ليسه دي زار

الشهادة المتوسطة　　　　　　　　　التجربة الأولى لعام 2007 - 2008

مسابقة في الرياضيات الانكليزي	المدّة : ساعتين	الإسم :	الرقم :

ارشادات عامة: – يسمح باستخدام آلة حاسبة غير قابلة للبرمجة او اختزان المعلومات او رسم البينات.

– يستطيع المرشح الاجابة بالترتيب الذي يناسبه دون التزام بترتيب المسائل الواردة في المسابقة.

– عدد المسائل 6 وجميعها إلزامية.

– العلامة القصوى 20.

1st exercise: (3pts)

Choose the correct answer and justify

No.	Questions	Answers a	Answers b	Answers c
1.	the equation $\frac{4x^2-9}{2x+3}=0$	has a unique solution $x=\frac{-3}{2}$	has 2 solutions $x=\frac{-3}{2}$ and $x=\frac{3}{2}$	has a unique solution $x=\frac{3}{2}$
2.	Given a triangle ABC of sides $AB=\sqrt{2+\sqrt{3}}cm$, $AC=\frac{\sqrt{6}+\sqrt{2}}{2}$ and $BC=1+\sqrt{3}$ cm then	triangle ABC is isosceles at B	triangle ABC is scalene	triangle ABC is right and isosceles at A
3.	$\frac{4^{152}-2^{303}}{8^{101}}=$	2	1	3
4.	The two circles $C(0,\sqrt{8})$ and $C'(0',\sqrt{18})$ such that $00'=\sqrt{50}$ are	internally tangent	not intersecting	externally tangent

2nd exercise: (3pts)

(C) is a circle of center O and diameter [AC] such that $AC=5\sqrt{10}-2\sqrt{40}+\sqrt{2}\times3\sqrt{5}$. B is a point such that $BO=(\sqrt{5}+\sqrt{2})^2+(1-2\sqrt{2})(1+2\sqrt{2})$ (unit of length is dm)

1. Write AC in the form $a\sqrt{b}$ where a and b are two natural integers to be determined. (¾ pt)
2. Show that $BO=2\sqrt{10}$ and justify that B belongs to (C) (1 ¼ pts)
3. Calculate AB if $BC=4\sqrt{5}$ then deduce that the triangle ABC is right isosceles at B(1pt)

Remark: you can only draw a sketch

3rd exercise: (2 ½ pts)

Consider the two polynomials: $P(x) = (a^2 - 5)x^2 + 6x + c - 2$ and $Q(x) = -4x^2 + (b^2 - 10)x - 2$

1. Find a, b, and c so that P(x) and Q(x) are identical. (1pt)
2. Find b so that x = 1 is a root of Q(x). (½ pt)
3. a) Verify that $-4(x-1)(x-\frac{1}{2})=-4x^2+6x-2$ (½ pt)

   b) Find the roots of Q(x) when b = 4 (½ pt)

4th exercise: (5 ½ pts)

Part A: Consider the two real numbers: $x = \frac{36}{\sqrt{3}} - 2\sqrt{27} + 2\sqrt{4}$ and $y = 4\sqrt{75} - \frac{3\sqrt{96}}{\sqrt{2}} + 2$

1. Show that $x = 4 + 6\sqrt{3}$ (¾ pt)
2. Write y in the form of $a + b\sqrt{3}$ where a and b are two integers to be determined. (¾ pt)

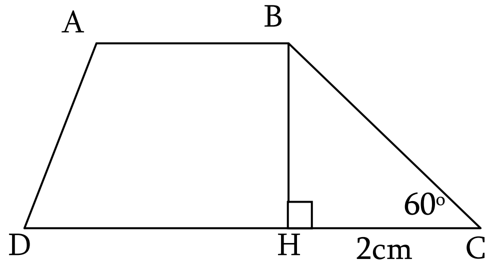
Part B: **1**. Let x and y represent the lengths of the bases of the trapezoid ABCD. Indicate the length of [AB] and that of [CD]. Justify by calculation. (1pt)

2. [BH] is the height relative to [CD], let CH = 2cm, and $B\hat{C}H = 60^o$

a. Show that BC = 4cm, then deduce BH using two different ways. (1 ½ pts)

b. Give an approximate value rounded to the nearest 0.001 of BH. (½ pt)

c. Calculate the exact area of the trapezoid ABCD (1pt)

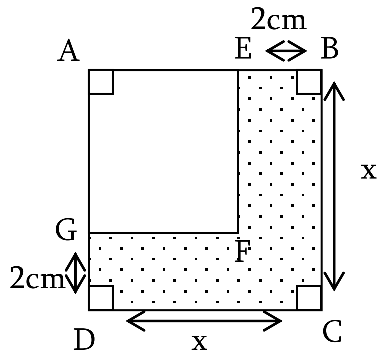


5th exercise: (3pts)

Given a square ABCD of side x cm (x > 2).

The sides [AB] and [AD] are decreased by 2cm each to obtain AEFG.

1. Find the nature of AEFG (1pt)
2. Determine the area of the shaded region in the form of a(x - b) where a and b are natural integers to be determined. (1pt)
3. Deduce the value of x so that the area of the shaded region is 16cm². (1pt)



6th exercise: (3pts)

Given a circle (C) of center O and radius R. [AB] is a fixed diameter and M is a variable point on (C). The circle (C_1) of center M and radius MA cuts (C) in A and E. Let D be the point diametrically opposite to A in (C_1).

1. Draw a figure. (½ pt)
2. Determine the nature of each of the following triangles ADE and AEB. Deduce that the points B, E and D are collinear. (1pt)
3. Show that (OM) and (BD) are parallel. Deduce that BD = 2R (¾ pt)
4. Choose the correct answer and justify.

a. The point B is	i. variable	ii. fixed
b. The point D is	i. variable	ii. fixed
c. The length BD is	i. constant	ii. variable

From the above questions, deduce the path on which the point D moves when M moves on (C). (¾ pt)