

SURNAME FIRST NAME

JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

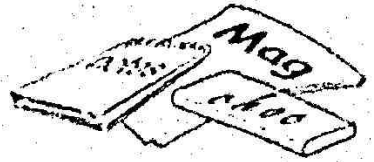
PAPER 2: Non-Calculator Paper

Monday 28 January 2008

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.

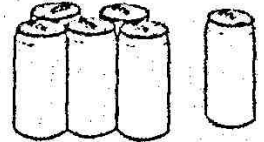
1. (a) Andy buys a notepad for 75p, a chocolate bar for 43p and a magazine for £2.89
How much does he spend altogether?



Answer: £

(2)

- (b) Becky buys a pack of 6 cans of lemonade.
One can contains 330 millilitres of lemonade.



- (i) How many litres of lemonade do the six cans contain in total?

Answer: litres

(2)

The pack of 6 cans costs £2.28

- (ii) Find the cost of one can in pence.

Answer: p

(2)

2. Look at the following numbers:

0.48

0.1

0.147

0.4641

0.037

What is the result when you subtract the smallest number from the largest number?

Answer:

(2)

3. (a) Calculate the value of

(i) $10 - 2 \times 3^2$

Answer: (2)

(ii) $5^3 - \sqrt{81}$

Answer: (2)

(b) Henry has been asked to work out an estimate for the following sum by rounding each number to 1 significant figure.

$$\begin{array}{r} 3.08 \times 682.89 \\ \hline 0.47 \end{array}$$

(i) Write down the numbers he will use for his estimate.

Answer: \times (2)
.....

(ii) Work out the value of your answer to part (b)(i).

Answer: (2)

$$35 \times 67 = 2345$$

(i) Use this fact to write down the value of

(a) 35×0.67

Answer: (1)

(b) $2345 \div 3.5$

Answer: (1)

Rulers cost 35 pence each.

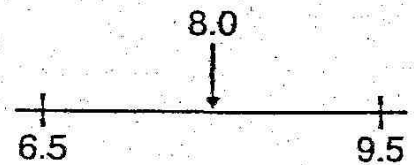
(ii) Calculate how many rulers can be bought with £24

Answer: (2)

5. The number 8.0 is half way between 6.5 and 9.5

Write down the number that is

(i) exactly half way between 2.8 and 9.4



Answer: (2)

(ii) exactly two-thirds of the way from -5 to 22

Answer: (2)

6. Mrs Melody has 18 piano pupils.
Each pupil has one lesson every week.



(i) (a) If a lesson lasts $\frac{3}{4}$ of an hour, for how many hours does Mrs Melody teach each week?

Answer: h (2)

(b) If each pupil pays £12 for a lesson lasting $\frac{3}{4}$ of an hour, how much does Mrs Melody earn each week from the piano lessons?

Answer: £ (2)

(ii) Suzie decides to have a longer lesson lasting 1 hour and 15 minutes.
If Mrs Melody charges the same rate per minute, what is the cost of Suzie's lesson?

Answer: £ (2)

(iii) Mrs Melody gives 15% of the money she earns to charity.
How much does she give to charity from each £12 lesson?

Answer: £ (2)

7. (i) (a) Write 45 as a product of its prime factors, using indices.

Answer: (2)

(b) Hence, or otherwise, write 45×3 as a product of its prime factors, using indices.

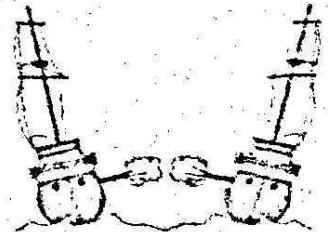
Answer: (1)

(ii) In the battle of Trafalgar, two boats were firing cannonballs at each other.

The *Britannia* fired a cannonball every 45 seconds, and the *Mont Blanc* fired a cannonball every 75 seconds.

They both fired their cannon at 12 noon.

How many seconds was it until the next time they both fired together? (It may help you to know that $75 = 3 \times 5^2$)



Answer: s (2)

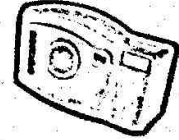
8. Jill is 15 years old and her brother Jack is 9 years old.



- (i) Write the ratio of Jill's age to Jack's age.
Give your answer in its simplest form.

Answer: : (2)

Together, they win a photography competition and their prize is £44
They decide to share the prize money in the ratio of their ages.



