وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات	امتحانات الشهادة المتوسطة	دورة سنة 2013 الاستثنائية الاثنين 26 آب 2013

عدد المسائل : ستة	مسابقة في مادةالرياضيات المدة: ساعتان	الاسم: الرقم:

ملاحظة : يسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو اختزان المعلومات أو رسم البيانات.
يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الوارد في المسابقة)

I- (2.5points)

All steps of calculation must be shown in each exercise.

1) GivenA = $6\times10^2+10^2+4\times10^{-2}+10-6$.

a.Write A in the form of a decimal number.

b. Write A in scientific notation .

c. Write A as the sum of an integer and a fraction less than 1, in its simplest form.

2)Show that the number $D=\frac{4}{2+\sqrt{3}}\div\frac{2-\sqrt{3}}{2}$ is a natural number.

3)Given the two numbers $B=\frac{5}{8}+\frac{3}{8}\times\frac{4}{6}-\left(\frac{3}{2}-1\right)^2$ and $C=2\sqrt{75}-4\sqrt{27}+4\sqrt{12}$.

a. Write B as a fraction in its simplest form.

b. Write C in the form $a\sqrt{3}$ where a is an integer.

II- (1.5points)

1) Solve the following system $\begin{cases}2a-b=4\\a+b=5\end{cases}$

2) Given the two polynomials $P(x)=(2a-b)x^2+5x-\frac{2}{3}$ and $Q(x)=4x^2+(a+b)x+c$.

Calculate a, b and cso that P(x) andQ(x) are identical.

III- (3.5points)

Part A

Given $E(x)=(3x-1)^2-(3x-1)(x+2)$.

1) Expand and reduce E(x).
2) Calculate x such that E(x) = 3.
3) Factorize E(x).

Part B

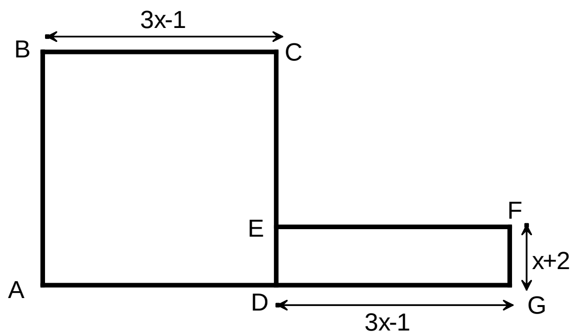
In the next figure:

- x represents a length in *cm* so that $x>0.5$
- ABCD is a square withside 3x-1.
- DEFG is a rectangle such that:

FG = x +2 and EF = 3x – 1.

1) Calculate, in terms of x, the area S of ABCD andthe area S' of DEFG.
2) Solve the equationS-S' = 0.
3) Determine all the integers xso that:

$S-S'>6x^2-5x-12$.



IV- (5.5points)

In an orthonormal system of axesx'Ox;y'Oy, consider the points A(-2 ;-2) ,E(2 ;6) and B (6 ;-2).

1) a-Plot the points A,E and B .

   b-Verify that the equation of (AE) is y= 2x+2.

2) Determine the equation of (AB).

3)Verify thatAE =BE .

4) Let K be the midpoint of the segment [AE].

   a-Calculate the coordinates of K.

   b-Let (d) be the perpendicular to (AE) at K. Determine the equation of (d).

5) The line (d) intersects the perpendicular bisector of [AB] atI.

   a- show that I is the center of circle circumscribed about the triangle ABE.

   b- Calculate the coordinates ofI.

6) Let J be the symmetric of E with respect to I.Show that (AJ) is parallel to (d).

V- (2points)

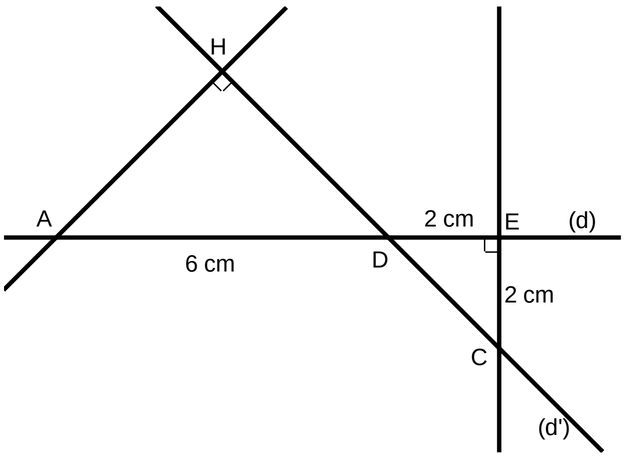
Given a parallelogram ABCDwith center O. The points E and F are such that
$\overrightarrow{AE} = \overrightarrow{DA}$ and $\overrightarrow{CF} = \overrightarrow{OC}$.

