

Mathematics Department

To support our Year 10 Higher Tier students over the coming weeks of uncertainty it is essential that they continue their learning in mathematics as planned. Students are best accessing the MathsWatch package. They should watch the correct clip, answer the online questions (which are instantly marked) and then complete the sheet in this booklet. Students normally study maths for 4 hours per week and this should continue at home in accordance with the schedule below.

Tier	Clip	Title	Topic	Grade
Week 1				
Foundation/Higher	96	Straight Line Graphs	Algebra	3
Foundation/Higher	97	The Gradient of a Line	Algebra	3
Foundation/Higher	98	Drawing Quadratic Graphs	Algebra	3
Foundation/Higher	133	Midpoint of a Line on a Graph	Algebra	4
Week 2				
Foundation/Higher	159a	Finding the Equation of a Straight Line - $y=mx+c$	Algebra	5
Foundation/Higher	159b	Finding the Equation of a Straight Line - Gradient and Coordinates	Algebra	5
Foundation/Higher	160	Roots and Turning Points of Quadratics	Algebra	5
Foundation/Higher	161	Cubic and Reciprocal Graphs	Algebra	5
Week 3				
Higher	195a	Trigonometric Graphs - Sine and Cosine	Algebra	7
Higher	195b	Trigonometric Graphs - Tangent	Algebra	7
Higher	216a	Interpreting Graphs - Velocity-Time Graphs	Algebra	8 - 9
Higher	216b	Interpreting Graphs - Rate of Change	Algebra	8 - 9
Week 4				
Foundation/Higher	52	Perimeters	Geometry	2
Foundation/Higher	53	Area of a Rectangle	Geometry	2
Foundation/Higher	54	Area of a Triangle	Geometry	2
Foundation/Higher	55	Area of a Parallelogram	Geometry	2
Foundation/Higher	56	Area of a Trapezium	Geometry	2
Week 5				
Foundation/Higher	114a	Surface Area of a Prism - Cuboids	Geometry	3
Foundation/Higher	114b	Surface Area of a Prism - Triangular Prisms	Geometry	3
Foundation/Higher	115	Volume of a Cuboid	Geometry	3
Foundation/Higher	116	Circle Definitions	Geometry	3
Week 6				
Foundation/Higher	117	Area of a Circle	Geometry	3
Foundation/Higher	118	Circumference of a Circle	Geometry	3
Foundation/Higher	119	Volume of a Prism	Geometry	3
Foundation/Higher	169	Spheres	Geometry	5
Foundation/Higher	170	Pyramids	Geometry	5
Week 7				
Foundation/Higher	171	Cones	Geometry	5
Foundation/Higher	172	Frustums	Geometry	5
Foundation/Higher	48	Reflections	Geometry	2
Foundation/Higher	49	Rotations	Geometry	2
Foundation/Higher	50	Translations	Geometry	2
Foundation/Higher	148	Enlargements	Geometry	4

Week 8				
Foundation/Higher	124	Bearings	Geometry	3
Foundation/Higher	145	Bisecting an Angle	Geometry	4
Foundation/Higher	146a	Constructing Perpendiculars - Bisecting a Line	Geometry	4
Foundation/Higher	146b	Constructing Perpendiculars - From any Point	Geometry	4
Foundation/Higher	147	Draw a Triangle Using Compasses	Geometry	4
Week 9				
Foundation/Higher	135a	Solving Equations - Balancing	Algebra	4
Foundation/Higher	137	Forming Formulae and Equations	Algebra	4
Foundation/Higher	140	Simultaneous Equations Graphically	Algebra	4
Foundation/Higher	157	Factorising and Solving Quadratics	Algebra	5
Foundation/Higher	162	Simultaneous Equations Algebraically	Algebra	5
Week 10				
Foundation/Higher	138	Inequalities on a Number Line	Algebra	4
Foundation/Higher	139	Solve Linear Inequalities	Algebra	4
Foundation/Higher	126	Possibility Spaces	Probability	3
Foundation/Higher	127a	Venn Diagrams - Introduction	Probability	3
Foundation/Higher	127b	Venn Diagrams - Notation	Probability	3
Week 11				
Foundation/Higher	58	Listing Outcomes	Probability	2
Foundation/Higher	59	Calculating Probabilities	Probability	2
Foundation/Higher	60	Mutually Exclusive Events	Probability	2
Foundation/Higher	61	Two-Way Tables	Probability	2
Foundation/Higher	125	Experimental Probabilities	Probability	3
Week 12				
Foundation/Higher	151	Simple Tree Diagrams	Probability	4
Foundation/Higher	175	Harder Tree Diagrams	Probability	5
Higher	185	Probability using Venn Diagrams	Probability	6
Higher	204	And and Or Probability Questions	Probability	7
Week 13				
Foundation/Higher	12a	Tessellations and Congruency - Tessellations	Geometry	1
Foundation/Higher	12b	Tessellations and Congruency - Congruent Shapes	Geometry	1
Foundation/Higher	166	Congruent triangles	Geometry	5
Higher	200	Similarity - Area and Volume	Geometry	7
Week 14				
Foundation/Higher	128a	Representing Data - Pie Charts	Probability	3
Foundation/Higher	128b	Representing Data - Stem and Leaf Diagrams	Probability	3
Foundation/Higher	129	Scatter Diagrams	Probability	3
Higher	186	Cumulative Frequency	Probability	6
Higher	187	Boxplots	Probability	6
Higher	205	Histograms	Probability	7

Please email Mr Roberts (GRoberts@secondary.ac.fk) with any queries through the time of school closure for support with maths.

Students can also access MathsWatch and watch videos, download worksheets and complete interactive self-marking tests. All students have been issued with a CGP Revision Guide. Please return these to the school once the qualification has been completed.

To access MathsWatch:

www.vle.mathswatch.co.uk

Username = AExample@falklandics

Password = changeme

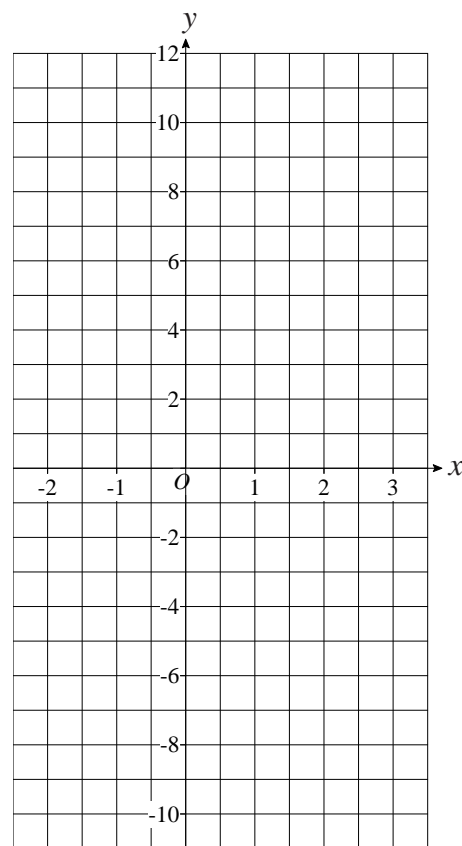


Straight Line Graphs

- 1) a) Complete the table of values for $y = 4x - 2$

x	-2	-1	0	1	2	3
y	-10		-2			10

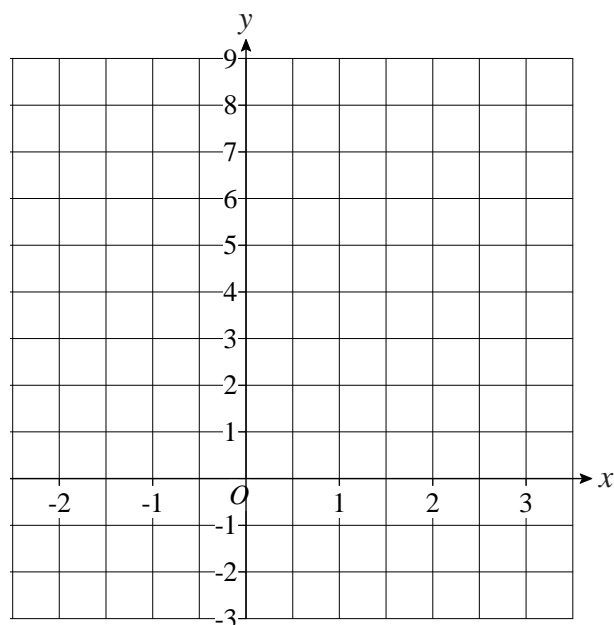
- b) On the grid, draw the graph of $y = 4x - 2$, for values of x from -2 to 3.
c) Use the graph to find the value of y when $x = 2.5$
d) Use the graph to find the value of x when $y = -8$



- 2) a) Complete the table of values for $y = 2x + 2$

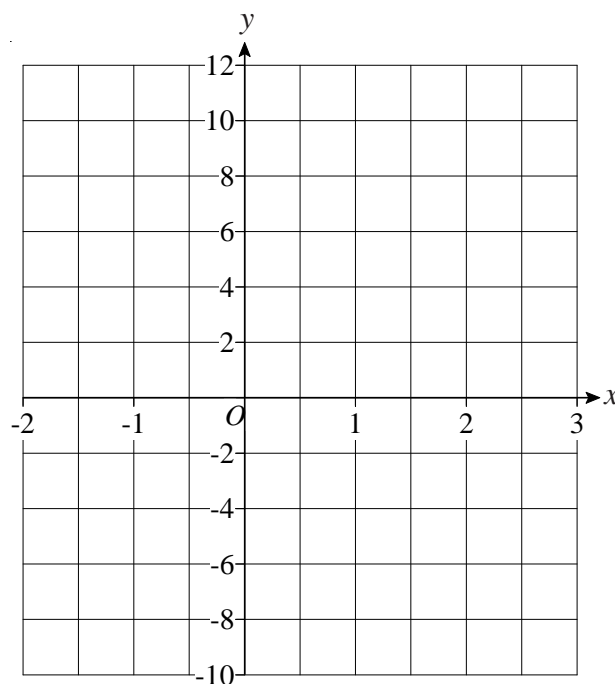
x	-2	-1	0	1	2	3
y		0	2			

- b) On the grid, draw the graph of $y = 2x + 2$.



Straight Line Graphs

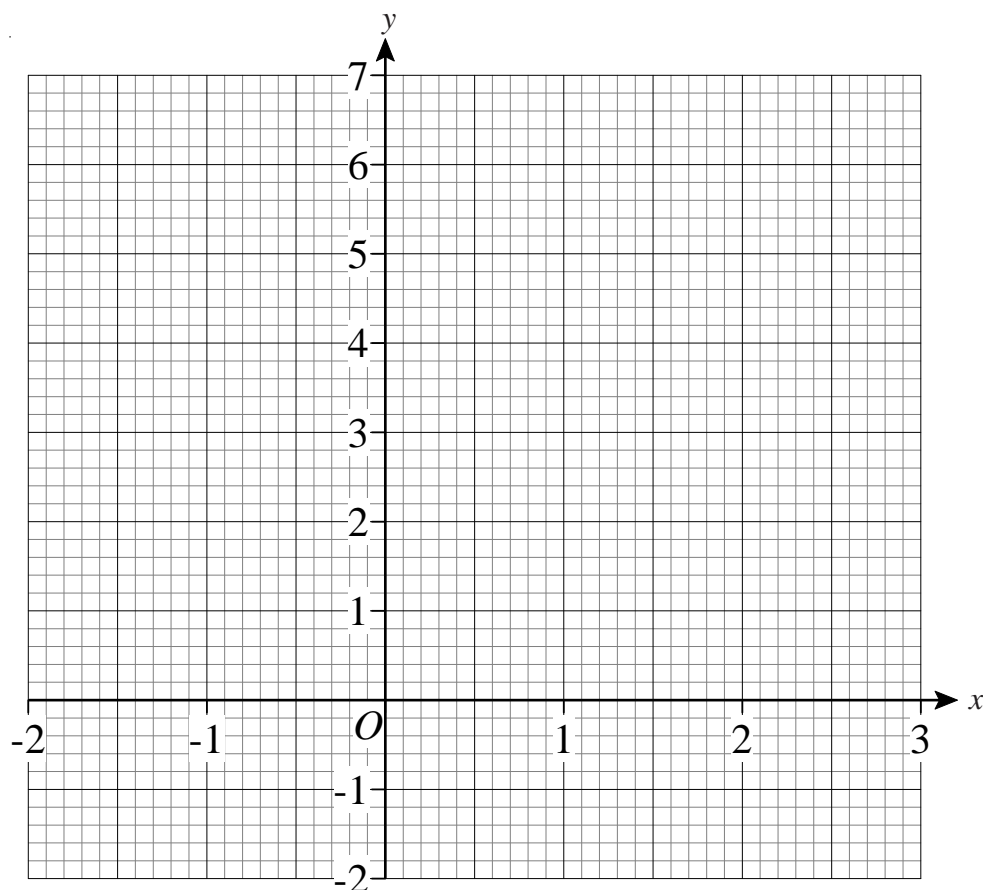
- 1) On the grid, draw the graph of $y = 2x - 4$



- 2) a) Complete the table of values for $3x + 2y = 6$

x	-2	-1	0	1	2	3
y		4.5	3			-1.5

- b) On the grid, draw the graph of $3x + 2y = 6$



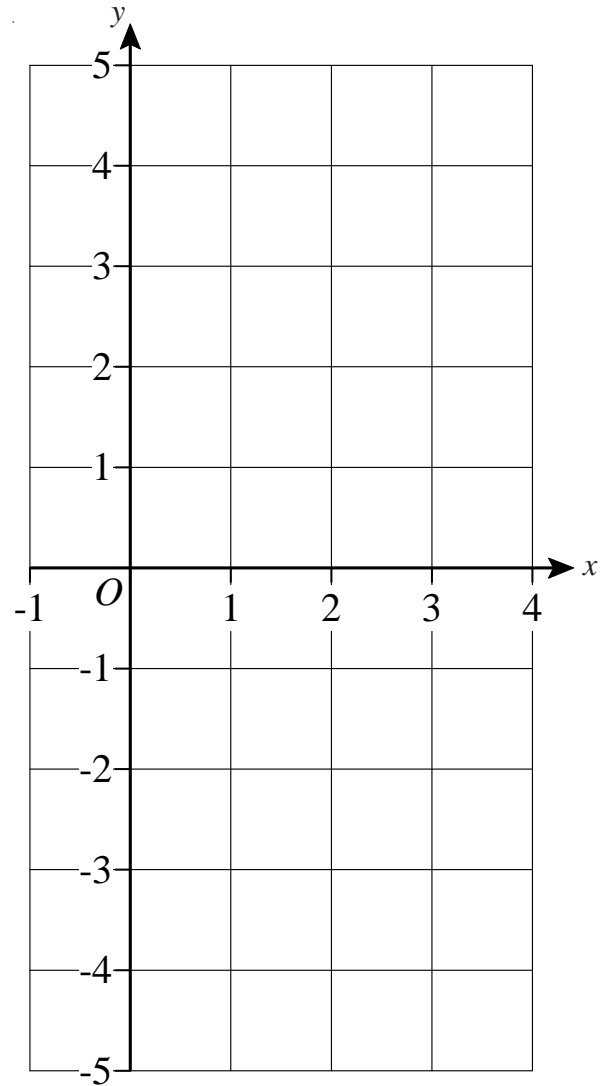
- c) Find the gradient of the graph of $3x + 2y = 6$.

