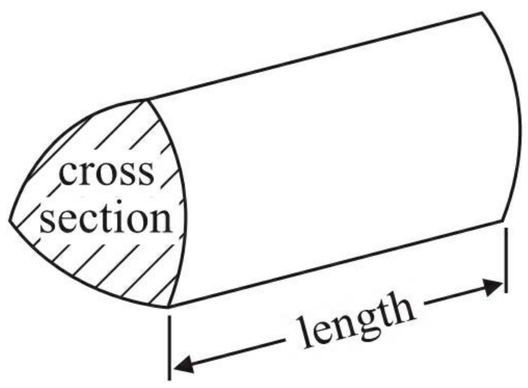
GCSE Mathematics 1MA0

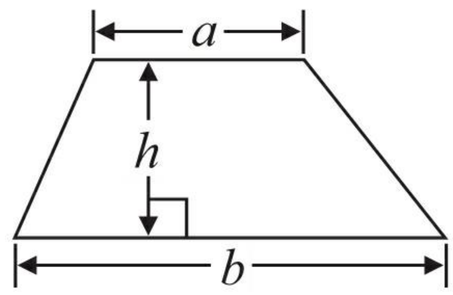
Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section × length

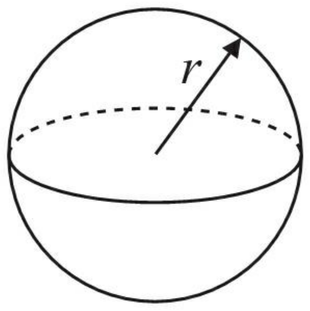


Area of trapezium = $\frac{1}{2}(a + b)h$



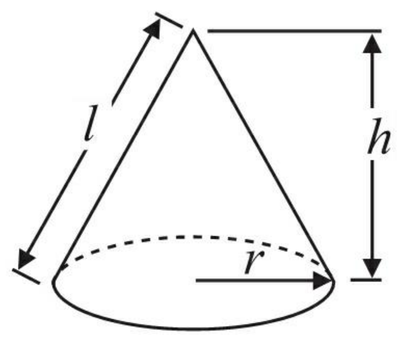
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

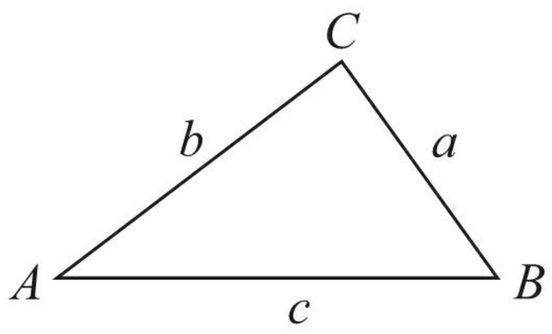


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle *ABC*



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \quad \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1 This is a list of ingredients for making chicken soup for 4 people.

Ingredients for **4** people	
60 g	butter
300 g	chicken
150 m*l*	cream
1	onion
640 m*l*	chicken stock

x1.5

Bill is going to make chicken soup for 6 people.

Work out the amount of each ingredient he needs.

