ليسه دي زار

الشهادة المتوسطة التجربة الثالثة لعام 2008 - 2009

مسابقة في الرياضيات الانكليزي	المدّة : ساعتان	الإسم :	الرقم :

ارشادات عامة: – يسمح باستخدام آلة حاسبة غير قابلة للبرمجة او اختزان المعلومات او رسم البيانات.
- يستطيع المرشح الاجابة بالترتيب الذي يناسبه دون الالتزام بترتيب المسائل الواردة في المسابقة.
- عدد المسائل 5 وجميعها إلزامية.
- على الطالب الإجابة بخط واضح ومفهوم.
- العلامة القصوى 30.

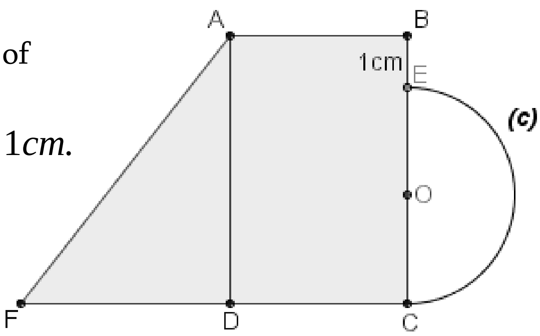
Exercise 1: (4pts)

Answer by **True** or **False** with **justification** and **correct** the false statements:

1. The equation of the line (D), passing through the points A(2;1) and B(-1;2), is: $y = -2x + 5$. **(1pt)**
2. Given that $a = \sqrt{(3-\sqrt{3})^2}$ and $b = \sqrt{(1-\sqrt{3})^2}$, then $\frac{a}{b} = \sqrt{3}$.**(1pt)**
3. If $A = 15.\overline{45} + \frac{1}{3}$, then $A = \frac{4735}{103}$.**(1pt)**
4. The price of an object that costs 1500L.L is increased by 15%, then the new price of the object is 1700L.L.**(1pt)**

Exercise 2: (4pts)

The adjacent figure represents a rectangle ABCD, a semi - circle (**c**) of radius **r** and a right triangle ADF.



Given: The area of (**c**) is $A = 4\pi\ cm^2$, $FD = 2(\sqrt{2}-1)\ cm$ and $BE = 1cm$.

a. Prove that **r** $= 2\sqrt{2}cm$.**(1pt)**
b. Deduce the length of [AD].**(0.5pt)**
c. Show that $AF = 3\sqrt{5}\ cm$ **(1pt)**
d. Let the perimeter of rectangle ABCD be $\frac{8}{\sqrt{2}-1}$, prove that its width AB is an integer. **(1 ½ pts)**

Exercise 3: (8pts)

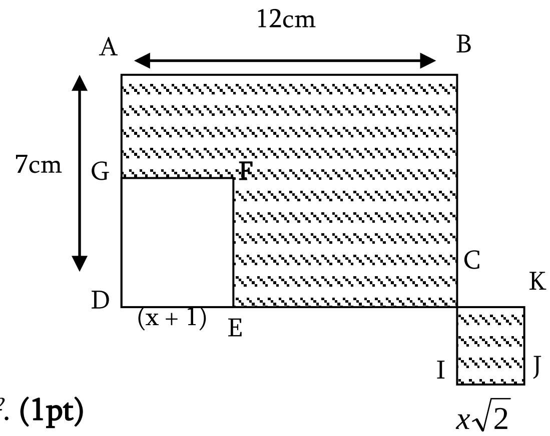
Part A:

1. Consider the two polynomials: $P(x) = (x+a)^2 + bx^2$ *and* $Q(x) = -3x^2 + 2x + 1$.
   Find a and b so that P(*x*) and Q(*x*) are identical. **(1pt)**
2. Suppose that $a = 1 and\ b = -4$
   a. Factorize $P(x)$.**(1pt)**
   b. Solve the equation $P(x) = 0$.**(1pt)**

Part B:

ABCD is a rectangle, where $AB = 12cm\ and\ AD = 7cm$.

DEFG and CIJK are two squares of respective sides $(x+1)$and $x\sqrt{2}$, such that $0 < x < 6$.



1) a. Prove that the area of the shaded region is:
   $A(x) = 84 - (x+1)^2 + 2x^2$. **(1pt)**
   b. Develop and reduce $A(x)$.**(1pt)**
2) a. Prove that $A(x) - 98 = (x-5)(x+3)$. **(1pt)**
   b. Deduce the value of x if the area of the shaded region is $98cm^2$. **(1pt)**
3) Find the value of x such that the area of DEFG is double the area of CIJK. **(1pt)**

Exercise 4: (7pts)

Consider in the orthonormal system of axes $(x'Ox \text{ and } y'Oy)$the lines:

$$(d_1): y = \frac{2x+3}{2} \quad ; \quad (d_2): 3x = 9 \quad ; \quad (d_3): 2y = -4.$$

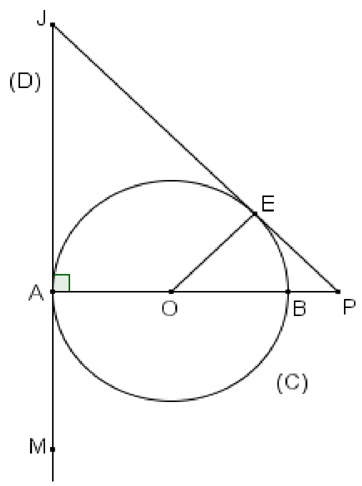
1. **Recopy and complete the following table: (2pts)**

Lines	Slopes	Parallel to y'Oy	Neither parallel nor perpendicular to y'Oy	Perpendicular to y'Oy
(d_1)				
(d_2)				
(d_3)				

2. Trace the given lines and then determine the coordinates of:
   a. Point A the point of intersection of $(d_2)\&(d_3)$. **(0.75pt)**
   b. Point B the point of intersection of $(d_1)\&(d_2)$. **(0.75pt)**
   c. Point C the point of intersection of $(d_1)\&(d_3)$. **(0.75pt)**
3. Determine the equation of the line (OA). Are the lines (OA) and (d_1) perpendicular? Justify. **(0.75pt)**
4. Determine the center and radius of the circle circumscribed about triangle ABC. **(0.5pt)**
5. Consider the point K($-\frac{9}{10}$;a).
   a. Find a so that the point K belongs to the line (d_1). **(0.75pt)**
   b. Deduce that the lines (d_1) and (OA) intersect at point K. **(0.75pt)**

Exercise 5: (7pts)

In the opposite figure:



- (C) is a circle of center O and diameter $[AB]$
- OA = OB = $3cm$
- P is a point of $[AB)$ such that OP = $5cm$
- E is a point of (C) such that PE = $4cm$
- (D) is the tangent at A to (C)
- M is a variable point on (D)
- (PE) cuts (D) in J.

1) Reproduce this figure. **(1pt)**
2) a- Prove that (PE) is tangent to (C) at E. **(1pt)**
   b- Deduce that JE = JA. **(1pt)**
3) Suppose that JE = JA = x and JP = $x + 4$ where x is a measure of length in centimeters.
   a- Apply Pythagoras theorem in triangle APJ, and then find the value of x. **(1pt)**
   b- Deduce that triangle ABJ is a right isosceles triangle. **(1pt)**
4) (JB) cuts (C) in a second point F. Prove that F is the midpoint of $[JB]$ and that (FO) is the perpendicular bisector of $[AB]$. **(1pt)**
5) Let N be the midpoint of $[MB]$.
   Find the locus of N as M varies on (D). **(1pt)**