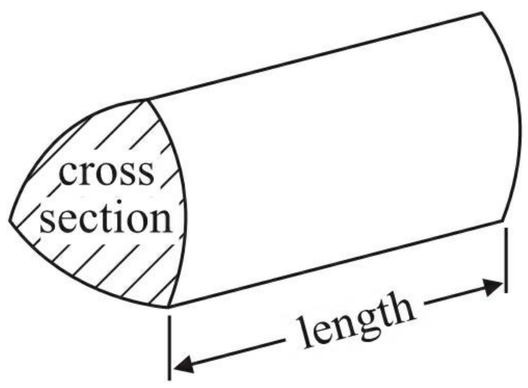
GCSE Mathematics 1MA0

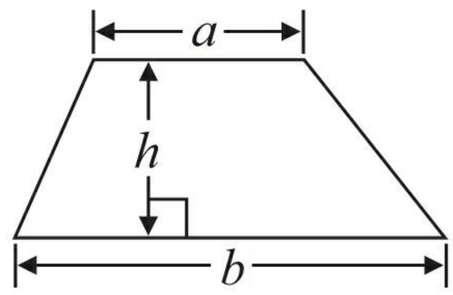
Formulae: Higher Tier

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

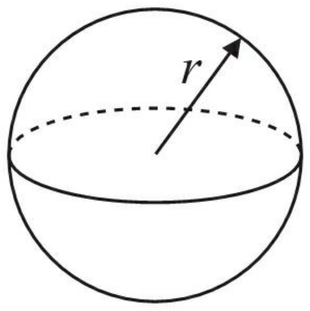


Area of trapezium = $\frac{1}{2}(a + b)h$



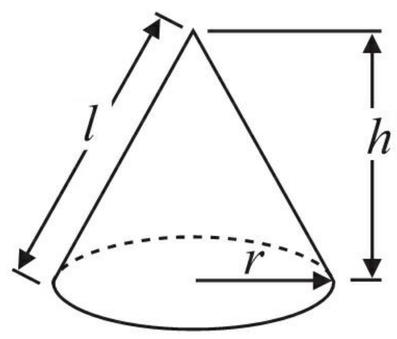
Volume of sphere = $\frac{4}{3}\pi r^3$

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

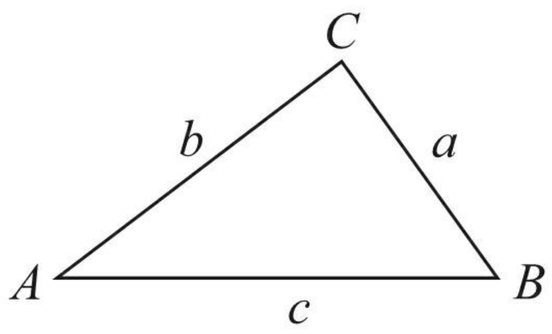


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 $(m + 3)(m + 10)$

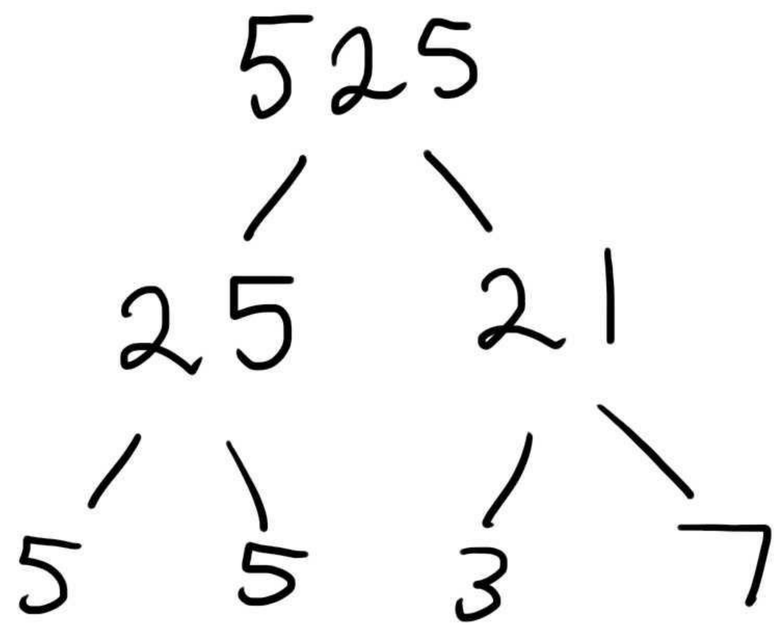
$m^2 + 10m + 3m + 30$

$m^2 + 13m + 30$

(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.

