 **AMBASSADORS INTERNATIONAL COLLEGE MAKEPE**

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***PO BOX: 8776, Douala, Cameroon* School Year: 2024/2025**

**Our Core Values**

1 Respect 2. Love 3. Leading through innovation and creativity 4. Pursuing excellence

5. Growing by learning 6. Exemplary Godly Leadership 7. Responsibility and engagement

**ANNUAL CURRICULUM PLAN**

**Subject: Mathematics**

**Year group: 13**

**Teacher: Elvis Abentama**

**PREFACE**

**Cambridge International AS & A Level Mathematics** develops a set of transferable skills. These include the skill of working with mathematical information, as well as the ability to think logically and independently, consider accuracy, model situations mathematically, analyse results and reflect on findings. Learners can apply these skills across a wide range of subjects and the skills equip them well for progression to higher education or directly into employment.  
**Aims**

The aims describe the purposes of a course based on this syllabus. The aims are to enable students to:  
• develop their mathematical knowledge and skills in a way which encourages confidence and provides  
satisfaction and enjoyment  
• develop an understanding of mathematical principles and an appreciation of mathematics as a logical and coherent subject  
• acquire a range of mathematical skills, particularly those which will enable them to use applications of mathematics in the context of everyday situations and of other subjects they may be studying  
• develop the ability to analyse problems logically  
• recognise when and how a situation may be represented mathematically, identify and interpret relevant factors and select an appropriate mathematical method to solve the problem  
• use mathematics as a means of communication with emphasis on the use of clear expression  
• acquire the mathematical background necessary for further study in mathematics or related subjects.