- (ii) How much does Jack receive?

Answer: £ (2)

9. Simplify the following expressions:

(i) $5b^2 + 3b - 3b^2$

Answer: (1)

(ii) $4t^2 \times 7t^4$

Answer: (2)

(iii) $(2c^2)^3$

Answer: (2)

10. Given that $b = 2$ $c = 3$ $d = -4$ find the value of

(i) $5b + d$

Answer: (1)

(ii) $2d^2$

Answer: (2)

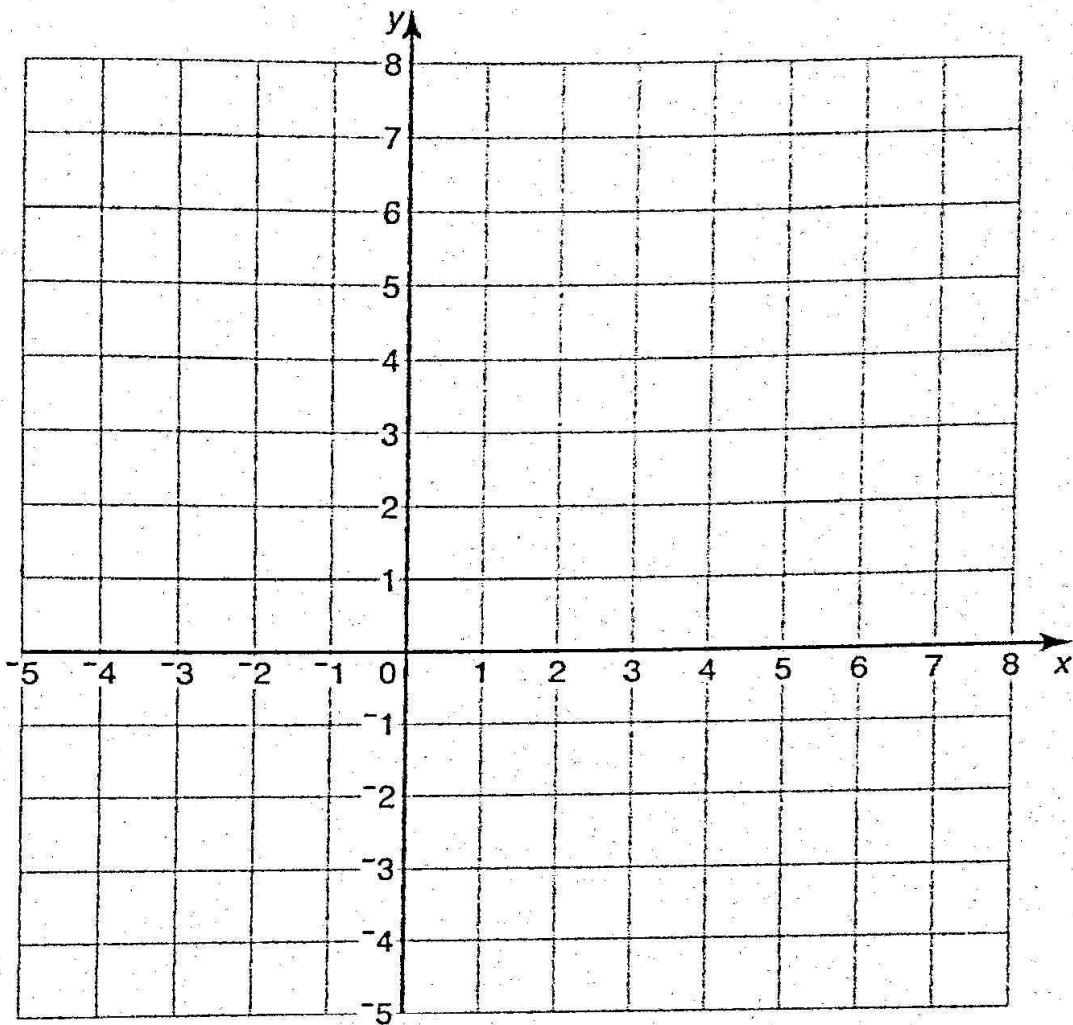
(iii) $3(d - c)$

Answer: (2)

(iv) $\frac{b-d}{b+d}$

Answer: (2)

11. (i) On the centimetre square grid below, plot the points (4, 1), (6, 1), (7, 4) and (5, 3). Join them up in order to make a quadrilateral and label your shape A.



