

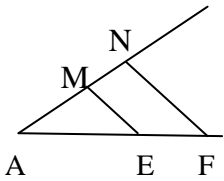
عدد المسائل: ستة	مسابقة في مادة الرياضيات المدة ساعتان	الاسم: الرقم:
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ارشادات عامة :- يسمح باستعمال آلة حاسبة غير قابلة للبرمجة او اختران المعلومات او رسم البيانات.
- يستطيع المرشح الإجابة بالترتيب الذي يناسبه دون الالتزام بترتيب المسائل الوارد في المسابقة .

I- (2 points)

In the following table, only one of the proposed answers to each question is correct.

Write the number of each question and its corresponding answer. Justify your choice.

N°	Questions	Proposed answers		
		a	b	c
1	If $\left(x + \frac{1}{x}\right)^2 = 15$ then $x^2 + \frac{1}{x^2} = \dots$	225	13	$\sqrt{15}$
2	n is a natural number $\left(\frac{4}{5}\right)^{n+1} \times \left(\frac{5}{4}\right)^n = \dots$	8×10^1	1^{2n+1}	8×10^{-1}
3	In an orthonormal system, the two lines $(D_1) : y = (2 - \sqrt{5})x - 5$ and $(D_2) : y = (2 + \sqrt{5})x + 5$ are ...	parallel	perpendicular	intersecting at B(0 ; 5)
4	(ME) and (NF) are two parallel lines , then $\frac{NF}{ME} = \dots$ 	$\frac{AN}{AM}$	$\frac{AE}{AF}$	$\frac{AN}{MN}$

II- (2 points)

Given : $A = \frac{8}{3} - \frac{5}{3} \times \frac{21}{15}$; $B = \frac{3.4 \times 10^{-3} \times 5 \times (10^2)^3}{4 \times 10^{-3}}$ and $C = \frac{(1 - \sqrt{3})^2}{(2 + \sqrt{3})^2}$.

Show all the details of the following :

- 1) Calculate A and write the answer as a fraction in the simplest form.
- 2) Calculate B and write the answer in scientific notation.
- 3) Write C in the form $a - b\sqrt{3}$ where a and b are two integers.

III- (3 points)

An agency for renting cars proposes to its customers the following two offers A and B:

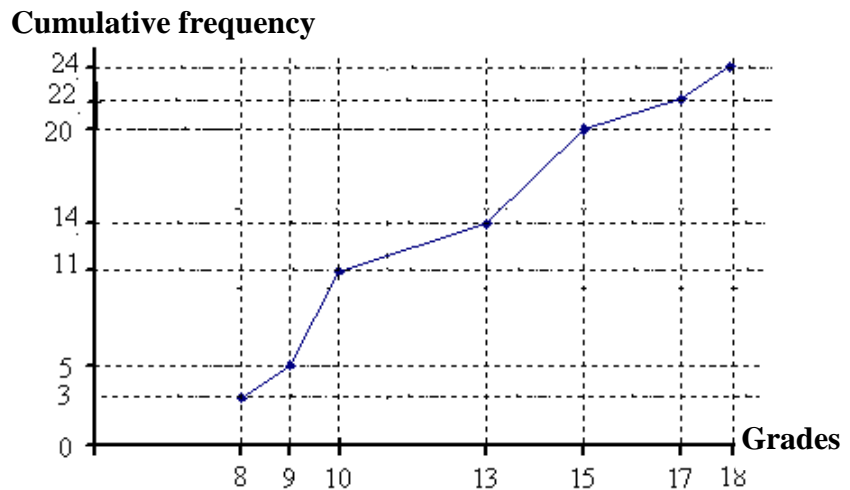
	Deposit	Charge per km
Offer A	50 000 LL	600 LL
Offer B	42 000 LL	700 LL

Denote by x the number of kilometers traveled by a car that a customer rents.

- 1) Find in term of x, the amount S paid by this customer if he selects the offer A, and the amount S' if he selects the offer B.
- 2) Calculate x so that S is equal to S' .
- 3) Starting what traveled distance is the offer A more advantageous than the offer B? justify.
- 4) A second customer selects offer A and pays 410 000 LL. What is the traveled distance by this customer?

IV- (3 points)

The adjacent graphic represents the cumulative frequency polygon of the students' grades in a certain class.



- 1) What is the number of students of this class?
- 2) Complete the following table:

Grades	8	9	10	13	15	17	18
Cumulative frequency	3	5					
Frequency	3	2					

- 3) Write as percent the relative frequency of grade 10.
- 4) What is the average grade of the students of this class ?