4 x 1.5 = 6

90 ..... g butter

450 ..... g chicken

225 ..... m*l* cream

1.5 ..... onions

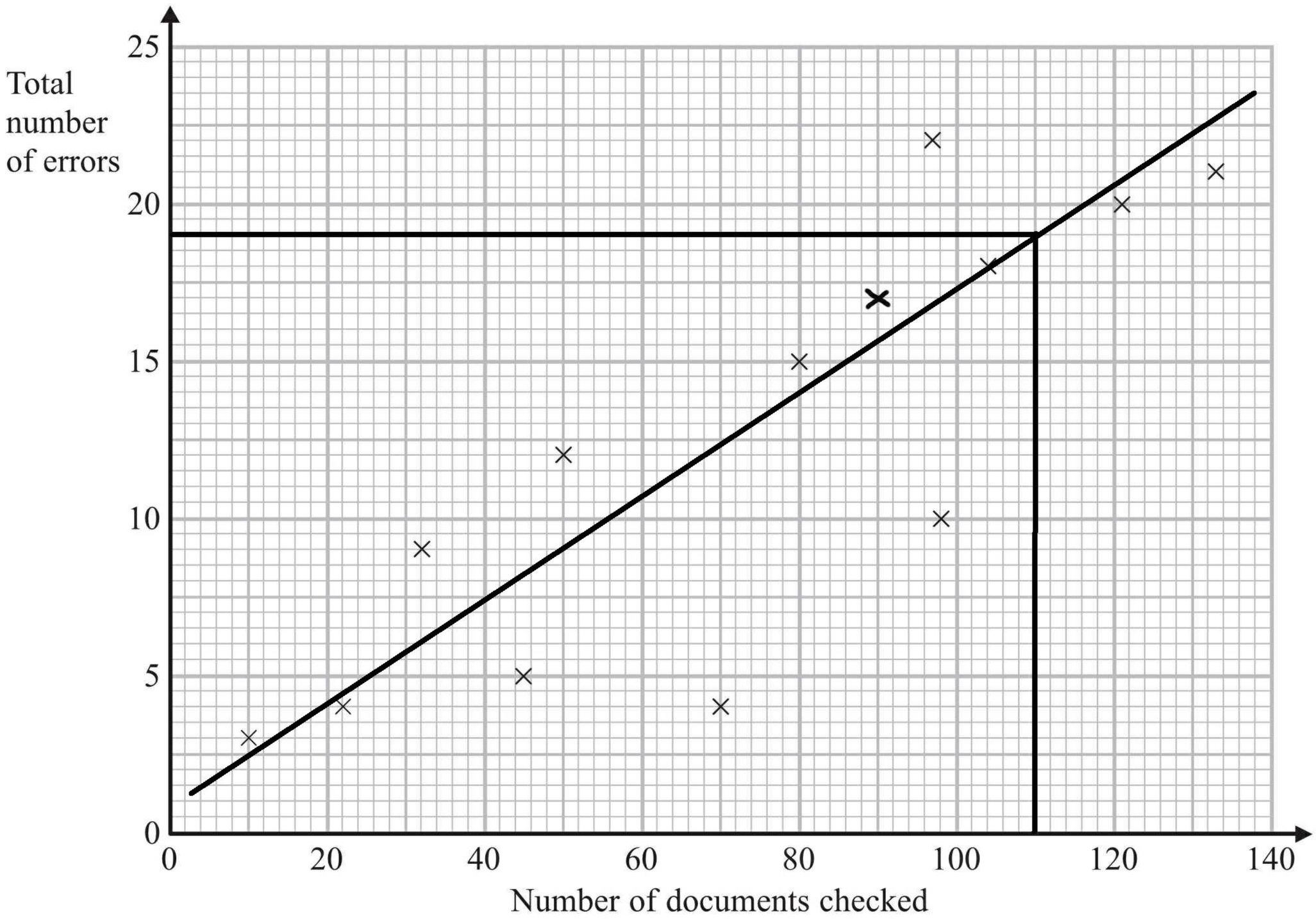
960 ..... m*l* chicken stock

(Total for Question 1 is 3 marks)

2 A publisher checks documents for errors.

He records the number of documents that are checked each day.
He also records the total number of errors in the documents each day.

The scatter graph shows this information.



On another day 90 documents are checked.
There is a total of 17 errors.

(a) Show this information on the scatter graph.

(1)

(b) Describe the correlation between the number of documents checked and the total number of errors.

positive correlation

(1)

One day 110 documents are checked.

(c) Estimate the total number of errors in these documents.

19

(2)

(Total for Question 2 is 4 marks)

