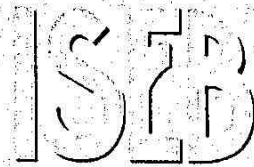


SURNAME ..... FIRST NAME .....

JUNIOR SCHOOL ..... SENIOR SCHOOL .....



Independent Schools  
Examinations Board

## COMMON ENTRANCE EXAMINATION AT 13+

# MATHEMATICS

## PAPER 2: NON-CALCULATOR PAPER

Monday 26 January 2009

Please read this information before the examination starts.

- This examination is 60 minutes long.
- All questions should be attempted.
- A row of dots ..... denotes a space for your answer.
- A completely correct answer may receive no marks unless you show all your working.
- Answers given as fractions should be reduced to their lowest terms.

1. Here is part of a number pattern:

16 15 13 10 6 1

(i) Without using any number twice, write down from the list above

(a) the product of 2 and 8

Answer: ..... (1)

(b) a prime number

Answer: ..... (1) 0

(c) a square number

Answer: ..... (1)

(ii) Calculate the range of the six numbers.

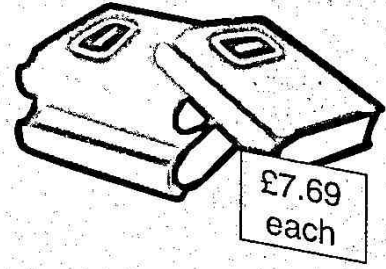
Answer: ..... (1) 0

(iii) If the pattern is continued, write down the first number in the pattern which is less than -10

Answer: ..... (1)

2. Paul buys a series of 3 books costing £7.69 each.

(i) How much does he pay altogether for the 3 books?



Answer: £ ..... (2)

His friend, Sam, buys the same series of books from a website for a total of £13.98 but he must also pay £2.55 for postage.

(ii) How much less does Sam pay in total than Paul?

Answer: £ ..... (2)

The 3 books in total contain 739 pages.

(iii) If Paul reads 15 pages each day, how many days will it take him to read all 739 pages?

Answer: ..... days (2)

3. (a) Calculate 35% of £4

Answer: £ ..... (2)

(b) Write 650 metres as a fraction of 1 kilometre.  
Simplify your answer.

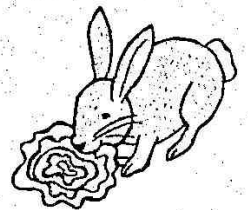
Answer: ..... (2)

(c) A packet of mints contains 36 mints.  
3 packets contain the same number of mints as 4 tubes.  
How many mints are there in a tube?



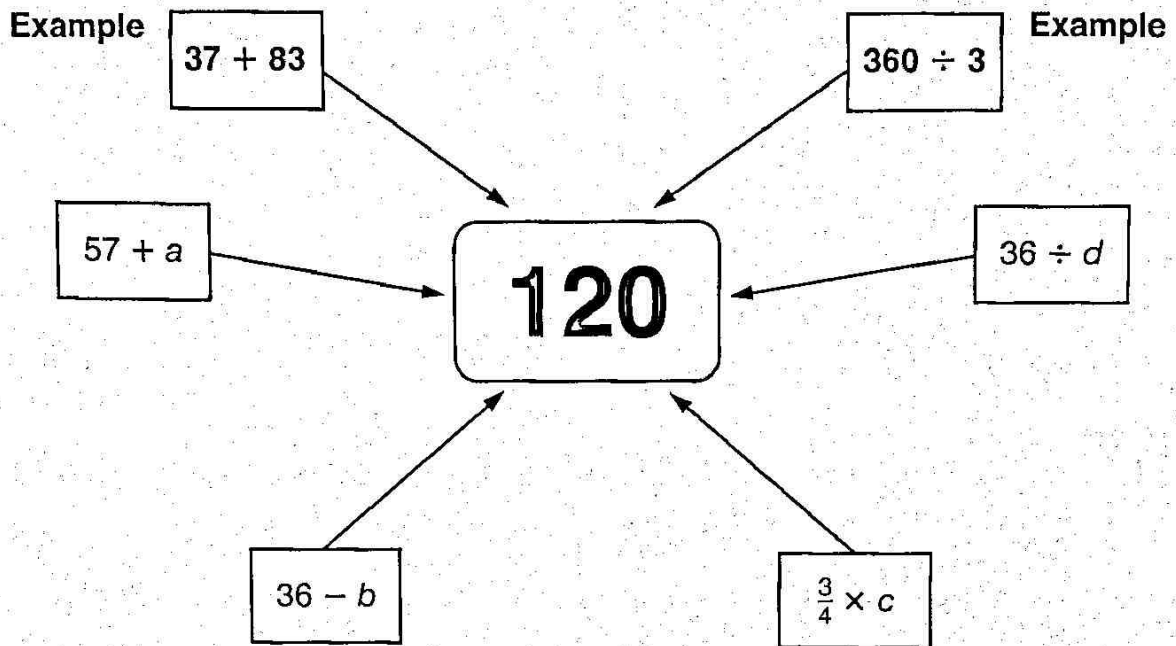
Answer: ..... (2)