Straight Line Graphs

- 1) a) Complete the table of values for $y = 2x - 3$

x	-1	0	1	2	3	4
y				1		

- b) Using the axes on the right draw the graph of $y = 2x - 3$
- c) Use your graph to work out the value of y when $x = 2.5$
- d) Use your graph to work out the value of x when $y = 4.5$



- 2) a) Complete the table of values for $y = 2 - x$

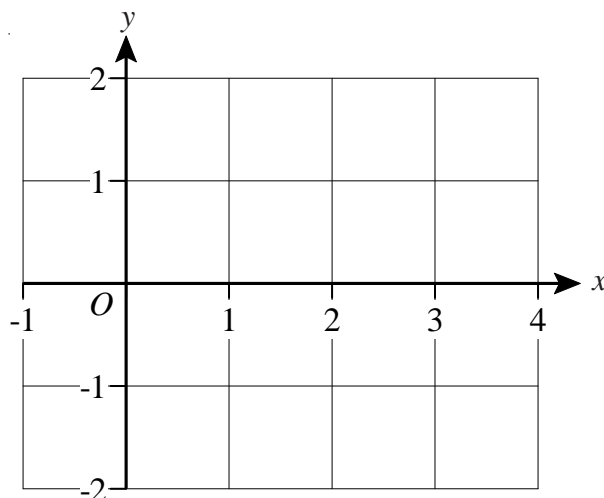
x	-1	0	1	2	3	4
y					-1	

- b) Using the axes on the right, again, draw the graph of $y = 2 - x$

- 3) a) Complete the table of values for $y = \frac{1}{2}x - 1$

- b) Draw the graph of $y = \frac{1}{2}x - 1$

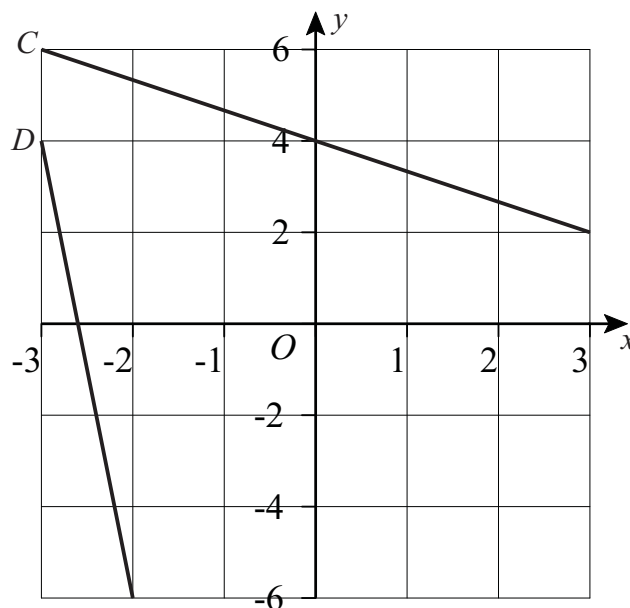
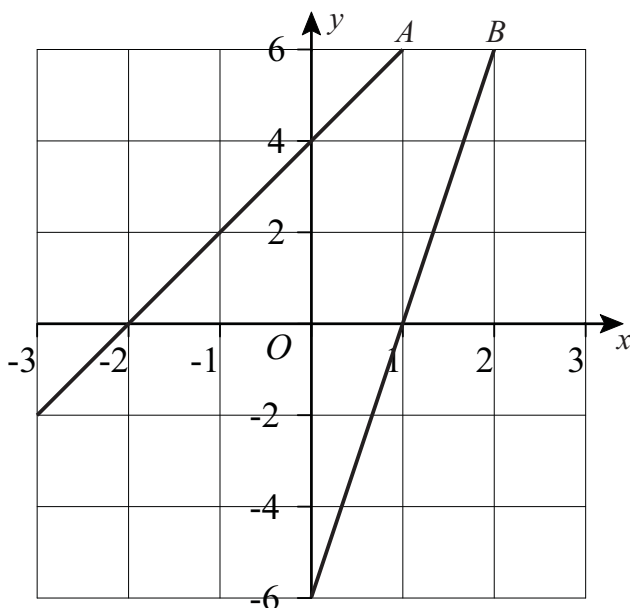
x	-1	0	1	2	3	4
y				0		



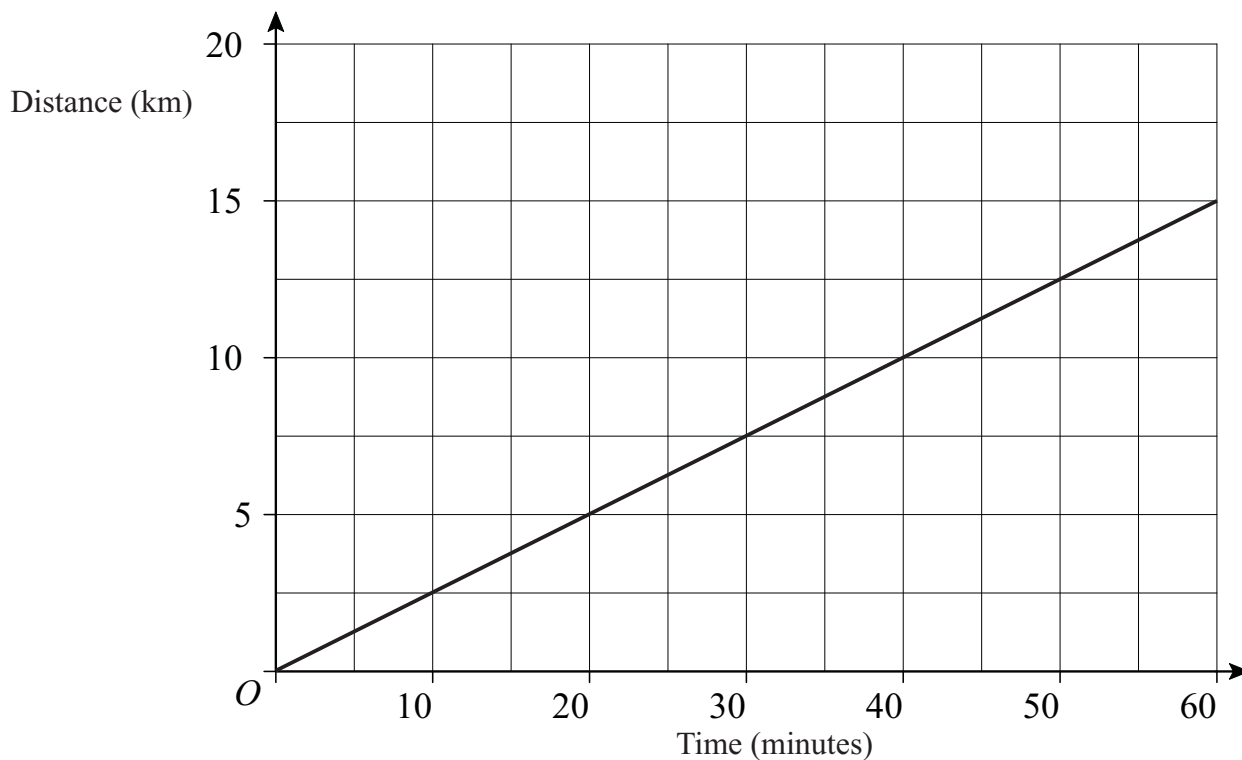
- c) Use your graph to find the value of y when $x = 3.5$

The Gradient of a Line

- 1) Find the gradient of lines A , B , C and D .



- 2) The graph shows how Meg cycles at a constant speed for 60 minutes.



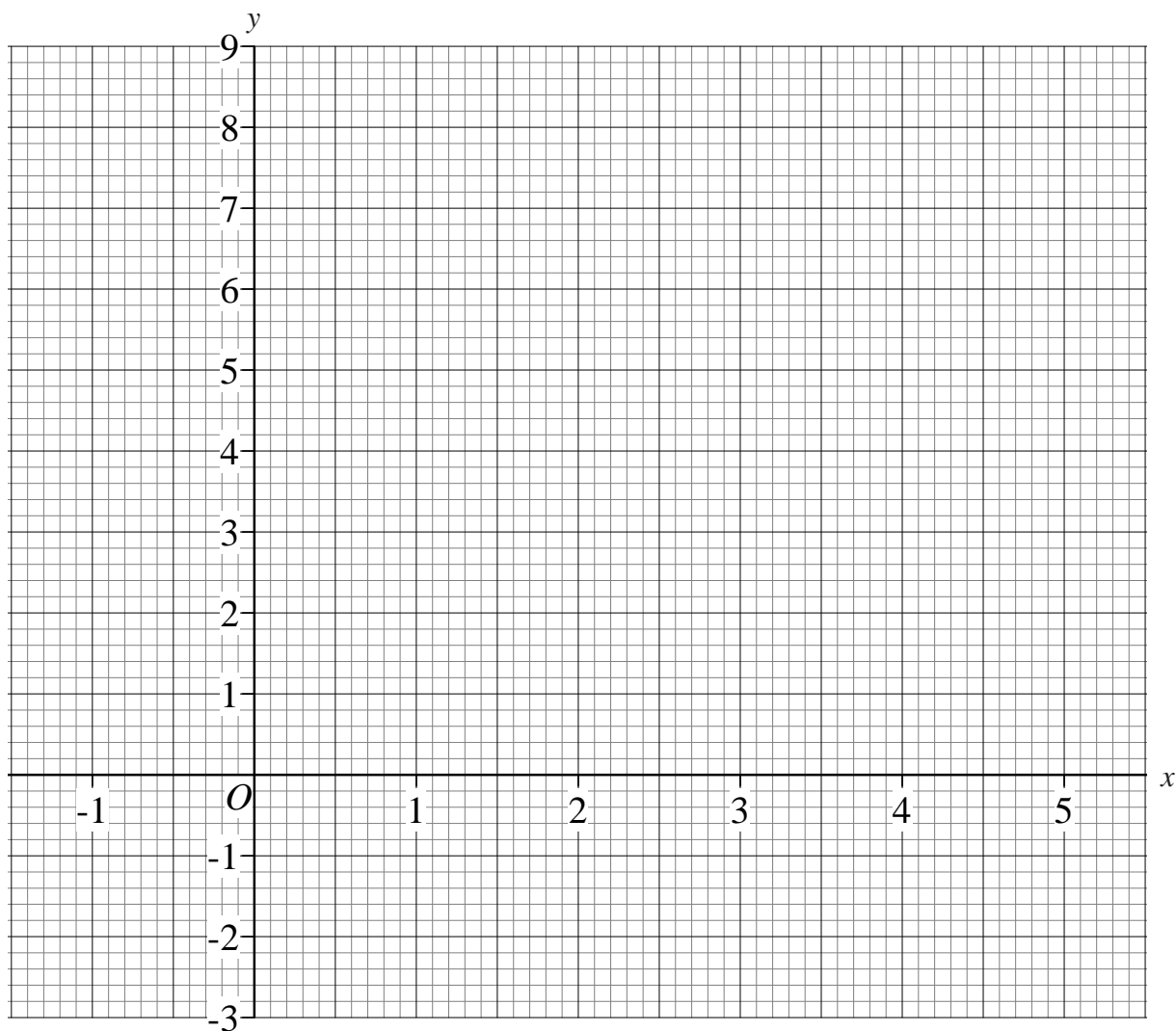
- Find the gradient of the line.
- What does the gradient show?