3 Here is a triangular prism.

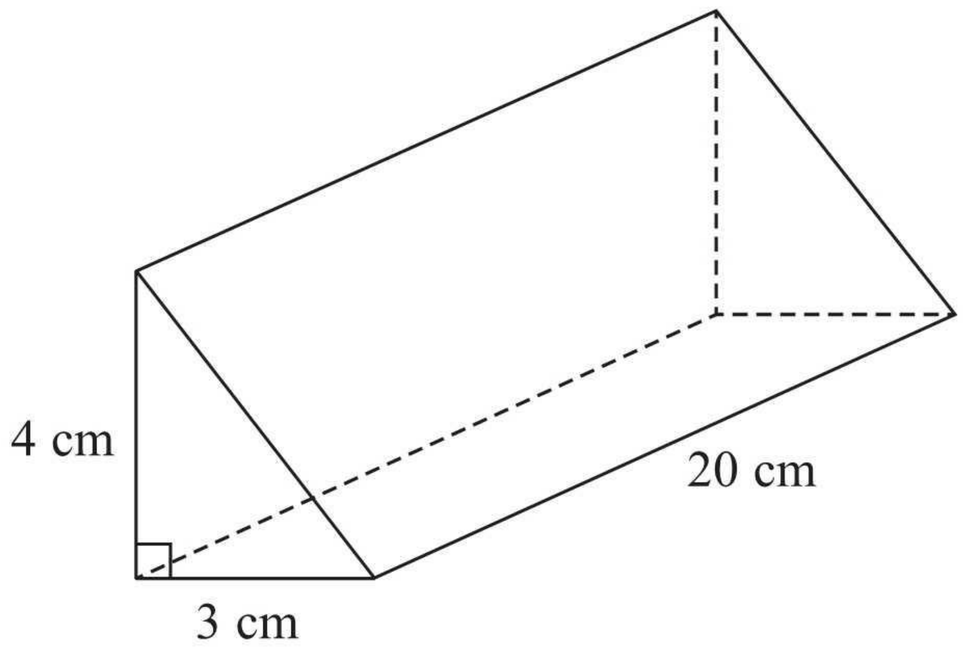


Diagram **NOT** accurately drawn

Work out the volume of this triangular prism.

Volume of prism = area of cross section x length

$= \frac{1}{2} \times 4 \times 3 \times 20$

$= 6 \times 20$

$= 120 cm^3$

$120 cm^3$

(Total for Question 3 is 4 marks)

4 (a) Simplify $4y + 2x - 3 + 3x + 8$

$4y + 5x + 5$

(2)

(b) Factorise fully $9x^2 - 6xy$

$3x(3x - 2y)$

(2)

(c) Expand $4(x + 2)$

$4x + 8$

(1)

(d) Expand and simplify $(x - 5)(x + 3)$

$x^2 + 3x - 5x - 15$

$x^2 - 2x - 15$

(2)

(Total for Question 4 is 7 marks)

5 Jane has a packet of seeds.
The probability that a seed will grow is 0.75

(a) What is the probability that a seed will **not** grow?

0.25

(1)

Jane plants 200 of these seeds.

(b) Estimate the number of the seeds that will grow.

