الأطر المرجعية المكيفة الخاصة بالامتحان الوطني الموحد للبكالوريا – دورة 2020 -

المسالك الدولية : خيار أنجليزية

الإطار المرجعي لمادة الرياضيات

شعبة العلوم الرياضية

مسلك العلوم الرياضية "أ" ومسلك العلوم الرياضية "ب"

First main domain: (Mandatory / all the skills mentioned in this area are mandatory in the national baccalaureate-2020 exam)

First subdomain : Numerical Sequences

1.1.1. Use geometric sequences and arithmetic sequences in the study of recurrent sequences.

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

1.1.3. Study the limit of the composite of a numerical sequence and a continuous function (Sequence in the form $\left(f(u_n) \right)_n$)

1.1.4. Study the limit of the sequences in the form $u_{n+1} = f(u_n)$ where f is a continuous function on an interval I such that $f(I) \subset I$

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

Second subdomain: Limits and Continuity

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

1.2.2. Study the continuity of a function on an interval using the continuity of the usual functions, the properties of the operations on continuous functions and the composite of continuous functions.

1.2.3. Determine the image of an interval or a segment by a continuous function.

1.2.4. Apply the Intermediate Value Theorem to prove the existence of solutions of some equations or to study the sign of some expressions…

1.2.5. Use the Dichotomy method.

1.2.6. Determine the inverse function of a continuous and strictly monotonic function on an interval.

1.2.7. Apply the theorem of the inverse function (Existence, Continuity, Variations and Graphical representation of the inverse function)

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مديرية التقويم وتنظيم الحياة المدرسية والتكوينات المشتركة بين الأكاديميات- المركز الوطني للتقويم و الامتحانات والتوجيه
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Third subdomain: Differentiation and Study of functions.

1.3.1. Study the Differentiability of a function at a point.

1.3.2. Study the Differentiability of a function on an interval using the differentiability of the usual functions, the properties of the operations on derivative functions and the composite of differentiable functions.

1.3.3. Determine the monotonicity of a function.

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

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

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

1.3.7. Study the differentiability and determine the derivative of the inverse function of a continuous and strictly monotonic function on an interval.

1.3.8. Use the formulas of differentiation to find primitives of a continuous function on an interval.

1.3.9. Master calculations on Logarithms.

1.3.10. Solve logarithmic equations, inequalities and systems.

1.3.11. Use basic logarithmic limits.

1.3.12. Master the exponential calculations with a given base.

1.3.13. Solve exponential equations, inequalities and systems.

1.3.14. Use basic limits of the Napierian exponential.

1.3.15. Master calculation on the real powers.

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

1.3.17. Apply Rolle's Theorem, the Mean Value Theorem and the Mean Value inequality in the study of the numerical sequences in the form $u_{n+1} = f(u_n)$ or in the boundedness of expressions, algebraic formulas, real numbers and integrals …

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

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

1.3.20. Solve differential equations which lead to one of the differential equations $y' = ay + b$ or $y'' + ay' + by = 0$
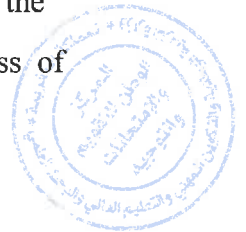
Fourth subdomain: Calculating Integrals

1.4.1. Use techniques of integral calculation to compute the integral of a continuous function on a segment.

1.4.2. Master the calculation of the domain's area delimited by two curves in the plane.

1.4.3 . Master the calculation of the volume of the solid of revolution generated by the rotation of the curve of a continuous function about one of the two axis of coordinate system.

