Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCSE

Mathematics A

Paper 1 (Non-Calculator)

Higher Tier

Tuesday 11 June 2013 – Morning
Time: 1 hour 45 minutes

Paper Reference
1MA0/1H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators must not be used.**

Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P43598A

6/5/5/

P 4 3 5 9 8 A 0 1 2 8

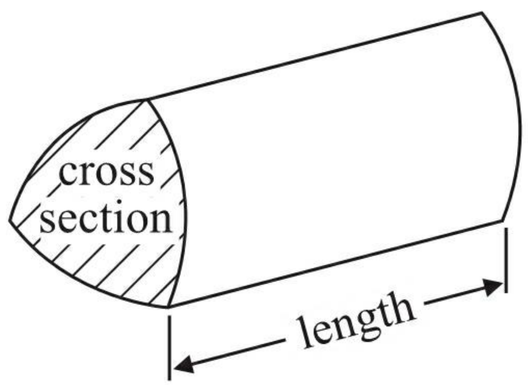
PEARSON

GCSE Mathematics 1MA0

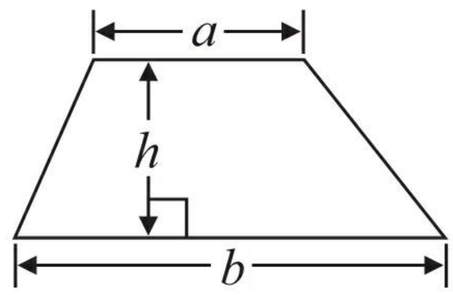
Formulae: Higher Tier

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

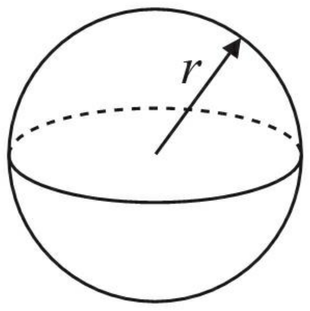


Area of trapezium = $\frac{1}{2}(a + b)h$



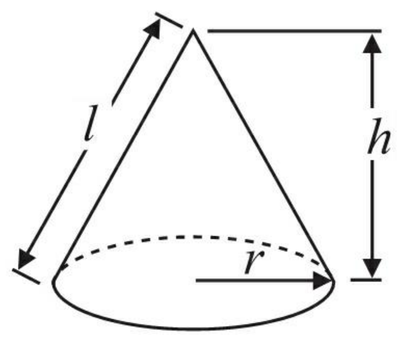
Volume of sphere = $\frac{4}{3}\pi r^3$

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

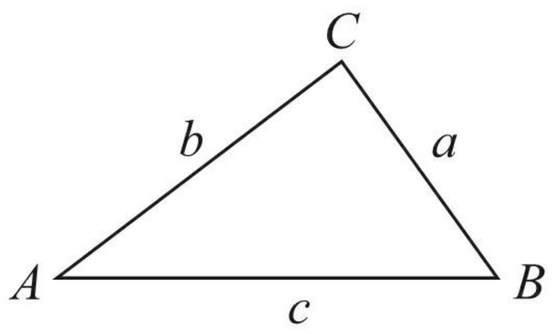


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 = $\frac{1}{2}ab \sin C$

P 4 3 5 9 8 A 0 2 2 8

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 Given that $1793 \times 185 = 331\,705$

write down the value of

(a) 1.793×185

331.705

(b) $331\,705 \div 1.85$

179300

(Total for Question 1 is 2 marks)

2 Mr Mason asks 240 Year 11 students what they want to do next year.

15% of the students want to go to college. 36

$\frac{3}{4}$ of the students want to stay at school. 180

The rest of the students do not know.

Work out the number of students who do not know.

10% = 24

5% = 12

15% = 36

$\frac{1}{4} = 60$

$\frac{3}{4} = 180$

36 + 180 = 216

240 − 216 = 24

24

(Total for Question 2 is 4 marks)

3 Sixteen babies are born in a hospital.

Here are the weights of the babies in kilograms.

2.4 2.7 3.5 4.4 4.5 4.1 4.4 2.8

4.1 3.8 3.8 4.2 3.3 3.0 3.7 3.3

Show this information in an ordered stem and leaf diagram.

2	4 7 8
3	0 3 3 5 7 8 8
4	1 1 2 4 4 5

Key:

2|4 = 2.4 kg

(Total for Question 3 is 3 marks)

4 (a) Expand $3(2 + t)$

$6 + 3t$

(1)

(b) Expand $3x(2x + 5)$

$6x^2 + 15x$

(2)

(c) Expand and simplify $(m + 3)(m + 10)$

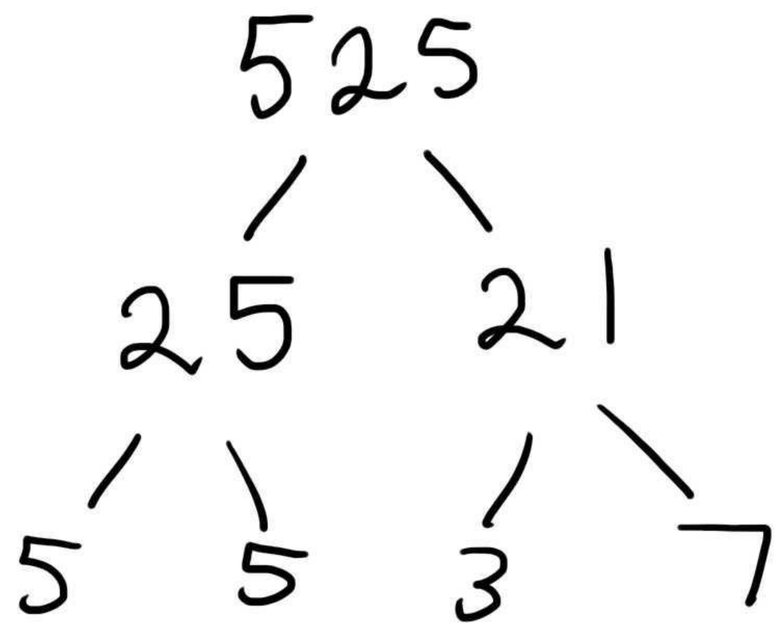
$m^2 + 10m + 3m + 30$

$m^2 + 13m + 30$

(2)

(Total for Question 4 is 5 marks)

5 Write 525 as a product of its prime factors.



3 x 5 x 5 x 7

(Total for Question 5 is 3 marks)

6 Ed has 4 cards.
There is a number on each card.

12	6	15	?

The mean of the 4 numbers on Ed's cards is 10

Work out the number on the 4th card.