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| MONTH | Week/Date | Theme/Topic /Sub-themes/sub-topics | Objectives |
| SEPTEMBER | Week 1  09-13 (7periods) | Grades descriptors and Cambridge learners’ attributes  1 Algebra   * 1. The modulus function   2. Graphs of y = |f(x)| and y =f(|x|) where f(*x*) is linear   3. Solving modulus inequalities   4. Division of polynomials   5. The factor theorem   6. The remainder theorem   7. Improper algebraic fractions   8. Partial fractions   9. Binomial expansion of for values of *n* that are not positive integers and   10. Binomial expansion of for values of *n* that are not positive integers   11. Partial fractions and binomial expansions | 1. understand the meaning of |x|   2 sketch the graph of y =|ax + b| and use relations such as |a| = |b| ⇔ and |x – a| < b ⇔ a – b < x < a + b   1. graphs of y = |f(x)| and y =f(|x|) for non-linear functions f are not included; 2. divide a polynomial by a linear or quadratic polynomial, and identify the quotient and remainder (which may be zero) 3. use the factor theorem and the remainder theorem. 4. recall an appropriate form for expressing rational functions in partial fractions, and carry out the decomposition in simple cases   7 use the expansion of , where n is a rational number and |x|<1; finding a general term in an expansion is not included; adapting the standard series |
| Week 2  16-20  (7 periods) | 1. Logarithmic and exponential functions    1. Logarithms to base 10    2. Logarithms to base *a*    3. The laws of logarithms    4. Solving logarithmic equations    5. Solving exponential equations    6. Solving exponential inequalities    7. Natural logarithms    8. Transforming a relationship to linear form | 1. understand the relationship between logarithms and indices, and use the laws of logarithms (excluding change of base) understand the definition and properties of ex and Inx, including their relationship as inverse functions and their graphs; including knowledge of the graph of y = for both positive and negative values of k 2. use logarithms to solve equations and inequalities in which the unknown appears in indices,e.g. < 5, < 5, 1 = 3. use logarithms to transform a given relationship to linear form, and hence determine unknown constants by considering the gradient and/or intercept, e.g. y = gives ln y = lnk + n lnxwhich is linear in lnx and ln y; y = k (ax) gives lny = lnk + x lnawhich is linear in x and ln y |
| Week 3  23-27  ( 7 periods) | 1. Trigonometry    1. The cosecant, secant and cotangent ratios    2. Compound angle formulae    3. Double angle formulae    4. Further trigonometric identities   3.5 Expressing a sin θ + b cos θ in the forms R sin(θ ± α) and R cos(θ ± α) | 1. understand the relationship of the secant, cosecant and cotangent functions to cosine, sine and tangent, and use properties and graphs of all six trigonometric functions for angles of any magnitude 2. use trigonometrical identities for the simplification and exact evaluation of expressions, e.g. simplifying cos(x – 30°) – 3sin(x – 60°), and in the course of solving equations, e.g. solving tan θ + cot θ = 4, 2  – tan θ = 5,3 cosθ + 2sin θ = 1 and select an identity or identities appropriate to the context, showing familiarity in particular with the use of: - ≡ 1 + and  ≡ 1 + - the expansions of sin(A ± B), cos(A ± B) and tan(A ± B) - the formulae for sin 2A, cos 2A and tan 2A- the expression of a sin θ + b cos θ in the forms R sin(θ ± α) and R cos(θ ± α) |
| OCTOBER. | Week 4  30-4  (7 periods) | 4 Differentiation  4.1 Derivatives of exponential functions  4.2 Derivatives of natural logarithmic functions  4.3 Derivatives of trigonometric functions | 1. use the derivatives of , In x, sin x, cos x, tan x, , together with constant multiples, sums, differences and composites; derivatives of and not required |
| Week 5  7-11  (7 periods) | 1. Differentiation   4.4 The product rule  4.5 The quotient rule  4.6 Implicit differentiation  4.7 Parametric differentiation  4.8 Application of differentiation (tangent line and normal line) | 1. differentiate products and quotients, e.g. 2. find and use the first derivative of a function which is defined parametrically or implicitly, e.g. x = t – , y = t + , e.g. + = xy + 7, including use in problems involving tangents and normals |
| Week 6  14-18  (7 periods) | 1. Integration    1. Integration of exponential functions    2. Integration of   5.3 Integration of sin(ax b + ), cos(ax b + ) and sec ( 2 ax b + )  5.4 Further integration of trigonometric functions  5.5 The trapezium rule  5.6 Integration of | 1. extend the idea of ‘reverse differentiation’ to include the   integration of |
| Week 7  21-25  (7 periods) | 5 Integration  5.7 Integration of  5.8 Integration by substitution  5.9 The use of partial fractions in integration  5.10 Integration by parts  5.11 Further integration | 1. use trigonometrical relationships in carrying out integration, e.g. use of double-angle formulae to integrate   integrate rational functions by means of decomposition into partial fractions; restricted to types of partial fractions as specified in topic 3.1 above  recognise an integrand of the form and integrate such functions, e.g. integration of recognise when an integrand can usefully be regarded as a product, and use integration by parts, e.g. integration of     1. use a given substitution to simplify and evaluate either a definite or an indefinite integral, e.g. to integrate 2x cos x using the substitution; |
| NOVEMBER. | **Week 8**  **28-01** | **MID-TERM BREAK** | |