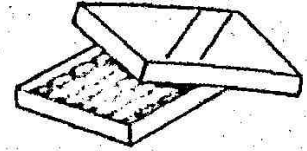
- (ii) (a) Draw and label the line $y = x$. (2)
- (b) Reflect shape A in the line $y = x$ and label the image B. (1)
- (iii) Rotate shape A through 180° about the point (2, 1) and label the image C. (2)
- (iv) Translate shape A by 2 squares left and 5 squares down and label the image D. (2)
- (v) Calculate the area of shape A.

Answer: cm^2 (2)

12. Emma is given a box of assorted chocolates for her birthday.

$\frac{2}{3}$ of them are milk chocolates and $\frac{1}{5}$ are plain chocolates.

She eats all the milk and plain chocolates.



- (i) What fraction of the chocolates in the box has she eaten?

Answer: (2)

The remaining six chocolates are white.

- (ii) How many chocolates altogether are there in a full box?

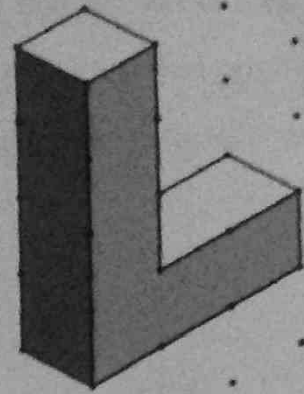
Answer: (2)

$\frac{1}{2}$ of the milk chocolates have a toffee centre and, of these, $\frac{3}{5}$ contain nuts.

- (iii) In a full box, how many milk chocolates have a toffee centre, but do not contain nuts?

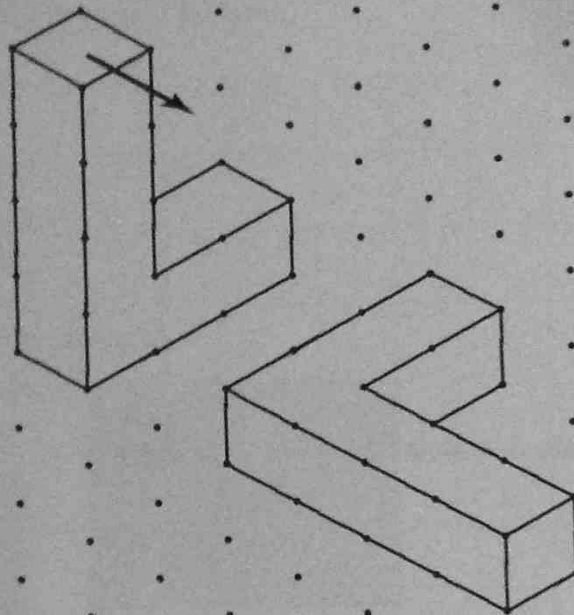
Answer: (2)

13. Here is a shape drawn on centimetre isometric paper.

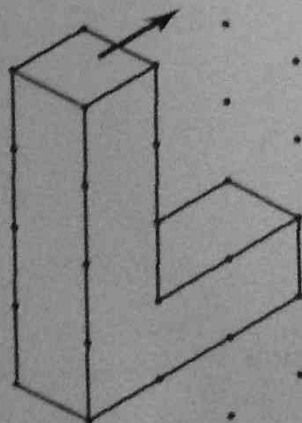


The shape is to be rotated through 90° in the direction shown by the arrow.

Example:



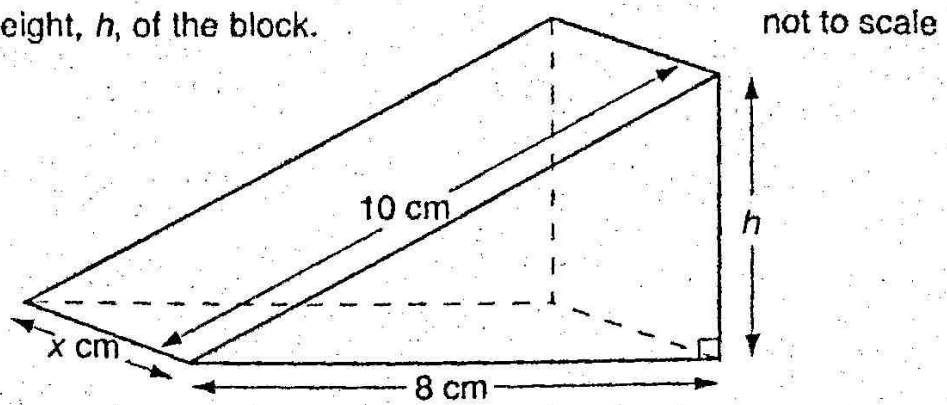
Draw the shape below in its new position.