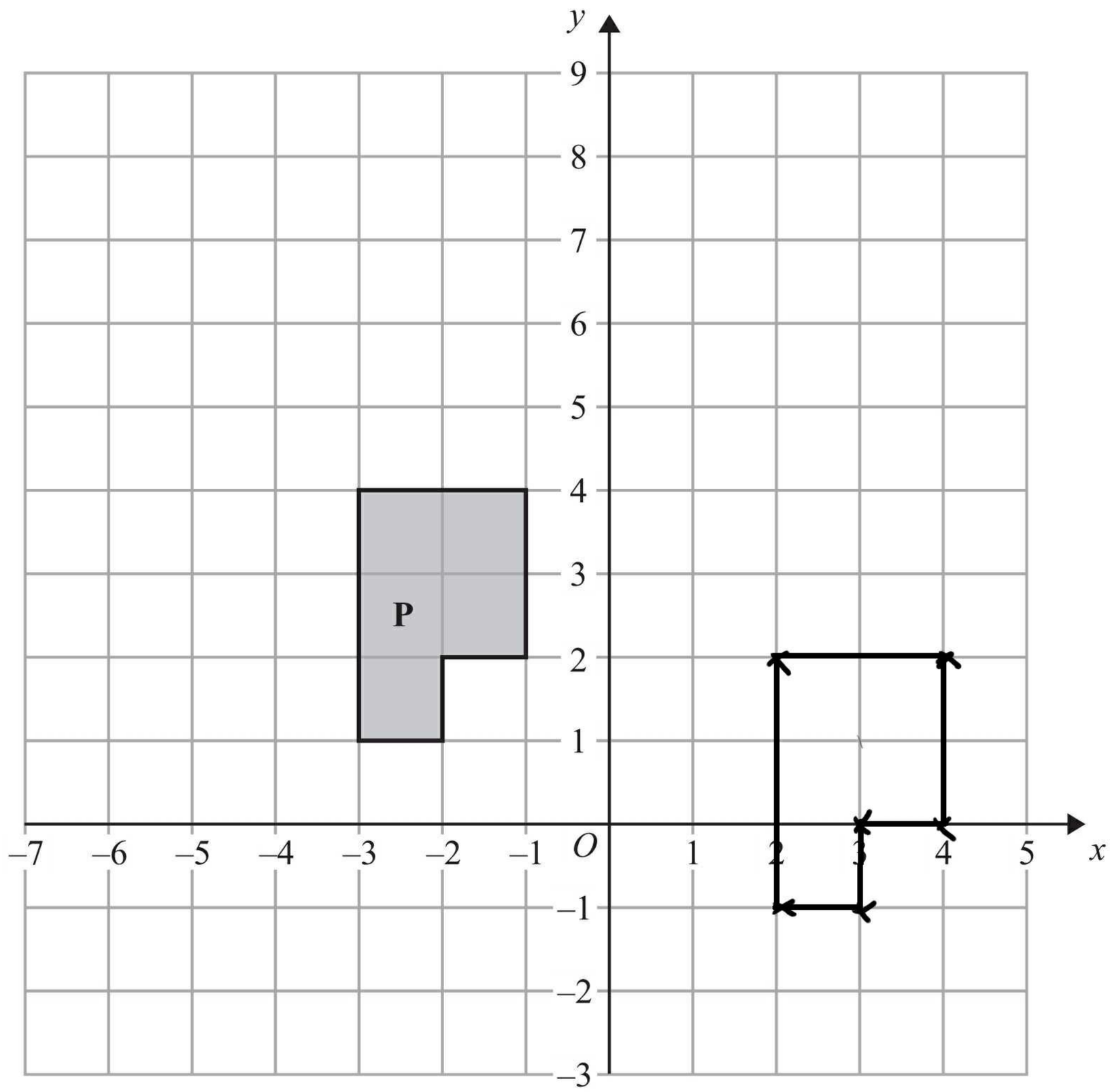
4 x 10 = 40

12 + 6 + 15 = 33

40 - 33 = 7

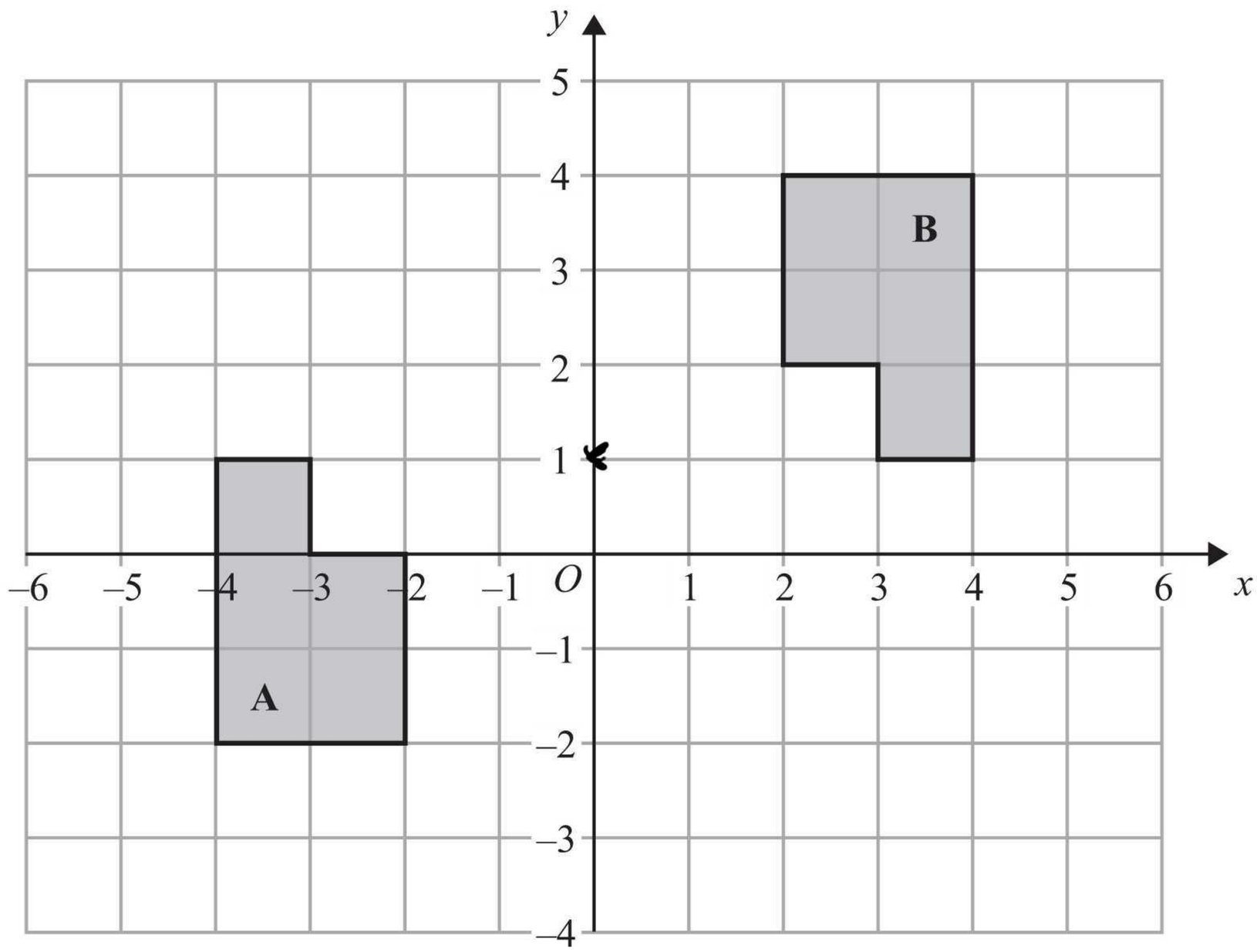
(Total for Question 6 is 3 marks)

7



(a) Translate shape **P** by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

(2)



(b) Describe fully the single transformation that maps shape **A** onto shape **B**.

Rotation, 180°, centre (0, 1)

(3)

(Total for Question 7 is 5 marks)

8 Margaret has some goats. 20 300

The goats produce an average total of 21.7 litres of milk per day for 280 days.

Margaret sells the milk in $\frac{1}{2}$ litre bottles.

0.5

Work out an estimate for the total number of bottles that Margaret will be able to fill with the milk.

You must show clearly how you got your estimate.

$\frac{20 \times 300}{0.5} = \frac{6000}{0.5} = 12000$

12000

(Total for Question 8 is 3 marks)

9 Matt and Dan cycle around a cycle track.

Each lap Matt cycles takes him 50 seconds.
Each lap Dan cycles takes him 80 seconds.

Dan and Matt start cycling at the same time at the start line.

Work out how many laps they will each have cycled when they are next at the start line together.