Drawing Quadratic Graphs

1) Complete the table of values for $y = x^2 - 4x + 3$

x	-1	0	1	2	3	4	5
y		3	0		0		8

On the grid, draw the graph of $y = x^2 - 4x + 3$

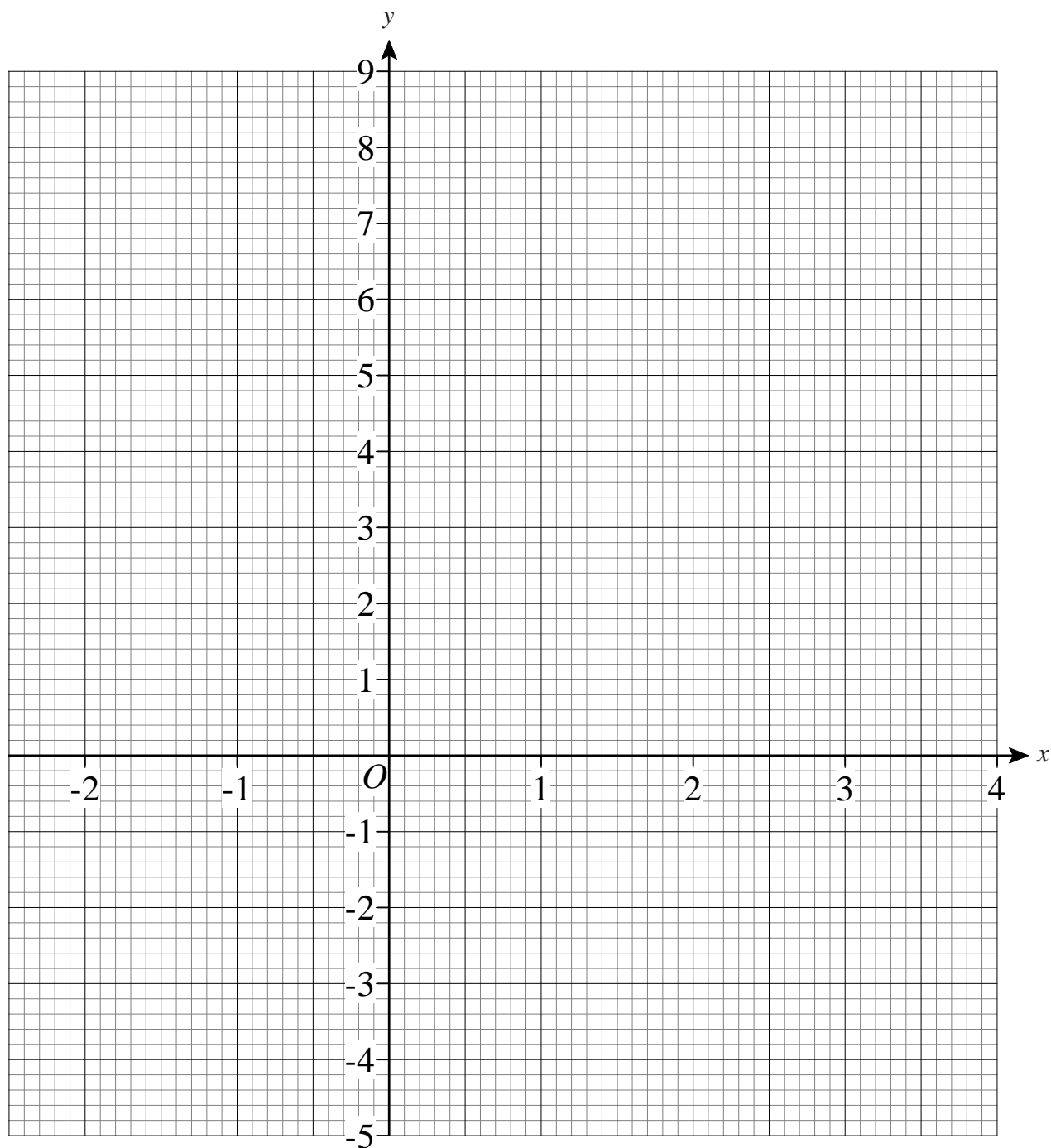


Drawing Quadratic Graphs

1) a) Complete the table of values for $y = x^2 - 3x - 2$

x	-2	-1	0	1	2	3	4
y		2	-2	-4		-2	

b) On the grid, draw the graph of $y = x^2 - 3x - 2$



c) Use your graph to estimate the values of x when $y = -1$

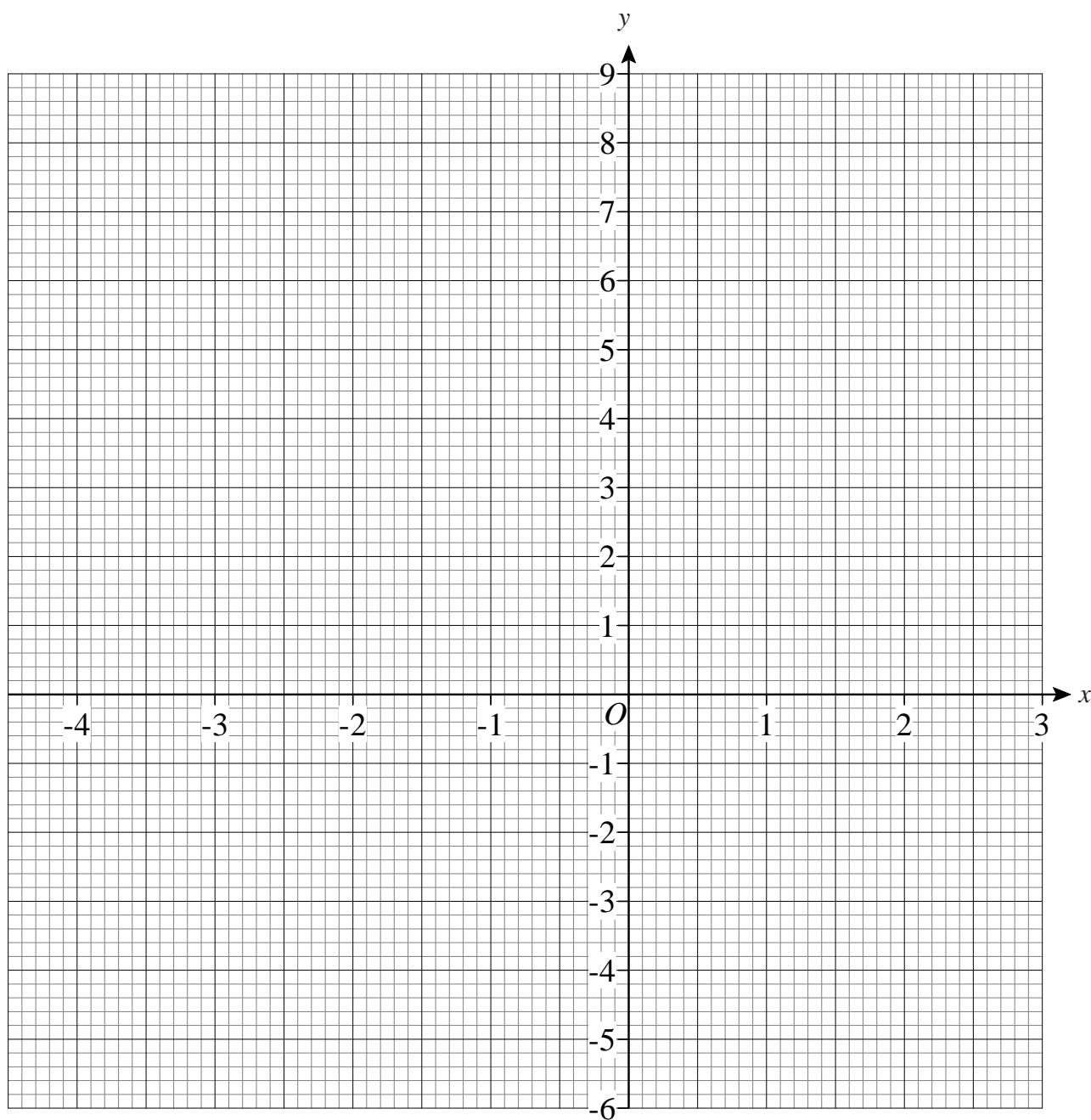
Drawing Quadratic Graphs



1) a) Complete the table of values for $y = x^2 + x - 4$

x	-4	-3	-2	-1	0	1	2	3
y	8		-2	-4				8

b) On the grid, draw the graph of $y = x^2 + x - 4$



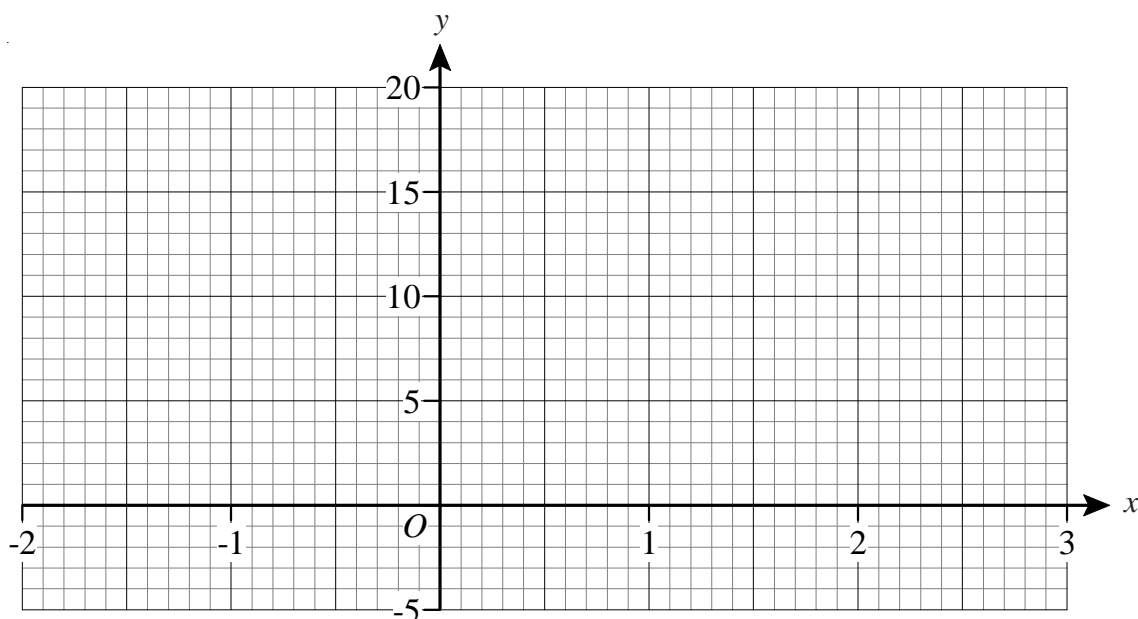
Drawing Quadratic Graphs



- 1) a) Complete the table of values for $y = 2x^2 - 3x$

x	-2	-1	0	1	2	3
y	14		0			9

- b) On the grid, draw the graph of $y = 2x^2 - 3x$ for values of x from -2 to 3



- c) Use the graph to find the value of y when $x = -1.5$

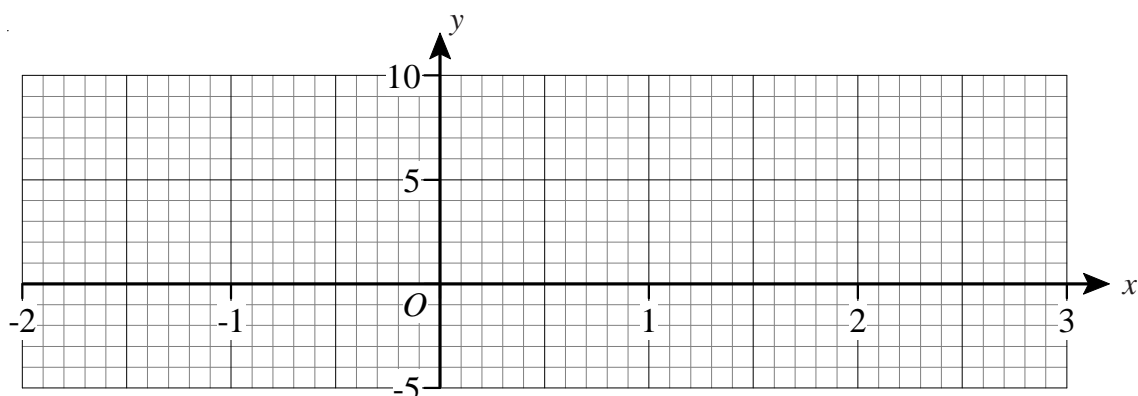
- d) Use the graph to find the values of x when $y = 4$



- 2) a) Complete the table of values for $y = x^2 - 2x$

x	-2	-1	0	1	2	3
y	8		0			

- b) On the grid, draw the graph of $y = x^2 - 2x$ for values of x from -2 to 3

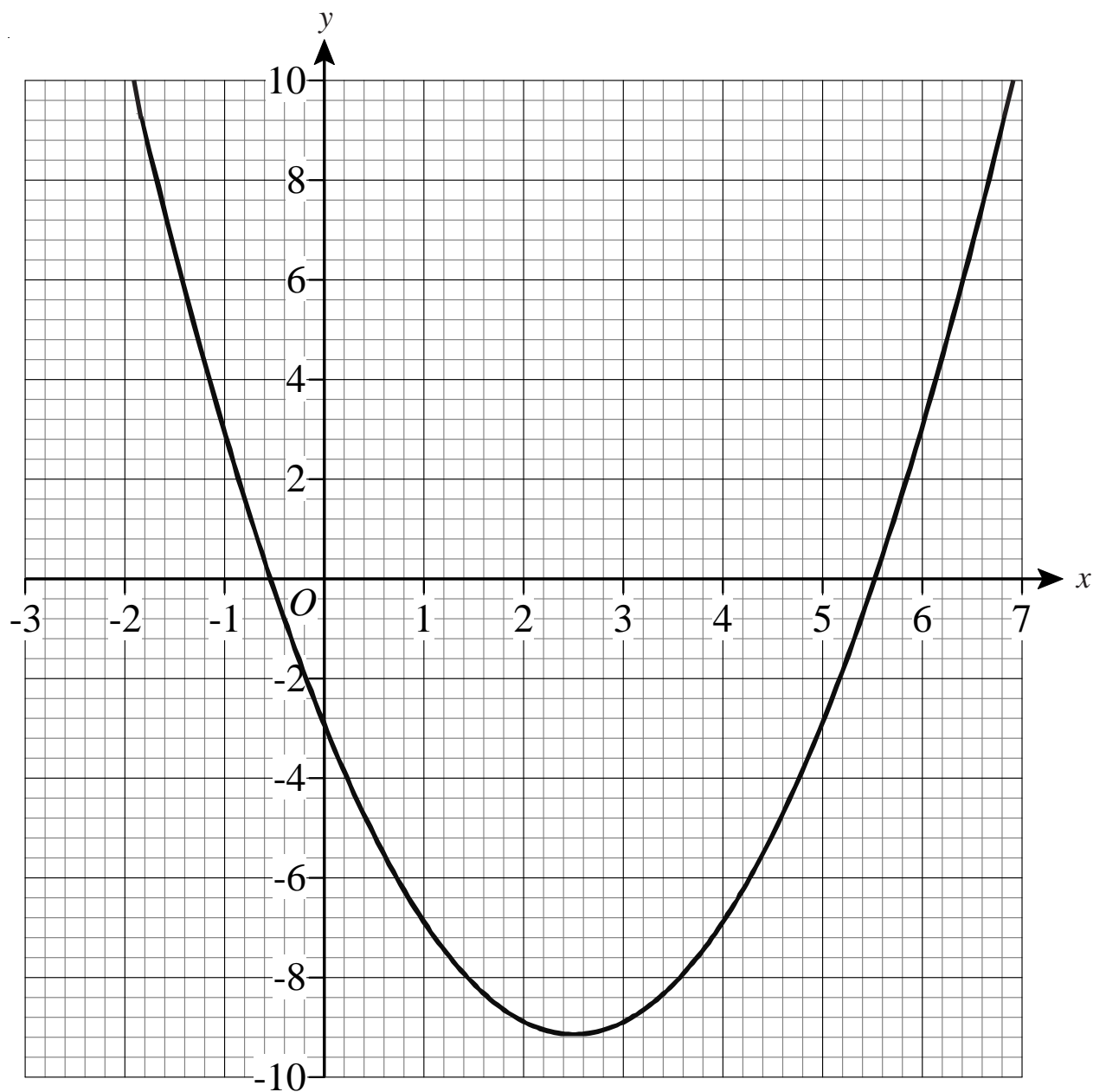


- c) (i) On the same axes draw the straight line $y = 2.5$

- (ii) Write down the values of x for which $x^2 - 2x = 2.5$

Drawing Quadratic Graphs

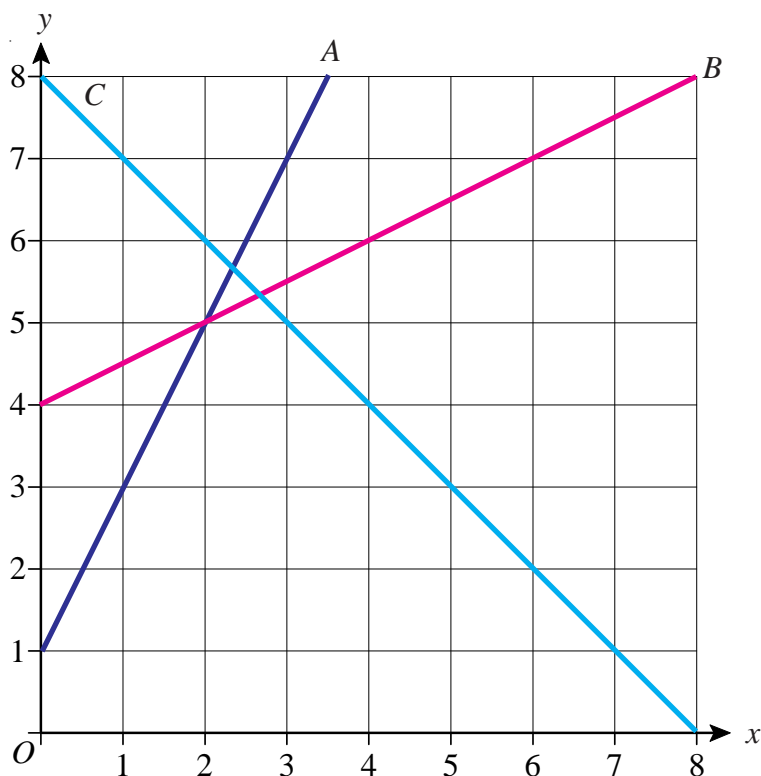
- 1) The diagram shows the graph of $y = x^2 - 5x - 3$