| Week 9  04-08  (7 periods) | 1. Numerical solution of equations    1. Finding a starting point   6.2 Improving your solution  6.3 Using iterative processes to solve problems involving other areas of mathematics | 1. locate approximately a root of an equation, by means of graphical considerations and/or searching for a sign change, e.g. finding a pair of consecutive integers between which a root lies. 2. understand the idea of, and use the notation for, a sequence of approximations which converges to a root of an equation 3. understand the idea of, and use the notation for, a sequence of approximations which converges to a root of an equation given rearrangement of an equation, to determine a root to a prescribed degree of accuracy; knowledge of the condition for convergence is not included, but an understanding that an iteration may fail to converge is expected |
| Week 10  11-15  (7 periods) | 1. Vectors   7.1 Displacement or translation vectors  7.2 Position vectors  7.3 Vector operations  7.4 Vector Geometry | 1. use standard notations for vectors, i.e 2. carry out addition and subtraction of vectors and multiplication of a vector by a scalar, and interpret these operations in geometrical terms, e.g. ‘OABC is a parallelogram’ is equivalent to the general form of the ratio theorem is not included, but understanding that the mid-point of AB has position vector is expected. |
| Week 11  18-22  (7 periods) | Vectors  7.5 The scalar product  7.6 The vector equation of a line  7.7 Intersection of two lines | 1. calculate the magnitude of a vector, and use unit vectors, displacement vectors and position vectors, in 2 or 3 dimensions 2. understand the significance of all the symbols used when the equation of a straight line is expressed in the form r = a + tb, and find the equation of a line, given sufficient information e.g. finding the equation of a line given the position vector of a point on the line and a direction vector, or the position vectors of two points on the line 3. understand the significance of all the symbols used when the equation of a straight line is expressed in the form r = a + tb, and find the equation of a line, given sufficient information e.g. finding the equation of a line given the position vector of a point on the line and a direction vector, or the position vectors of two points on also not required 4. use formulae to calculate the scalar product of two vectors, and use scalar products in problems involving lines and points; e.g.finding the angle between two lines, and finding the foot of the perpendicular from a point to a line; questions may involve 3D objects such as cuboids, tetrahedra (pyramids), etc.; knowledge of the vector product is not required |
| Week 12  25-29  (7 periods) | **Start of exams for exam classes** |  |
| DECEMBER. | **Week 13**  **02-06** | **EXAMINATION WEEK** | |
| Week 114  09-13  (7 periods) | 1. Differential equations    1. The technique of separating the variables    2. Forming a differential equation from a problem | 1. find by integration a general form of solution for a first order differential equation in which the variables are separable; including any of the integration techniques from topic 3.5 above use an initial condition to find a particular solution interpret the solution of a differential equation in the context of a problem being modelled by the equation; where a differential equation is used to model a ‘real life’ situation, no specialised knowledge of the context will be required |
| Week 15  16-20  (7 periods) | 1. Complex numbers    1. Imaginary numbers    2. Complex numbers    3. The complex plane | 1. 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; notations Rez, Imz, |z|, argz, z\* should be known; the argument of a complex number will usually refer to an angle θ such that – π < θ ≤ π, but in some cases the interval 0 ≤ θ < 2 π may be more convenient; answers may use either interval unless the question specifies otherwise 2. carry out operations of addition, subtraction, multiplication and division of two complex numbers expressed in Cartesian form x + iy; for calculations involving multiplication or division, full details of the working should be shown 3. use the result that, for a polynomial equation with real coefficients, any non-real roots occur in conjugate pairs, e.g. in solving a cubic or quartic equation where one complex root is given 4. represent complex numbers geometrically by means of an Argand diagram |
| **END OF TERM 1**  **HOLIDAY** | | |
| JANUARY. |
| Week 1  06-10   1. periods) | 9 Complex numbers   * 1. Solving equations   2. Loci | 1. carry out operations of multiplication and division of two complex numbers expressed in polar form r(cos θ + i sin θ ) ≡ r; including the results |z1z2| = |z1||z2| and arg (z1 z2) = arg(z1) + arg(z2), and corresponding results for division 2. find the two square roots of a complex number e.g. the square roots of 5 + 12i in exact Cartesian form; full details of the working should be shown 3. understand in simple terms the geometrical effects of conjugating a complex number and of adding, subtracting, multiplying and dividing two complex numbers 4. illustrate simple equations and inequalities involving complex numbers by means of loci in an Argand diagram,   e.g. |z – a| < k, , arg(z – a) = a |
| Week 2  13-17  (7 periods) | 1. The Poisson distribution/ Linear combinations of random variables    1. Probability of Poisson distribution.    2. Mean and variance of Poisson distribution    3. Poisson distribution as a model    4. Approximation of binomial distribution into Poisson distribution    5. Normal distribution, with continuity correction, as an approximation to the Poisson distribution | 1. use formulae to calculate probabilities for the distribution Po(λ) 2. use the fact that if X ~ Po(λ) then the mean and variance of X are each equal to λ; proofs are not required understand the relevance of the Poisson distribution to the distribution of random events, and use the Poisson distribution as a model 3. use the Poisson distribution as an approximation to the binomial distribution where appropriate; the conditions that n is large and p is small should be known; n > 50 and np < 5, approximately 4. use the normal distribution, with continuity correction, as an approximation to the Poisson distribution where appropriate; the condition that λ is large should be known; λ > 15, approximately |