400 seconds (LCM)

Matt 8 laps

Dan 5 laps

(Total for Question 9 is 3 marks)

10 The diagram shows a garden in the shape of a rectangle.

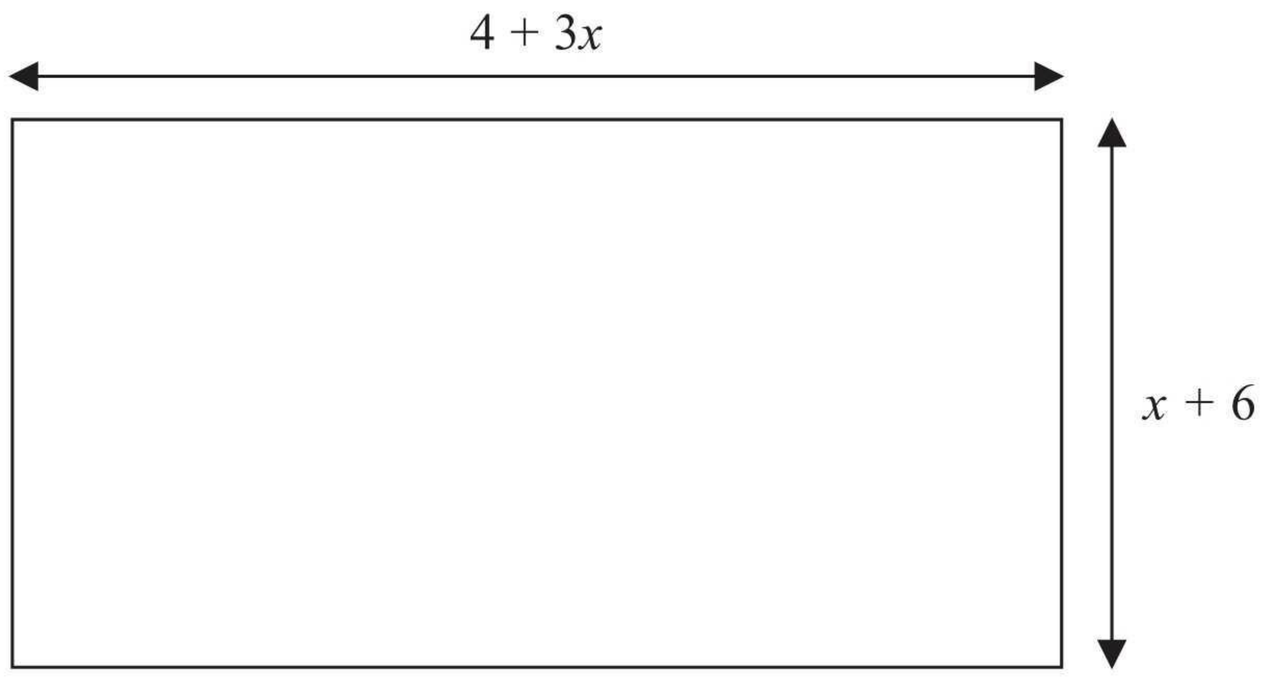


Diagram **NOT** accurately drawn

All measurements are in metres.
The perimeter of the garden is 32 metres.

Work out the value of x

$2(x+6) + 2(4+3x) = 32$

$2x + 12 + 8 + 6x = 32$

$8x + 20 = 32$

$8x = 12$

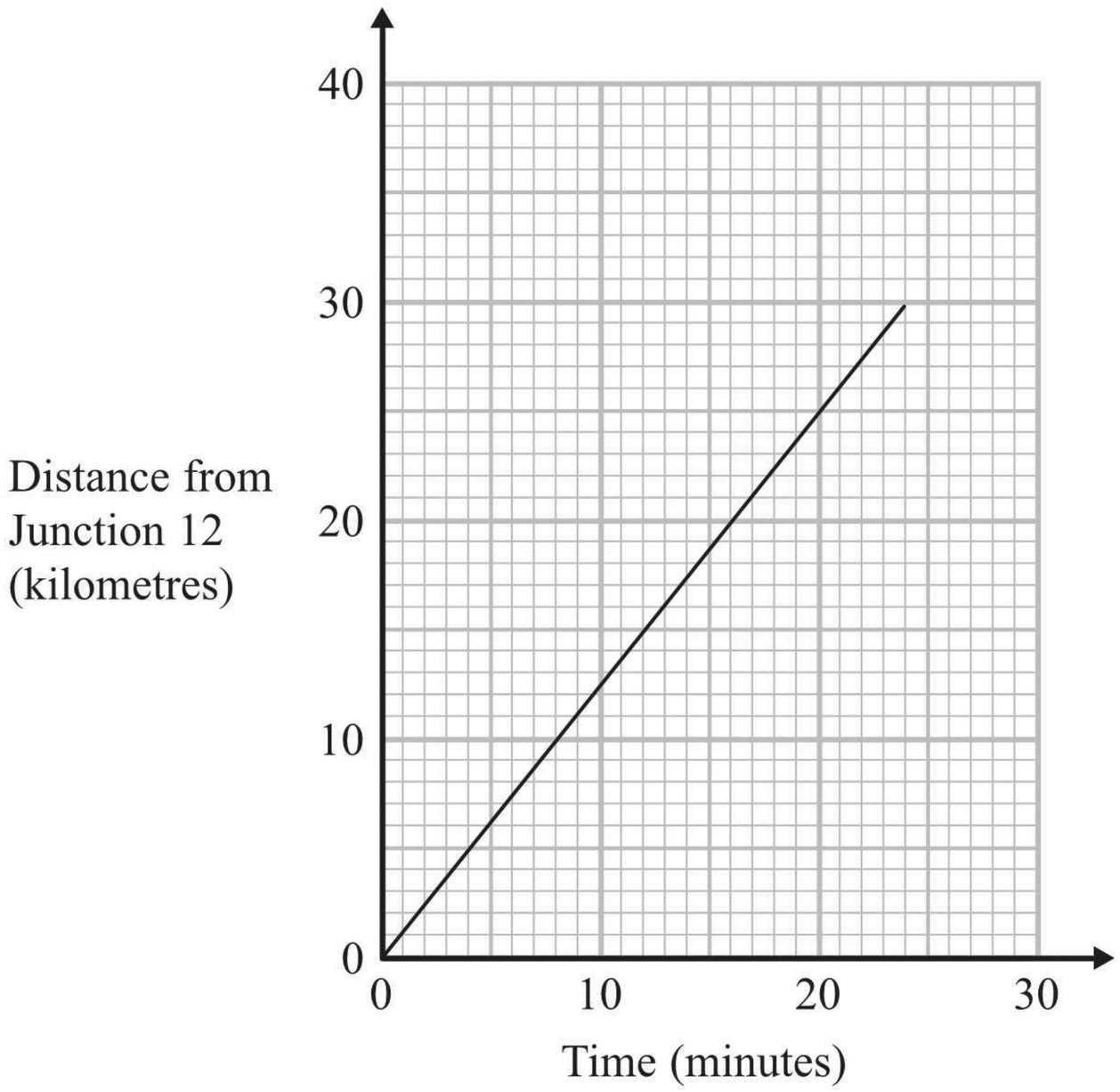
$x = 1.5$

1.5

(Total for Question 10 is 4 marks)

***11** Debbie drove from Junction 12 to Junction 13 on a motorway.

The travel graph shows Debbie's journey.



Ian also drove from Junction 12 to Junction 13 on the same motorway.
He drove at an average speed of 66 km/hour.

Who had the faster average speed, Debbie or Ian?
You must explain your answer.