14. Ned has a tub of building blocks.

(i) A large red block is in the shape of a triangular prism.

(a) Calculate the height, h , of the block.



Answer: $h = \dots\dots\dots$ cm (3)

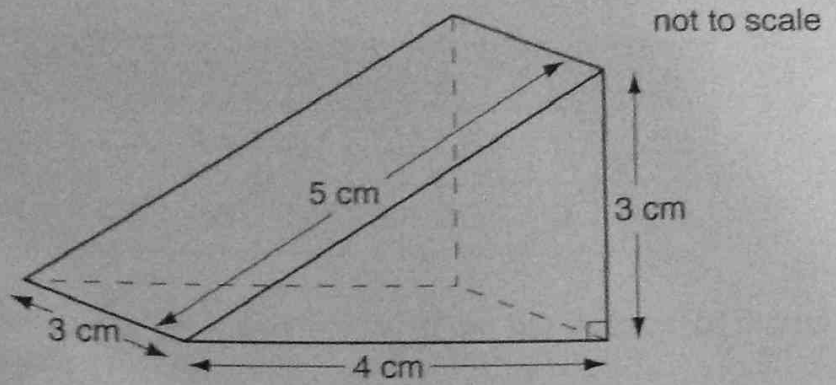
(b) Calculate the area of a triangular face.

Answer: $\dots\dots\dots$ cm² (1)

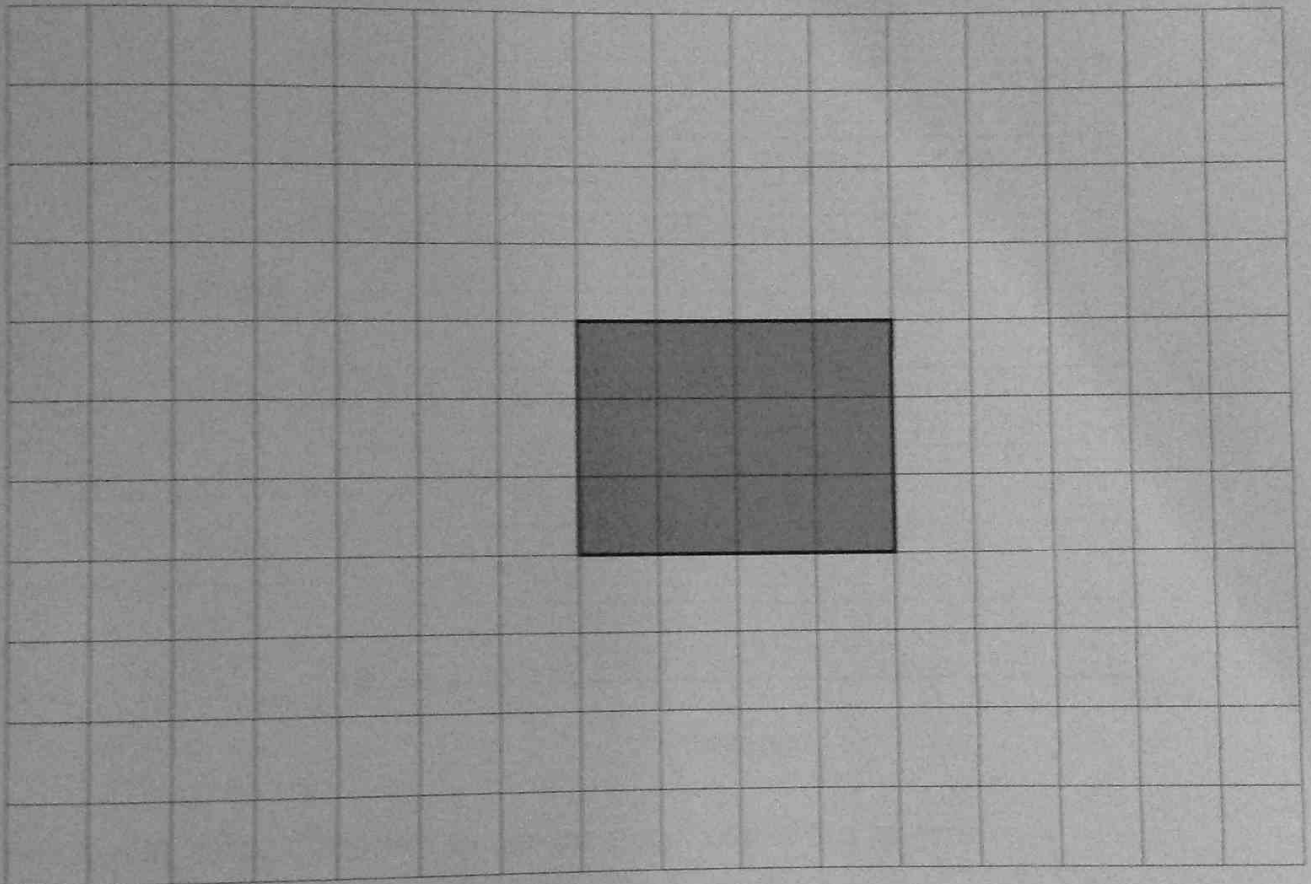
(c) Given that the volume of the block is 96 cm³, calculate the value of x .

