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

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

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

LEVEL 2: NON-CALCULATOR PAPER

Monday 27 January 2014

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.
- You must show all your working or you may receive no marks.
- Answers given as fractions should be reduced to their lowest terms.

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1. (a) Calculate

(i) 1234 + 567

Answer: ..... (2)

(ii) 1234 − 567

Answer: ..... (2)

(b) Work out the total cost of 3 footballs which cost £5.75 each.

Answer: £ ..... (2)

(c) Farmer Matthew's chickens lay a total of 346 eggs which he packs in boxes.

If he packs 6 eggs in each box, how many boxes can he completely fill?

Answer: ..... (2)

2. (a) Calculate $12 + 6 \div 3$

Answer: ..... (1)

(b) Which number should be written in the box to complete the following calculation?

$2 \times (3 + \square) = 56 \div 7$

Answer: ..... (2)

3. (a) Write 9% as a decimal.

Answer: ..... (1)

(b) (i) Write $\frac{9}{25}$ as a percentage.

Answer: .....% (2)

(ii) Write the following in order of size, starting with the smallest:

$\frac{9}{25}$ $\quad$ $\frac{9}{24}$ $\quad$ $0.\dot{3}$

Answer: ....., ..., ... (2)

4. Billy won a sum of money in a photography competition.

He spent $\frac{1}{4}$ of the sum on a pair of trainers and $\frac{2}{3}$ of the sum on a new lens.

(i) What fraction of the sum did Billy spend altogether?

Answer: ..... (2)

Billy kept the rest of the money.

(ii) What fraction of the sum did Billy keep?

Answer: ..... (1)

Billy's trainers cost £60

(iii) How much money did Billy win?

Answer: £ ..... (2)

5. (a) Write 100 as a product of its prime factors.

Answer: ..... (2)

(b) Given that $324 = 2 \times 2 \times 3 \times 3 \times 3 \times 3$, work out $\sqrt{324}$

Answer: ..... (2)

6. *The terms in each of the following sequences go up or down by a fixed number.*

(i) A sequence begins **8.6** **9.2** **9.8** **....** **....**

What is the 4th term of this sequence?

Answer: ..... (1)

(ii) The 2nd term of a sequence is 1.5
The 3rd term is 1.35

What is the 1st term of this sequence?

Answer: ..... (2)

(iii) The 2nd term of a sequence is 13
The 5th term of the sequence is 25

What is the 6th term of this sequence?

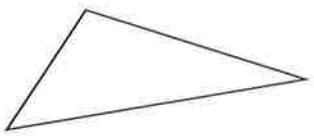
Answer: ..... (2)

7. (a) 4 identical notepads have a total mass of 250 grams.

What is the total mass, in kilograms, of 24 of these notepads?

Answer: ..... kg (2)

(b) The angles of a triangle are in the ratio 2 : 3 : 4



not to scale

(i) Work out the size of the smallest angle in the triangle.

Answer: ..... ° (3)

The triangle is enlarged by scale factor 2

(ii) What is the size of the smallest angle in the enlarged triangle?

Answer: ..... ° (1)

8. (a) If $e = 2$ $f = 4$ and $g = -5$ find the value of

(i) $4e - 3f$

Answer: ..... (1)

(ii) $(e + g)^3$

Answer: ..... (2)

(iii) $2g^2$

Answer: ..... (2)

(iv) $\frac{2g - f}{e}$

Answer: ..... (2)

(b) If $D = b^2 - 4ac$ calculate the value of D when $a = 3$ $b = -4$ and $c = -1$

Answer: $D =$ ..... (2)

9. Solve the following equations:

(i) $4w = 18$

Answer: $w =$ ..... (1)

(ii) $11 - 3x = 5$

Answer: $x =$ ..... (2)

