

إرشادات عامة:

- يسمح بإستعمال آلة حاسبة غير قابلة للبرمجة
- يمكن الإجابة على المسائل بالترتيب الذي تريد
- يرجى الإجابة بخط واضح ومرتب
- العلامة القصوى من 30
- عدد المسائل: 5

1st exercise: (5pts)

In the table below, only one among the proposed answers to each question is correct. Write down the number of each question and give, with justification, the answer corresponding to it.

No.	Questions	Answers		
		A	B	C
1.	If α is an acute angle such that $\text{Cos}\alpha = \frac{2\sqrt{2}}{3}$ then $\text{Sin}\alpha =$	$\frac{1}{3}$	$-\frac{1}{3}$	$\frac{\sqrt{2}}{9}$
2.	$\vec{AM} + \vec{KA} + \vec{DK} + \vec{BD} + \vec{MB} =$	\vec{AB}	\vec{AD}	$\vec{0}$
3.	The negative integers that are solutions of the inequality $\frac{3x+2}{5} - \frac{2x+1}{3} \leq \frac{x+4}{3}$ are:	The negative integers strictly less than “-3”	-3, -2, -1, and 0	-4, -3, -2, -1
4.	Given $A = \frac{1.5 \times 8 \times 120 \times 10^{-1}}{7.5 \times 4.8}$ and $B = \sqrt{\frac{30}{70}} \times \sqrt{\frac{7}{48}}$ then	A = B	A is the inverse of B	A is the opposite of B
5.	If a straight-line of equation $y = ax + b$ is increasing and cuts the positive y-axis then	$a > 0$ and $b > 0$	$a < 0$ and $b < 0$	$a < 0$ and $b > 0$

2nd exercise: (5pts)

Upon studying the number of daily hours spent by each of the 25 students of Grade 9 on the internet, we obtained the following results organized in the table below:

Number of daily hours	1	2	3	4	5
Number of students	2	y	9	x	3

- 1) Determine the studied character and its nature. (½ pt)
- 2) a) Explain what x and y represent in the above table and interpret one of them. (½ pt)
b) Deduce a relation between x and y. (½ pt)
- 3) Calculate x and y knowing that the mean number of daily hours spent on the internet is 3.2. (1pt)
For the remaining parts, let x = 7 and y = 4
- 4) Set up the table of increasing cumulative frequency in percentage and interpret any value. (¾ pt)
- 5) Is it true that 76% of the students use the internet at least 3 hours daily? **Justify**. (¾ pt)
- 6) Calculate the central angles and draw the circular diagram for this statistical distribution. (1pt)

3rd exercise: (4 ½ pts)

Given the following two polynomials:

$$E(x) = (2m - 3)x^2 + (m - 1)x - 5m + 4 \text{ and } G(x) = a(2x - 1)^2 - cx^2 + (3a - b)x - 4a - 3.$$

1) Calculate m so that “- 2” is a root of the polynomial E(x). (¾ pt)

In the remaining parts take m =2

2) a) Expand G(x), then show that: $G(x) = (4a - c)x^2 - (a + b)x - 3a - 3$. (1 ¼ pts)

b) Calculate a, b and c so that E(x) and G(x) are identical polynomials. (¾ pt)

3) Consider the polynomial $F(x) = (x + 3)(x - 2) + (2x - 1)(2 - x) + 2x^2 - 8$.

a) Factorise F(x) and verify that $F(x) = (x - 2)(x + 8)$. (¾ pt)

b) Let $A(x) = \frac{(x + 3)(\sqrt{8} - x\sqrt{2})}{F(x)}$

Give all the values of x, for which A(x) is not defined, then simplify A(x). (1pt)

4th exercise: (8pts)

In the plane of an orthonormal system x'ox, y'oy, where the unit of length is the centimeter, consider the points A(0 ; - 4), B(- 2 ; 0) and C(-1 ; 3) and the straight-line (d) of equation $y = 3x + 6$.

1) a) Plot the points A, B and C. (¾ pt)

b) Verify that B and C belong to straight-line (d), then draw (d). (1pt)

2) a) Determine the equation of the altitude (AH) in triangle ABC. (H is the orthogonal projection of A on (BC)). (¾ pt)

b) Given $(AH) : y = -\frac{1}{3}x - 4$. Calculate the coordinates of H, then deduce the distance from point A to (d) and the area of triangle ABC. (1 ½ pts)

c) Determine the coordinates of the point M, the symmetric of A with respect to (BC). (¾ pt)

3) Let (Ω) be the circle of center A and tangent to (BC). Show that E(3; -5) belongs to (C). (¾ pt)

4) Let F be the translate of C by the vector translation $\overline{CA} + \overline{CM}$.

a) Justify that CAFM is a Rhombus. (¾ pt)

b) Calculate the coordinates of F. (¾ pt)

5) Given $AC = \sqrt{50}$ and $AH = \sqrt{10}$.

Calculate $\tan \hat{CAH}$ then deduce \hat{HCA} to the nearest 10^{-1} . (1pt)

5th exercise: (7 ½ pts)

In the adjacent figure, (C) is a circle of centre O. [AB] is a fixed diameter of (C) such that AB = 6cm.

[MN] is a variable diameter of (C). E is the symmetric of A with respect to M.

(Note: don't reproduce the figure).

1) a) Prove that (OM) and (BE) are parallel. (¾ pt)

b) Prove that (BM) is the perpendicular bisector of [AE]. (¾ pt)

c) Find the locus of E as M varies on the circle (C). (¾ pt)

2) (EN) cuts (AB) in I.

a) Prove that that the two triangles ION and IBE are similar and deduce that $IB = 2 \times IO$. (1 ½ pts)

b) Calculate IO and IB. (1pt)

c) Is I the center of gravity of triangle MBN? Justify. (¾ pt)

3) In this part, suppose that AM = 3cm.

a) Calculate BM and deduce the area S of triangle BAE. (1pt)

b) Show that $2S = EA \times EB \times \sin \hat{BEA}$. (1pt)