in 20 mins Debbie drove 25km

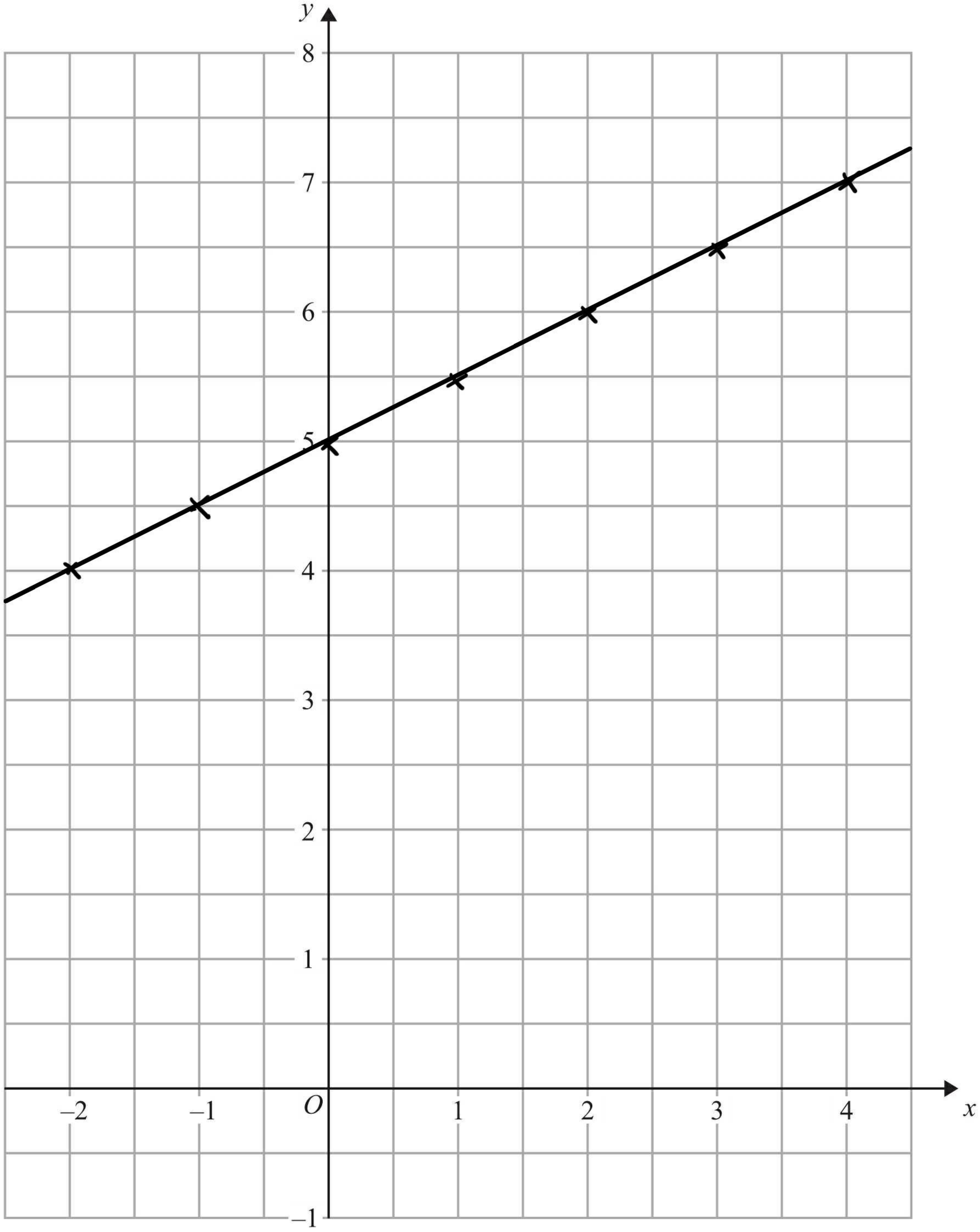
∴ in 1 hour Debbie would have driven 75km

Debbie's speed is faster.

(Total for Question 11 is 4 marks)

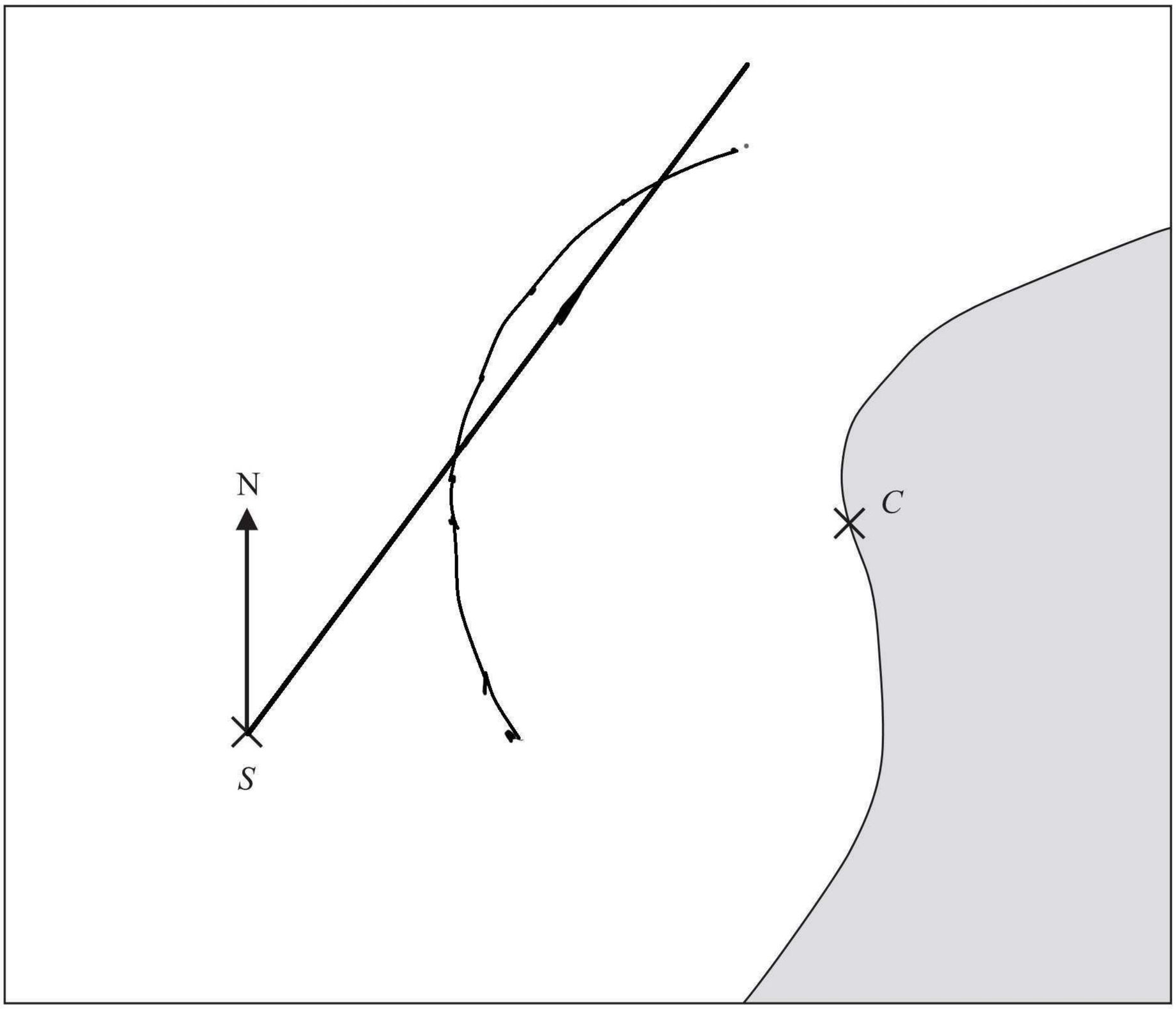
12 On the grid, draw the graph of $y = \frac{1}{2}x + 5$ for values of x from –2 to 4

x	-2	-1	0	1	2	3	4
y	4	4.5	5	5.5	6	6.5	7



(Total for Question 12 is 3 marks)

***13** Here is a map.
The position of a ship, *S*, is marked on the map.



Scale 1 cm represents 100 m

Point *C* is on the coast.
Ships must not sail closer than 500 m to point *C*.

The ship sails on a bearing of 037°

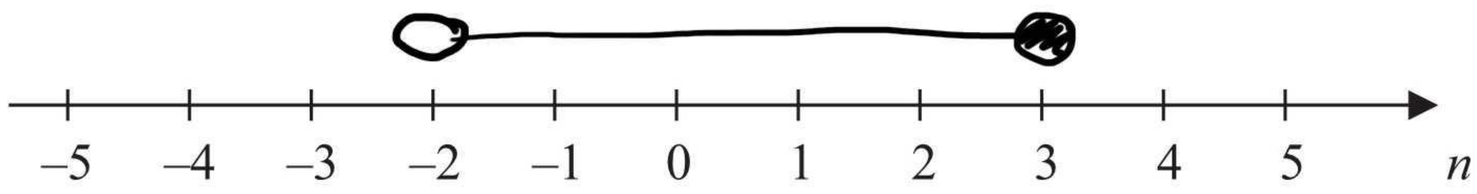
Will the ship sail closer than 500 m to point *C*?
You must explain your answer.

yes, the ship will sail close than 500m from C.

(Total for Question 13 is 3 marks)

14 $-2 < n \leqslant 3$

(a) Represent this inequality on the number line.



(2)

(b) Solve the inequality $8x - 3 \geqslant 6x + 4$

$2x - 3 \geqslant 4$

$2x \geqslant 7$

$x \geqslant 3.5$

$x \geqslant 3.5$

(2)

(Total for Question 14 is 4 marks)

***15** One sheet of paper is 9×10^{-3} cm thick.

Mark wants to put 500 sheets of paper into the paper tray of his printer.
The paper tray is 4 cm deep.

Is the paper tray deep enough for 500 sheets of paper?
You must explain your answer.

$500 \times 9 \times 10^{-3}$

$5 \times 10^{2} \times 9 \times 10^{-3}$

45×10^{-1}

4.5

The paper will be 4.5cm thick, it will not fit in the tray.