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

(ii) There is a blue block which is a smaller triangular prism as shown in the diagram.



(a) Draw a net of the smaller triangular prism on the centimetre square paper below. (The base is already drawn for you.)

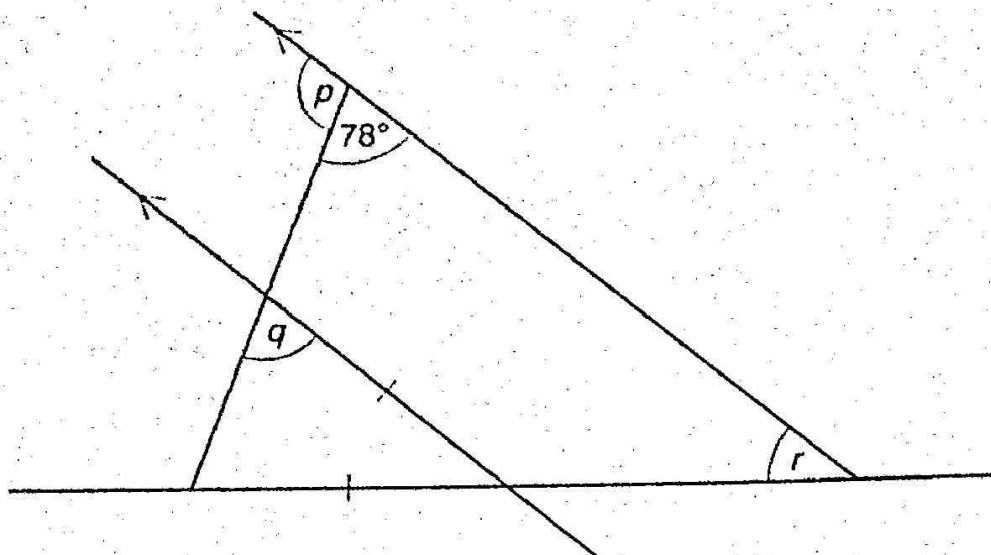


(2)

(b) Hence, or otherwise, calculate the total surface area of the blue block.

Answer: cm^2 (3)

