمواد الرياضيات للصفين (١١-١٢)

Mathematics Learning Outcomes and Resources - grades 11 & 12

2022/2023

Learning Outcomes for Applied Math – Grade (12)

Applied Math Grade 12 - Semester 1

Area	Topic	pages in book	Components of topic to be covered	Content	No. of weeks
Number and Algebra	Sequence and Series	395-420	<ul style="list-style-type: none"> - Number Patterns - Sequences of numbers - Arithmetic sequences. - Geometric sequences. - Compound interest. - Growth and decay. - Series. 	<ul style="list-style-type: none"> - Arithmetic sequences and series, and their applications. - Use of the formulae for the nth term and the sum of the first nth terms of the sequence. - Geometric sequences and series. - Use of the formulae for the nth term and the sum of the first n terms of the sequence. 	2.5
Financial	Financial Mathematics	421-452	<ul style="list-style-type: none"> - Foreign exchange. - Simple interest. - Compound interest. - Depreciation. - Personal loans. - The effect of inflation. 	<ul style="list-style-type: none"> - Currency conversions. - Students should be able to perform currency transactions involving commission. - Financial applications of geometric sequences and series: <ul style="list-style-type: none"> ▪ compound interest ▪ annual depreciation. 	4

Area	Topic	pages in book	Components of topic to be covered	Content	No. of weeks
Probability	Probability	453-494	<ul style="list-style-type: none"> - Experimental probability. - Chance investigation. - Estimating probabilities from data. - Sample space. - Theoretical probability. - Using grids to find probabilities. - Compound events. - Using tree diagrams. - Sampling with and without replacement. - Probabilities from Venn diagrams. - Laws of probability. - Independent events revisited. 	<ul style="list-style-type: none"> - Sample space; event A; complementary event, A'. - Probability of an event. - Probability of a complementary event. - Expected value. - Probability of combined events, mutually exclusive events, independent events. - Use of tree diagrams, Venn diagrams, sample space diagrams and tables of outcomes. - Probability using "with replacement" and "without replacement". - Conditional probability. 	4
Logic	Logic	495-519	<ul style="list-style-type: none"> - Propositions. - Compound propositions. - Truth tables and logical equivalence. - Truth tables for three propositions. - Implication. - Converse, inverse and contrapositive. - Valid arguments. - Arguments with three propositions. 	<ul style="list-style-type: none"> - Basic concepts of symbolic logic: definition of a proposition; symbolic notation of propositions. - Compound statements: implication, equivalence, negation, conjunction, disjunction, exclusive disjunction. - Translation between verbal statements and symbolic form. - Truth tables: concepts of logical contradiction and tautology. - Converse, inverse, contrapositive. - Logical equivalence. - Testing the validity of simple arguments through the use of truth tables. 	2.5

Applied Math Grade 12 - Semester 2

Area	Topic	pages in book	Components of topic to be covered	Content	No. of weeks
Functions	Exponential and Trigonometric Functions	517-544	<ul style="list-style-type: none"> - Evaluating exponential functions. - Graphing simple exponential functions. - Exponential growth. - Exponential decay. - Period functions. - Sine functions. - Cosine functions. - Modeling using sine and cosine functions. - Equations involving sine and cosine. - Using sine and cosine models. 	<ul style="list-style-type: none"> - Exponential models. - Exponential functions and their graphs: $f(x) = kax + c; a \in Q +, a \neq 1, k \neq 0.$ $f(x) = ka - x + c; a \in Q +, a \neq l, k \neq 0.$ - Concept and equation of a horizontal asymptote. 	4
	More Functions	545-570	<ul style="list-style-type: none"> - Cubic polynomials. - Quartic polynomials. - The rectangular hyperbola. - Higher order rational functions. - Unfamiliar functions. - Where functions meet. 	<ul style="list-style-type: none"> - Models using functions of the form: $f(x) = axm + bxn + \dots; m, n \in Z.$ - Functions of this type and their graphs. - The y-axis as a vertical asymptote. - Drawing accurate graphs. - Creating a sketch from information given. - Transferring a graph from GDC to paper. - Reading, interpreting and making predictions using graphs. - Included all the functions above and additions and subtractions. - Use of a GDC to solve equations involving combinations of the functions above. 	3

المخرجات والمواد التعليمية لمواد الرياضيات للصفين (١١-١٢)

Mathematics Learning Outcomes and Resources - grades 11 & 12

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Area	Topic	pages in book	Components of topic to be covered	Content	No. of weeks
Statistics	Two Variable Ststistics	571-600	<ul style="list-style-type: none"> - Correlation. - Measuring correlation. - Least squares regression. - The χ^2 test of independent. 	<ul style="list-style-type: none"> - Bivariate data: the concept of correlation. - Scatter diagrams; line of best fit, by eye, passing through the mean point. - Pearson's product-moment correlation coefficient, r. - Interpretation of positive, zero and negative, strong or weak correlations. - The regression line for y on x. - Use of the regression line for prediction purposes. - The X^2 test for independence: formulation of null and alternative hypotheses; significance levels; contingency tables; expected frequencies; degrees of freedom; p-values. 	2.5
Calculus	Introductory Differential Calculus	601-638	<ul style="list-style-type: none"> - Rate of change. - Derivatives. - The idea of a limit. - The derivative function. - Simple rules of differentiation. - Tangents to curves. - The second derivative. - Changing shape. - Stationary points. - Rates of change. - Optimisation. 	<ul style="list-style-type: none"> - Concept of the derivative as a rate of change. - Tangent to a curve. - The principle that $f(x) = ax^2 \Rightarrow f'(x) = 2ax$. - The derivative of functions of $f(x) = ax^n + bx^{n-1} + \dots$, where all exponents are integers. - Gradients of curves for given values of x. - Values of x where $f'(x)$ is given. - Equation of the tangent at a given point. - Equation of the line perpendicular to the tangent at a given point (normal). - Increasing and decreasing functions. - Graphical interpretation of $f'(x) > 0$, $f'(x) = 0$, $f'(x) < 0$. - Values of x where the gradient of a curve is zero. - Solution of $f'(x) = 0$. - Stationary points. - Local maximum and minimum points. - Optimization problems. 	4.5

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