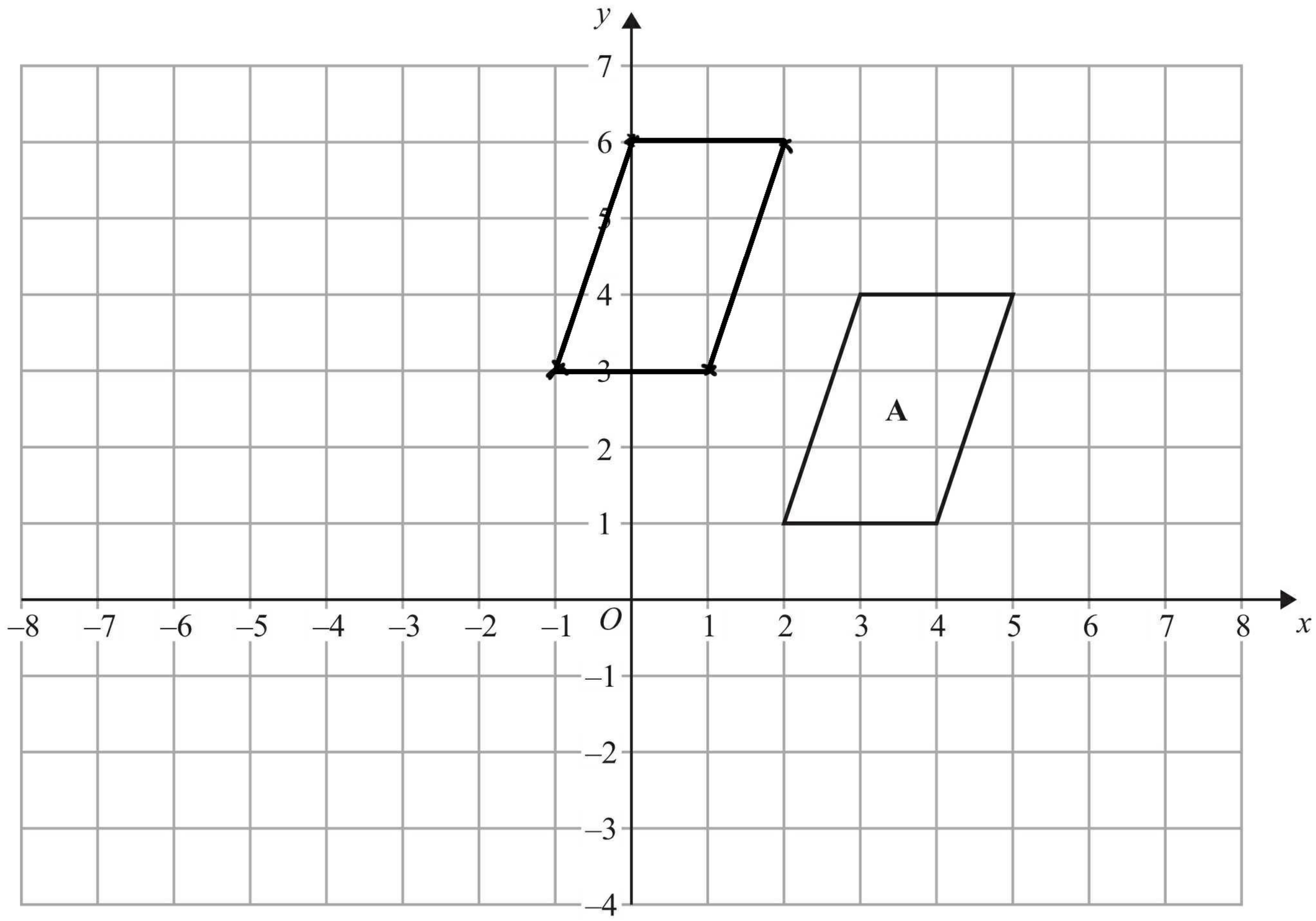
0.75 × 200

150

(2)

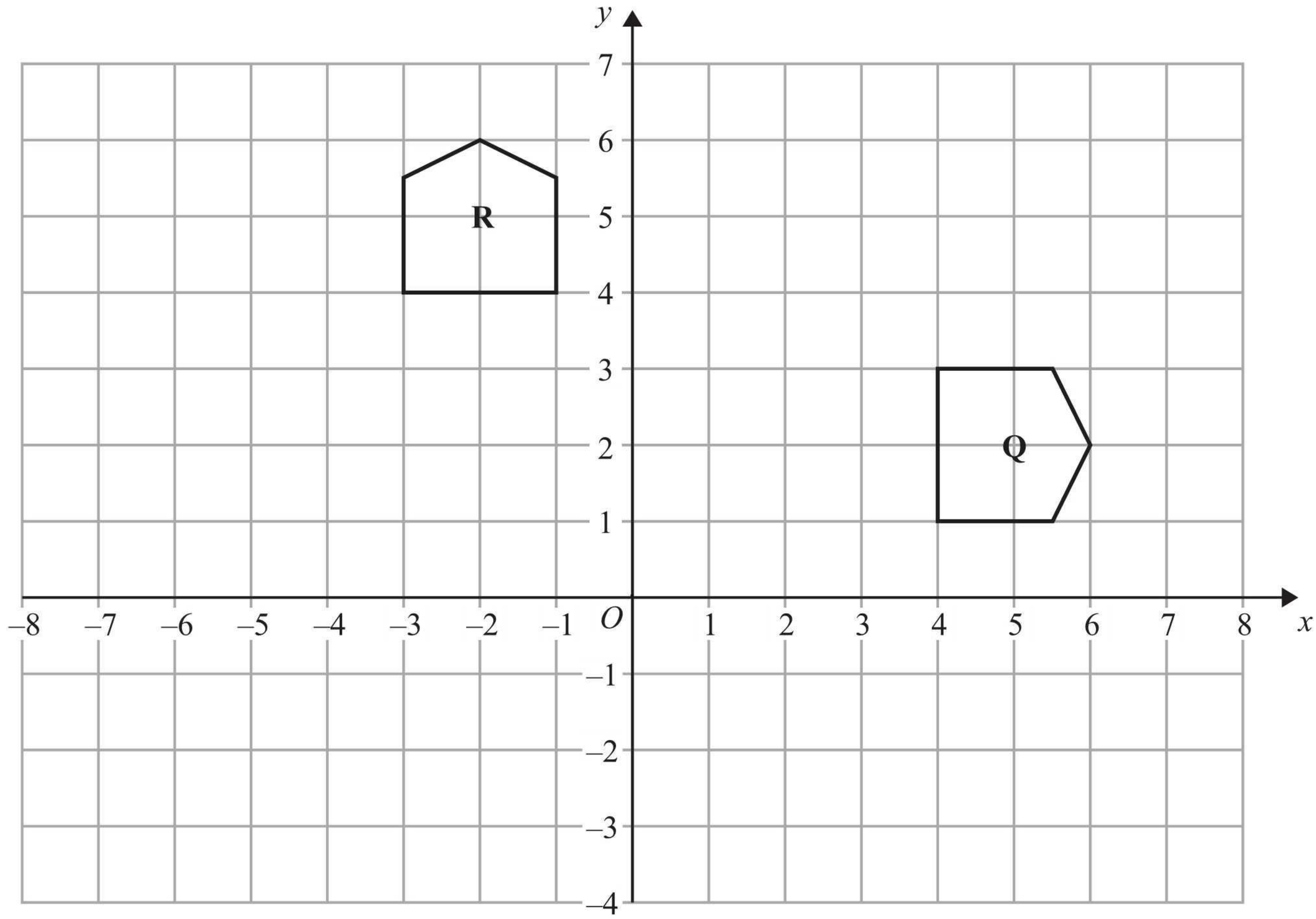
(Total for Question 5 is 3 marks)