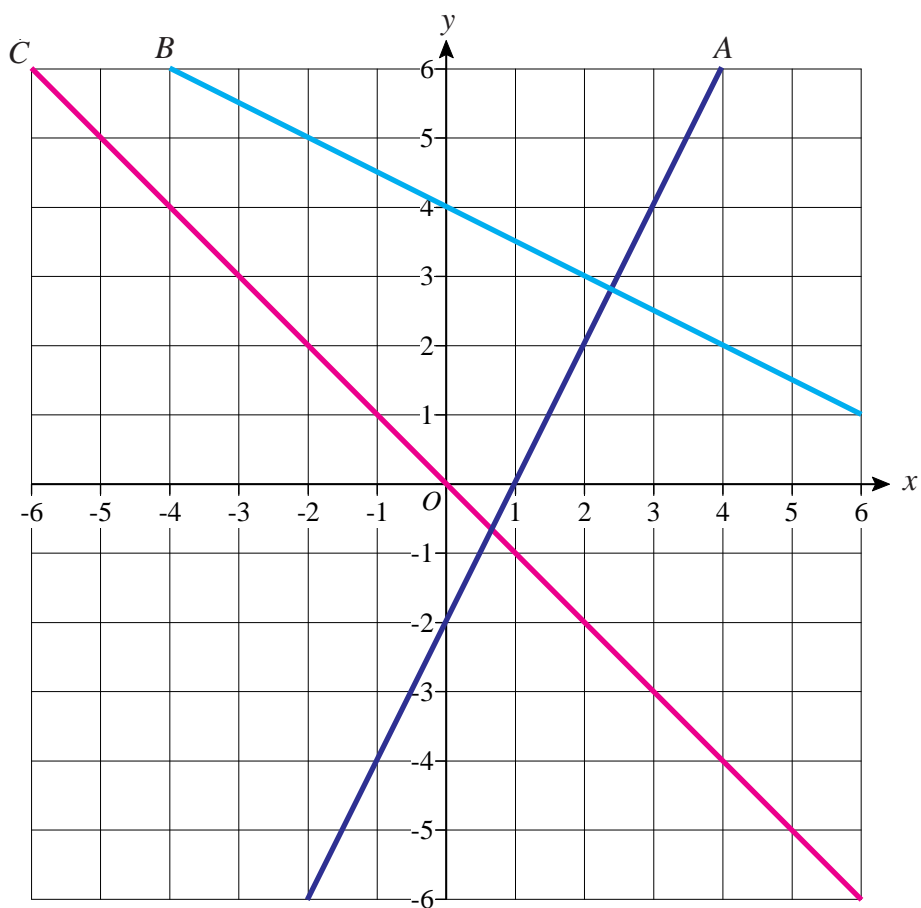
- a) Use the graph to find estimates for the solutions of
- $x^2 - 5x - 3 = 0$
 - $x^2 - 5x - 3 = 6$
- b) Use the graph to find estimates for the solutions of the simultaneous equations
- $$y = x^2 - 5x - 3$$
- $$y = x - 4$$

Finding the Equation of a Straight Line

- 1) Find the equations of lines A , B and C on the axes below

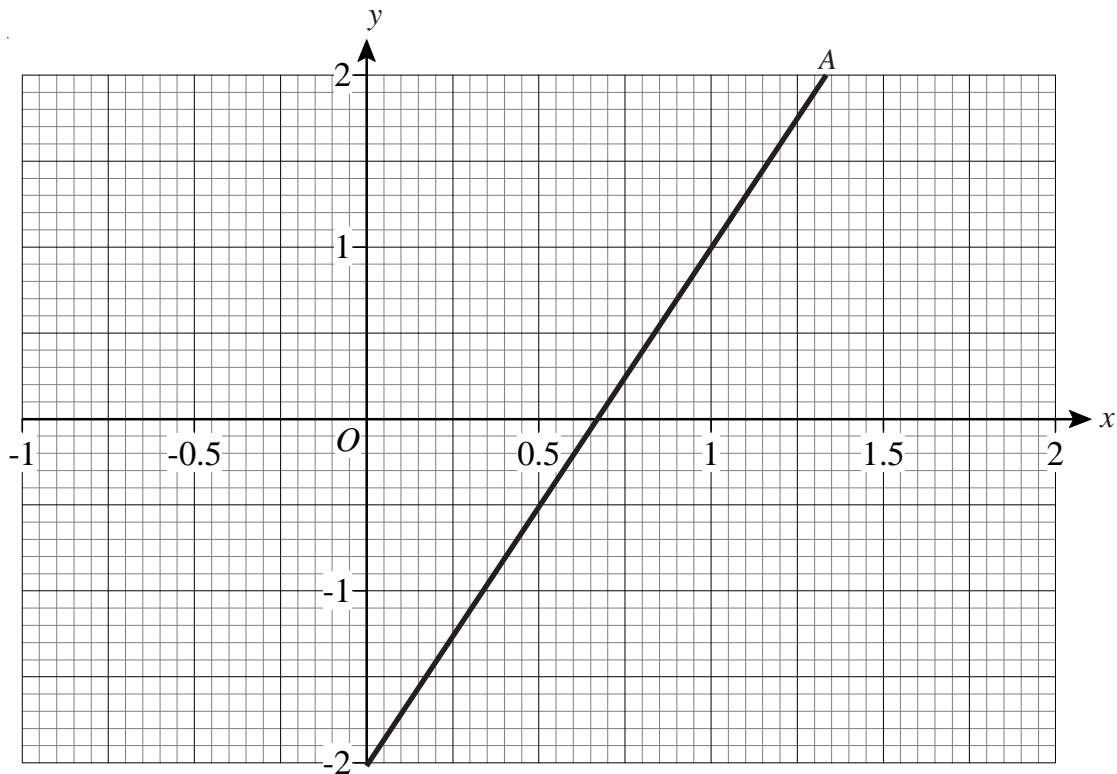


- 2) Find the equations of lines A , B and C on the axes below



Finding the Equation of a Straight Line

- 1) Find the equation of line A on the grid below.



- 2) A straight line passes through points $(0, 4)$ and $(3, 13)$.
What is its equation?



- 3) A straight line passes through points $(0, 7)$ and $(2, -1)$.
What is its equation?



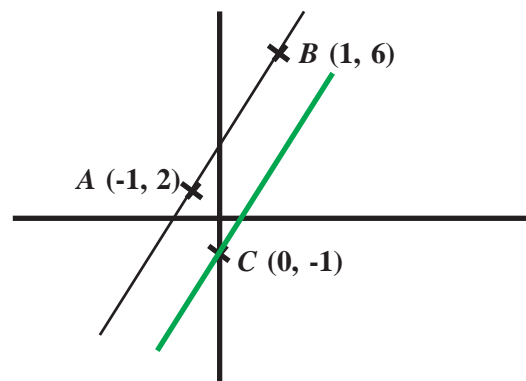
- 4) A straight line is parallel to $y = 3x - 2$ and goes through $(1, 8)$.
What is its equation?



- 5) A straight line is parallel to $y = 2x + 5$ and goes through $(5, 6)$.
What is its equation?



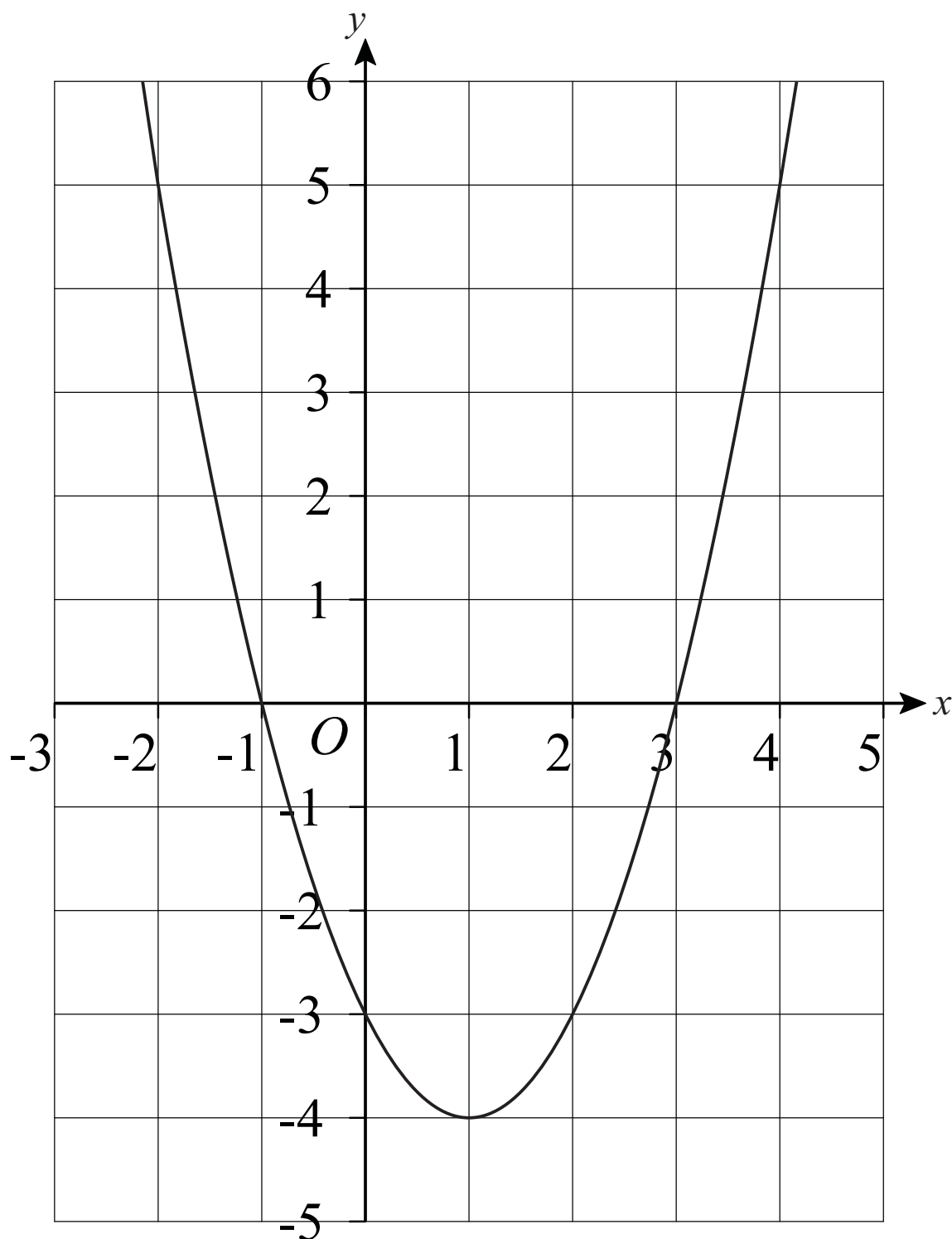
- 6) A is the point $(-1, 2)$.
B is the point $(1, 6)$.
C is the point $(0, -1)$.
Find the equation of the line which passes through C
and is parallel to AB.



- 1) The graph of $y = x^2 - 2x - 3$ is shown.

Write down the coordinates of:

- a) The turning point of the curve.
- b) The roots of the equation $x^2 - 2x - 3 = 0$
- c) The intersection of the curve with the y -axis.