15. Calculate the size of each of the angles marked p , q and r .



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

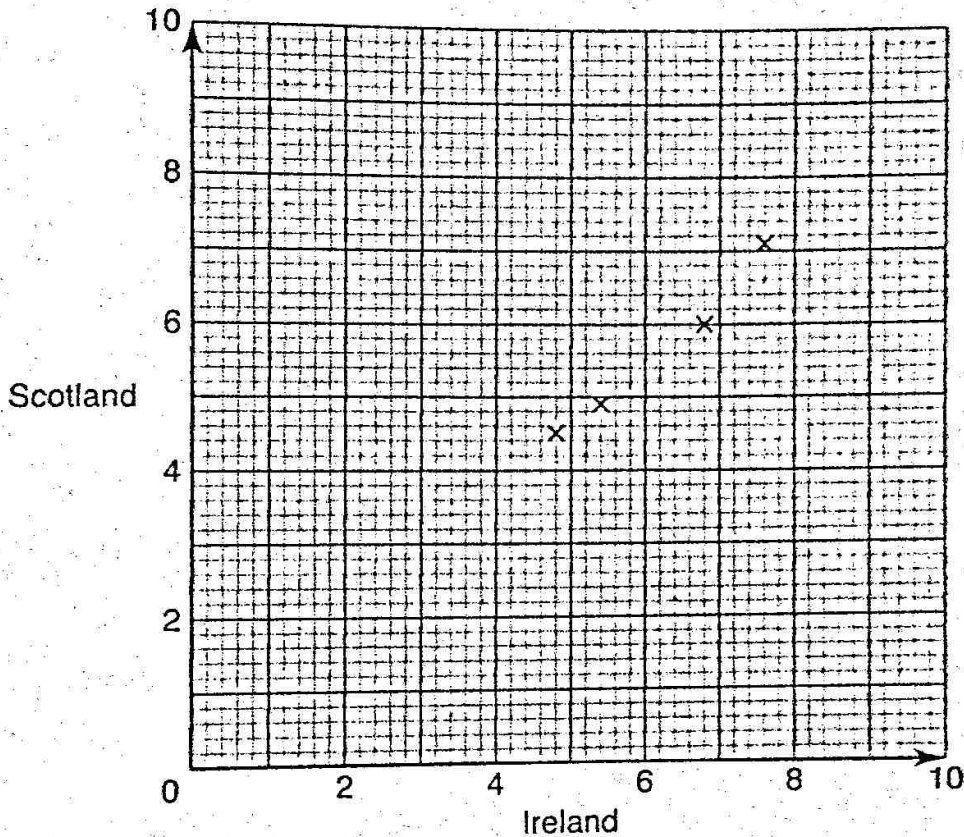
$q = \dots\dots\dots$ (1)

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

16. In a singing competition, the judges from Ireland and Scotland awarded the following marks out of 10:

judge \ singer	A	B	C	D	E	F	G	H	I
Ireland	7.6	5.4	4.8	6.8	4.0	3.6	8.8	9.6	8.5
Scotland	7.1	4.9	4.5	6.0	3.0	2.4	6.2	8.9	7.8

(i) Show this information on the scatter graph below. (The first 4 pairs of marks have already been plotted for you.)



(3)

The judges had a difference of opinion about one of the singers.

(ii) Circle the point on your graph which represents this singer. (1)

(iii) Ignoring the circled point, draw a line of best fit on your graph. (1)

(iv) Showing how you take your readings, use your line to estimate the marks awarded by the Irish judge if the Scottish judge awarded 4.0 marks.

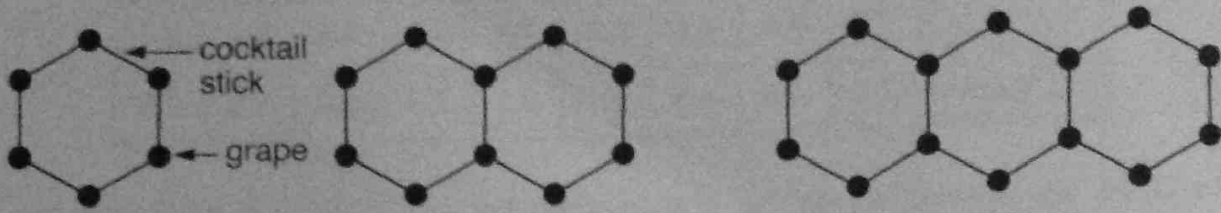
Answer: (2)

Turn over

17. Pat and Ettie decide to hold a mathematical dinner party.

To impress their friends, they have decided to arrange some grapes in lines of hexagons using cocktail sticks.

The diagrams show some grapes joined together to form lines of hexagons.



(i) Draw a diagram on the hexagonal grid below to show how grapes can be joined together to form a line of four hexagons.



(1)

(ii) Complete the table.

number of hexagons	1	2	3	4	5
number of grapes	6	10	14		

(1)

(iii) Write down an expression for the number of grapes needed to form a line of n hexagons.

Answer: (2)

(iv) What is the maximum number of hexagons they can have in a line if there are only 100 grapes?

Answer: (1)

(v) When the difference between the number of grapes and the number of cocktail sticks is 10, how many hexagons are in the line?

Answer: (2)

(Total marks: 100)