(Total for Question 15 is 3 marks)

16 The normal price of a television is reduced by 30% in a sale.

The sale price of the television is £350

Work out the normal price of the television.

£350 = 70% (÷7)

£50 = 10%

£500 = 100%

£ 500

(Total for Question 16 is 3 marks)

17 Sumeet has a pond in the shape of a prism.

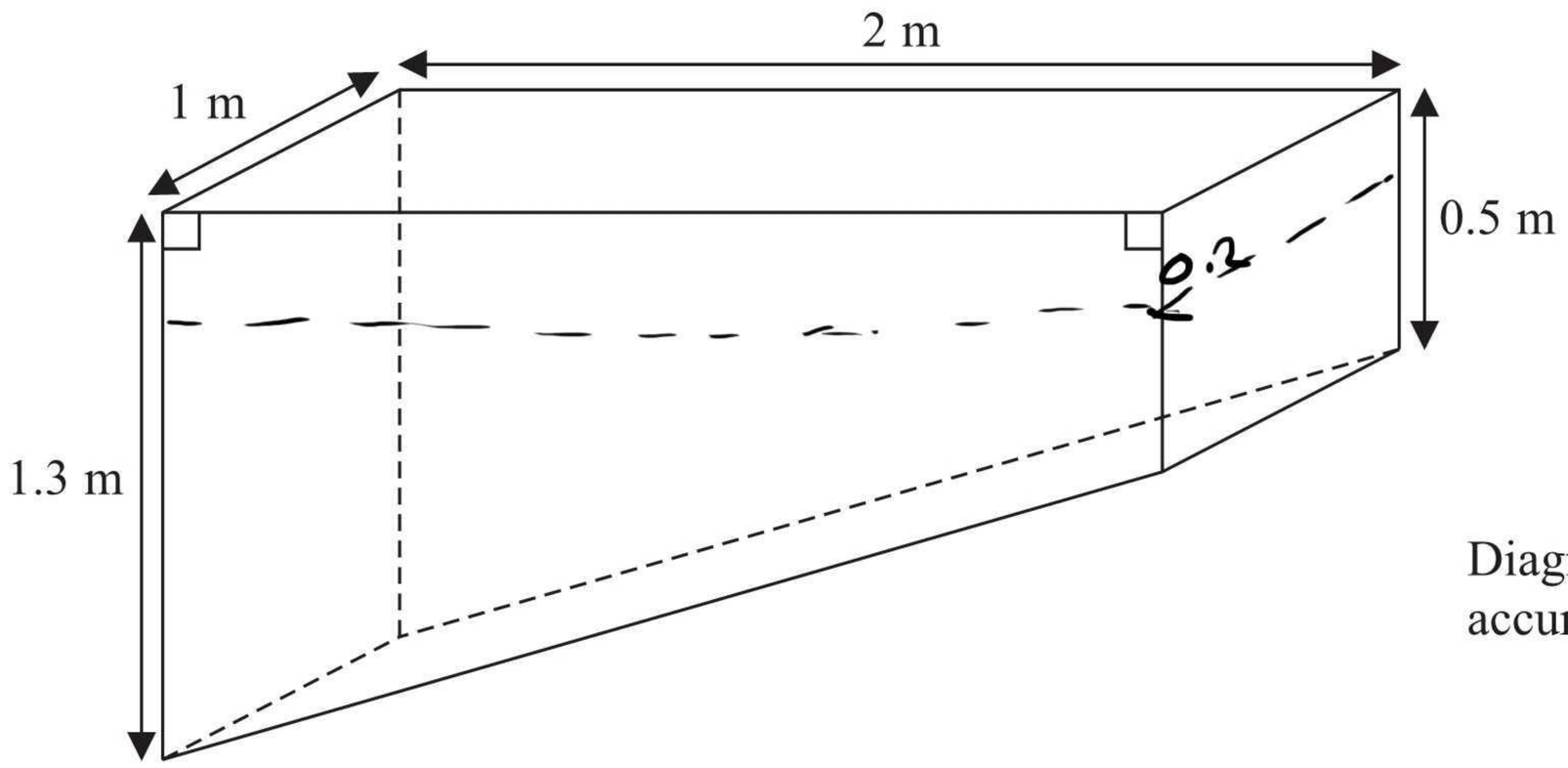


Diagram **NOT** accurately drawn

The pond is completely full of water.
Sumeet wants to empty the pond so he can clean it.
Sumeet uses a pump to empty the pond.

The volume of water in the pond decreases at a constant rate.
The level of the water in the pond goes down by 20 cm in the first 30 minutes.

Work out how much more time Sumeet has to wait for the pump to empty the pond completely.

volume = $\frac{1.3+0.5}{2} \times 2 \times 1$

$= 0.9 \times 2$

$= 1.8\ m^2$

in 30 mins : $= 0.2 \times 2 \times 1$

$= 0.4 m^2$

30 mins = $0.4 m^2$
60 mins = $0.8 m^2$
120 mins = $1.6 m^2$
135 mins = $1.8 m^2$

$135 - 30 =$ 105 mins

(Total for Question 17 is 6 marks)

18 Solve the simultaneous equations

$$4x + 7y = 1 \quad \times 3$$
$$3x + 10y = 15 \quad \times 4$$

$12x + 21y = 3$

$12x + 40y = 60$

$19y = 57$

$y = 3$

$4x + 7(3) = 1$

$4x + 21 = 1$

$4x = -20$

$x = -5$

$x =$ -5

$y =$ 3

(Total for Question 18 is 4 marks)

19 Write these numbers in order of size.
Start with the smallest number.

5^{-1} 0.5 -5 5^0

$\frac{1}{5}$

0.2

1

-5 5^{-1} 0.5 5^0

(Total for Question 19 is 2 marks)

20

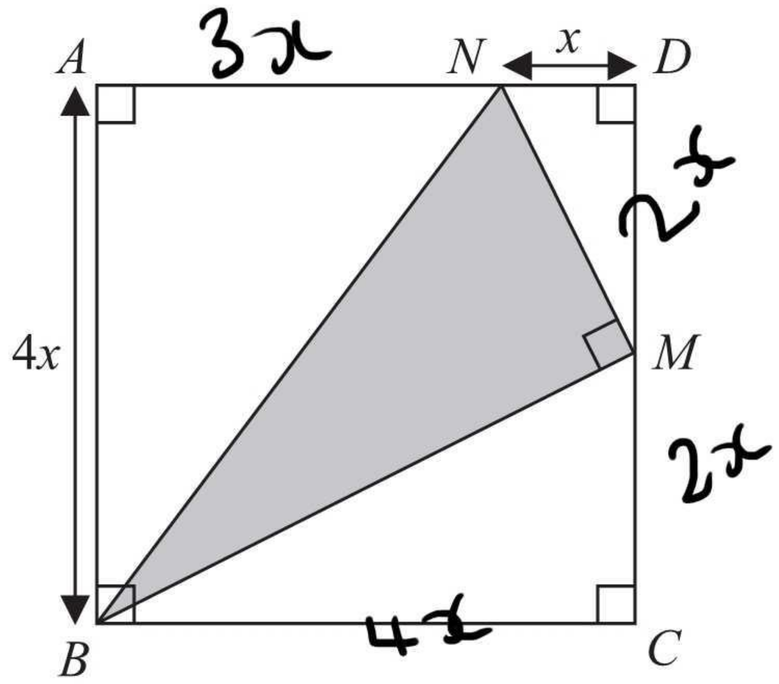


Diagram **NOT** accurately drawn

$ABCD$ is a square with a side length of $4x$
M is the midpoint of DC.
N is the point on AD where $ND = x$

BMN is a right-angled triangle.

Find an expression, in terms of x, for the area of triangle BMN.
Give your expression in its simplest form.