Cubic and Reciprocal Graphs



- 1) a) Complete this table of values for

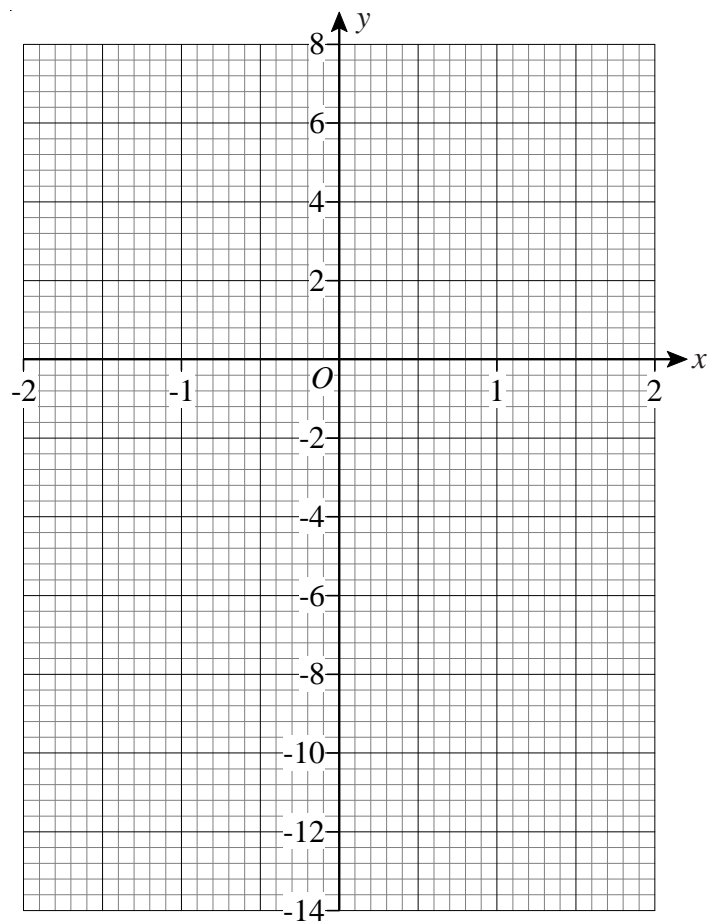
$$y = x^3 + x - 4$$

x	-2	-1	0	1	2
y	-14			-2	

- b) On the grid, draw the graph of

$$y = x^3 + x - 4$$

- c) Use the graph to find the value of x when $y = 2$



- 2) a) Complete this table of values for

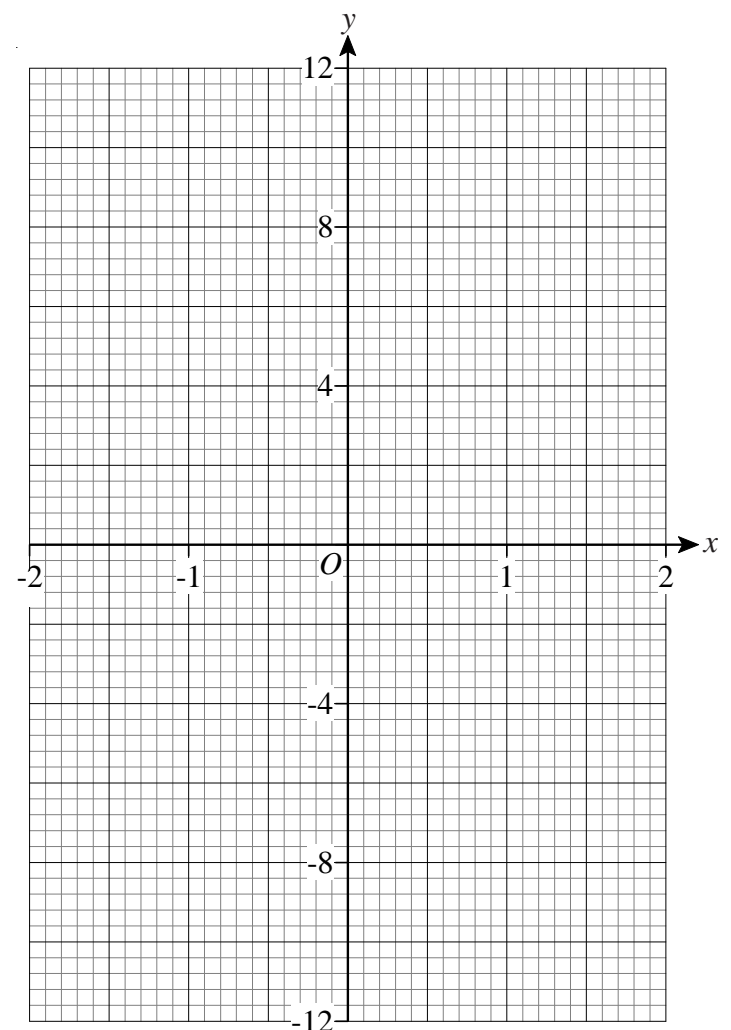
$$y = x^3 + 2x$$

x	-2	-1	0	1	2
y	-12		0		

- b) On the grid, draw the graph of

$$y = x^3 + 2x$$

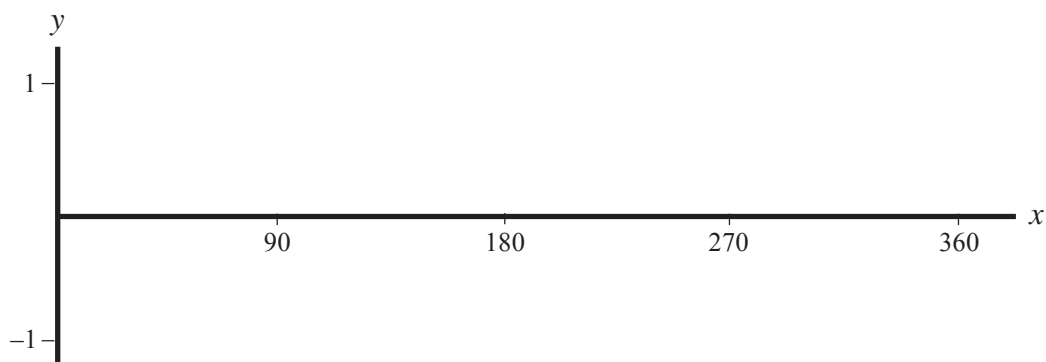
- c) Use the graph to find the value of x when $y = -6$



- 3) Sketch the graph of $y = 1 + \frac{1}{x}$

Trigonometric Graphs

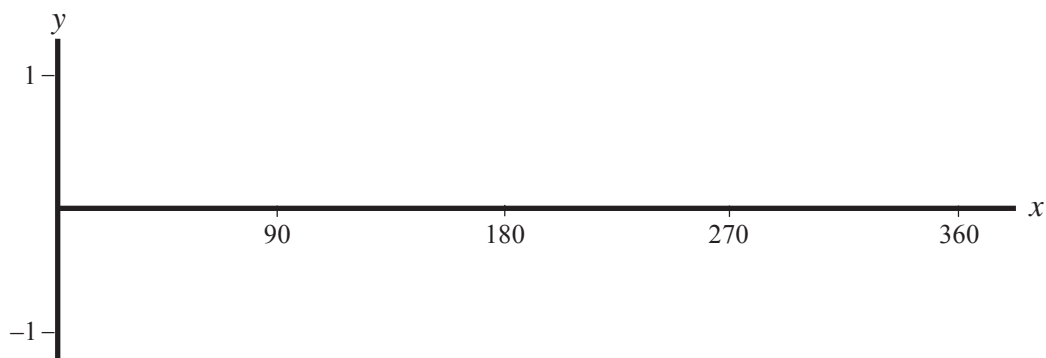
- 1) On the axes below, draw a sketch-graph to show $y = \sin x$



Given that $\sin 30^\circ = 0.5$, write down the value of:

- (i) $\sin 150^\circ$
- (ii) $\sin 330^\circ$

- 2) On the axes below, draw a sketch-graph to show $y = \cos x$

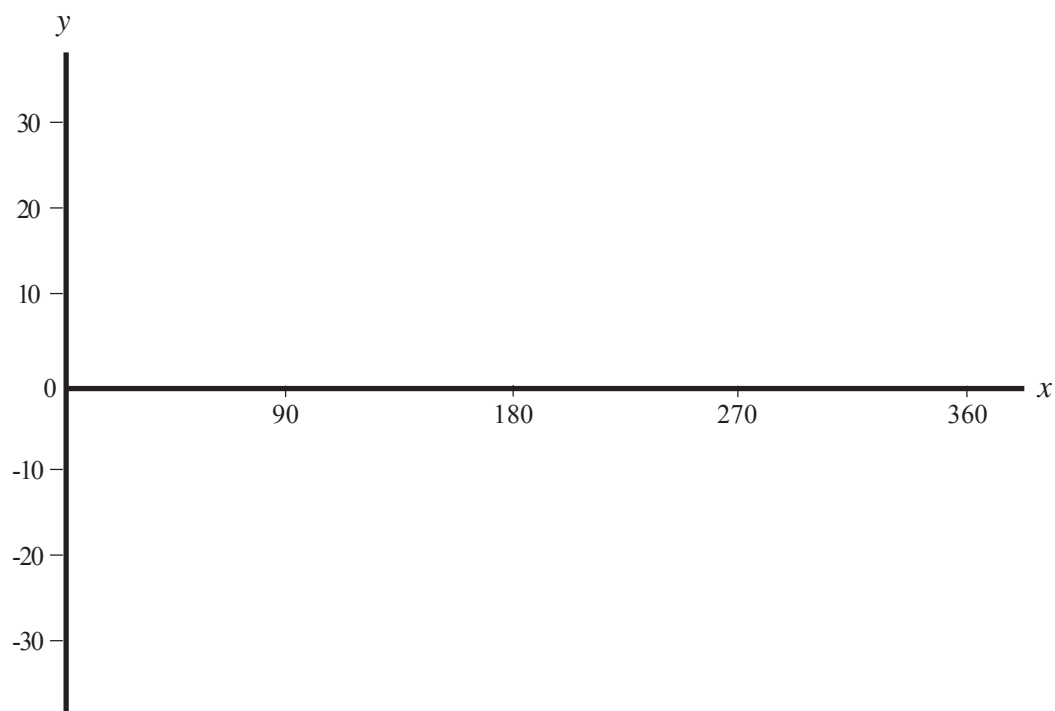


Given that $\cos 60^\circ = 0.5$, write down the value of:

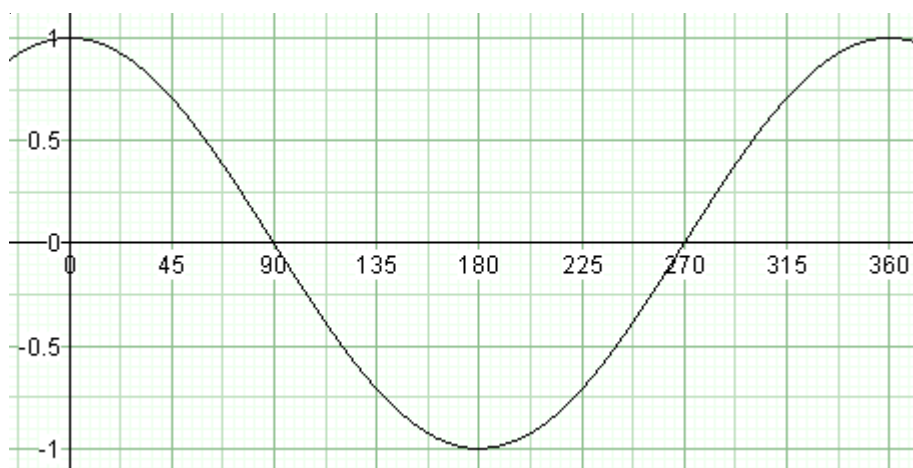
- (i) $\cos 120^\circ$
- (ii) $\cos 240^\circ$

Trigonometric Graphs

- 1) On the axes below, draw a sketch-graph to show $y = \tan x$



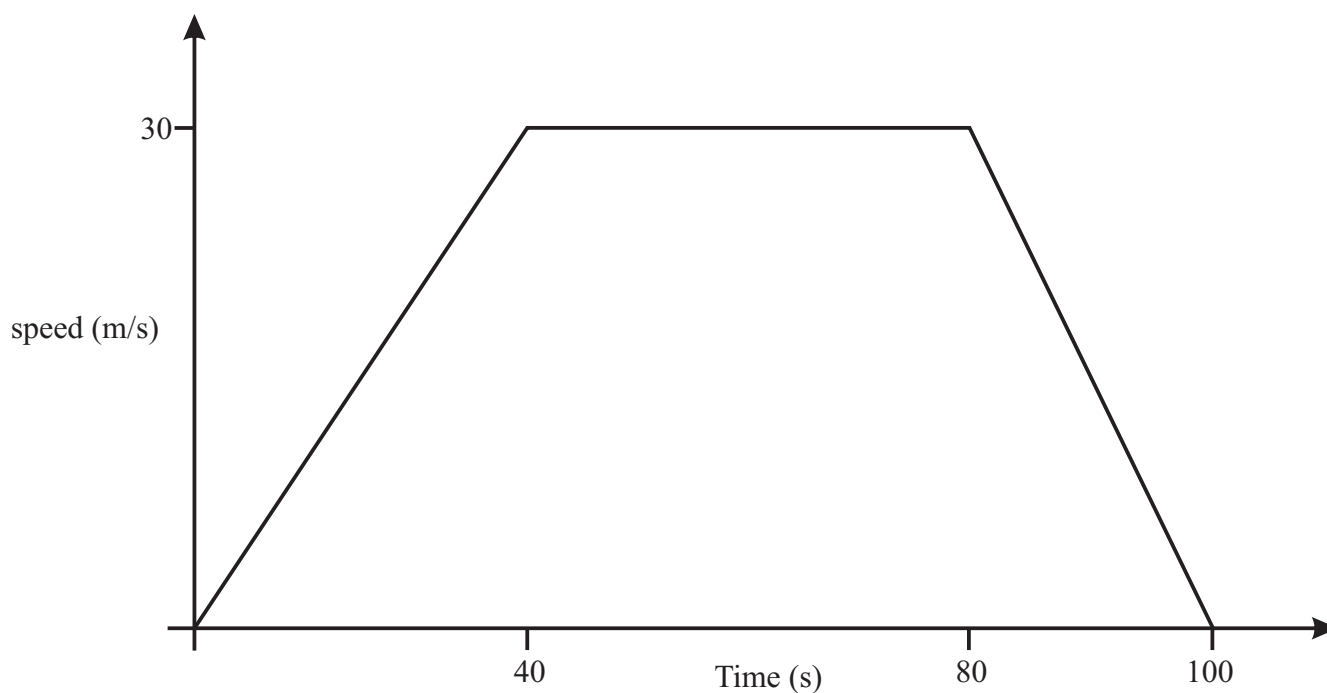
- 2) Here is the graph of the curve $y = \cos x$ for $0 \leq x \leq 360^\circ$.



