ليسه دي زار

الشهادة المتوسطة التجربة الثانية لعام 2006 - 2007

مسابقة في الرياضيات الإنكليزي	المدّة : ساعتين	الإسم :	الرقم :

1^{rst} exercise: (2pts)

Solve then choose the correct answer

No.	Questions	Answers		
		A	B	C
a	$(5 + 4)^2 =$	$5^2 + 4^2$	3^4	-9^2
b	The half of 2^{2002} is	2^{1001}	2^{2001}	1^{2002}
c	$5-2\sqrt{6}=$	$3\sqrt{6}$	$\left(\sqrt{6}-3\right)^2$	$\left(\sqrt{2}-\sqrt{3}\right)^2$
d	$\sqrt{\left(2-\sqrt{5}\right)^2}$	$-2+\sqrt{5}$	$2+\sqrt{5}$	$2-\sqrt{5}$

2^{nd} exercise: (2 ½ pts)

A. Give the numbers

$$B=\frac{2-\frac{1}{3}}{\left(\frac{1}{2}\right)^2} \qquad C=\frac{4\times10^{-2}\times(+5)\times10^{7}}{3\times10^{5}} \qquad D=\frac{\left(3+\sqrt{11}\right)^2-6\sqrt{11}}{3}$$

by showing all steps of calculation show that B = C = D

B. 1) Let n be a non-zero natural integer. Prove the equality: $\frac{1}{n}-\frac{1}{n+1}=\frac{1}{n(n+1)}$

2) Use the preceding equality to calculate the expression:

$$E=\frac{1}{1\times2}+\frac{1}{2\times3}+\frac{1}{3\times4}+......+\frac{1}{7\times8}+\frac{1}{8\times9}+\frac{1}{9\times10}$$

3^{rd} exercise: (4pts)

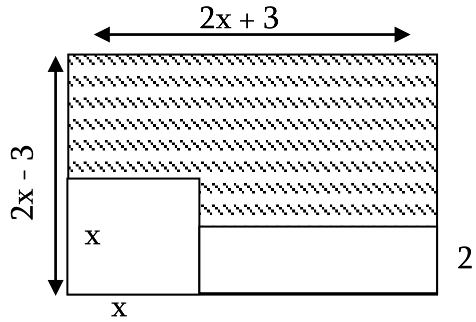
A. Given the following expressions.

$A(x) = x^2 (4x - 4) - (3x - 4) (1 - x) - 3 (x - 1)^2$

and $B(x) = 2x^2 - 10x + 4$

1. Factorize A(x) and prove that $A(x) = (x - 1) (2x + 1) (2x - 1)$
2. Let $D(x) = B(x) - x + 1$

prove that $D(x) = (x -5) (2x - 1)$



B. Given the polynomial

$P(x) = 3x^2 - 2x - 33$

1. Calculate the value of P(x) for x = -3
2. Prove that $\frac{11}{3}$ is a root of P(x)
3. Expand the expression $(x + 3) (3x - 11)$, then solve the equation $P(x) = 0$
4. Find the area of the shaded part interns of x.
5. Find x such that this area equal $18cm^2$.

4th exercise: (2pts)

The unit of length is the centimeter. Given a rectangle of dimension:

$x = 2\sqrt{108} - 5\sqrt{12} + 2\sqrt{32} - 8\sqrt{2} + \sqrt{16}$

$y = 2\sqrt{64} - 8 + 4\sqrt{75} - 6\sqrt{27}$

1. Simplify x and y.
2. State the length and the width of this rectangle. Justify.
3. Express the area of this rectangle in the form $a + b\sqrt{3}$
4. Find z such that $z = \left(x + 4 - 4\sqrt{3}\right)y$

5th exercise: (4 ½ pts)

In an orthonormal system of axis x'ox, y'oy. Given the straight line (D) y = x + 2 and the points E(0; -4) and H(-1, 1)

1. Plot (D) and prove that H belong (D).
2. (D) Cuts x'ox at F and y'oy at G. Prove by calculation that H is the midpoint of [FG].
3. Find the equation of (D_1) parallel to (D) and passes through E.
4. Let B be the point of intersection between (D_1) and x'ox and J is the midpoint to [EB]. Find the equation of (OH), and deduce that H, O and J are collinear.
5. Find the equation of (D_2) which is perpendicular to (D) and passes through A(2, 7).

6th exercise: (5pts)

In the adjacent figure given the circle C(0; $2\sqrt{3}$ cm) of diameter [AB]; Let E be a point on (C) such that ABE = 30°, the tangent at A to (C) cut (BE) at F, and the tangent drawn from F cuts (C) at P.

1. Reproduce the figure.
2. Calculate AE and BE.
3. Prove that BF = 8cm, deduce the length of AF.
4. The perpendicular to (AB) drawn from O cuts [BF] at M.
   a. Find the nature of OMFA.
   b. Calculate the midline of OMFA.
5. In this part, suppose that F is a variable point, (OF) cuts (AP) at I, Find the locus of I as F varies.