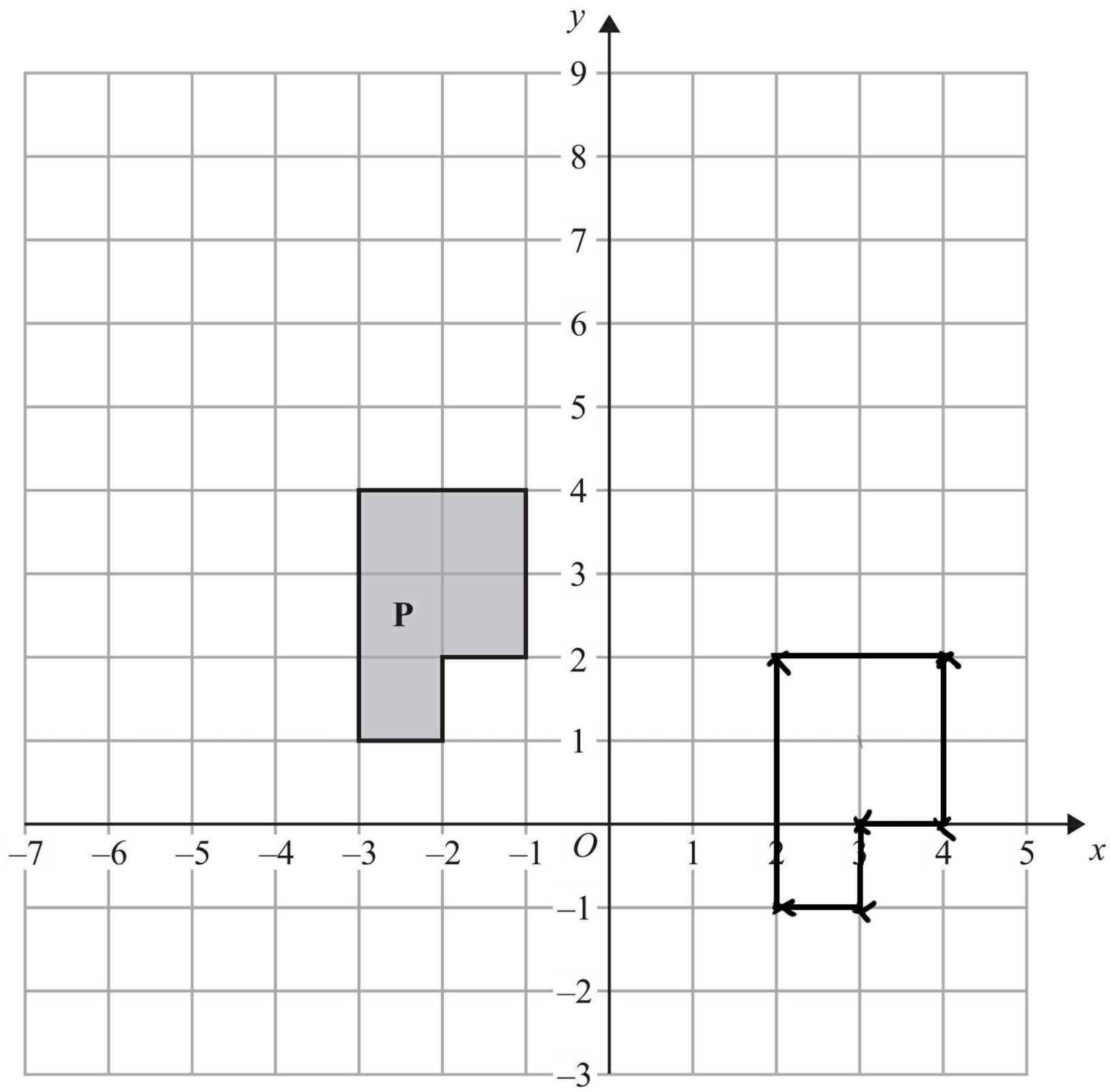
4 x 10 = 40

12 + 6 + 15 = 33

40 - 33 = 7

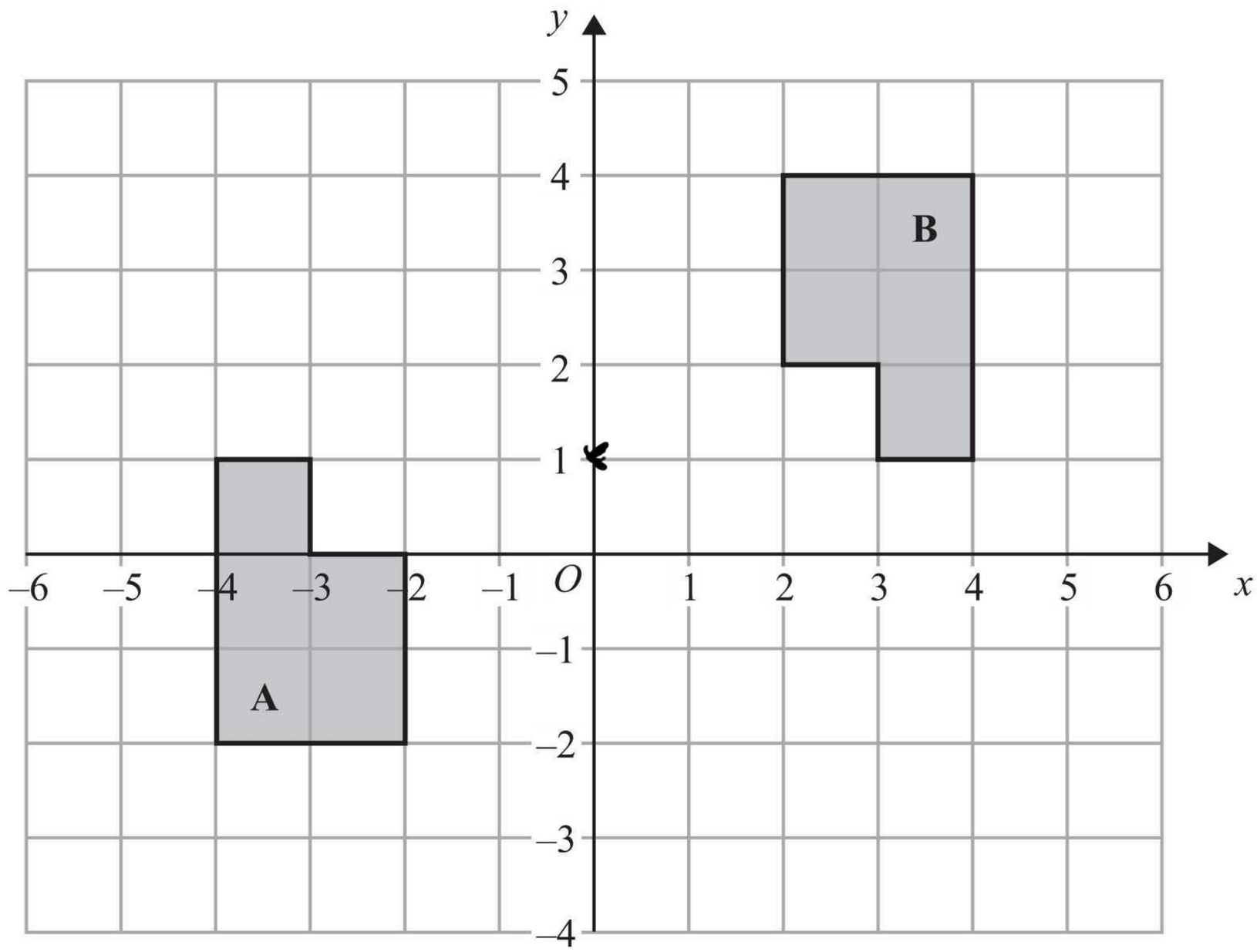
(Total for Question 6 is 3 marks)

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.