(d) Bruce, the rabbit, eats  $\frac{2}{3}$  of a cabbage each day.  
How many days will it take him to eat 6 cabbages?



Answer: ..... days (2)

4. The answer to each of the calculations shown below is 120  
Find the value of each of the letters  $a$ ,  $b$ ,  $c$  and  $d$ .



Answer:  $a =$  ..... (1)  
 $b =$  ..... (1)  
 $c =$  ..... (1)  
 $d =$  ..... (1)

5. Mr Bright, the maths teacher, took a sum of money out of his bank account. He spent  $\frac{1}{3}$  of the sum on a new jumper and  $\frac{2}{5}$  of the sum on books.

(i) What fraction of the sum of money did he have left?



Answer: ..... (2)

(ii) If he had £20 left, how much money did Mr Bright spend on books?

Answer: £ ..... (2)

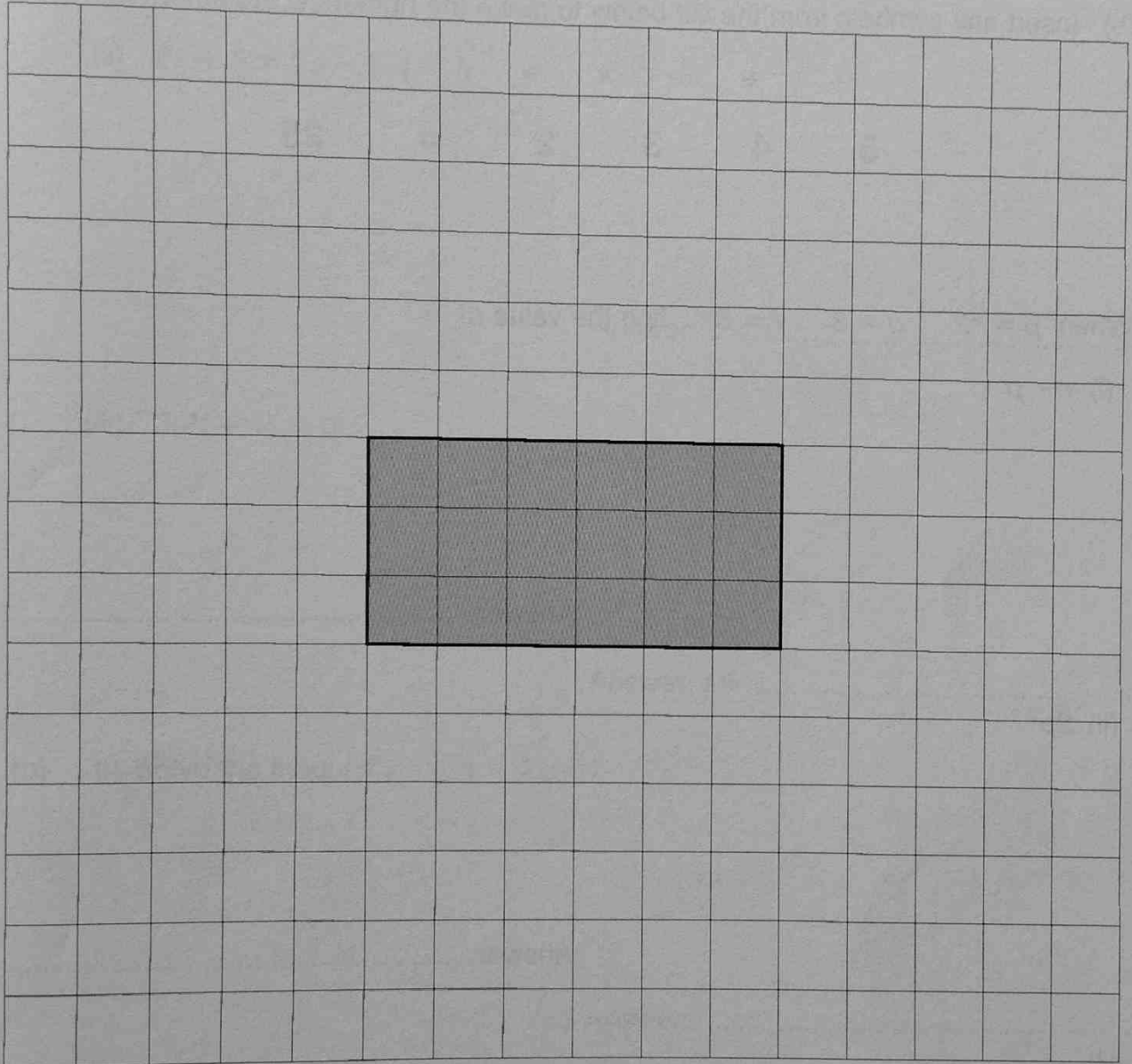
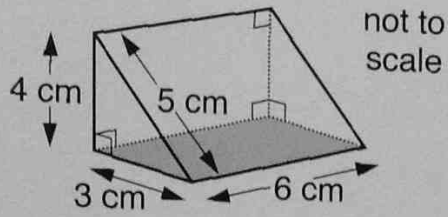
Mr Bright spent  $3\frac{1}{3}$  hours shopping.

Three-quarters of this time was spent in the book shop.

(iii) How long did Mr Bright spend in the book shop?

Answer: ..... hours (2)

6. (i) Draw a net for this shape on the centimetre squared grid below.  
 (The shaded face is already drawn for you.)



(3)

- (ii) Calculate the volume of the shape.

Answer: .....  $\text{cm}^3$  (2)

7. (a) Calculate  $\sqrt{2^3 + 4 \times 7}$

Answer: ..... (2)

(b) Insert any symbols from the list below to make the numerical statement correct.

$$5 \quad 4 \quad 3 \quad 2 \quad = \quad 25$$

+   -   ×   ÷   (   )

(2)

8. When  $p = -2$     $q = 3$     $r = 5$  find the value of

(i)  $r - p$

Answer: ..... (1)

(ii)  $3p^2$

Answer: ..... (2)

(iii)  $\frac{r}{p - q}$

Answer: ..... (2)



9. (a) Solve the following equations:

(i)  $\frac{2r}{3} + 6 = 18$

Answer:  $r = \dots\dots\dots$  (2)

(ii)  $6s + 5 = 2s - 5$

Answer:  $s = \dots\dots\dots$  (2)

(iii)  $3(2t + 1) = 0$

Answer:  $t = \dots\dots\dots$  (2)