Area of triangle ABN = $6x^2$

BCM = $4x^2$

NDM = x^2

} $11x^2$

Area of square = $16x^2$

$16x^2 - 11x^2$

$5x^2$

(Total for Question 20 is 4 marks)

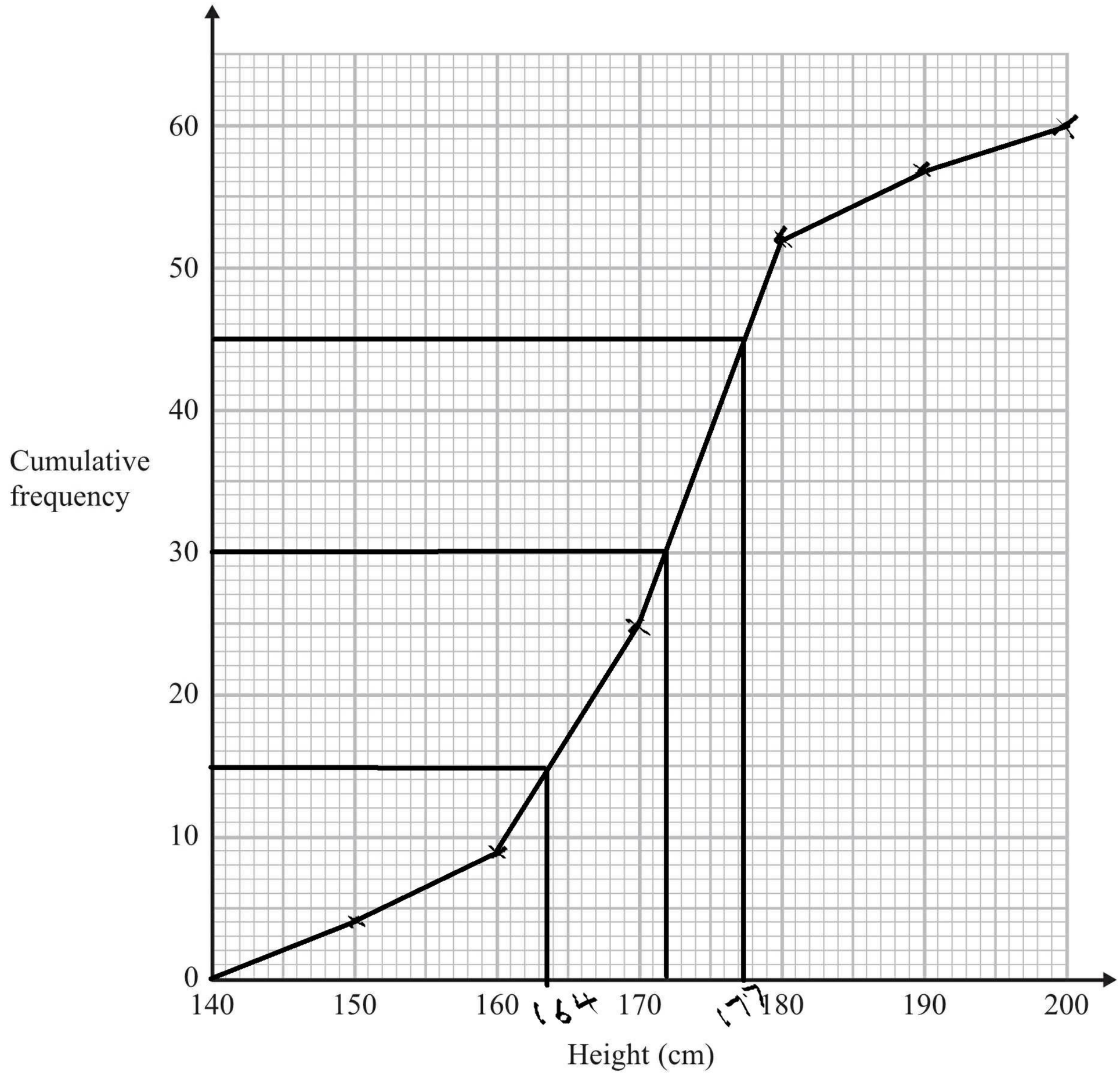
21 The table below shows information about the heights of 60 students.

Height (x cm)	Number of students
$140 < x \leqslant 150$	4
$150 < x \leqslant 160$	5
$160 < x \leqslant 170$	16
$170 < x \leqslant 180$	27
$180 < x \leqslant 190$	5
$190 < x \leqslant 200$	3

4
9
25
52
57
60

(a) On the grid opposite, draw a cumulative frequency graph for the information in the table.

(3)



(b) Find an estimate

(i) for the median,

172 cm

(ii) for the interquartile range.

13 cm

(3)

(Total for Question 21 is 6 marks)

22 **P** and **Q** are two triangular prisms that are mathematically similar.

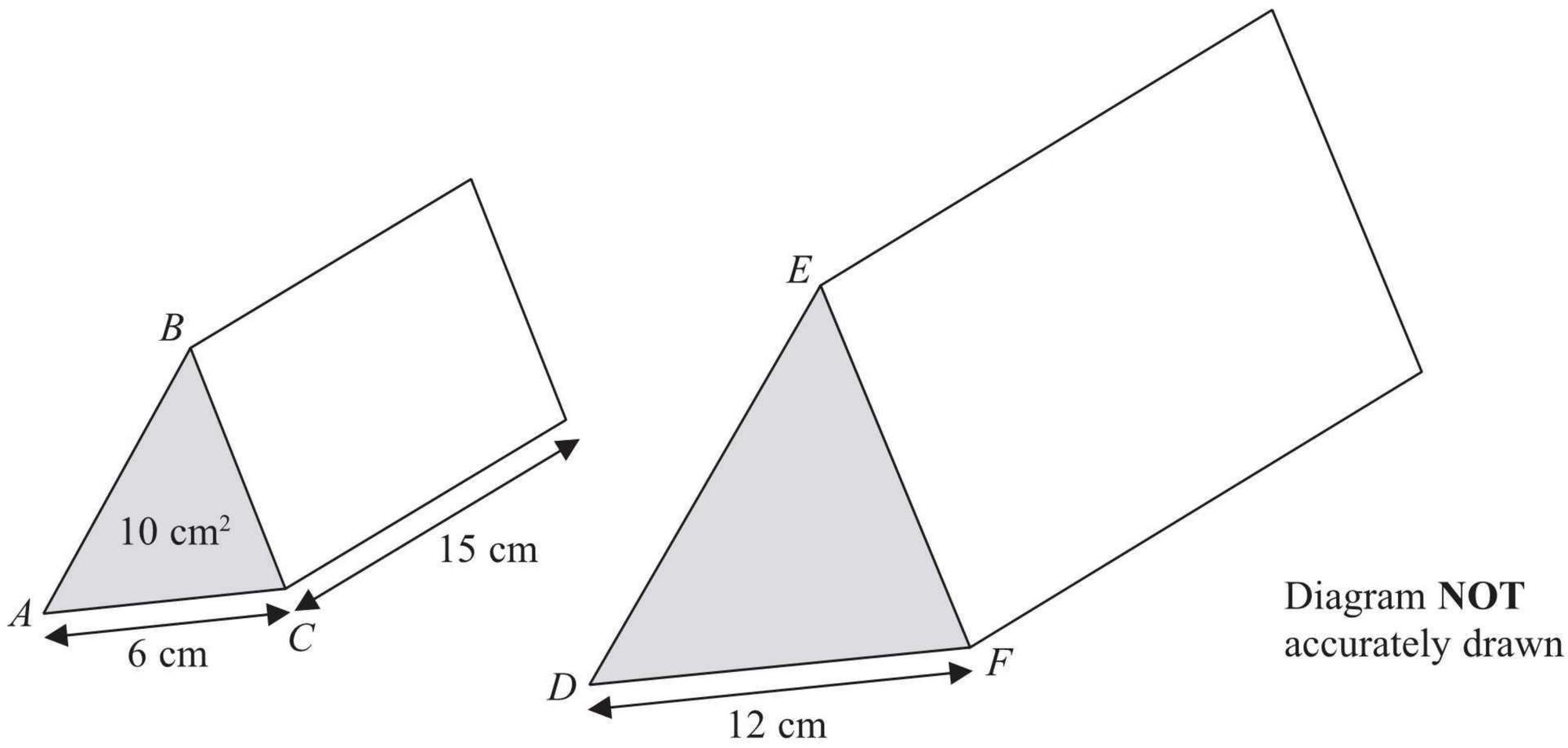


Diagram **NOT** accurately drawn

Prism P **Prism Q**

Prism **P** has triangle *ABC* as its cross section.
Prism **Q** has triangle *DEF* as its cross section.