6



(a) Translate shape **A** by the vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$.

(1)



(b) Describe fully the single transformation that maps shape **Q** onto shape **R**.

Rotation, 270° clockwise, centre (0,0)

(3)

(Total for Question 6 is 4 marks)

7 Rita is going to make some cheeseburgers for a party.
She buys some packets of cheese slices and some boxes of burgers.

There are 20 cheese slices in each packet.
There are 12 burgers in each box.

Rita buys exactly the same number of cheese slices and burgers.

(i) How many packets of cheese slices and how many boxes of burgers does she buy?

3 packets of cheese slices

5 boxes of burgers

Rita wants to put one cheese slice and one burger into each bread roll.
She wants to use all the cheese slices and all the burgers.

(ii) How many bread rolls does Rita need?

60 bread rolls

(Total for Question 7 is 4 marks)

8 ABC is a triangle.

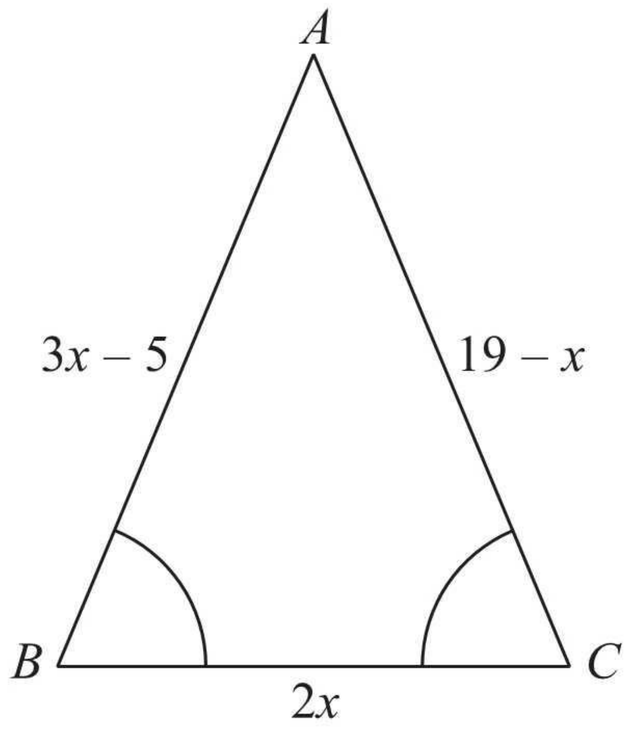


Diagram **NOT** accurately drawn

Angle ABC = angle BCA.

The length of side AB is $(3x – 5)$ cm.
The length of side AC is $(19 – x)$ cm.
The length of side BC is $2x$ cm.

Work out the perimeter of the triangle.
Give your answer as a number of centimetres.

$3x - 5 = 19 - x$ (isosceles triangle)

$+x \quad +x$

$4x - 5 = 19$

$4x = 24$

$x = 6$

Perimeter $= 13 + 13 + 12 = 38$cm

38 ..... cm

(Total for Question 8 is 5 marks)

9 Julia is investigating how much exercise people do in a week.

She uses these two questions in a questionnaire.

Question 1 What is your age?

☐ Under 15 ☐ 15 to 25 ☐ 25 to 40 ☐ over 40

Question 2 How much exercise do you do?

☐ A bit ☐ Some ☐ A lot

(a) Write down **one** thing wrong with each of these questions.