(iii) $2(3y + 4) = 2$

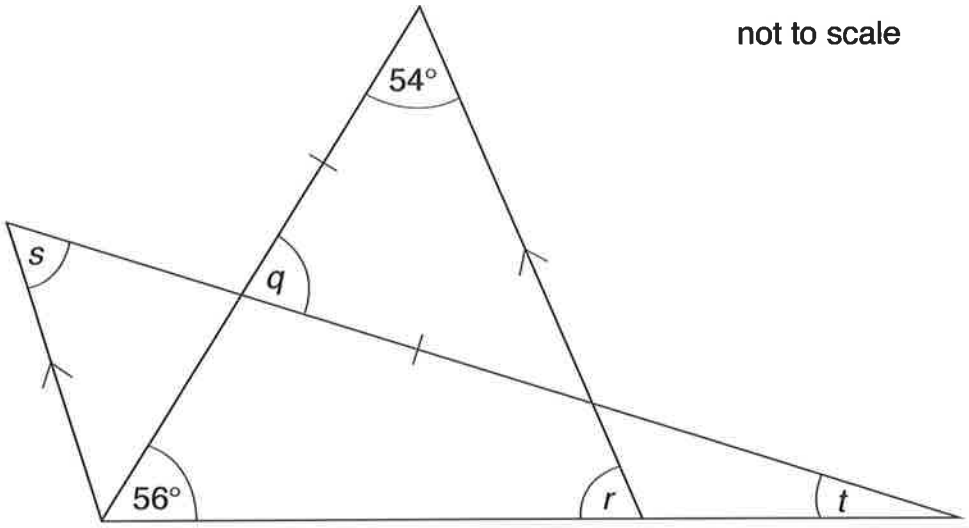
Answer: $y =$ ..... (2)

(iv) $4z + 3 = 5 - 2z$

Answer: $z =$ ..... (2)

10. Calculate the size of each of the angles marked q, r, s and t in the diagram below.

not to scale



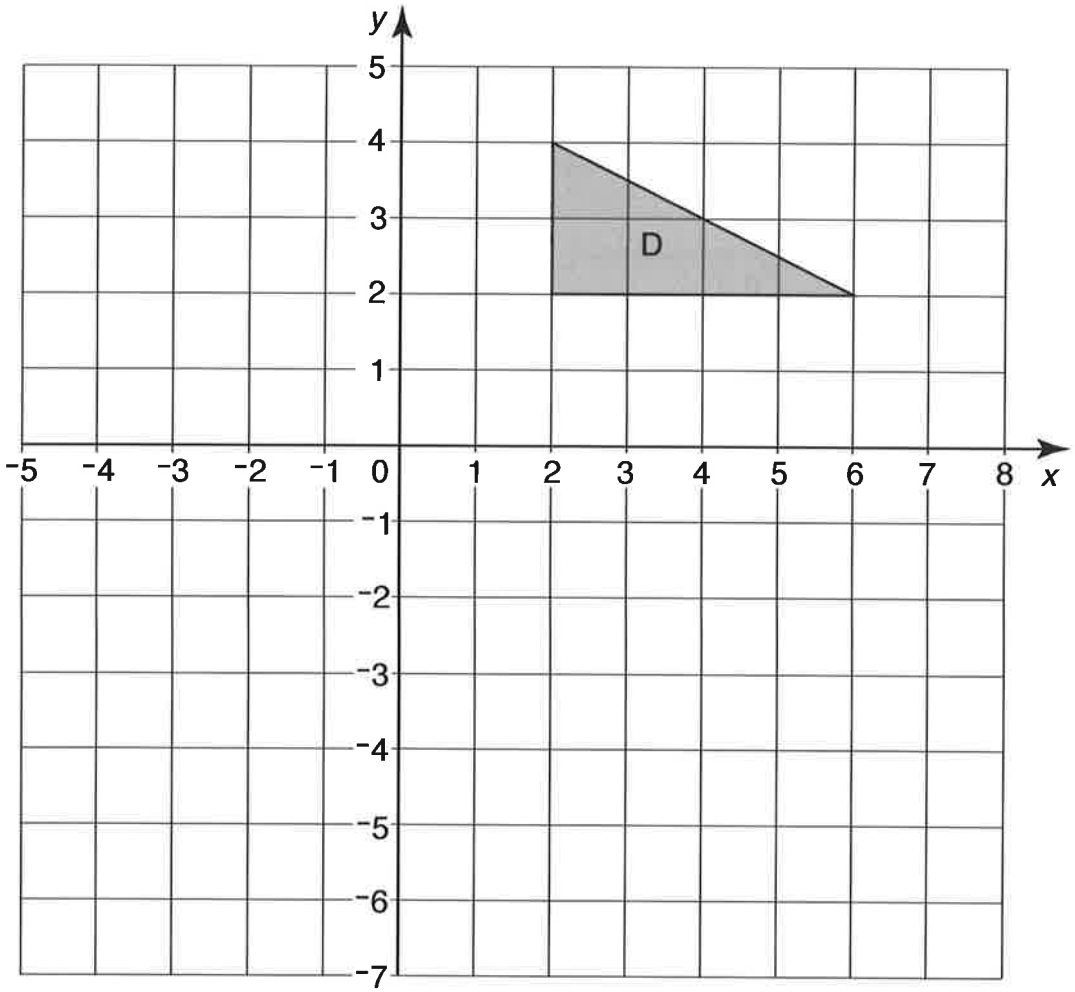
Answer: q = ... ° (2)

r = ... ° (1)

s = ... ° (1)

t = ... ° (2)