AC = 6 cm
DF = 12 cm

The area of the cross section of prism **P** is 10 cm².
The length of prism **P** is 15 cm.

Work out the volume of prism **Q**.

length ×2 →
area ×4 →
150 cm³ vol → ×8

1200 cm³

(Total for Question 22 is 4 marks)

23 Simplify $\dfrac{4(x+5)}{x^2+2x-15}$

$$\frac{4(x+5)}{(x+5)(x-3)}$$

$$\frac{4}{x-3}$$

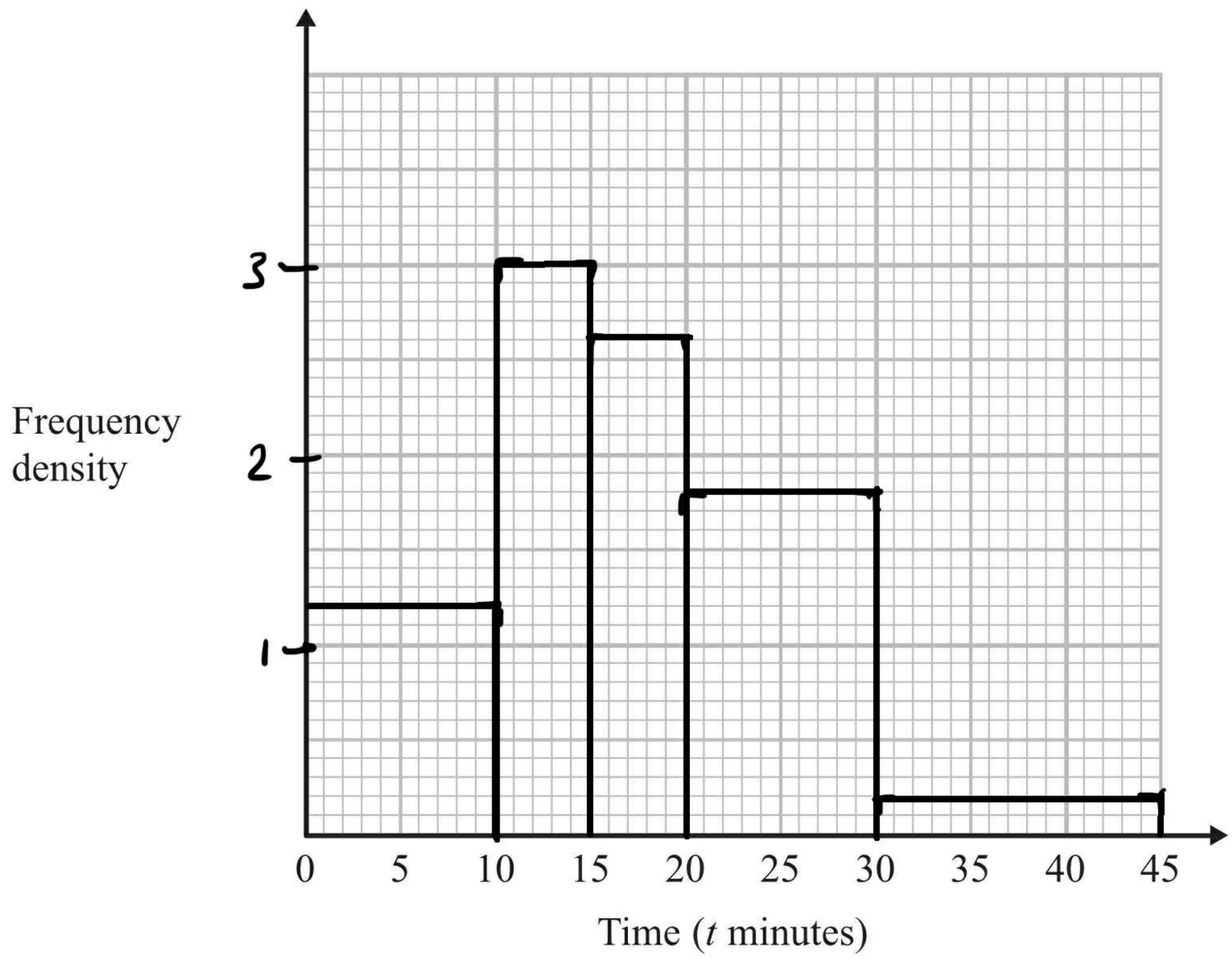
(Total for Question 23 is 2 marks)

24 Bill works for a computer service centre.

The table shows some information about the length of time, t minutes, of the phone calls Bill had.

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 15$	$15 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 45$
Number of calls	12	15	13	18	3
F.d	1.2	3	2.6	1.8	0.2

On the grid, draw a histogram to show this information.



(Total for Question 24 is 3 marks)

25 The expression $x^2 - 8x + 21$ can be written in the form $(x - a)^2 + b$ for all values of x.

(a) Find the value of a and the value of b.

$(x-4)^2 - 16 + 21$

$(x-4)^2 + 5$

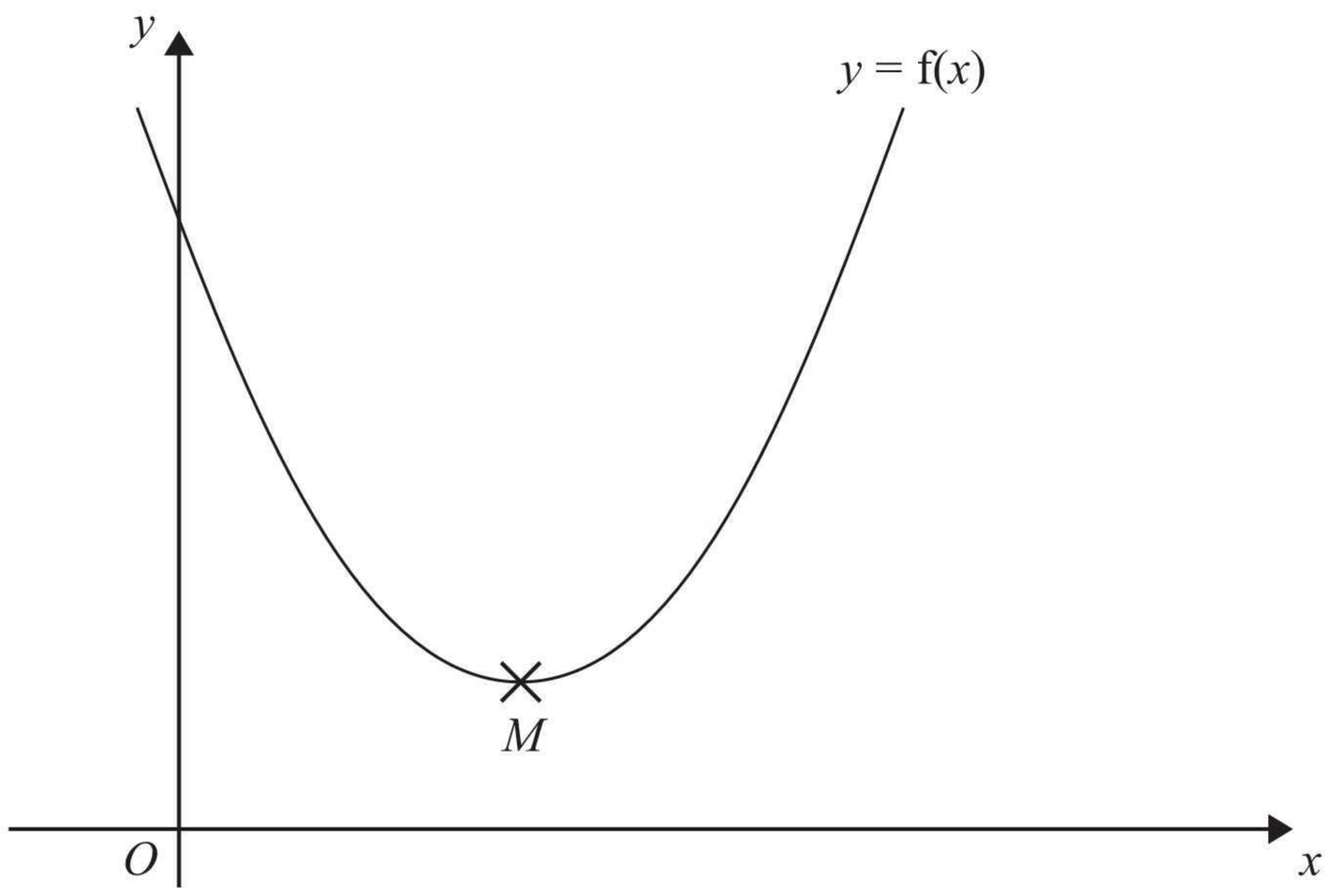
$a =$ 4

$b =$ 5

(3)

The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 8x + 21$

The diagram shows part of a sketch of the graph of $y = f(x)$.