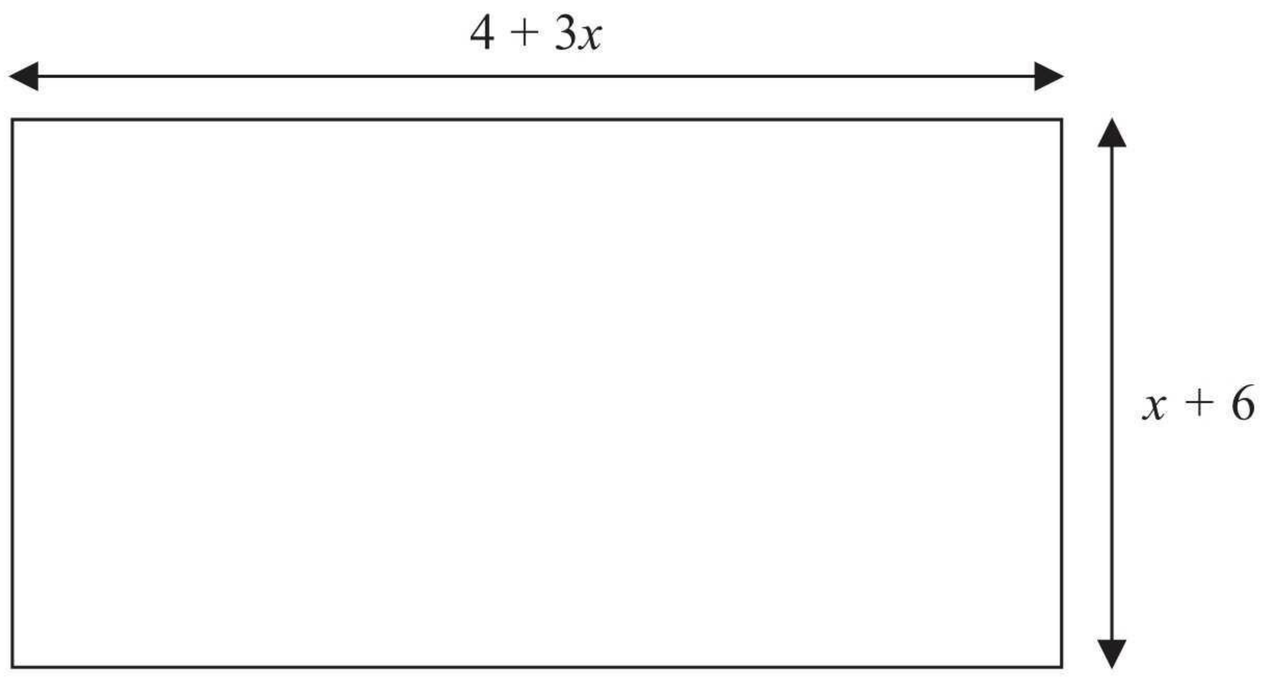


Diagram **NOT** accurately drawn

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

Work out the value of x

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

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

$8x + 20 = 32$