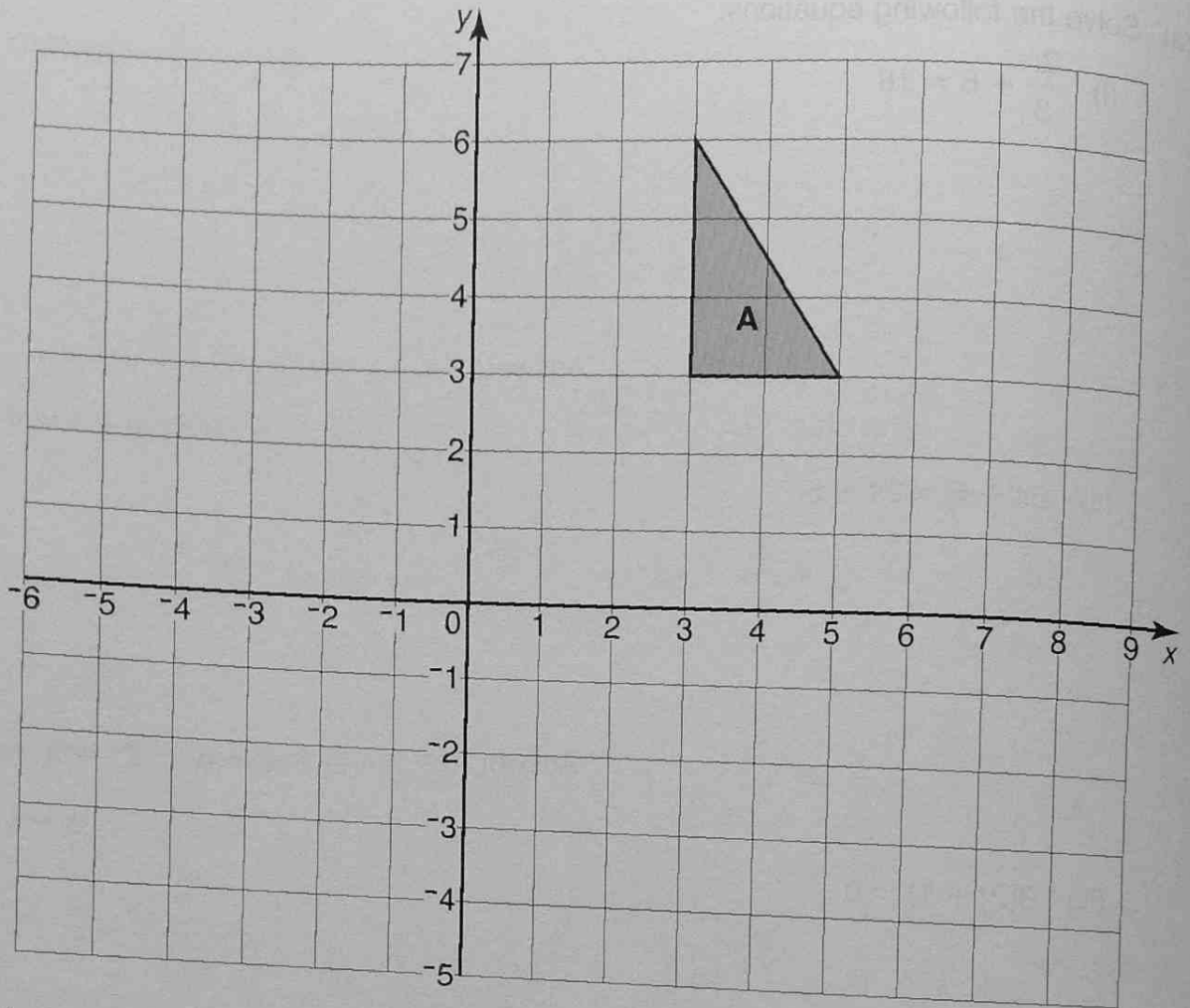
(b) (i) Solve the inequality  $1 - 2u < 7$

Answer:  $\dots\dots\dots$  (2)

(ii) Write down the smallest integer which satisfies your answer to part (b) (i).

