ليسه دي زار

التجربة الأولى لعام 2008 - 2009 الشهادة المتوسطة

مسابقة في الرياضيات الانكليزي	المدّة : ساعتين	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: (5pts)

For each question, indicate the correct answer, and then justify.

No.	Question	Answers a	b	c
1	If $\left(\sqrt{5}-1\right)$ is a solution of $p(x)=x^2+3x-m$, then	$m=3+\sqrt{5}$	$m=3+7\sqrt{5}$	$m=3+3\sqrt{5}$
2	If, $A=\dfrac{10^{-2}+10^2}{10^2}$, then	$A=0.1$	$A=0.01$	$A=1.0001$
3	If $(1/2)$ is a root of $p(x)=(3x-a)(2x+a)$, then	$a=\dfrac{3}{2}$ or $a=-1$	$a=6$ or $a=\dfrac{-1}{4}$	$a=\dfrac{-3}{2}$ or $a=1$
4	If $A=\sqrt{6}\sqrt{1-\dfrac{\sqrt{5}}{3}}$; and $C=\left(\sqrt{5}-1\right)^2$ then	$A^2=C$	$A^2>C$	$A^2<C$
5	Consider the expression: $E=\dfrac{8^{10}+4^{10}}{8^4+4^{11}}$, then	$E=4^8$	$E=2^8$	$E=8^2$

2nd exercise: (6pts)

1) Given that $S=\dfrac{1}{a}+\dfrac{1}{2a}+\dfrac{1}{3a}+\dfrac{1}{6a}$; where *a* is a non-zero integer.
   a. Write *S* in the form of a fraction. (1pt)
   b. Deduce that we can write the fraction $\left(\dfrac{2}{7}\right)$ as the sum of four fractions.(1pt)

2) Given the rectangle *ABCD* such that: $AB=\sqrt{4+\sqrt{7}}$ and $BC=\sqrt{\dfrac{7}{2}}+\sqrt{\dfrac{1}{2}}$.
   1. Calculate AB^2 and BC^2. Deduce that $AB=BC$. (1½ pts)
   2. What can you say about the rectangle ABCD ?(1pt)
   3. Develop and reduce $\left(\sqrt{7}+1\right)^2$. (½ pt)
   4. Calculate the radius of the circle circumscribed about triangle ABC. (1pt)

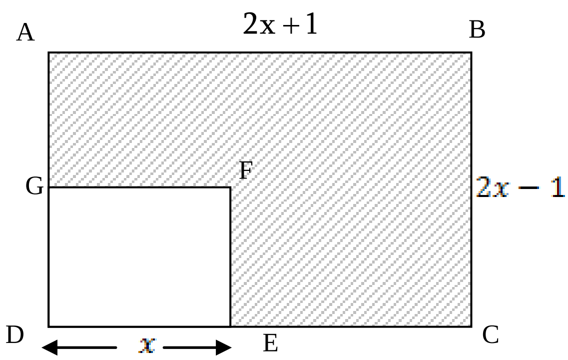
3rd exercise: (5pts)

1. Consider the polynomial: $p(x)=3x^3-12x^2-3x+a$. Calculate *a* so that 1 is a root of $P(x)$. (½ pt)
2. In what follows suppose that $a=12$.
   Factorize $P(x)$, and then solve the equation $P(x)=0$. (1 ½ pts)
3. If $Q(x)=(x-7)(x^2+2x+1)+(x-1)(x+1)^2$. Prove that the given polynomial can be written in the form $Q(x)=(2x-8)(x+1)^2$. (1pt)
4. Let $E(x)=\dfrac{P(x)}{Q(x)}$
   a. Find all values of *x* for which $E(x)$ is defined and then simplify $E(x)$. (1pt)
   b. Find $E(\sqrt{2})$, then rationalize the denominator of the answer obtained. (1pt)

4th exercise: (3 pts)

In the opposite figure $ABCD$ is a rectangle and $DEFG$ is a square.

a. Express the areas of $ABCD$ and $DEFG$ as a function of *x*. (1pt)
b. Determine the value of *x* if the area of the shaded region is 26cm^2. (1pt)
c. Find the dimensions of $ABCD$.(1pt)



5th exercise: (5pts)

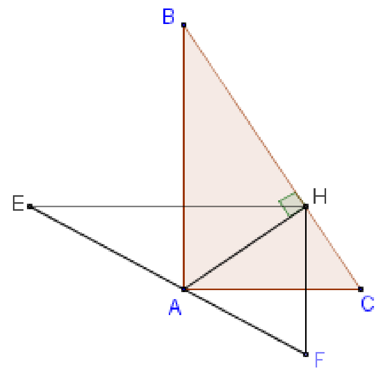
Let (C) be a circle of center O , radius $r=5\text{cm}$ and diameter $[AB]$. The perpendicular bisector of $[AO]$ intersect (C) at points D & E. M is the symmetric of O with respect to A.

1. a. Prove that:
   ii. The measure of angle $D\hat{A}O$ is 60°. (¾ pt)
   iii. The triangle MDO is right at D. (3/4-pt)
   b. What do the lines (MD) and (ME) represent with respect to the circle (C) .Justify. (1pt)
   c. Calculate the measure of the angles $D\hat{M}E$ and $A\hat{D}B$. (1pt)
   d. Calculate the length of the segments $[MD]$ and $[ME]$. (1pt)
2. Complete the following sentence: (½ pt)
   From the point M outside the circle, we can draw …… so that MD …… ME.

6th exercise: (6pts)

Let ABC be a right triangle at A, and $[AH]$ the height issued from A . See opposite figure.

The point E is the symmetric of H with respect to the line (AB), and F is the symmetric of H with respect to the line (AC).



1. Reproduce this figure. (½ pt)
2. a. Prove that A is the center of the circle (C) circumscribed about the triangle EHF. (1pt)
   b. Deduce that the points $E, A,$ and F are collinear. (1pt)
3. In this part, take $AB=6\text{cm}$ & $AC=2\text{cm}$.
   a. Show that $BC=2\sqrt{10}\text{cm}$. (1pt)
   b. Calculate the area of triangle ABC, and then deduce that $AH=\dfrac{3\sqrt{10}}{5}\text{cm}$. (1 ½ pts)
4. Answer by true or false and justify your answer: Is (BC) tangent to the circle (C) at point H? (1pt)