$8x = 12$

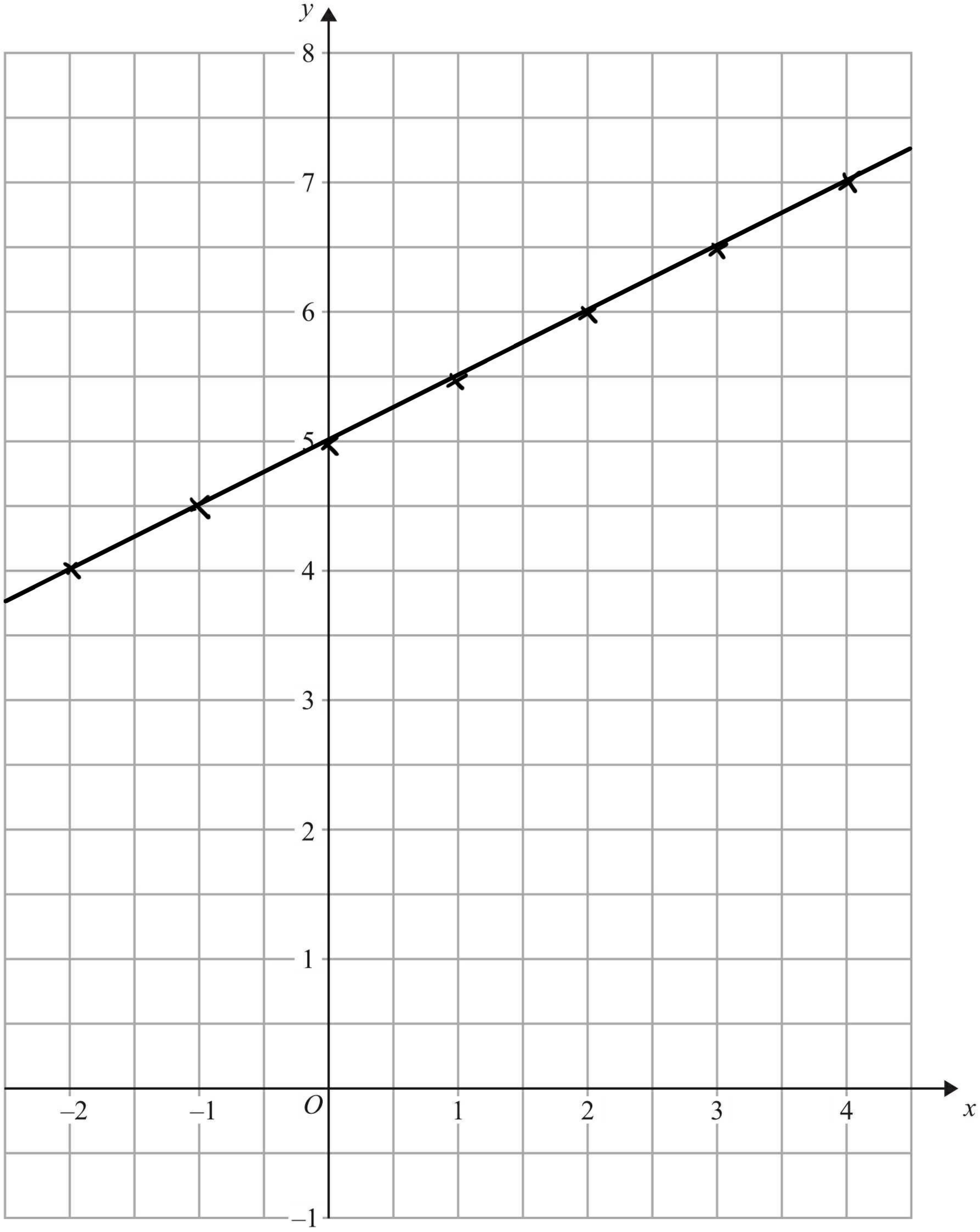
$x = 1.5$

1.5

(Total for Question 10 is 4 marks)

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

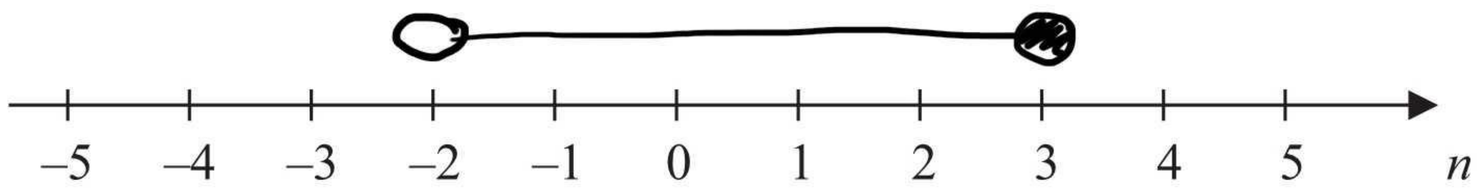
x	-2	-1	0	1	2	3	4
y	4	4.5	5	5.5	6	6.5	7



(Total for Question 12 is 3 marks)