1) Draw a figure.
2) Prove that $\overrightarrow{EB} = \overrightarrow{AC}$ and $\overrightarrow{OF} = \overrightarrow{AC}$.
3) The lines (EF) and (OB) intersect at K.Prove that K is the midpoint of the segment [EF].

VI- (5points)

In the next figure:

- (d) and (d') are two lines intersecting at D
- EDC is a right triangleat E
- AD = 6*cm*and DE = EC = 2*cm*
- (AH) is perpendicular to (d').



1) Copy the figure.

2) What is the nature ofthe triangle ADH ?

   Calculate the exact lengths of [DH],

[DC] and [AC].

3) Prove that the points A, H, E and C are onthe same circle whose diameter to be determined.

4) Let M be the orthogonal projection of D on (AC).

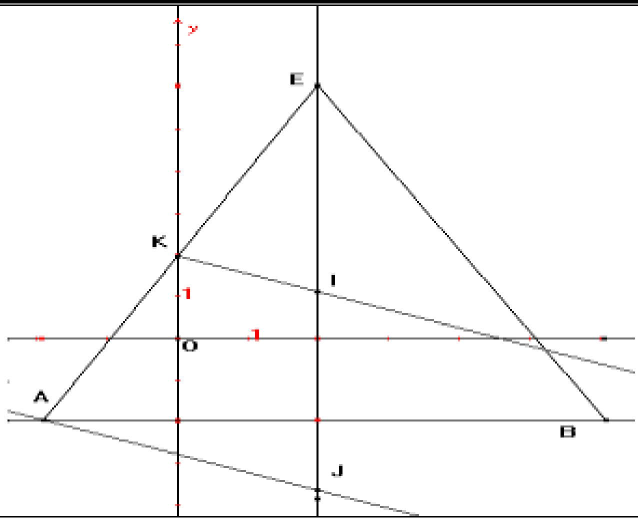
   Prove that the two trianglesAHC andDMC are similar. Calculate the product CM×CA.

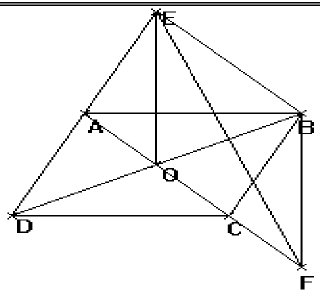
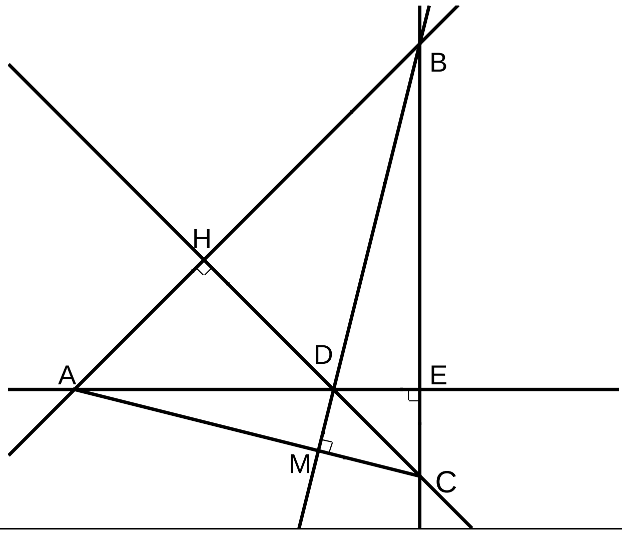
5) Calculatetan $\widehat{ACH}$. Deduce the value of the angle $\widehat{ACH}$ rounded to the nearest degree.

6) The lines (AH) and (CE) intersect atB,prove that (MD) passes through B.