Answer:  $\dots\dots\dots$  (1)

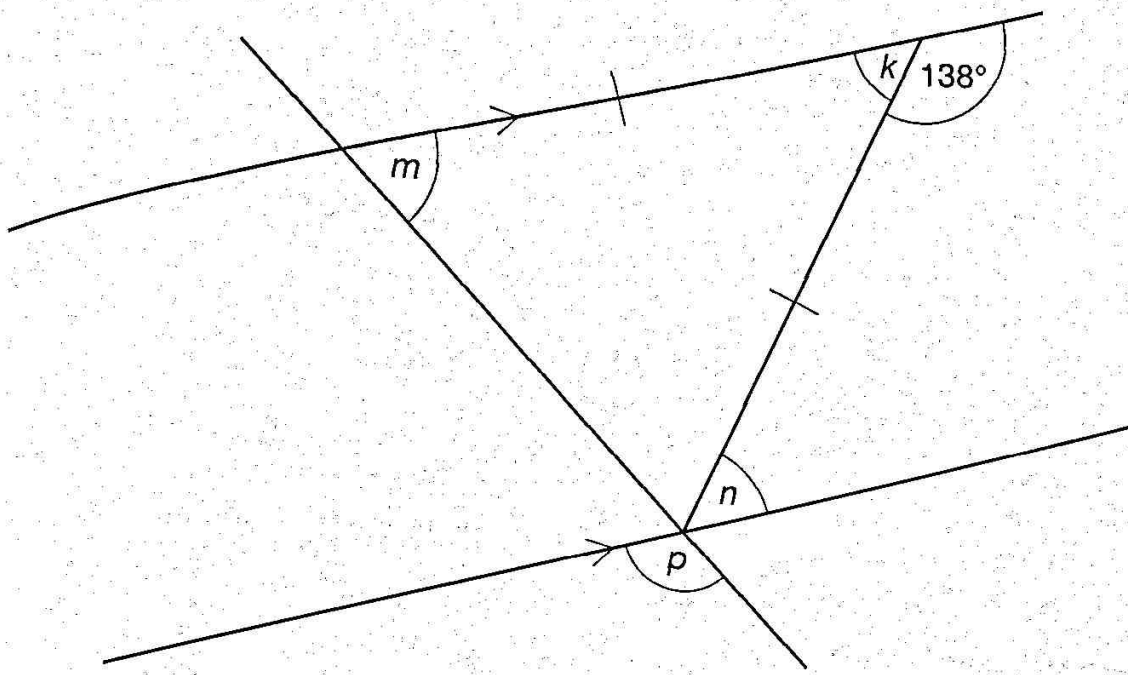
10.



- (i) On the grid above, draw and label the line  $x = 1$  (1)
- (ii) Reflect triangle **A** in the line  $x = 1$   
Label the image **B**. (1)
- (iii) Rotate triangle **A** through  $90^\circ$  anticlockwise about the point  $(2, 0)$ .  
Label the image **C**. (2)
- (iv) Translate triangle **A** by *2 units to the left* and *6 units down*.  
Label the image **D**. (2)
- (v) (a) Enlarge triangle **A** by scale factor 2 with centre of enlargement  $(5, 6)$ .  
Label the image **E**. (2)
- (b) How many times larger is the area of **E** than the area of **A**? (2)

Answer: ..... (1)

11. Calculate the size of each of the angles marked  $k$ ,  $m$ ,  $n$  and  $p$ .

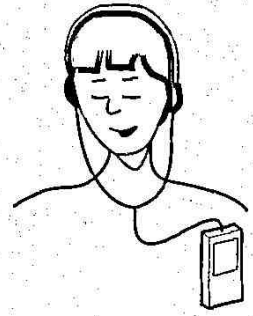


not to scale

- Answer:  $k = \dots\dots\dots^\circ$  (1)  
 $m = \dots\dots\dots^\circ$  (2)  
 $n = \dots\dots\dots^\circ$  (1)  
 $p = \dots\dots\dots^\circ$  (2)

12. On Monday, Kate downloads a music track which lasts 3 minutes and 59 seconds.  
On Tuesday, she downloads a different track which lasts 4 minutes and 49 seconds.