- a) Use the graph to solve $\cos x = 0.75$ for $0 \leq x \leq 360^\circ$
 b) Use the graph to solve $\cos x = -0.75$ for $0 \leq x \leq 360^\circ$

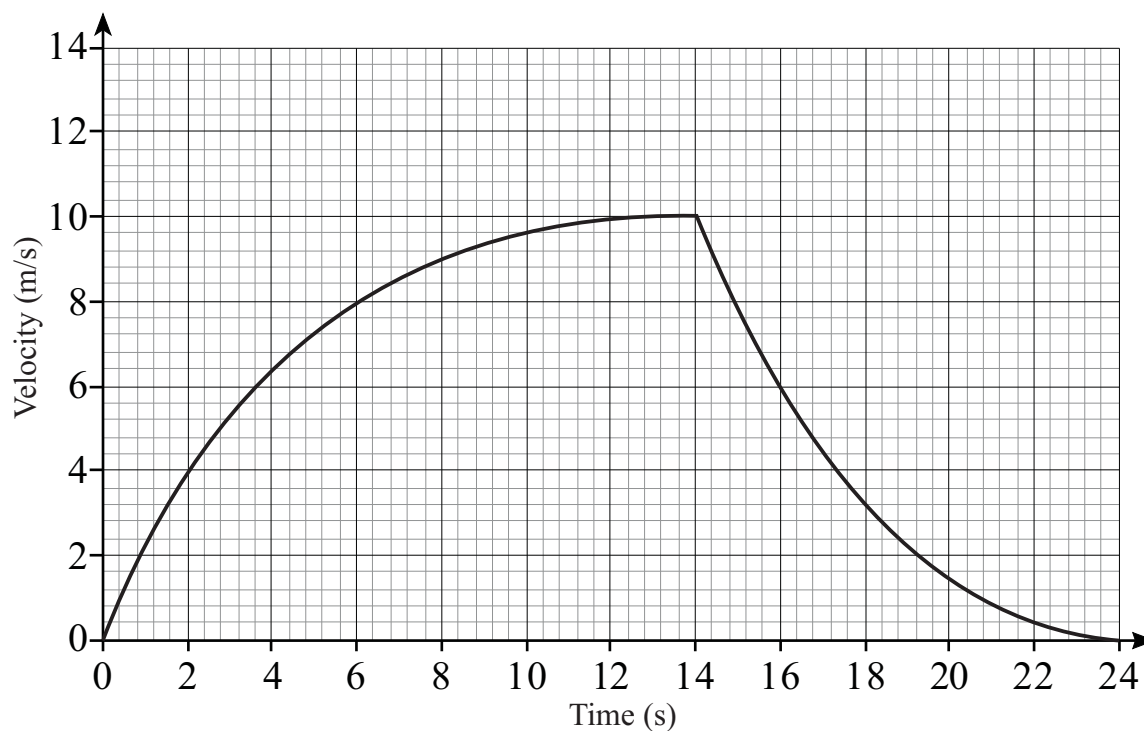
Interpreting Graphs

- 1) The graph shows the speed of a coach between two bus stations.



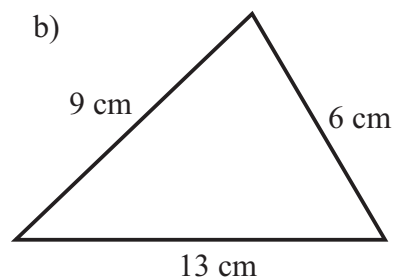
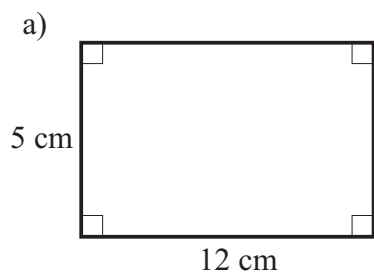
- What was the acceleration of the coach in m/s^2 for the first 40 seconds?
- What is the distance, in metres, between the two stations?

- 2) The velocity-time graph for a car is shown.



- Estimate the acceleration of the car at 6 seconds.
- Find an estimate for how far the car has travelled in the first 14 seconds.
Show all your working.

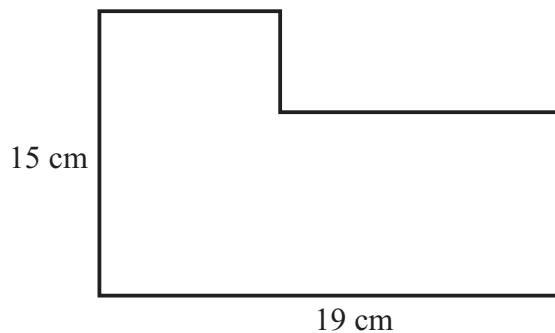
- 1) Find the perimeters of the following two shapes.



- 2) The length of a rectangle is 9 cm.
The total perimeter is 30 cm.

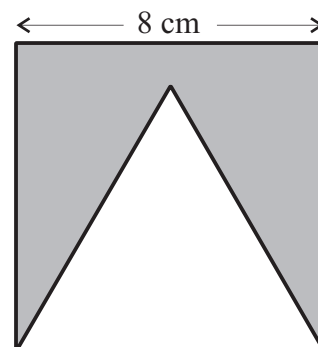
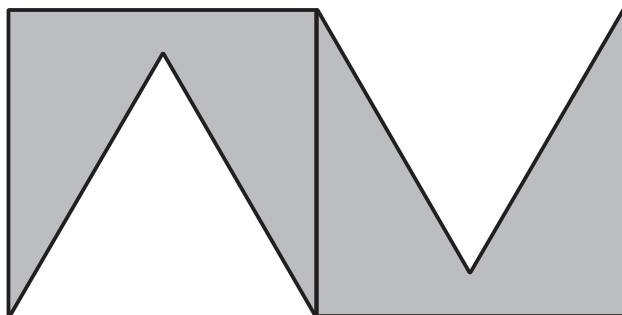
Calculate the length of the width of the rectangle.

- 3) Work out the perimeter of this L shape.



- 4) This shape is made by cutting out an equilateral triangle from a square.

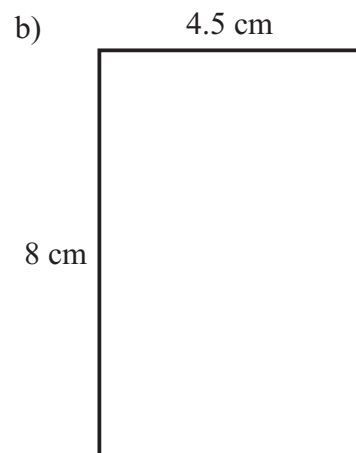
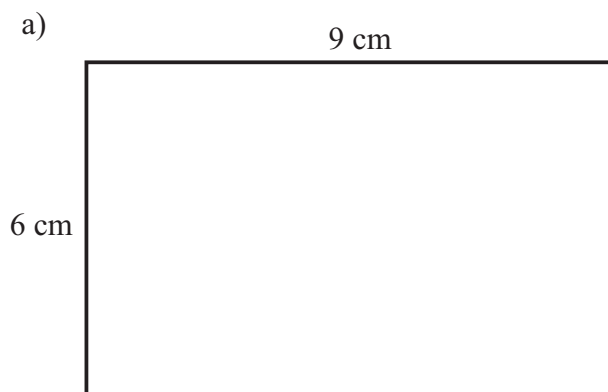
Two of these shapes are then put together to make this shape.



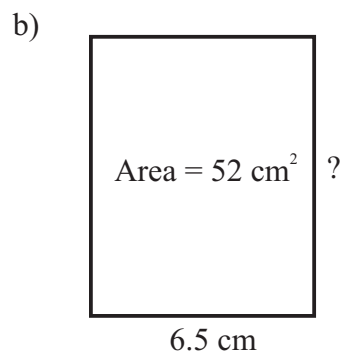
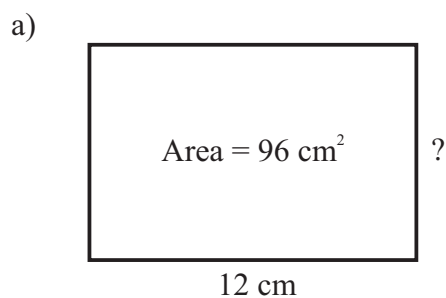
Work out the perimeter of this new shape.

Area of a Rectangle

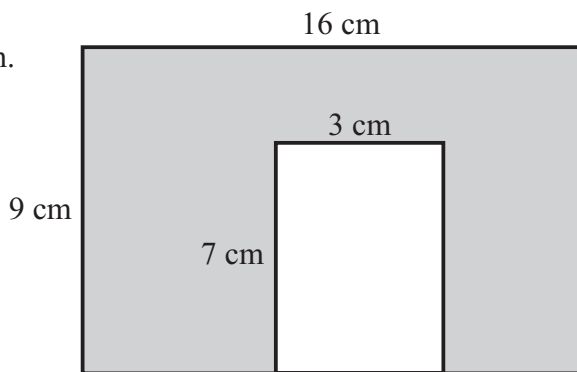
- 1) Find the areas of these two rectangles.



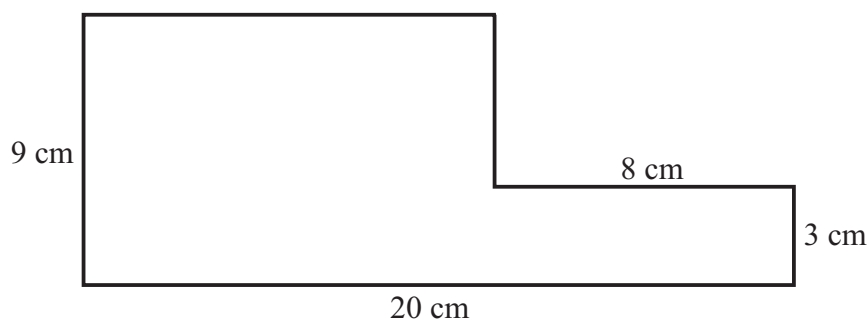
- 2) Find the size of the missing sides in these two rectangles.



- 3) Find the area of the shaded section.

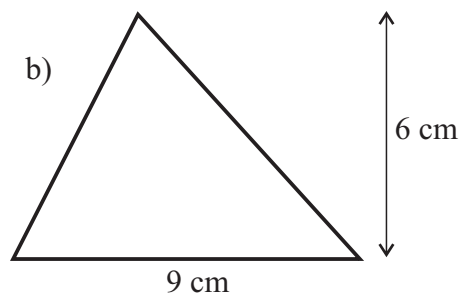
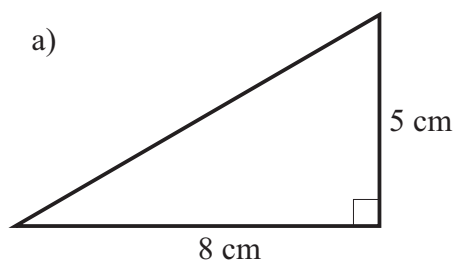


- 4) Find the area of the L shape.

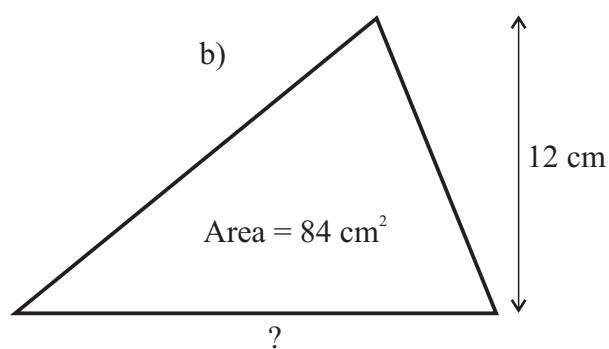
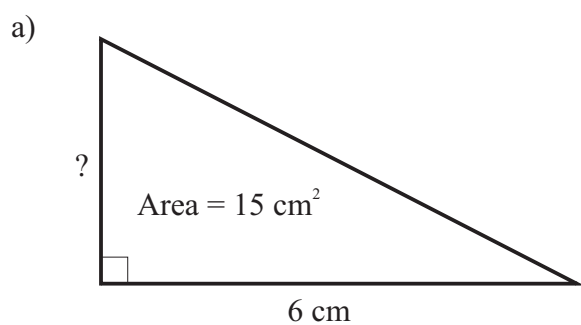


Area of a Triangle

- 1) Find the areas of the following two triangles.

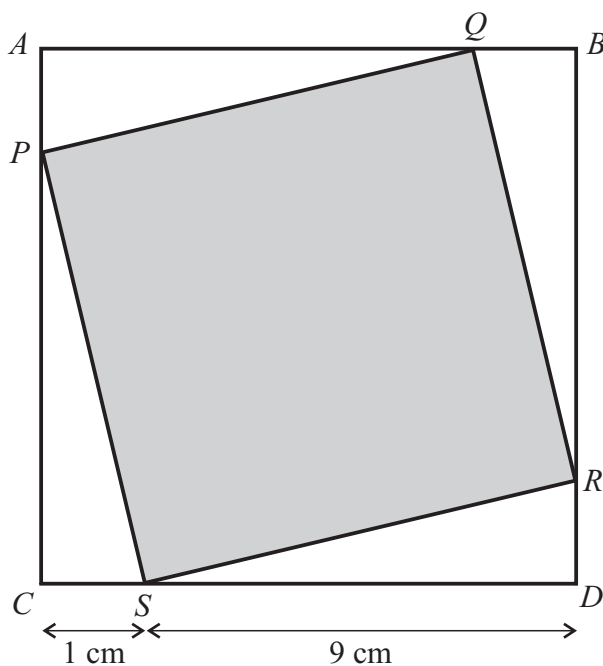


- 2) Find the missing lengths.



- 3) $ABCD$ is a square.

$PQRS$ is a square.

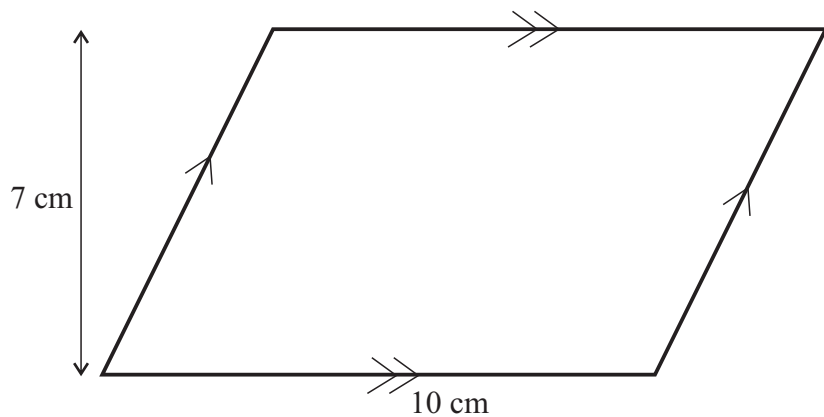


Find the area of the shaded square, $PQRS$.