11. Shape D is drawn on the centimetre-square grid below.



(i) (a) Draw and label the line $x = 1$ (1)

(b) Reflect shape D in the line $x = 1$
Label the image E. (1)

(ii) Rotate shape D through 180° about the point (1, -1).
Label the image F. (2)

(iii) Describe the single transformation which would map shape E on to shape F.

Answer: ..... (2)

Shape D is translated *4 squares left* and *5 squares down* to give shape G.

(iv) Write down the coordinates of the right-angled vertex of shape G.

Answer: (..... , ...) (1)

12. Visitors to a National Park were asked which was their favourite season.

15 people said Spring
30 people said Summer
25 people said Autumn
and the rest said Winter

When a pie chart is drawn to show these results, the angle representing Spring is 60°.

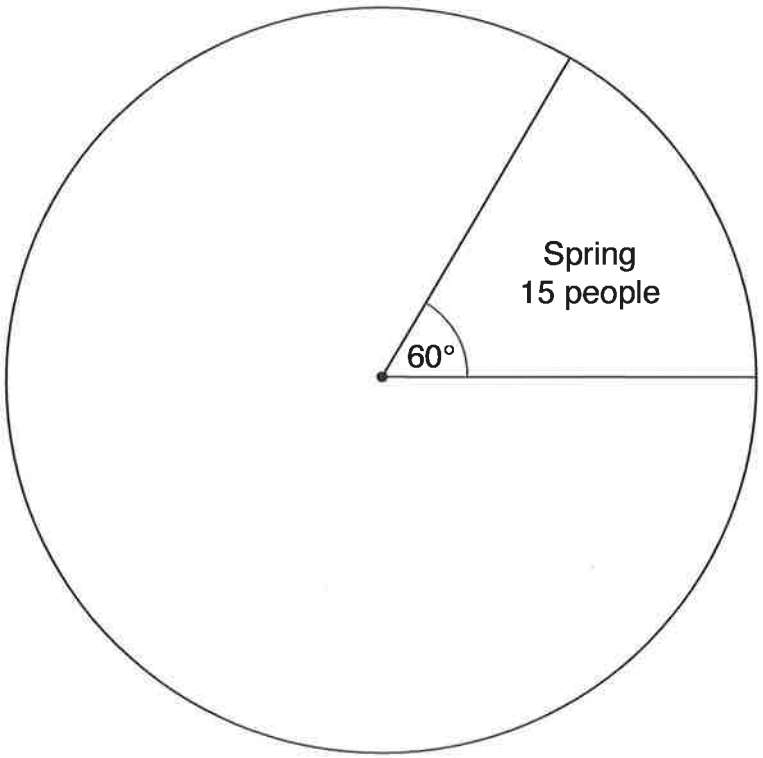
(i) Use this information to work out how many degrees represent one person.

Answer: ..... ° (1)

(ii) How many people were asked altogether?

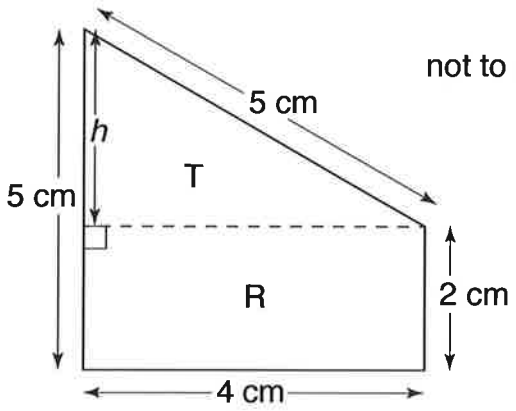
Answer: ..... (1)

(iii) Complete the pie chart below to show the results, labelling each sector fully.



(3)

13. (i) The trapezium shown on the right can be split into a triangle T and a rectangle R.



(a) Work out the height, *h*, of triangle T.