1.4.4. Apply the integral calculation to prove some inequalities, to calculate some limits and to give approximations…

1.4.5. Study composite functions in the form: $\quad x \rightarrow \displaystyle\int_a^{u(x)} f(t)\,dt$

1.4.6. Determine the limit of each of the two sequences $u_n = \dfrac{b-a}{n}\displaystyle\sum_{k=1}^{n} f(a+k\dfrac{b-a}{n})$ and

$v_n = \dfrac{b-a}{n}\displaystyle\sum_{k=0}^{n-1} f(a+k\dfrac{b-a}{n})$ where f is a continuous function on the segment $[a,b]$

1.4.7. Study functions and sequences defined by an integral.

Fifth subdomain : Complex Numbers

1.5.1. Master the algebraic calculation on the complex numbers (with each of their writings : algebraic, trigonometric and exponential)

1.5.2. Interpret, using the complex tool, the following geometrical concepts: distance between two points, measurement of angles, barycenter, collinearity of points, collinearity and orthogonality of vectors and concyclicity of four points…

1.5.3. Interpret geometrically complex expressions.

1.5.4. Use the complex numbers in trigonometric calculation (transformations formulas, linearization and development)

1.5.5. Solve a second degree equation with one variable.

1.5.6. Solve equations which lead to a second degree equation with one variable.

2.2.7. Solve equations type of $z^n = a$ and recognize the geometrical interpretation of its set of solutions.

2.2.8. Determine the complex expressions of the usual transformations and their composites (composite of two rotations, composite of rotation and translation, composite of homothety and translation, composite of rotation and homothety)

2.2.9. Use complex expressions of the usual transformations to study geometrical situations.

2.2.10. Use complex numbers to solve geometrical problems.

Second main domain: (Optional / the skills mentioned are to be chosen between those of the first sub-domain or those of the second sub-domain)

First subdomain : Arithmetic

2.1.1. Use the decomposition into a product of prime factors to determine the least common multiple and the greatest common divisor of two or several integers.

2.1.2. Use the decomposition into a product of prime factors to determine the divisors of an integer.

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2.1.3. Use Euclid's algorithm to determine the greatest common divisor of two integers and to determine Bezout coefficients in the writing : $a \wedge b = au + bv$.

2.1.4. Write a natural number in a numeral system with a given base.

2.1.5. Add, multiply, and compare two integers in a numeral system with a given base.

2.1.6. Use the writings in numeral systems in arithmetic situations.

2.1.7. Use congruence modulo n , operations' properties in $\mathbb{Z}/n\mathbb{Z}$ and the structure of $(\mathbb{Z}/n\mathbb{Z}, +, .)$ in arithmetic situations.

2.1.8. Use the divisibility, Euclidean division, Gauss's theorem, Bezout's theorem, Fermat's theorem, the fundamental theorem and the properties of prime numbers and relatively prime numbers in arithmetic situations.

2.1.9. Solve the equation: $ax + by = c$ in $\mathbb{Z} \times \mathbb{Z}$

Second subdomain : Algebraic Structures

2.2.1. Recognize an internal composition law and its properties.

2.2.2. Recognize the algebraic structures in the syllabus (group, ring, field and vector space)

2.2.3. Master the operations techniques in the usual sets and in various algebraic structures in the syllabus.

2.2.4. Use the algebraic structures of the usual sets to study structures of other sets.

2.2.5. Transfer the algebraic structure of a set with an internal composition law to another set with an internal composition law using the homomorphism and isomorphism concepts.

2.2.6. Use the characteristic property of a vector subspace and of a subgroup.

2.2.7. Recognize a linearly independent list, a spanning list and a basis in a real vector space.

2.2.8. Determine the components of a vector in a given vector space basis.

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جداول التخصيص

Specification Tables

a- According to the main domains :

Domains	Subdomains	Importance Rate
First main domain	Numerical sequences	65%
	Limits and continuity	
	Differentiability and study of functions	
	Calculating Integrals	
	Complex Numbers	17.5%
Second main domain	Arithmetic / Algebraic structures	17.5%
Total		100%

b- According to the Skill levels

Skill Level	Importance Rate
Direct application of knowledge (a definition, a property, a theorem, an algorithm, a formula, a technic, ...)	40%
Evoke and apply non-explicit knowledge in a question (definition; property; theorem ; algorithm ; expression ; techniques , rule ....) in familiar situation.	40%
Deal with unfamiliar situations using knowledge synthesis and results.	20 %
Total	100%