



**Entrance test**

**Mathematics**

**M61**

**July 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.**

$$\log_a b = c \text{ then } a^c = b$$

$$\text{Remember } 0.5 = \frac{5}{10} = \frac{1}{2} \text{ and } 1,000 = \text{one thousand}$$

**Question 1** Solve  $\frac{5x-7}{7x-5} = \frac{x-5}{2x-13}$

**Answer:**  $x =$       and      .

**Question 2**

Find  $\alpha$  and  $\beta$  when  $2^{\frac{\alpha}{2} + \beta - 1} = 8 \times 2^4 \times 2^2$  and  $\log_8(2\beta - \alpha)^5 = 5$

**Answer:**  $\alpha =$       and  $\beta =$       .

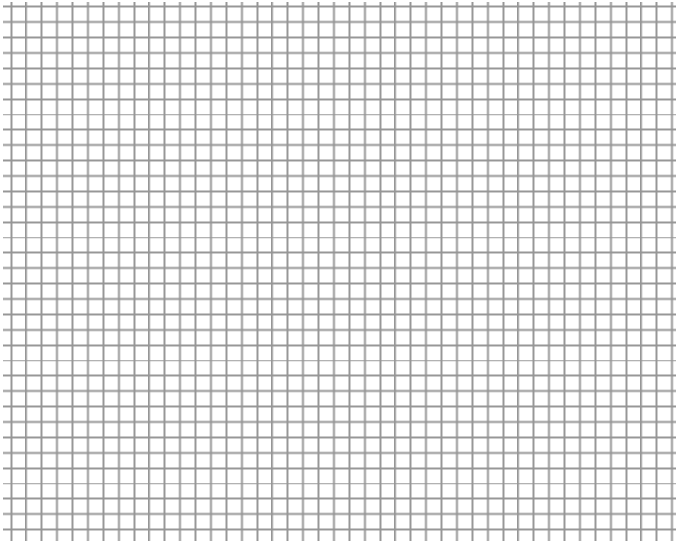
**Question 3**

In 2010 2.3 billion passengers used a bus in London – 24 million more than the year before. The number of passengers has increased by 60% since 2000. Every weekday (Monday-Friday) in 2010 the 7,500 London busses carried 6.015 million passengers. A) How many passengers travelled in 2009? B) How many passengers travelled in 2000? C) How many passengers does a bus carry on average every weekday? D) If there were 364 days when the busses run in 2010 how many passengers travelled on weekends (Saturday, Sunday)?

**1,000,000=million; billion = 1,000 million; 2.3 = 23/10**

**Answer:**

**Question 4** The lines  $y=ax+b$ ,  $x-2y=-1$  and  $x+2y=4$  meet at one point. The line  $y=ax+b$  also passes through  $(0,-1)$ . Draw the three lines, for  $x$  between  $-2$  and  $+3$  showing clearly where they meet and where they meet the axes.

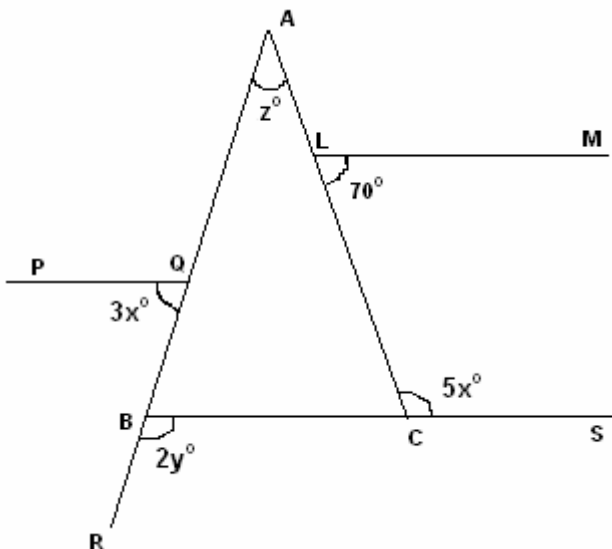


**Question 5** Find  $x$  when  $\frac{1}{4 - \frac{y}{6 + \frac{3x}{1-x}}} = 4$  and  $\frac{6\sqrt{y}-11}{3\sqrt{y}} = \frac{2\sqrt{y}+1}{\sqrt{y}+6}$

**Answer:**  $x = \dots$

**Question 6.**

Find the value of  $x$ ,  $y$ ,  $z$  in the figure below if lines  $PQ$ ,  $LM$ , and  $BS$  are parallel to each other.  $AQBR$  and  $BCS$  are straight lines.



**Answer:**  $x = \dots$ ,  $y = \dots$ ,  $z = \dots$