| Week 3  20-24  (7 periods) | 1. Linear combinations of random variables/ 12 Continuous random variables    1. Properties of Expectation and variance    2. Linear combination of Independent Normal distribution    3. Linear combination of independent Poisson distribution    4. Continuous Random Variable and properties of probability density function    5. Mean and Variance of a distribution using probability density function | 1. use, when solving problems, the results that: - E(aX + b) = aE(X) + b and Var(aX + b) = Var(X) - E(aX + bY) = aE(X) + bE(Y) - Var(aX + bY) = Var(X) + Var(Y) for independent X and Y- if X has a normal distribution then so does aX + b- if X and Y have independent normal distributions then aX + bY has a normal distribution - if X and Y have independent Poisson distributions then X + Y has a Poisson distribution proofs of these results are not required 2. understand the concept of a continuous random variable, and recall and use properties of a probability density function; for density functions defined over a single interval only; the domain may be infinite e.g. for x ≥ 1use a probability density function to solve problems involving probabilities, and to calculate the mean and variance of a distribution; including location of the median or other percentiles of a distribution by direct consideration of an area using the density function; explicit knowledge of the cumulative distribution function is not included |
| Week 4  27-31  (7 periods) | 1. Sampling and estimation    1. Sampling and Sampling Methods and their advantages    2. Mean and Variance of sampling    3. Central Limit Theorem | 1. understand the distinction between a sample and a population, and appreciate the necessity for randomness in choosing samples explain in simple terms why a given sampling method may be unsatisfactory; including an elementary understanding of the use of random numbers in producing random samples; knowledge of particular sampling methods, such as quota or stratified sampling, is not required recognise that a sample mean can be regarded as a random variable, and use the facts that E(X̅ ) = μ and that Var(X̅ ) = 2. use the fact that (X̅ ) has a normal distribution if X has a normal distribution 3. use the Central Limit Theorem where appropriate; only an informal understanding of the Central Limit Theorem (CLT) is required; for large sample sizes, the distribution of a sample mean is approximately normal |
| FEBRUARY. | Week 5  03-07   1. periods) | 13Sampling and estimation   * 1. Mean and Variance of an unbiased Estimator   2. Confidence Interval Mean for a Normal distribution.   3. Approximation of Confidence Interval | 1. calculate unbiased estimates of the population mean and variance from a sample, using either raw or summarised data; only a simple understanding of the term ‘unbiased’ is required, e.g. that although individual estimates will vary the process gives an accurate result ‘on average determine and interpret a confidence interval for a population mean in cases where the population is normally distributed with known variance or where a large sample is used determine, from a large sample, an approximate confidence interval for a population proportion |
| Week 6  10-14  (7 periods) | 1. Hypothesis tests   14.1 Null hypothesis, alternative hypothesis, significance level  14.2 One-tailed and two-tailed tests  14.3 Formulation of hypothesis and application of hypothesis testing on mean and variance binomial or Poisson distribution using direct observation or normal approximation  14.4 Types of errors | 1. understand the nature of a hypothesis test, the difference between one-tailed and two-tailed tests, and the terms null hypothesis, alternative hypothesis, significance level, rejection region (or critical region), acceptance region and test statistic. Outcomes of hypothesis tests are expected to be interpreted in terms of the contexts in which questions are set. Formulate hypotheses and carry out a hypothesis test in the context of a single observation from a population which has a binomial or Poisson distribution, using - direct evaluation of probabilities - a normal approximation to the binomial or the Poisson distribution, where appropriate 2. formulate hypotheses and carry out a hypothesis test concerning the population mean in cases where the population is normally distributed with known variance or where a large sample is used understand the terms Type I error and Type II error in relation to hypothesis tests calculate the probabilities of making Type I and Type II errors in specific situations involving tests based on a normal distribution or direct evaluation of binomial or Poisson probabilities |
| Week 7  17-21 | MID-TERM BREAK | |
| Week 8  24-28 | Mock Exams- Years 9, 11, and 13 |  |
| MARCH. | Week 9  03-07 | Mock Exams- Years 9, 11, and 13 |  |
| Week 10  10-14  (7 periods) | **R**evision |  |
| Week 11  17-21 | **EXAMINATION WEEK** |  |
| Week 12  24-28  (7 periods) | **R**evision |  |
| APRIL. | Week 13  31-4  (7 periods) | **R**evision |  |
| Week 14  07-18 | **END OF TERM 2**  **HOLIDAY** | |
| Week 1  21-02  (7 periods) | **R**evision |  |
|  | 28-02 |  |  |
| MAY. | Week 2  05-09  (7 periods) | **R**evision |  |
| Week 3  12-16  (7 periods) | **R**evision |  |
| Week 4  19-23 | **EXAMINATION WEEK** | |
| Week 5  26-30  (7 periods) | **R**evision |  |
| JUNE | Week 6  02- 06  (7 periods) | **R**evision |  |
| Week 7  09- 11 | **END OF TERM 3**  **HOLIDAY** |  |
| Week 8  16-20 | **R**evision |  |
| Week 9  23-27 | **R**evision |  |