Answer: h = ... cm (1)

(b) Work out the area of triangle T.

Answer: ..... cm^2 (2)

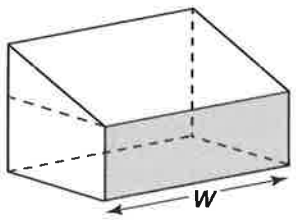
(c) Calculate the area of the trapezium.

Answer: ..... cm^2 (1)

(ii) Tommy is making a model of a garden shed.

The model is a prism and each end wall is the trapezium shown above.

Part of a net for Tommy's model – the base and the shaded wall – is shown on the page opposite.

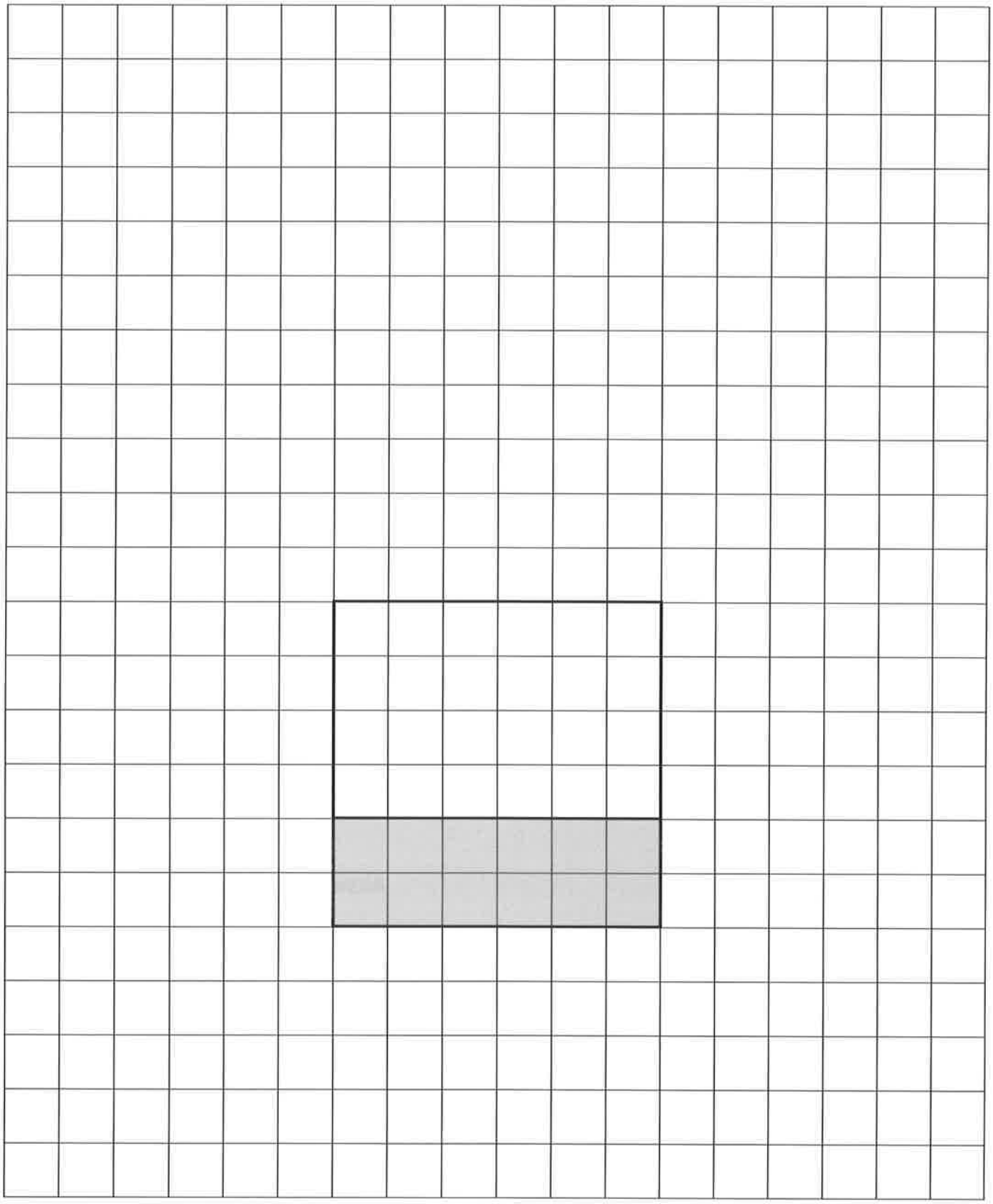


not to scale

(a) By making a measurement on the net, find the width, *w*, of Tommy's model.

