ليسه دي زار　　　الشهادة المتوسطة　　　التجربة الثانية لعام 2015 – 2016

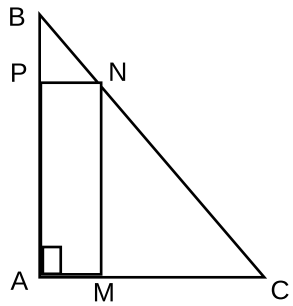
مسابقة في الرياضيات الإنكليزي　　　المدّة : ساعتان　　　الإسم :　　　الرقم :

إرشادات عامة:

- يسمح بإستعمال ألة حاسبة غير قابلة للبرمجة
- يمكن الإجابة على ألمسائل بالترتيب االذي تريد
- يرجى الإجابة بخط واضح ومرتب
- العلامة القصوى من 30

1st exercise: (7 pts)

In the following table, **only one** of the proposed answers to each question is correct. Write the number of each question and the corresponding answer, and **justify**.

№	Questions	Answers a	Answers b	Answers c
1.	The two straight lines (d) and (D) of respective equations: $y=\left(\dfrac{\frac{3}{7}-\frac{1}{8}}{\frac{1}{8}-\frac{3}{7}}+3\right)x+2$ and $x=\frac{1}{2}y-1$ are ……. **(1½pts)**	Parallel	Perpendicular	Confounded
2.	In the figure below, we have: * ABC is a right triangle at A. * PNMA is a rectangle. * $AM = x\ cm\ ;(x>0)$  * $AC=\sqrt{6-2\sqrt{5}}\times\sqrt{6+2\sqrt{5}}-\sqrt{\left(2-\sqrt{3}\right)^2}-\sqrt{3}$ * $AB=\left(1-\sqrt{2}\right)^2+\sqrt{8}\,cm$ Then AP = …. **(2½pts)**	$\frac{3}{2}x$	$3-1.5x$	$\frac{6}{x}$
3.	If $\begin{cases}3\sqrt{x}-2\sqrt{y}=4\\3\sqrt{x}+2\sqrt{y}=8\end{cases}$ then $\sqrt{x^3-60y^3}$ is … **(1½pts)**	2	1	0
4.	In a store, the price of an electrical gadget is reduced by 20% during the season of holidays, **then after this period** the price has been raised by 25%, then….. **(1½pts)**	Then the final price is less than the initial price	Then the final price is greater than the initial price	Then the final price is equal the initial price

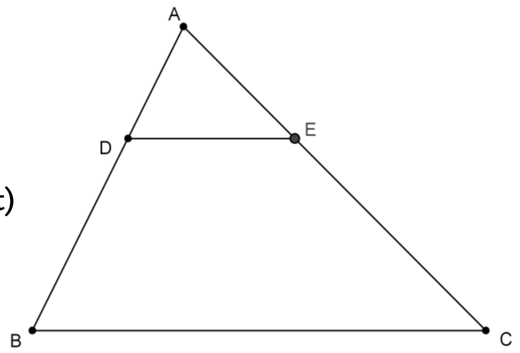
2nd exercise: (6¼ pts)

In the following figure, we have:

* (BC) is parallel to (DE).
* AE = 3 cm and EC = 6 cm.
* DE = $x+2y-2$ and BC = $2x+3y-6$

(x and y are two real numbers for which DE and BC exist)

NOTE: DO NOT DRAW THE FIGURE.



1) Show that: $y=-\frac{1}{3}x$. **(1½pts)**

2) Let g be a function such that $g(x)=y$.

   a) What is the nature of g? **Justify. (½pt)**

   b) What is the sense of variation of g? **Justify. (½pt)**

   c) Represent g, graphically by a straight line (d), in an orthonormal system of axes $(x'Ox, y'Oy)$. **(¾pt)**

   d) f is a decreasing affine function of representative straight line (d '). How would you choose **the director coefficient** of ***f so that (d') is closer to the ordinate axis than (d).*** **(1pt)**

3) **Calculate the perimeter of DECB, when the two conditions below are satisfied:**

   * (d) passes through a point of abscissa $x=9$.
   * The perimeter of ADE equals to 6 cm. **(2pts)**

3rd exercise: (10¼ pts)

In an orthonormal system $(x'Ox, y'Oy)$ (1unit =1 cm), given the points $A\left(\frac{m}{2};n\right)$, $B(-1-m;4-n)$, $C(4\,;\,-3)$ and $D(2\,;\,-6)$. (d) is the straight line of equation $\frac{1}{2}y+2x-2=-1$.

1) a) Show that the reduced form of the equation of (d) is $y=-4x+2$. **(½pt)**

   b) Deduce the coordinates of I and J, the intersection points between (d) and the axes of system: $x'Ox$ and $y'Oy$ respectively. **(1pt)**

   c) Verify, ***by calculation***, that the point D belongs to (d). **(½pt)**

   d) Draw (d) in the orthonormal system of axes. **(½pt)**

2) Let P be the symmetric of D with respect to the ordinate axis y'O y and Q the symmetric of P with respect to x' Ox.

   a) Determine the coordinates of the two points P and Q. **(1pt)**

   b) Determine the slope of the straight line (PQ) and deduce its equation. **(1pt)**

3) (Δ) is the straight line of equation $y=x+3$.

   a) Show that **if (Δ) passes through A and B** then m and n verify the system: $\begin{cases}2n-m=6\\ n-m=2\end{cases}$. **(¾pt)**

   b) Deduce then **the coordinates of A and B when they belong to (Δ) and then plot them. (1¼pts)**

In what follows, suppose that: $m=2$, $n=4$ and CA = $\sqrt{58}$.

4) a) Show that $BC=\sqrt{58}$. **(½pt)**

   b) Let K be the midpoint of [AB] and let (C) be the circle circumscribed about the triangle KBC. Determine the coordinates of S, the center of (C), and calculate its radius. **(1¼pts)**

   c) Precise the position of the point $F(0\,;\,-0.5)$ with respect to the circle (C). **(Interior or exterior to** (C)) **(¾pt)**

6) Find the **equation of the tangent (T) to the circle** (C) at B. **(1¼pts)**

4th exercise: (6½ pts)

(S) is the circle of center O and of diameter $[AB]$ such that $AB = 6$ cm. Let M be the midpoint of $[OB]$ and C be a point on (S) such that $BC = 3.6$ cm.

1) Draw a neat and clear figure that will be completed progressively. **(¾pt)**

2) Determine the nature of the triangle ABC, and then deduce that $AC = 4.8$ cm. **(1¼pts)**

3) ➢ The straight line parallel to (AC) through O and the tangent to (S) at C intersect at D.

➢ (OD) cuts (BC) at R.

a) Show that $[OR)$ is the bisector of $C\hat{O}B$. **(1pt)**

b) Prove that the triangles COD and OBD are congruent. **(¾pt)**

c) Deduce that (BD) is tangent to (S) at B. **(¾pt)**

d) Verify that the points O, C, D and B belong to the same circle whose diameter is to be determined. **(1pt)**

4) **Suppose in this part that the point C varies on the circle (S).** Designate by G the centroid of the triangle ABC. Determine **the line on which the variable point G varies** as C describes the circle (S). **(1pt)**