دورة سنة 2013 الاستثنائية الاثنين 26 آب 2013	توزيع علامات مسابقة الرياضيات امتحانات الشهادة المتوسطة	وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات

I	1.a		704,04	0.25
	1.b		$7,0404 \times 10^2$	0.25
	1.c		$704 + \frac{1}{25}$	0.25
	2		$\frac{4}{2+\sqrt{3}} \times \frac{2}{2-\sqrt{3}} = 8$	0.5
	3.a		$\frac{5}{8} + \frac{1}{4} - \frac{1}{4} = \frac{5}{8}$	0.5
	3.b		$10\sqrt{3} - 12\sqrt{3} + 8\sqrt{3} = 6\sqrt{3}$	0.75
II	1		$\begin{cases} 2a - b = 4 \\ a + b = 5 \end{cases}$ a=3, b=2	0,75
	2		a=3, b=2 et $c = -\frac{2}{3}$	0,75
III	A	1	$E(x) = 9x^2 - 6x + 1 - \left(3x^2 + 5x - 2\right) = 6x^2 - 11x + 3$	0.5
		2	x(6x -11) = 0 , alors x=0 ou x= $\frac{11}{6}$.	0.5
		3	E(x) = (3x-1)(3x-1-x-2) = (3x-1)(2x-3)	0.5
	B	1	$S = (3x-1)^2$ *et* $S' = (3x-1)(x+2)$	0.5
		2	(3x-1)(2x-3) = 0 alors $x = \frac{1}{3}$. $x = \frac{3}{2}$, $x = \frac{1}{3}$ inacceptable donc $x = \frac{3}{2}$.	0.75
		3	$6x^2 - 11x + 3 > 6x^2 - 5x - 12 . -6x > -15$ donc $x < \frac{15}{6}$ alors x=1 ou x=2.	0.75

IV	1.a	Points A,B et E. 	0,5
	1.b	Les coordonnées de A et E vérifient l'équation.	0,5
	2	$y_A = y_B = -2$, Eq. de (AB) : y = -2.	0,5

IV	3	$AE=4\sqrt{5}$ et $BE=4\sqrt{5}$	**0,75**
	4a	K(0;2)	**0,5**
	4b	Equation de (d) : $y=-\frac{1}{2}x+2$	**0,75**
	5.a	(d) est la médiatrice de [AE]donc I est le point d'intersection des médiatrices des côtés du triangle AEB alors c'est le centre du cercle circonscrit à ce triangle.	**0,5**
	5.b	I(2;1)	**0,75**
	6	Dans le triangle EAJ ,Ket I sont les milieux de [AE] et [JE] donc (AJ) parallèle à(d).Ou….	**0,75**
V	1		**0,5**
	2	$\overrightarrow{AE}=\overrightarrow{DA}=\overrightarrow{CB}$ alors AEBC est un parallélogramme. $\overrightarrow{EB}=\overrightarrow{AC}$; $\overrightarrow{AO}=\overrightarrow{OC}=\overrightarrow{CF}$ donc $\overrightarrow{OF}=\overrightarrow{AC}$	**1**
	3	$\overrightarrow{EB}=\overrightarrow{AC}$ et $\overrightarrow{OF}=\overrightarrow{AC}$ donc $\overrightarrow{EB}=\overrightarrow{OF}$ alors OBEF est un parallélogramme alors K milieu de [EF].	**0,5**
VI	1		**0,25**
	2	ADH est rectangle isocèle (angle de 45^0), DH= $3\sqrt{2}$; DC= $2\sqrt{2}$ AC = $2\sqrt{17}$	**1,75**
	3	AHC et AEC sont deux triangles rectangles .A,H,E et C sont sur un même cercle de diamètre [AC]	**0,5**
	4	$\widehat{AHC}=\widehat{DMC}=90^\circ$ et $\widehat{HCA}$ angle commun. CM×CA=CD×CH= $2\sqrt{2}\times5\sqrt{2}$ =20.	**1**
	5	$\tan\widehat{ACH}=\frac{AH}{HC}=\frac{3\sqrt{2}}{5\sqrt{2}}=\frac{3}{5}$ $\widehat{ACH}=\tan^{-1}\frac{3}{5}\approx 30,9\approx 31^\circ$	**0,75**
	6	Dans le triangle ABC, D est l'orthocentre donc (MD) est la troisième hauteur	**0,75**