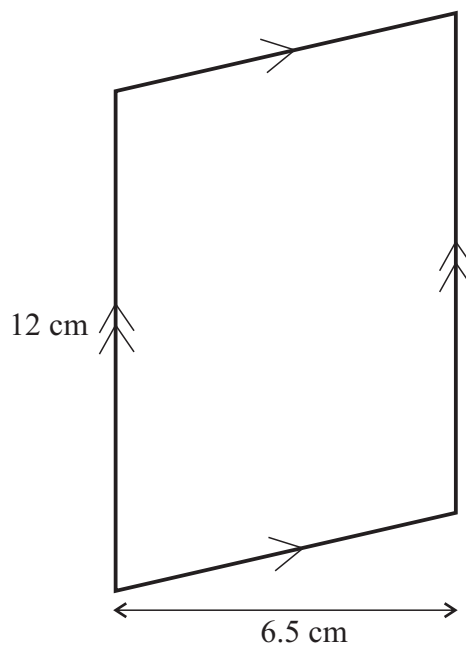
Area of a Parallelogram

1) Find the area of each of these parallelograms.

a)

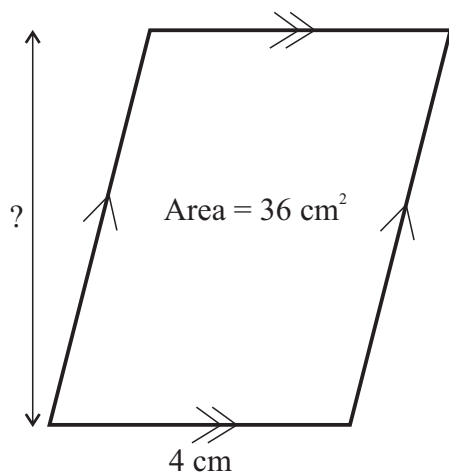


b)

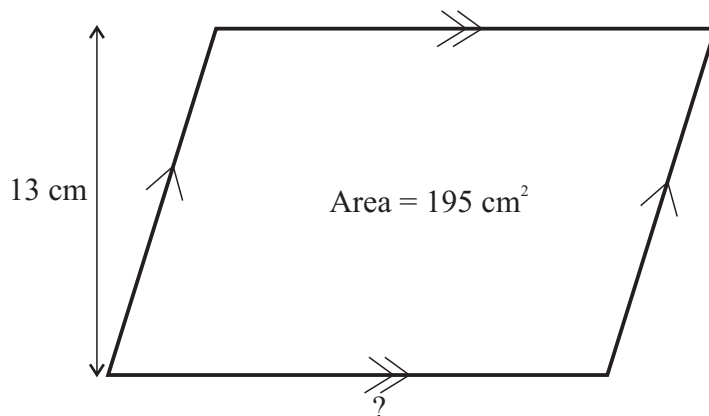


2) Find the missing lengths in these two parallelograms.

a)

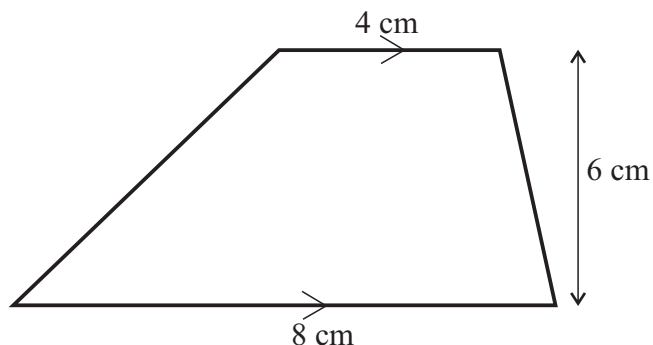


b)

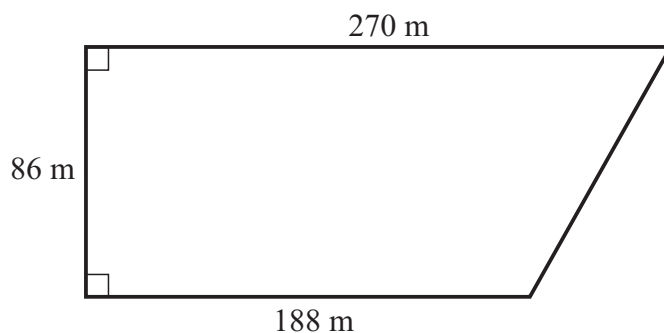


Area of a Trapezium

- 1) Find the area of this trapezium.



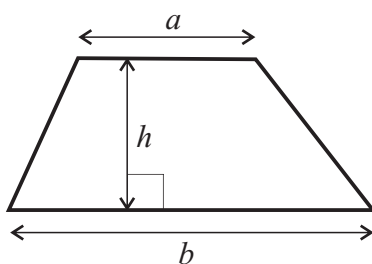
- 2) The diagram shows a field.



Work out the area of the field.



- 3) In the trapezium, $a = 6.6$ cm, $b = 8.4$ cm and $h = 3.6$ cm.

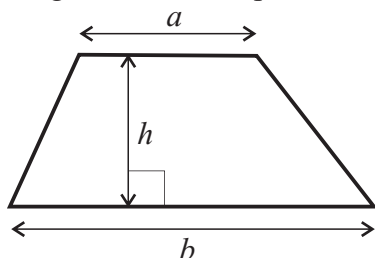


Work out the area of the trapezium.

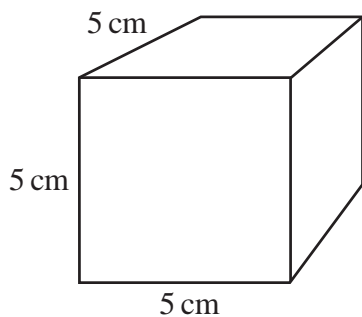


- 4) In the trapezium below, the area is 45 cm^2 .
 $a = 5$ cm and $b = 10$ cm.

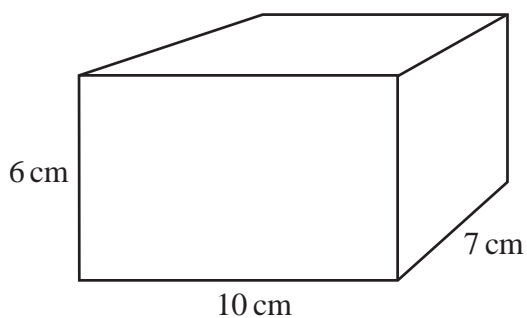
Calculate the height, h , of the trapezium.



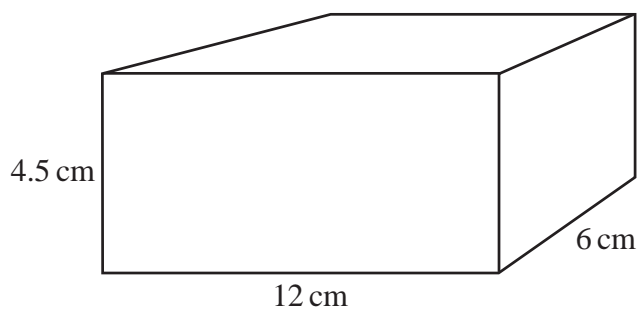
- 1) A cube has sides of length 5 cm.
Find the total surface area of the cube.



- 2) A cuboid has sides of length 10 cm, 6cm and 7 cm.
Find the total surface area of the cuboid.

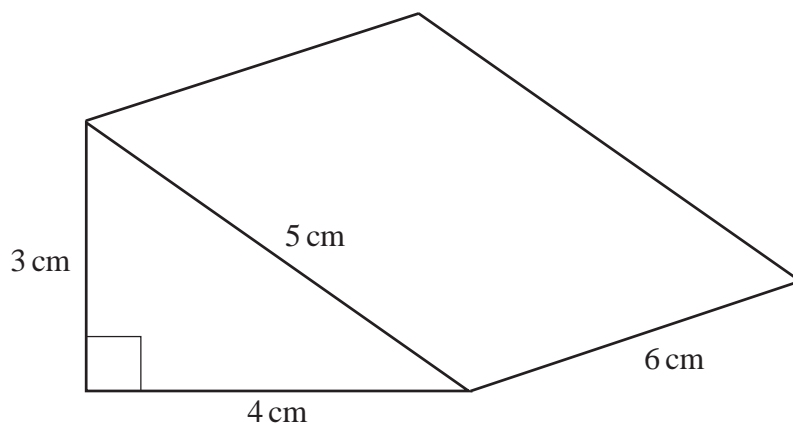


- 3) A cuboid has sides of length 12 cm, 4.5cm and 6 cm.
Find the total surface area of the cuboid.

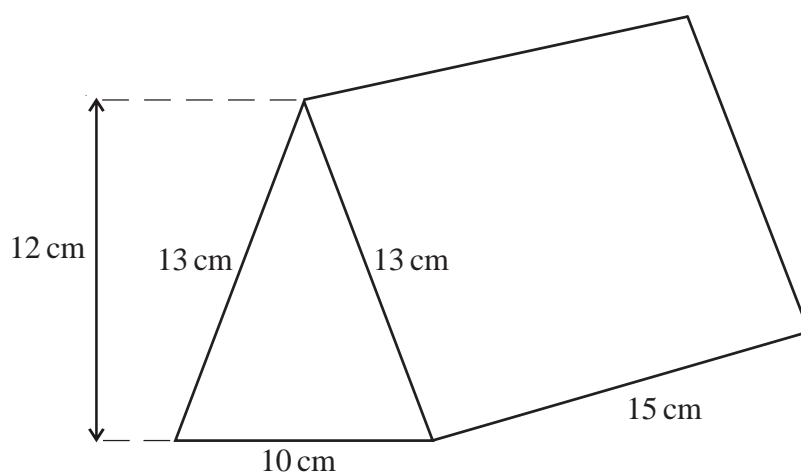


Surface Area of a Prism - Triangular Prisms

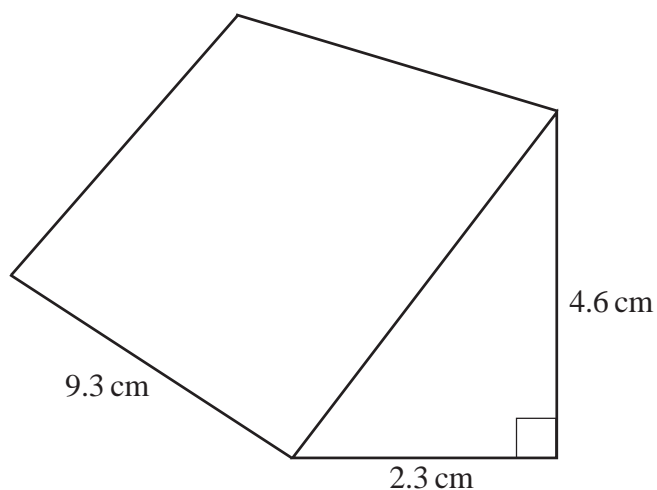
- 1) Find the surface area of this triangular prism.



- 2) Find the surface area of this triangular prism.

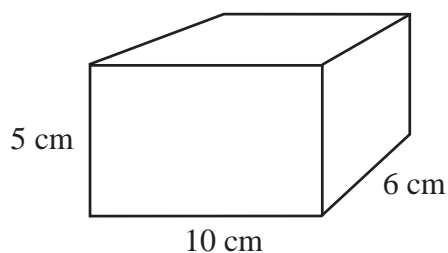


- 3) With the aid of Pythagoras' Theorem, find the surface area of this triangular prism.
Give your answer correct to 2 significant figures.

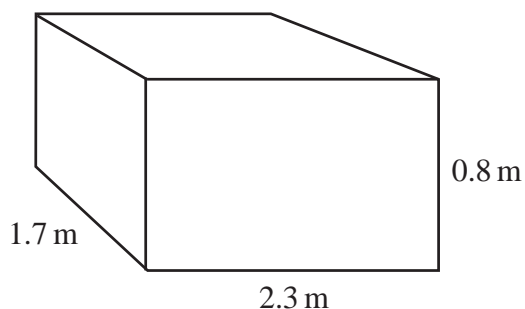


Volume of a Cuboid

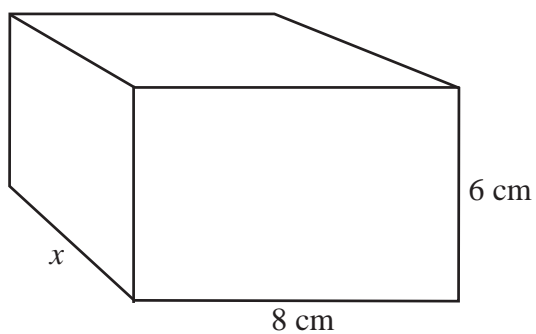
- 1) Find the volume of this cuboid.



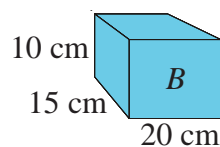
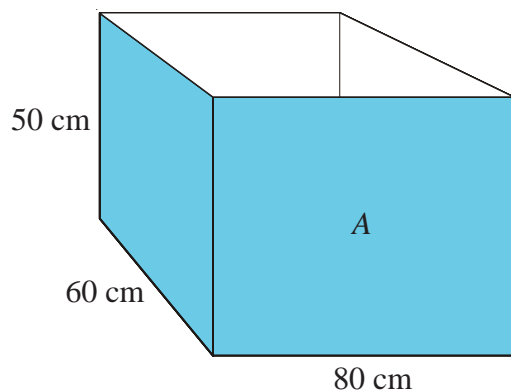
- 2) Find the volume of this cuboid.



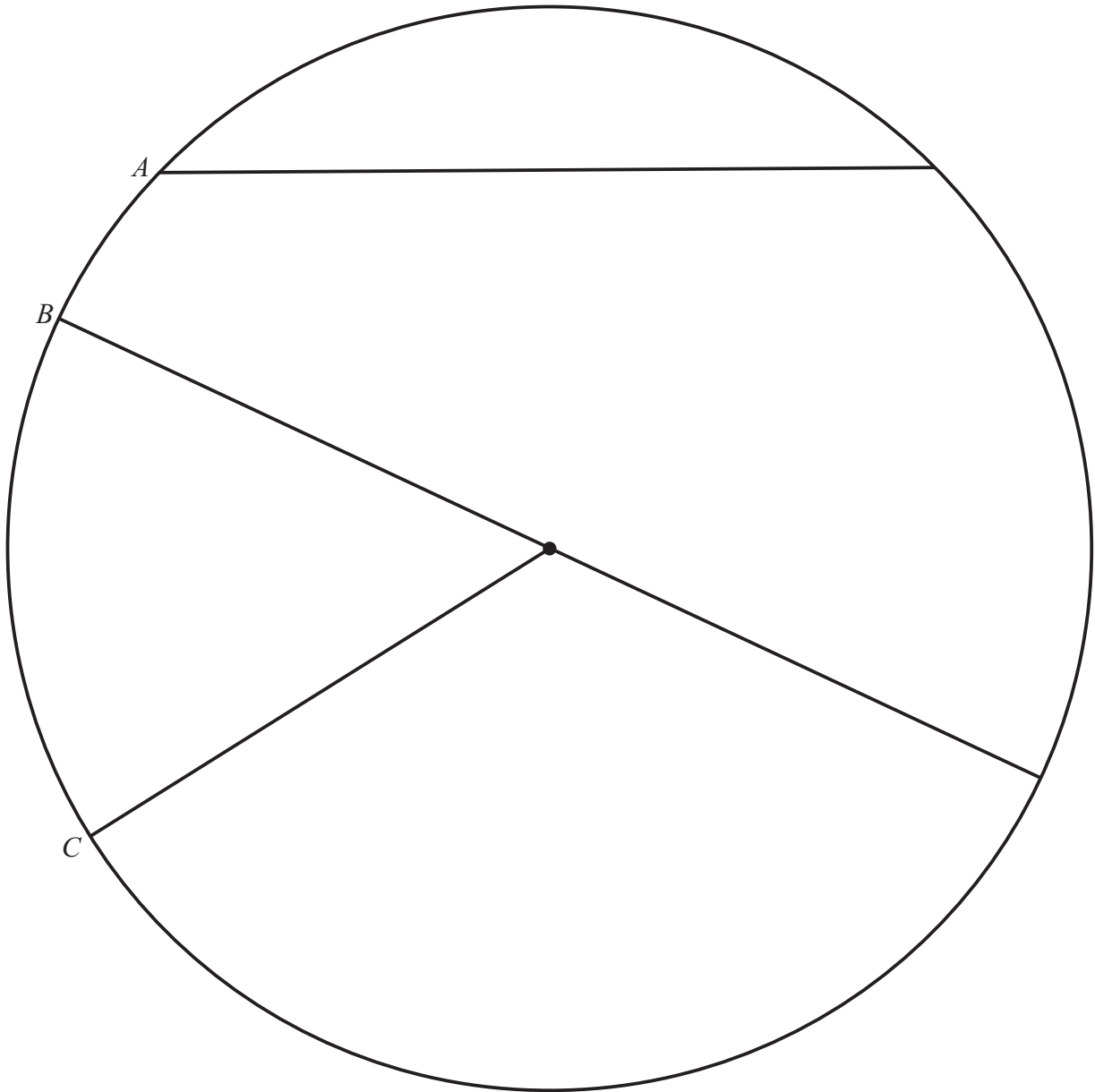
- 3) The volume of this cuboid is 480 cm^3 .
Find the length of the side marked x .