Question 1

There is overlap: 25 is in two boxes

Question 2

'A bit', 'Some' and 'A lot' will mean different things to different people

(2)

Julia wants to know how much time people spend exercising.

(b) Design a question Julia could use in her questionnaire.

How much time do you spend exercising a week?

☐ 0 ☐ 1-2hours ☐ 3-4hours ☐ 5 hours or more

(2)

(Total for Question 9 is 4 marks)

***10** The diagram shows the floor of a village hall.

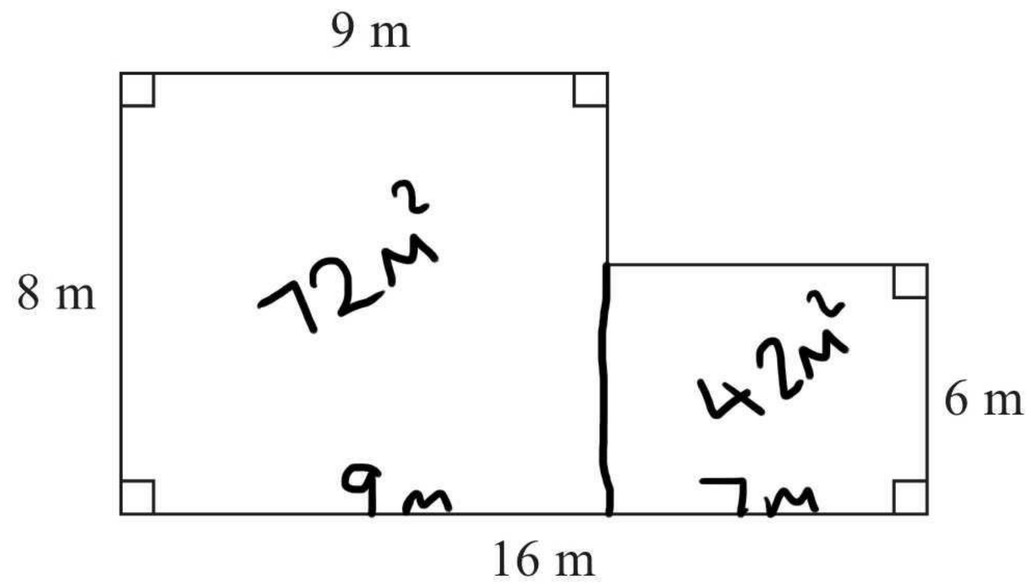


Diagram **NOT** accurately drawn

The caretaker needs to polish the floor.

One tin of polish normally costs £19
One tin of polish covers 12 m² of floor.

There is a discount of 30% off the cost of the polish.

The caretaker has £130

Has the caretaker got enough money to buy the polish for the floor?
You must show all your working.

Area of floor = 72 + 42 = 114 m²

The caretaker will need 10 tins of polish.

£19 × 10 = £190

10% = £19
30% = £57

The polish will cost 190 − 57 = £133

The caretaker does not have enough money.
He needs £133, but he only has £130.

(Total for Question 10 is 5 marks)

11 Each day a company posts some small letters and some large letters.

The company posts all the letters by first class post.

The tables show information about the cost of sending a small letter by first class post and the cost of sending a large letter by first class post.

Small Letter

Weight	First Class Post
0–100 g	60p

Large Letter

Weight	First Class Post
0–100 g	£1.00
101–250 g	£1.50
251–500 g	£1.70
501–750 g	£2.50

One day the company wants to post 200 letters.

The ratio of the number of small letters to the number of large letters is 3 : 2

70% of the large letters weigh 0–100 g.

The rest of the large letters weigh 101–250 g.

Work out the total cost of posting the 200 letters by first class post.

5 parts

200 ÷ 5 = 40

Each part is 40

120 small letters

80 large letters

70% of 80 = 56 (0-100g)

30% of 80 = 24 (101-250g)