V- (5 points)

In an orthonormal system of axes, $x'Ox$ and $y'Oy$, consider the line (D) with equation $y = -2x - 3$ and the two points A (-2 ; 1) and B (6 ; 5).

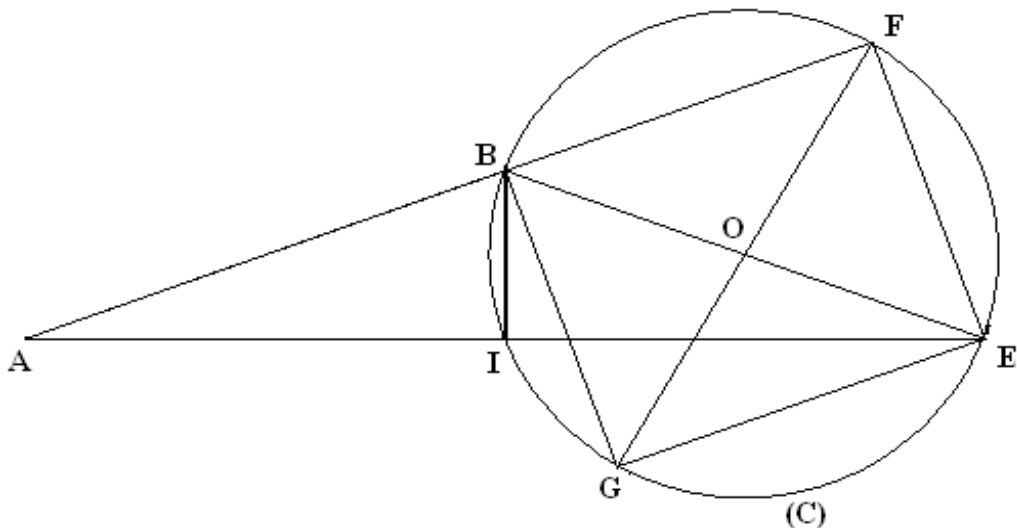
- 1) Verify that (D) passes through A.
- 2) Plot A and B and draw (D).
- 3) Determine the equation of (AB) and deduce that (D) is perpendicular to (AB).
- 4) Calculate, rounded to the nearest degree, the value of the acute angle that (AB) makes with $x'Ox$.
- 5) The line (D) intersects $y'Oy$ at C. Find the coordinates of C.
- 6) Let (S) be the circle circumscribed about the triangle ABC. I is the center of this circle. Calculate the coordinates of I.
- 7) The line (D') is the parallel through C to (AB). (D') intersects the circle (S) at another point E.
 - a. What is the nature of the quadrilateral ABEC? Justify.
 - b. Calculate the coordinates of the point E.
 - c. (d) is the tangent at A to (S). Find the equation of (d).

VI- (5 points)

ABE is an isosceles triangle with vertex B, and so that $BE = BA = 6$ cm and $\widehat{ABE} = 140^\circ$. The circle (C) with diameter [BE] and center O intersects (AB) at another point F.

- 1) Make a figure.
- 2) What is the nature of the triangle BEF? Justify.
- 3) I is the midpoint of [AE]. Show that I is a point on (C).
- 4) a. Calculate \widehat{BAE} and \widehat{EBF} .
b. Find to the nearest thousandth an approximate value of BF.
- 5) Prove that the two triangles ABI and AEF are similar, and deduce that $AB \times AF = 2 \times AI^2$.
- 6) G is the translate of E under the translation with vector \overrightarrow{FB} .
 - a. Show that EFBG is a rectangle but not a square.
 - b. Prove that G, O and F are collinear.

Sixth exercise (5 points)

Part of the Q	Answer	Mark
1	<p>La figure:</p> 	0.50
2	BEF is right at F.	0.50
3	(BI) \perp (AB), then $\widehat{BIE} = 90^\circ$. Hence I is on (C).	0.75
4.a	$\widehat{ABE} = 180^\circ - 40^\circ = 140^\circ$; $\widehat{EBF} = 40^\circ$.	0.50
4.b	<p>EBF is right at F , $\cos \widehat{EBF} = \frac{BF}{BE}$</p> <p>$BF = 6 \times \cos 40^\circ$; $BF \approx 4.596$.</p>	0.75
4.c	$EF^2 = BE^2 - BF^2$, $EF \approx 3.8$ (Or : $EF = BE \times \sin 40^\circ$).	0.50
5.a	<p>EFBG is a parallelogram and $\widehat{BFE} = 90^\circ$, then it is a rectangle.</p> <p>Moreover $EF \neq BF$, then it is not a square.</p>	0.75
5.b	[GF] is a diagonal of the rectangle EFBG, then O is the midpoint of [GF].	0.75