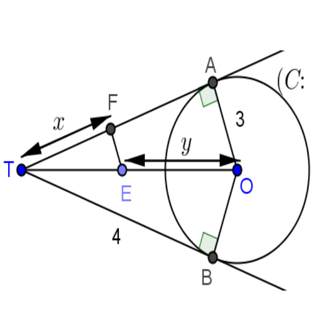
مسابقة في الرياضيات الإنكليزي	المدّة : ساعتان	الإسم :	الرقم :

إرشادات عامة:

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

1st exercise: (7pts)

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**.

No.	Questions	Answers A	Answers B	Answers C
1.	(D_1) and (D_2) are two straight lines of equations (D_1) : $y = (2-\sqrt{3})x+5$ (D_2) : $y = \left(\frac{1}{2+\sqrt{3}}\right)x-7$ then: **(1 pt)**	(D_1) and (D_2) are parallel	(D_1) and (D_2) are perpendicular	(D_1) and (D_2) are neither parallel nor perpendicular
2.	If a straight-line of equation y = ax + b is increasing and cuts the positive y-axis then: **(1 pt)**	a > 0 and b > 0	a < 0 and b < 0	a < 0 and b > 0
3.	The straight-line(D) passing through the point ***A*** (***a*** ; ***b***) where $\boldsymbol{a} = \dfrac{\frac{1}{2}+\frac{10}{4}}{\frac{5}{2}-2}$ and $b = (2-\sqrt{3})^2 + \sqrt{48}$ admits: **(2¼ pts)**	An equation $\boldsymbol{y = x}+1$	An equation $\boldsymbol{y = x}-1$	An equation $\boldsymbol{y = x}$
4.	If the price of an item is **increased by** 25% **at the beginning of the spring season** but it **returns to its initial price at the end of this season**, then the percentage of **decrease** will be: **(1¼ pts)**	25%	20%	80%
5.	If in the adjacent figure: $[TA)$ & $[TB)$ are tangents to $C(O, 3cm)$ & $(EF) \parallel (OA)$ then the relation *between y and x* is: **(1½ pts)** 	$y = \frac{5}{4}x$	$y = -\frac{5}{4}x+5$	$x = -\frac{4}{5}y+4$

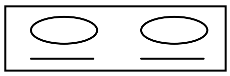
2nd exercise: (7pts)

1) Consider the system: $\begin{cases} 5x+2y = 12000 \\ 3x+6y = 24000 \end{cases}$

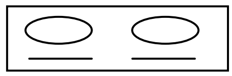
Verify that the couple (1000; 3500) is the solution of this system. **(1½ pts)**

2) A craftsman fabricates **black pearls** and **golden pearls**. **Bag B_1** containing **10 black pearls** and **4 golden pearls** is sold for 24000L.P. **Bag B_2** containing **3 black pearls** and **6 golden pearls** is sold for 24000L.L.

a) Reproduce and complete each of the given spaces ▬▬ in the adjacent diagrams with the suitable information. **(1½ pts)**



Bag B_1 ______



Bag B_2 ______

b) Translate the given by 2 equations with 2 unknowns. and calculate the **price of one black pearl and the price of one golden pearl**. **(2pts)**

3) Nada wants to buy a bag containing 12 pearls which costs 24500L.P. How many black and golden pearls are there in the bag? **(2pts)**

3rd exercise: (9pts)

In an orthonormal system of axes $(x'Ox; y'Oy)$, consider the points: $A(1;3), B(5;1), C(-1;1)$, $D(-1;4)$ ***and the*** straight line $(d): y = -\frac{1}{2}x + \frac{7}{2}$

1) a) Place the given points A, B, C and D in the orthonormal system. **(1¼ pts)**

b) Prove that (d) passes through the points A & B, then trace (d). **(1¼ pts)**

c) Deduce that the points A, B & D are collinear. **(¾ pt)**

2) a) Determine the equation of straight line (AC). **(¾ pt)**

b) **Verify if** the two straight lines (d) & (AC) are perpendicular. **(¾ pt)**

3) Let (Δ) be the median relative to $[AB]$ of triangle ABC.

a) Calculate the coordinates of **M**, the midpoint of segment $[AB]$. **(½pt)**

b) Verify that the equation of (Δ): $y = \frac{1}{4}x + \frac{5}{4}$. **(¾ pt)**

4) a) Determine the coordinates of the point **R**, the symmetric of point D **with respect to origin**. **(¾pt)**

b) Determine the equation of straight-line (n), perpendicular to (Δ) and passing through **R**. **(1pt)**

5) Consider the equation $(D): mx + (m-2)y + m - 4 = 0$, where m is a real number.

Determine the value of m in each of the following cases:

a) (D) passes through the origin. **(½pt)**

b) (D) is parallel to the abscissa axis. **(¾ pt)**

4th exercise: (7pts)

Consider a circle (C) of center O and diameter AB = 6cm. Let M be a variable point on the tangent (T) to (C) at A. (MO) cuts (C) respectively in E and F (E is between M and O). The parallel through B to (MF) cuts the circle (C) in N and (AE) in S.

1) Draw a figure. **(1pt)**
2) Show that E is the midpoint of [AS] and that BS = 6cm. **(1pt)**
3) (SF) cuts [OB] in I.
   a) By using the two triangles OIF and SIB, show that $\frac{IO}{IB} = \frac{1}{2}$. **(1pt)**
   b) Verify that: IB = 2cm and IO = 1cm. **(1 pt)**
4) Let G be the centroid of triangle SAB.
   a) Show that $\frac{GO}{GS} = \frac{1}{2}$ and that (IG) is parallel to (BS). **(1 ½ pts)**
   b) Deduce that IG = 2cm then determine the locus of G as M varies on (T). **(1½pts)**