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)

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)

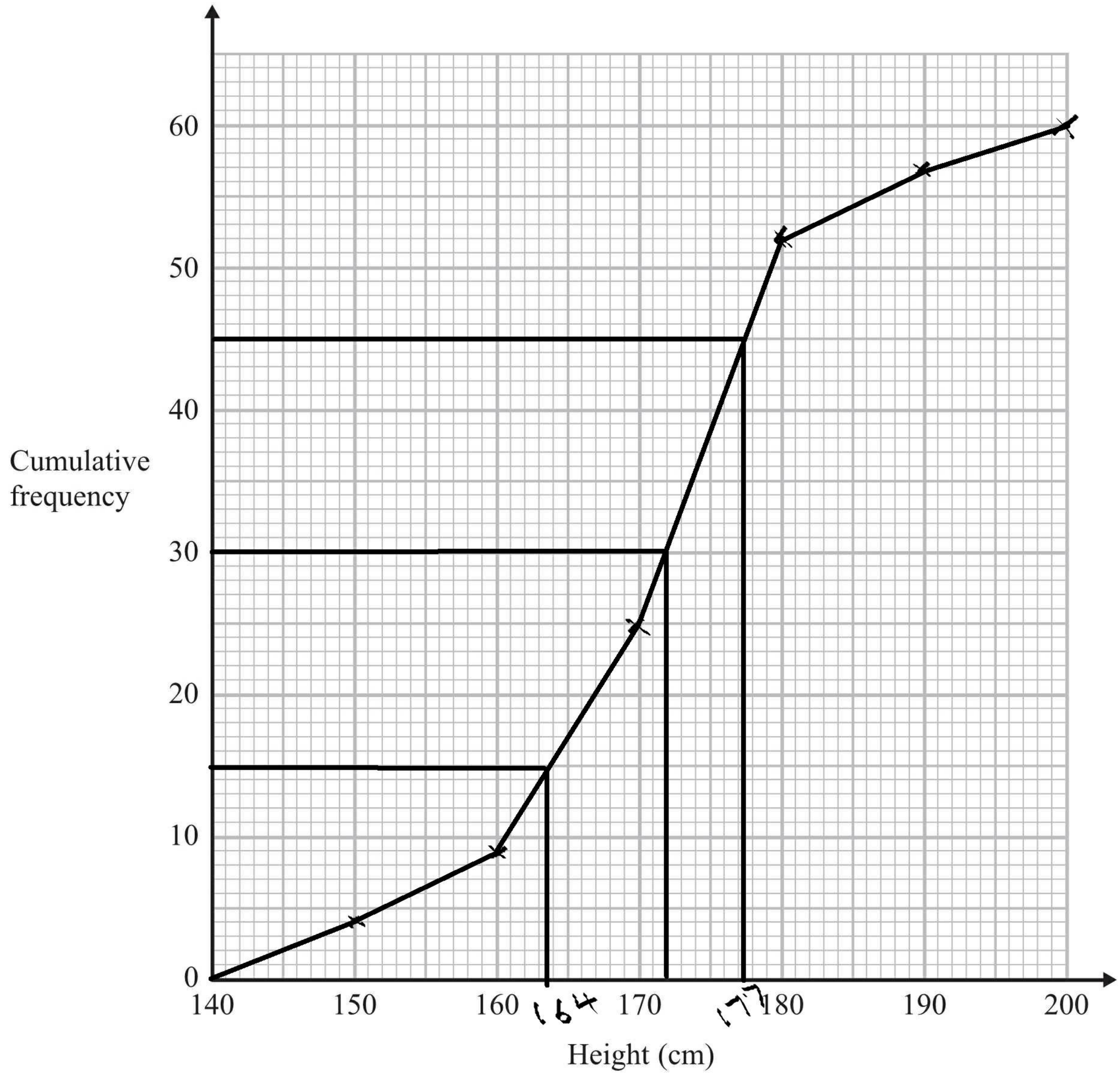
21 The table below shows information about the heights of 60 students.

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)

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)