Answer: w = ... cm (1)

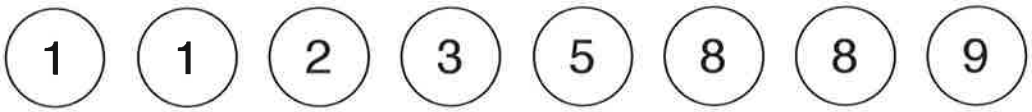
(b) Complete the net on the opposite page for the model drawn above. (3)



(c) What is the total surface area of Tommy's model?

Answer: ..... cm^2 (2)

14. Scott has a bag containing the eight numbered counters shown below.



He takes one counter at random from the bag.
Work out the probability that the counter he takes shows:

(i) 8

Answer: ..... (1)

(ii) a square number

Answer: ..... (1)

(iii) a number which has exactly two factors

Answer: ..... (1)

Scott does not replace the counter in the bag.
The probability of taking a number greater than 3 from the bag is now $\frac{4}{7}$
The probability of taking an even number from the bag is now $\frac{2}{7}$

(iv) What number was on the counter which Scott took from the bag?

Answer: ..... (2)

15. Kate has six cousins.

The age in years of each of her cousins is 10, 17, 3, 4, 8 and 6 respectively.

(i) What is the range of the ages of Kate's cousins?

Answer: ..... years (1)

(ii) Work out the median age of her cousins.

Answer: ..... years (2)

(iii) Work out the mean age of her cousins.

Answer: ..... years (2)

When Kate's age is included, the mean age of all seven children is now 9 years.

(iv) What is Kate's age?

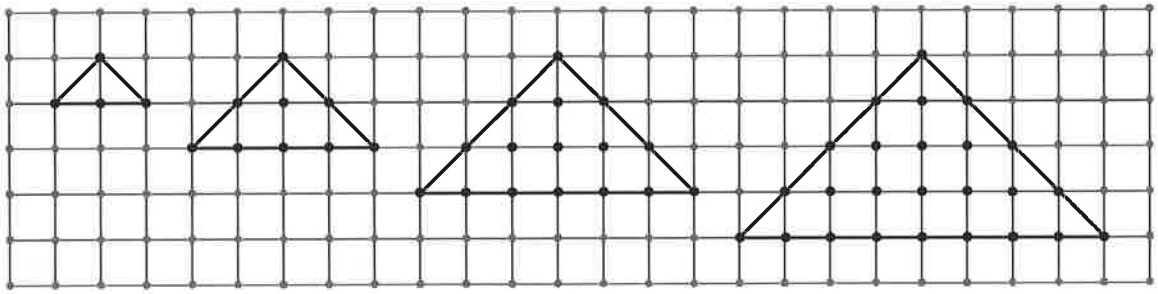
Answer: ..... years (2)

(v) Exactly two years ago, what was the range and the mean of the ages of all seven children?

Answer: the range was ..... years (1)

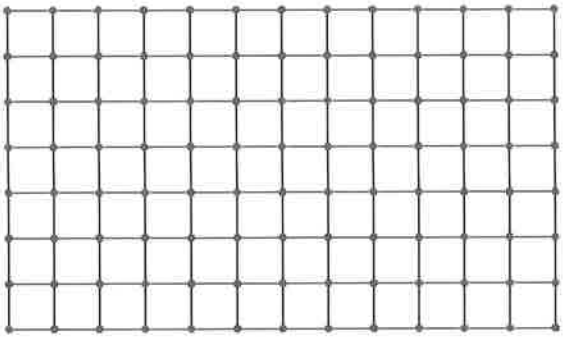
the mean was ..... years (1)

16. Below is a series of triangles drawn on a squared grid.



triangle 1 triangle 2 triangle 3 triangle 4

(i) Draw triangle 5 on the grid below.



(1)

(ii) Use the diagrams to complete the table below.

triangle number	1	2	3	4	5
number of dots on the perimeter of the triangle	4	8	12		
number of dots completely inside the triangle	0	1			

(2)

(iii) For triangle 12, calculate

(a) the number of dots on the perimeter of the triangle

Answer: ..... (1)

(b) the number of dots completely inside the triangle

Answer: ..... (2)

(Total marks: 100)