The minimum point of the curve is M.

(b) Write down the coordinates of M.

(4 , 5)

(1)

(Total for Question 25 is 4 marks)

26 Fiza has 10 coins in a bag.
There are three £1 coins and seven 50 pence coins.

Fiza takes at random, 3 coins from the bag.

Work out the probability that she takes exactly £2.50

£1, £1, 50p $\frac{3}{10} \times \frac{2}{9} \times \frac{7}{8} = \frac{42}{720}$

£1, 50p, £1 $\frac{3}{10} \times \frac{7}{9} \times \frac{2}{8} = \frac{42}{720}$

50p, £1, £1 $\frac{7}{10} \times \frac{3}{9} \times \frac{2}{8} = \frac{42}{720}$

$\frac{126}{720}$

(Total for Question 26 is 4 marks)

27

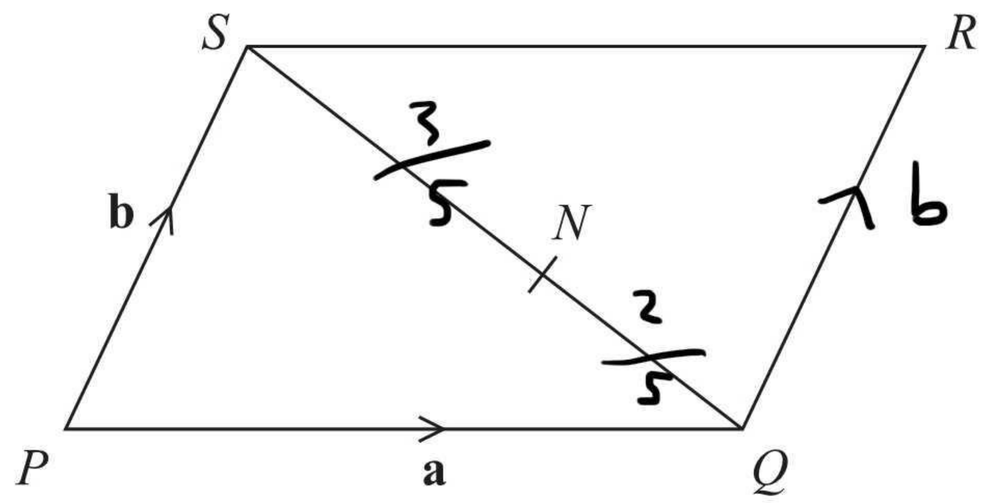


Diagram **NOT** accurately drawn

PQRS is a parallelogram.
N is the point on *SQ* such that $SN : NQ = 3 : 2$
$\overrightarrow{PQ} = \mathbf{a}$
$\overrightarrow{PS} = \mathbf{b}$

(a) Write down, in terms of **a** and **b**, an expression for $\overrightarrow{SQ}$.

$\overrightarrow{SQ} =$ $-\mathbf{b} + \mathbf{a}$

(1)

(b) Express $\overrightarrow{NR}$ in terms of **a** and **b**.

$$\overrightarrow{NR} = \frac{2}{5}(-\mathbf{b} + \mathbf{a}) + \mathbf{b}$$

$$= -\frac{2}{5}\mathbf{b} + \frac{2}{5}\mathbf{a} + \mathbf{b}$$

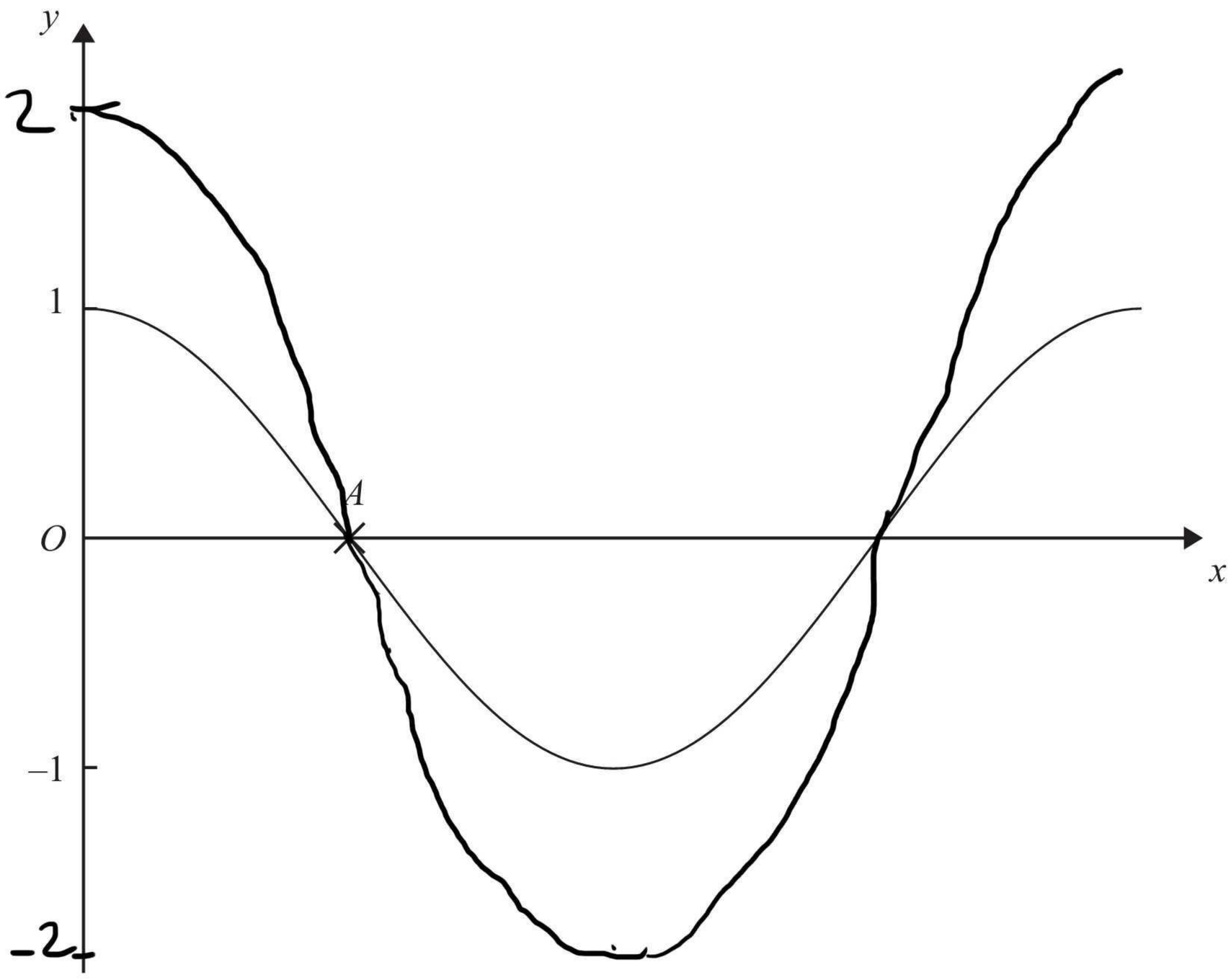
$$= \frac{3}{5}\mathbf{b} + \frac{2}{5}\mathbf{a}$$

$\overrightarrow{NR} =$ $\frac{3}{5}\mathbf{b} + \frac{2}{5}\mathbf{a}$

(3)

(Total for Question 27 is 4 marks)

28 The diagram shows a sketch of the graph of $y = \cos x°$



(a) Write down the coordinates of the point A.

(90 , 0)

(1)

(b) On the same diagram, draw a sketch of the graph of $y = 2 \cos x°$

(1)

(Total for Question 28 is 2 marks)

TOTAL FOR PAPER IS 100 MARKS