120 small letters: 120 × 60p = £72

56 0-100g large: 56 × £1 = £56

24 101-250g large: 24 × £1.50 = £36

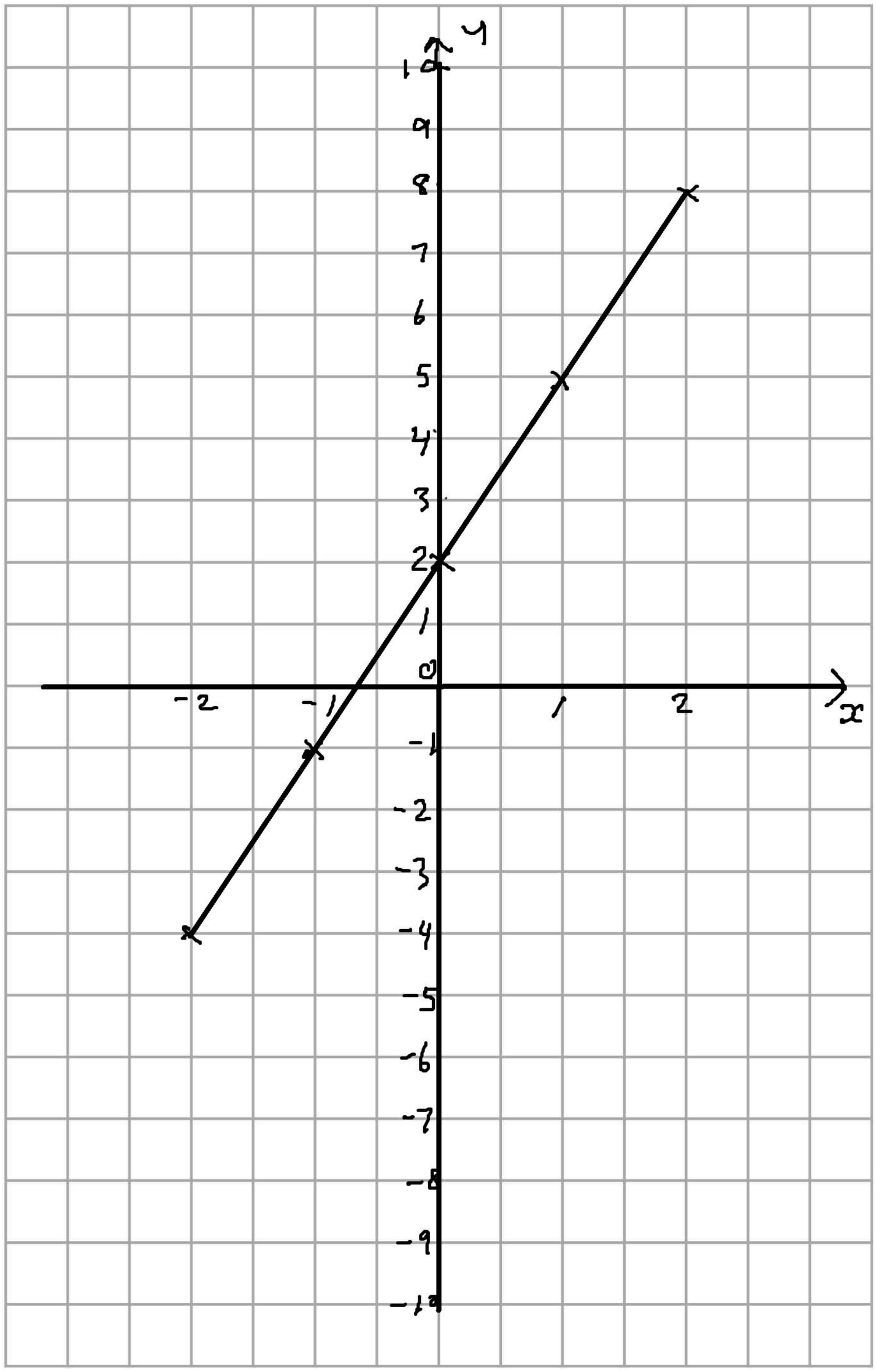
£72 + £56 + £36 = £164

£ 164

(Total for Question 11 is 5 marks)

12 On the grid, draw the graph of $y = 3x + 2$ for values of x from –2 to 2

x	-2	-1	0	1	2
y	-4	-1	2	5	8



(Total for Question 12 is 4 marks)

13 Hertford Juniors is a basketball team.

At the end of 10 games, their mean score is 35 points per game.
At the end of 11 games, their mean score has gone down to 33 points per game.

How many points did the team score in the 11th game?

After 10 games $35 \times 10 = 350$ points

After 11 games $33 \times 11 = 363$ points

13

(Total for Question 13 is 3 marks)

14 (a) Write down the reciprocal of 5

$\frac{1}{5}$

(1)

(b) Evaluate 3^{-2}

$\frac{1}{9}$

(1)

(c) Calculate $9 \times 10^4 \times 3 \times 10^3$
Give your answer in standard form.