(i) What is the total length of the two tracks?



Answer: ..... min ..... s (2)

On Wednesday, she downloads a third track.  
Her three tracks last exactly 13 minutes in total.

(ii) Calculate the mean length of a track which Kate downloads.

Answer: ..... min ..... s (1)

Kate downloads a fourth track.

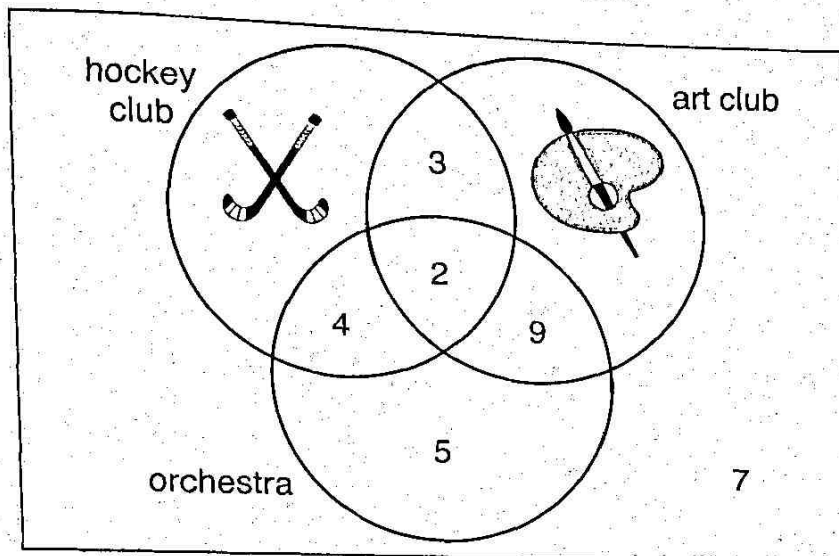
The mean length of a track is now 4 minutes and 25 seconds.

(iii) What is the length of the fourth track?

Answer: ..... min ..... s (2)

13. Miss Smart asked the children in Year 8 to which school clubs they belong. The results are shown in the diagram.

For example, 9 children belong to the art club and orchestra, but not the hockey club. 7 children do not belong to any of the clubs.



(i) How many children

(a) belong to all 3 clubs?

Answer: ..... (1)

(b) only belong to the orchestra?

Answer: ..... (1)

(c) belong to exactly 2 clubs?

Answer: ..... (1)

Two numbers in the diagram are covered by logos.

The number of children who only belong to the hockey club is twice the number who only belong to the art club.

(ii) If there are 48 children altogether in Year 8, calculate the total number of children who belong to the hockey club.

Answer: ..... (3)

14. (i) Express 260 as a product of its prime factors using indices.

Answer: ..... (3)

(ii) Write down the largest odd number which is a factor of 260?

Answer: ..... (1)

(iii) Given that  $60 = 2^2 \times 3 \times 5$ , calculate the lowest common multiple of 260 and 60

Answer: ..... (2)

