



**Entrance test**

**Mathematics**

**M59**

**May 2011**

**Time allowed: One hour ten minutes**

**Answer all questions.**

**It is advised that you work quickly and that you leave behind questions that are taking you too long to answer.**

**You should only bring in writing material (pens, pencils, erasers, rulers).**

**No calculators are allowed.**

**All your rough calculations have to be presented. Answers with no evidence of calculations will not score any marks.**

**Use the blank pages of the exam paper to do your rough work.**

**Nothing should be removed from the exam room.**

**The sum of  $n$  terms of the arithmetic progression  $a, a+d, a+2d, a+3d\dots$  is**

$$S = \frac{n}{2}[2a + (n-1)d]$$

Remember  $0.39 = \frac{39}{100}$

**Question 1** Solve the equation  $p - (x-4)^2 = \left(\frac{a}{b} + 8\right)x - \frac{c}{2b^2}x^2 - x^2 - 16$

when  $p = 1\frac{8}{10}$ ,  $a = 10$ ,  $b = 20$  and  $c = 10$ .

**Answer:**  $x =$       and      .

**Question 2**

Find the value of AB when  $A = -\frac{a+b}{2a} + \frac{a+2b}{3a} - \frac{b-5a}{6a} - \frac{a^2 - 2ab + b^2 - (a-b)^2}{(a+b)^4}$

and  $B = \frac{3}{2 + \frac{2}{3 + \frac{2}{3 + \frac{2}{3}}}} \times \frac{1}{0.39}$

**Answer:** AB =

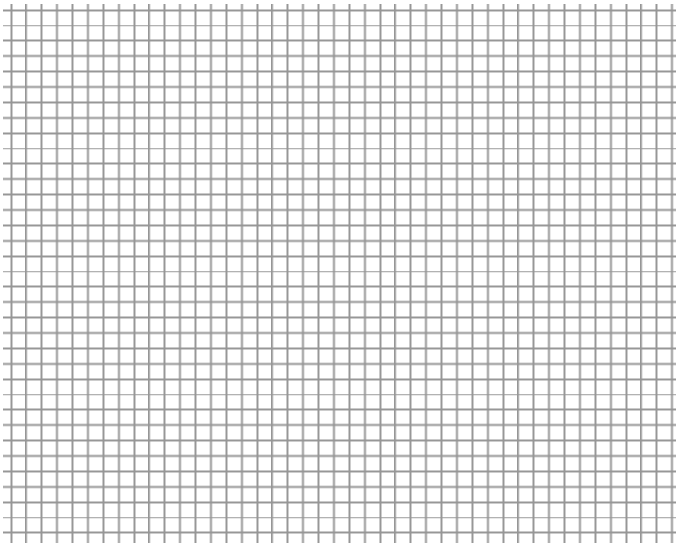
**Question 3**

The sum of two numbers is equal to 8 and the sum of their squares is 36. What are the two numbers?

**Answer:** The numbers are      and      .

**Question 4** a) Find the point where all three lines  $y = 4 + 2x$ ,  $y = 4 - \frac{2}{3}x$ , and  $2y = 8 - x$  meet.

b) Draw the lines  $y = 4 + 2x$  and  $y = 4 - \frac{2}{3}x$ , showing clearly where they meet and use your diagram to calculate the area of the triangle formed by these two lines and x-axis.



**Answer:** a) All three lines meet at ( , ); b) The area is = .

**Question 5** The sum of the first 20 terms of an arithmetic progression is 400 and the sum of the first 30 terms is 900. Find the first term and the difference of the progression.

**Answer:** The first term is and the difference is .

**Question 6.**

AB and AC are the equal sides of an isosceles triangle ABC. The point L is the middle of AB, the point M is the middle of BC and the point N is the middle of CA.

a) prove that  $LM = MN$  and b) if angle  $\angle CMN = 64^\circ$ , what is the size of angle  $\angle ALM$  ?

**Answer:**  $\angle ALM =$  .