BACCALAURÉAT EUROPÉEN

MATHEMATICS 5 PERIODS

EXAMPLES OF FINAL ASSESSMENT

FRENCH / ENGLISH

The structure and content of the final assessment is given in the syllabus:

> **[All] topics from S6 […] could potentially be included.**
>
> The final Baccalaureate written exam will consist of two parts, one part with and one part without a technological tool. Each part will make up 50% of the total 100 marks and will be 120 minutes long. All topics from the S6 and S7 5 Period courses can be examined in the final written Baccalaureate exam.
>
> The overall weighting of the competences will be set by the **Mathematics BAC matrix**. The weightings are designed to ensure meaningful marks across the range of performances. Performances should be distinguishable not only quantitatively ("more or less of the same") but also qualitatively ("different levels of attainment"). This will make the paper accessible to all pupils while providing more challenging problems to obtain higher marks. […]
>
> The part without the technological tool will consist of **six short response questions and two longer questions that require more extended mathematical thinking.** These extended questions could be structured, giving pupils greater guidance, or more open, requiring pupils to develop a suitable strategy for solving the problem.
>
> The part with the technological tool will consist of a smaller number of longer, structured questions that allow pupils to explore a given context in more depth. In general, the level of thinking will increase as a pupil works through the questions. The technological tool will need to be used to fully answer this paper, though this does not exclude the possibility that some questions could be fully answered without the use of the tool.

The structure of the papers should therefore not be as rigid as it was with the previous syllabus. Questions can cover any subject, in any order, and one question can cover more than one part of the syllabus, as is the case for some questions in these examples.

Example 1 – part A

Question A1

Let f and g be two functions defined by:

$$f(x)=a+e^{-x+2} \wedge g(x)=\frac{b\cdot x+2}{x-1}$$

where a and b are real numbers.
Find the values of a and b such that f and g have the following properties:

- f and g have the same limit in $+\infty$.
- The graphs of functions f and g intercept in a point with abscissa 2.

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Question A2

Consider vectors $\vec{a}=\begin{pmatrix}1\\1\\1\end{pmatrix}$, $\vec{b}=\begin{pmatrix}n\\1\\-3\end{pmatrix}$ and $\vec{c}=\begin{pmatrix}2\\-1\\-1\end{pmatrix}$, where n is a real number.

Prove that whatever the value of n, the volume of the parallelepiped determined by these vectors is always the same.

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Question A3

Solve the equation:

$$\log_2(x)+\log_2(x-1)=1$$

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Question A4

Consider function f defined by $f(x)=x^2\cdot\cos x$.
Of the four functions below, which one is a primitive function of f? Explain you answer.

$F(x)=\frac{x^3}{3}\cdot\sin x$	$H(x)=2x\cdot\cos x+(x^2-2)\cdot\sin x$
$G(x)=-2x\cdot\sin x$	$K(x)=2x\cdot\cos x-x^2\cdot\sin x$

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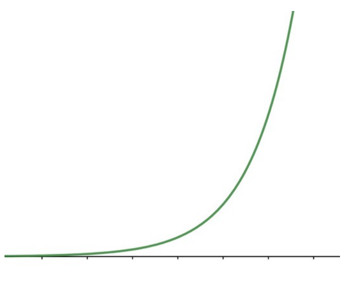
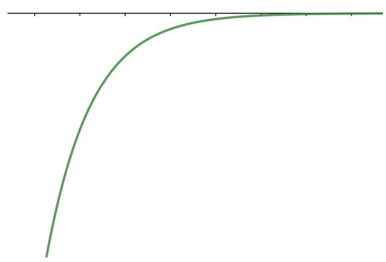
Question A5

Soient a et b deux réels non nuls et f la fonction définie sur R par :

$$f(x)=a\cdot e^{b\cdot x}$$

Voici deux allures possibles pour la courbe de cette fonction.
Dans chaque cas, préciser les valeurs possibles pour a et b.

Cas 1	Cas 2
	

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Question A6	
Find a complex number z that is a cube root of $-8i$ and a fourth root of $-8-8i\sqrt{3}$.	**5**

Question A7	
La réserve de Corbett Nation Park en Inde est une réserve où l'on peut rencontrer des tigres. **1.** Cette réserve abrite 8 tigres, dont cinq sont marqués. On capture trois tigres, quelle est la probabilité que deux d'entre eux soient marqués ? Donner le résultat sous la forme d'une fraction irréductible.	**2**
2. Un groupe de 8 touristes arrive sur le site pour un safari. Quatre de ces touristes doivent s'installer dans la première voiture, à quatre places différentes. De combien de manières différentes peuvent-ils s'installer dans la voiture ?	**2**
3. On sait que 40% des visiteurs de Corbett Nation Park sont européens. Parmi les visiteurs européens, 10% rencontrent un tigre. De plus, 20% des visiteurs de cette réserve rencontre un tigre. On croise un visiteur non européen au hasard. Calculer la probabilité qu'il ait rencontré un tigre.	**2**
4. On rappelle que la probabilité qu'un touriste rencontre un tigre est de 0,2. **a.** Calculer la probabilité que le touriste voit un tigre pour la première fois le troisième jour.	**2**
b. On note $P(X=n)=p_n$ la probabilité que le touriste voit un tigre pour la première fois le n-ème jour. Montrer que la suite est une suite géométrique dont on précisera le premier terme et la raison.	**2**
c. Démontrer que $P(X\leq n)=1-0{,}8^n$. Interpréter le résultat dans ce contexte.	**3**

Question A8	
Let f and g be two functions defined by $f(x)=\frac{-1}{2}\left(e^{2x}+e^{-2x}\right) \wedge g(x)=x^n\cdot\ln(x)$ where n is a positive integer. Prove that the graphs of these two functions never intersect, whatever the value of n.	**7**