15. Holly has to choose a tariff for her mobile phone.

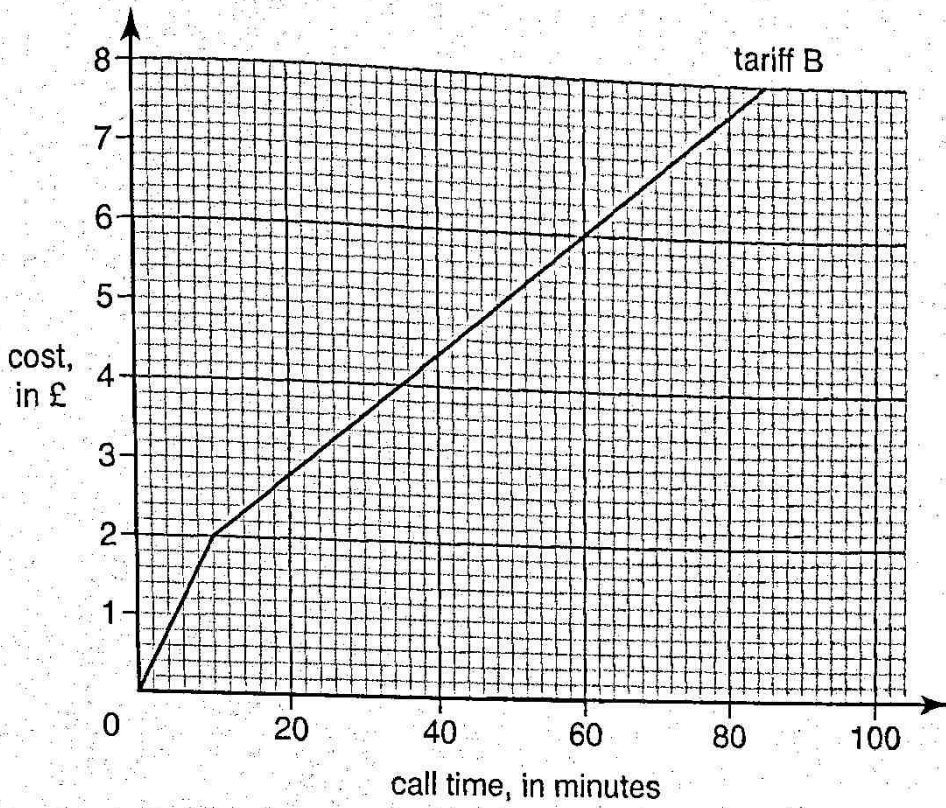
**tariff A**  
Pay £4.00 per month,  
then all calls cost  
3p per minute.

**tariff B**  
No monthly charge.  
Calls cost 20p per minute for the first 10 minutes  
per month, then 8p per minute after that.

(i) Calculate the total monthly bill including 40 minutes of calls using tariff A.

Answer: £ ..... (2)

The graph below shows the total monthly charges when using tariff B.



(ii) Use the graph to find the total monthly bill including 40 minutes of calls using tariff B. Show clearly where you take your reading.

Answer: £ ..... (1)

(iii) On the same axes, draw and label a line to show the total monthly charges when using tariff A. (2)

(iv) How many minutes of calls in a month would give the same bill on each tariff?

Answer: ..... min (1)

Holly decided to use tariff B.  
Her first monthly bill was for £10.80

(v) Showing your working, calculate the number of minutes of calls Holly made during her first month.

Answer: ..... min (3)

16. Triangular numbers are formed by adding the positive whole numbers in order.  
 For example, the 3rd triangular number is  $1 + 2 + 3 = 6$   
 These results are put into a table:

	working	triangular number	pattern
1st	1	1	$\frac{1}{2}(1 \times 2) = 1$
2nd	1 + 2	3	$\frac{1}{2}(2 \times 3) = 3$
3rd	1 + 2 + 3	6	$\frac{1}{2}(3 \times 4) = 6$

- (i) Complete the next two rows.

4th			
5th			

(2)

Robin spots a quick way to calculate triangular numbers using the pattern column.

- (ii) Use this method to find

(a) the 10th triangular number

Answer: ..... (2)

(b) the 100th triangular number

Answer: ..... (1)

Robin writes down the triangular numbers in order.

- (iii) Where in the order is the triangular number 210?

Answer: .....th place (2)

(Total marks: 100)