27×10^7

2.7×10^8

2.7×10^8

(2)

(Total for Question 14 is 4 marks)

15 Solve the simultaneous equations

$3x + 4y = 5$ × 2
$2x - 3y = 9$ × 3

$6x + 8y = 10$
$6x - 9y = 27$

$17y = -17$
$y = -1$

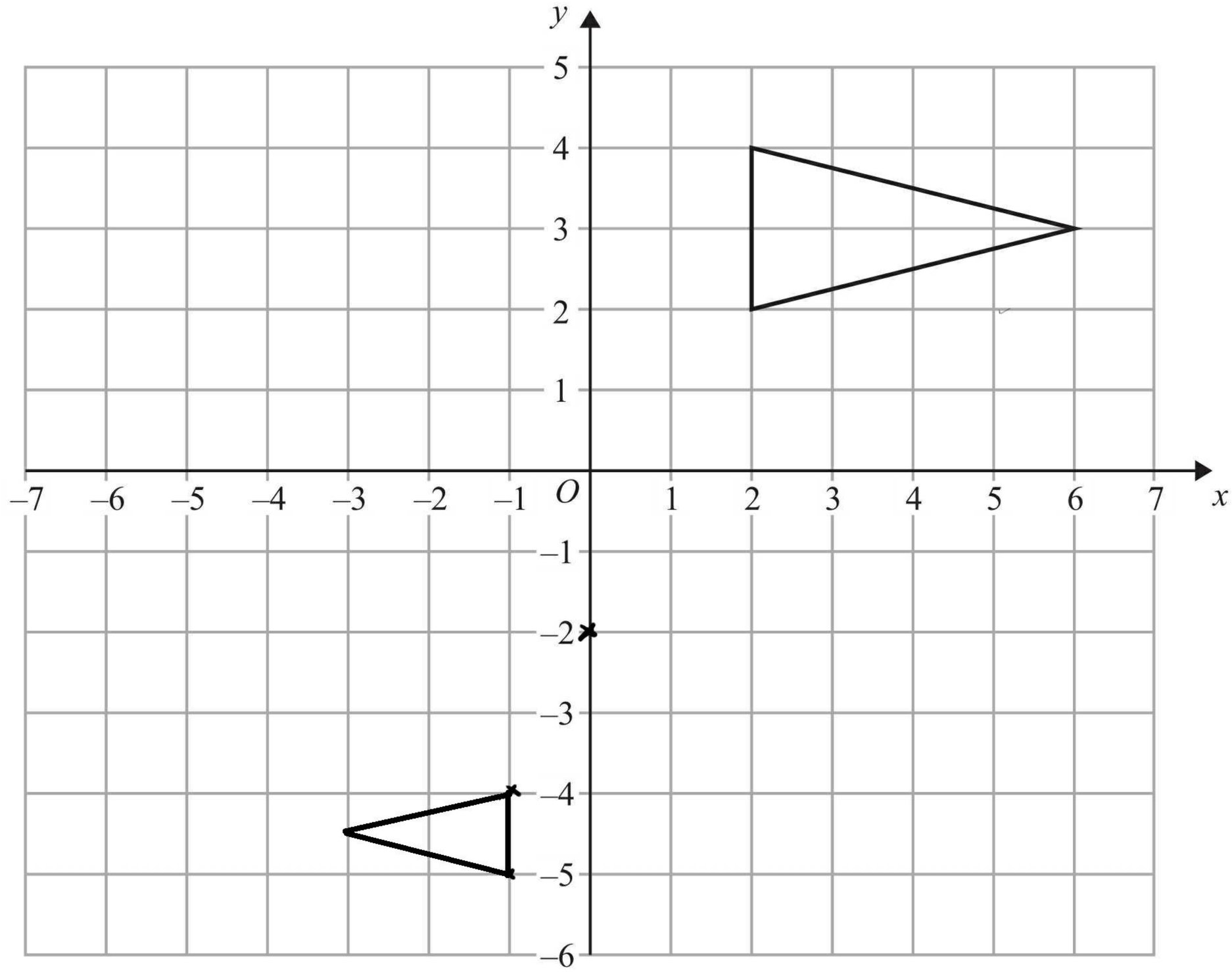
$3x + 4(-1) = 5$
$3x - 4 = 5$
$3x = 9$
$x = 3$

$x =$ 3

$y =$ −1

(Total for Question 15 is 4 marks)

23



On the grid, enlarge the triangle by scale factor $-\frac{1}{2}$, centre (0, –2).

(Total for Question 23 is 2 marks)