المملكة المغربية
وزارة التربية الوطنية
والتعليم الأولي والرياضة

A Reference Framework for the National Baccalaureate Exam

International Options of the Moroccan Baccalaureate

English Option

Subject: Mathematics
Section: Experimental Sciences
Streams: Physics and Life -Earth Sciences

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First main domain: Analysis

First subdomain : Numerical Sequences

1.1.1. Use geometric sequences and arithmetic sequences to study examples of sequences in the form:

$$u_{n+1} = au_n + b \quad \text{or} \quad u_{n+1} = \frac{au_n + b}{cu_n + d}$$

1.1.2. Use the limits of the reference sequences and the convergence criteria in order to determine the limits of numerical sequences.

1.1.3. Determine the limit of the composite of a numerical sequence and a continuous function (Sequence in the form $v_n = f(u_n)$)

1.1.4. Study the convergence of a sequence (u_n) in the form $u_{n+1} = f(u_n)$ where f is a continuous function on an interval I verifying $f(I) \subset I$ and determine its limit.

1.1.5. Use numerical sequences to solve various problems from different fields.

Second subdomain : Continuity, differentiation and study of functions

1.2.1. Study the continuity of a numerical function at a point using limits calculation.

1.2.2. Determine the image of an interval or a segment by a continuous function or by a continuous and strictly monotonic function.

1.2.3. Apply the Intermediate Value Theorem to study some equations and inequations or to study the sign of some expressions…

1.2.4. Apply the Intermediate Value Theorem, in the case of a continuous and strictly monotonic function on an interval, to prove the uniqueness of the solution of the equation: $f(x) = \lambda$

1.2.5. Study the Differentiability of a numerical function at a point and on an interval.

1.2.6. Determine the derivative function of a numerical function.

1.2.7. Determine the monotonicity of a function.

1.2.8. Determine the sign of a function using its variations table.

1.2.9. Determine the sign of a function from its graphical representation.

1.2.10. Solve graphically equations in the form $f(x) = g(x)$ and inequalities in the form $f(x) \leq g(x)$

1.2.11. Determine the derivative and the monotonicity of the inverse function of a continuous and strictly monotonic function on an interval and represent it graphically.

1.2.12. Solve application problems about minimum values and maximum values.

1.2.13. Use the first derivative and the second derivative to study a numerical function and to prove some inequalities…

1.2.14. Determine the primitive functions of usual functions.

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1.2.15. Use derivation formulas to determine the primitive functions of a function on an interval.

1.2.16. Master the algebraic calculation on Logarithms.

1.2.17. Master and solve logarithmic equations, inequalities and systems.

1.2.18. Recognize and apply the decimal logarithm (in particular to solve equations in the form $10^x = a$ and inequalities in the form $10^x \leq a$ or $10^x \geq a$)

1.2.19. Master and apply the basic logarithmic limits.

1.2.20. Master and solve equations, inequalities and systems that contain Napierian exponentials.

1.2.21. Master and apply the basic limits of the Napierian exponential function.

1.2.22. Study and represent graphically functions and composite functions among the functions included in the syllabus (domain of definition, elements of symmetry, periodicity, monotonicity, infinite branches, tangent lines, concavity, inflexion points…)

1.2.23. Solve the differential equation: $y' = ay + b$

1.2.24. Solve the differential equation: $y'' + ay' + by = 0$

Third subdomain : Calculating Integrals

1.3.1. Use a primitive function or the technique of integration by parts in order to calculate the integral of a function.

1.3.2. Use the integral properties.

1.3.3. Calculate the domain's area delimited by two curves in the plane.

1.3.4. Calculate the volume of the solid of revolution generated by the rotation of the curve of a function about the x-axis.

Second main domain: Algebra and Geometry

First subdomain : Scalar product in V_3

2.1.1. Express and prove the orthogonality of two vectors using the Scalar product.

2.1.2. Express vectorially the orthogonality and its properties.

2.1.3. Express analytically the orthogonality and its properties.

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Second subdomain : Applying the Scalar product in space

2.2.1. Determine an equation of a plan defined by a point and a normal vector.

2.2.2. Determine a parametric representation of a straight line passing through a point and orthogonal to a plane.

2.2.3. Study the set of points $M(x, y, z)$ such that : $x^2 + y^2 + z^2 + ax + by + cz + d = 0$

2.2.4. Determine a Cartesian equation of a sphere defined by its center and its radius.

2.2.5. Recognize the set of points M in space verifying $\overrightarrow{MA}.\overrightarrow{MB} = 0$

2.2.6. Use the distance of a point to a plane to solve geometrical problems (relative positions of a plane and a sphere and of a straight line and a sphere…)

Third subdomain : Cross product

2.3.1. Calculate the area of a triangle using the cross product.

2.3.2. Determine the equation of a plane defined by three non collinear points.

2.3.3. Use the distance of a point to a straight line to solve geometrical problems.

2.3.4. Apply the cross product to solve geometrical problems.

Fourth subdomain : Complex numbers

2.4.1. Master algebraic calculations on the complex numbers (In their writings : algebraic, trigonometric and exponential)

2.4.2. Go from the algebraic form to the trigonometric form of a complex number and inversely.

2.4.3. Linearize trigonometric monomials using the exponential form of a complex number.

2.4.4. Interpret, using the complex tool, the following geometrical concepts: distance between two points, measurement of angles, collinearity of points, collinearity and orthogonality of vectors.

2.4.5. Express the translation, the homothety and the rotation using complex tools.

2.4.6. Recognize a translation , homothety or rotation from their complex expressions.

2.4.7. Using complex numbers to solve geometric problems (collinearity, orthogonality…)

2.4.8. Solve the equation $az^2 + bz + c = 0$ in the complex numbers set where a ,b and c are real numbers.

2.4.9. Solve equations which lead to a second degree equation with one variable and real coefficients.

Fifth subdomain : Calculating probabilities

2.5.1. Using the appropriate counting model according to the studied situation.

2.5.2. Calculate the probability of the union of two events, the probability of the opposite event of an event and the probability of the intersection of two events.

2.5.3. Calculate the conditional probability and use it to determine the probability of the intersection of two events.

2.5.4. Recognize the independence of two events.

2.5.5. Determine the law of probability of a random variable and calculate its diverse parameters.

2.5.6. Recognize the binomial law and apply it in various situations.

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Specifications Table

a- *According to the main domains*

Main Domain	Subdomains	Importance rate
Analysis	Numerical sequences	**55%**
	Continuity, Differentiation and Study of functions	
	Calculating Integrals	
Algebra and Geometry	Scalar Product in V_3	**15%**
	Applications of the Scalar product in space	
	Cross product	
	Complex Numbers	**30%**
	Calculating Probabilities	
Total		**100%**

b- *According to the Skill levels*

Skill Level	Importance Rate
Direct application of knowledge (a definition, a property, an algorithm, a formula, a technique, a rule ... ..)	**50%**
Evoke and apply non-explicit knowledge in a question (definition; property; theorem ; algorithm ; expression ; technic , rule ....) in familiar situations.	**35%**
Deal with unfamiliar situations using knowledge synthesis and results.	**15%**
Total	**100%**

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