- 4) Boxes A and B are both cuboids.
How many of box B could be packed into box A ?



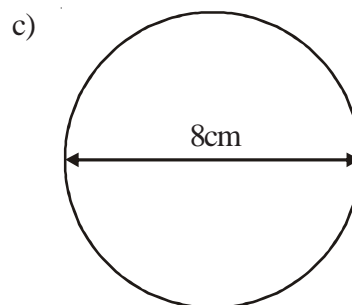
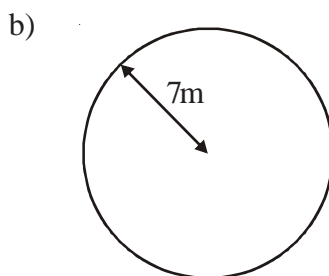
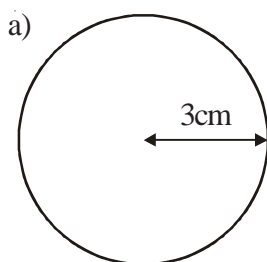
- 1) In the circle, write the correct names for line A , B and C .



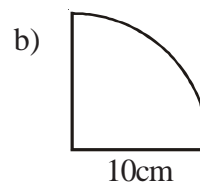
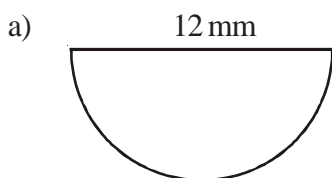
- 2) What is the special name given to the perimeter of a circle?



1) Find the areas of the following shapes.



2) Work out the areas of the following shapes.



3) The **radius** of the top of a circular table is 60 cm.
The table also has a circular base with **diameter** 30 cm.

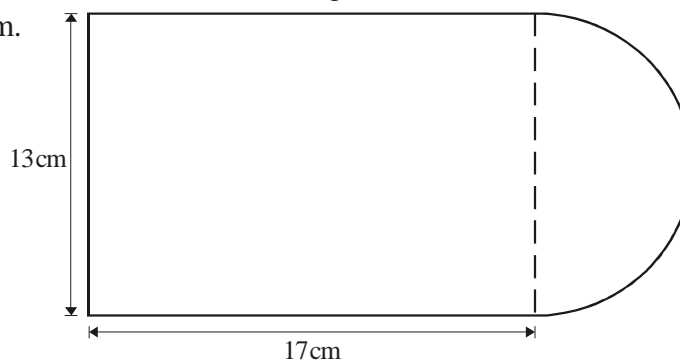
a) Work out the area of the top of the table.

b) Work out the area of the base of the table.



4) The diagram shows a shape, made from a semi-circle and a rectangle.
The diameter of the semi-circle is 13 cm.
The length of the rectangle is 17 cm.

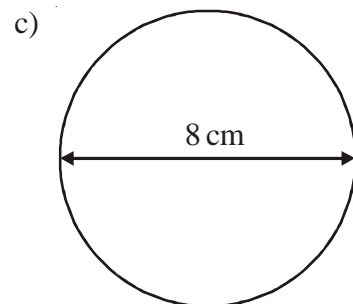
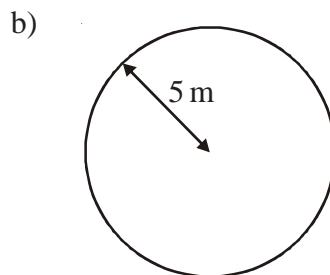
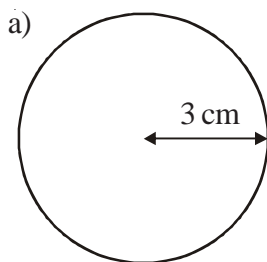
Calculate the area of the shape.
Give your answer correct to
3 significant figures.



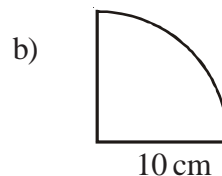
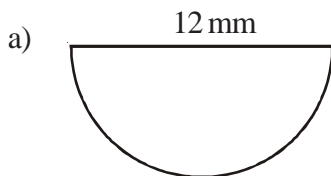
Circumference of a Circle



- 1) Find the circumference of the following shapes.



- 2) Work out the perimeter of the following shapes.

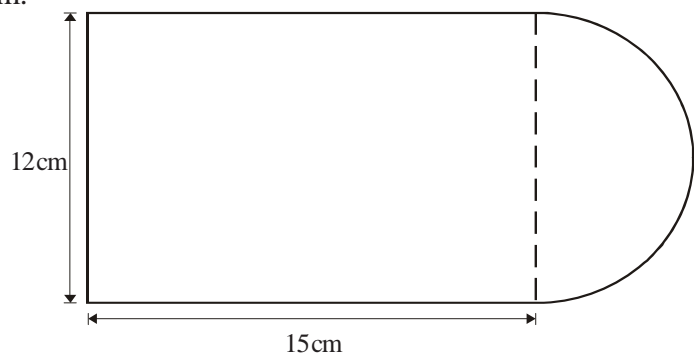


- 3) The **radius** of the top of a circular table is 60 cm.
The table also has a circular base with **diameter** 30 cm.
- a) Work out the circumference of the top of the table.
Let π be 3.14
- b) Work out the circumference of the base of the table.
Let π be 3.14



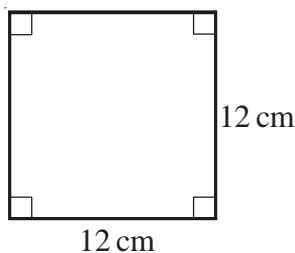
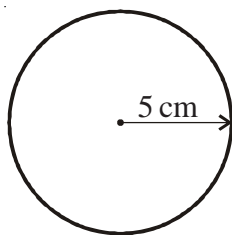
- 4) The diagram shows a shape, made from a semi-circle and a rectangle.
The diameter of the semi-circle is 12 cm.
The length of the rectangle is 15 cm.

Calculate the perimeter of the shape.
Give your answer correct to
3 significant figures.



Area and Circumference of a Circle

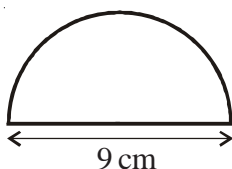
- 1) A circle has a radius of 5 cm.
A square has sides of length 12 cm.



Work out the difference between the area of the circle and the area of the square if you take π to be 3.



- 2) Here is a tile in the shape of a semi-circle.



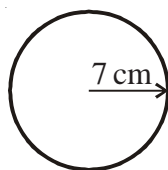
The diameter of the semi-circle is 9 cm.

Work out the perimeter of the tile.

Give your answer correct to two decimal places.



- 3) A circle has a radius of 7 cm.

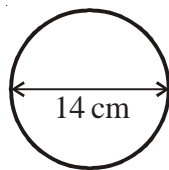


Work out the area of the circle.

Give your answer correct to three significant figures.



- 4) A circle has a diameter of 14 cm.



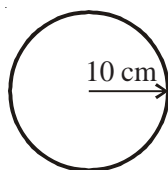
Work out the circumference of the circle.

Give your answer correct to three significant figures.

Area and Circumference of a Circle



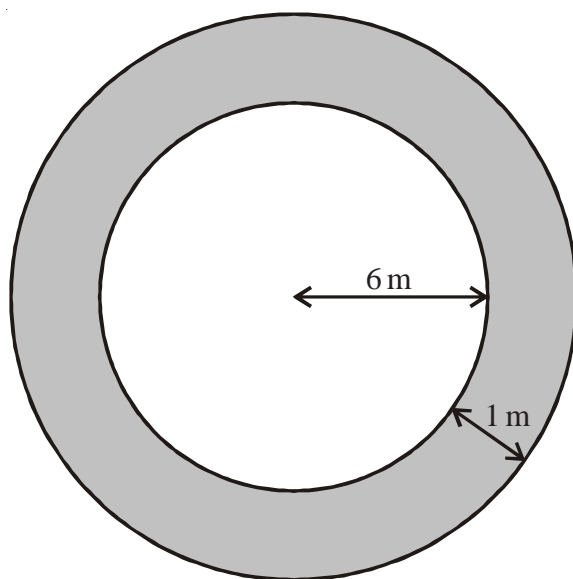
- 1) The radius of a circle is 10 cm.



Work out the area of this circle.



- 2) The diagram shows a circular pond with a path around it.



The pond has a radius of 6 m.

The path has a width of 1 m.

Work out the area of the path.

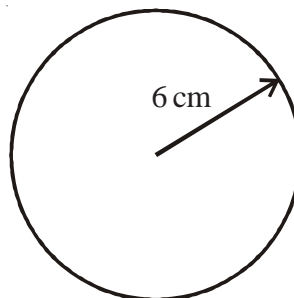
Give your answer correct to 3 significant figures.



- 3) The diagram shows a CD which has a radius of 6 cm.

- a) Work out the circumference of the CD.

Give your answer correct to 3 significant figures.



CDs of this size are cut from rectangular sheets of plastic.

Each sheet is 1 metre long and 50 cm wide.

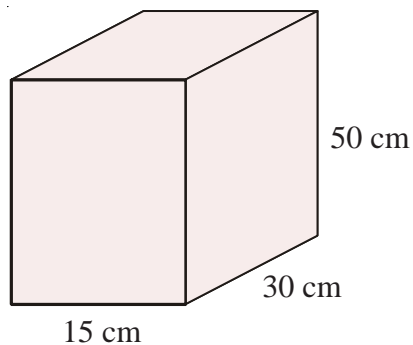
- b) Work out the greatest number of CDs which can be cut from one rectangular sheet.

Volume of a Prism

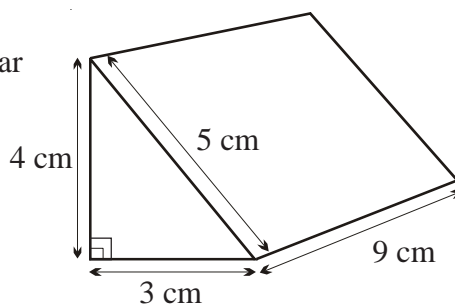


- 1) The diagram shows a cuboid.

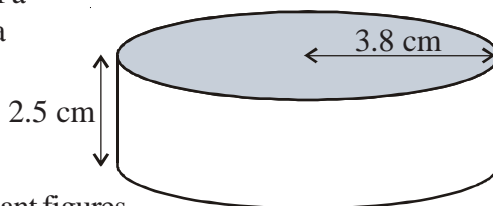
Work out the volume of the cuboid.



- 2) Calculate the volume of this triangular prism.



- 3) An ice hockey puck is in the shape of a cylinder with a radius of 3.8 cm and a thickness of 2.5 cm.

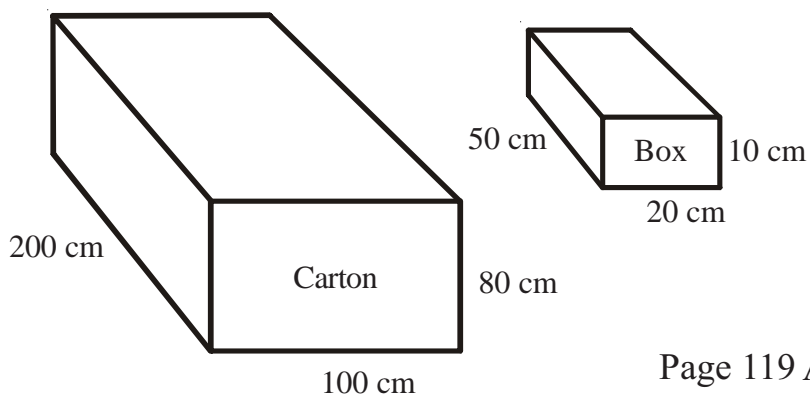
Work out the volume of the puck.
Give your answer correct to 3 significant figures.

- 4) A cuboid has: a volume of
- 80cm^3
-
- a length of 5 cm
-
- a width of 2 cm

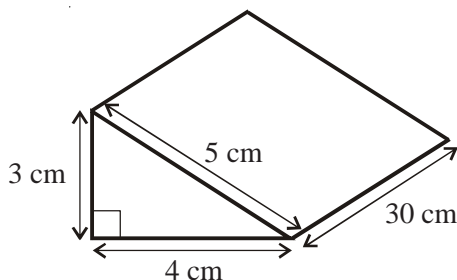
Work out the height of the cuboid.



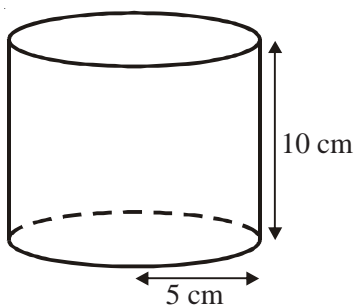
- 5) Work out the maximum number of boxes which can fit in the carton.



1) Work out the volume of the prism.



2)

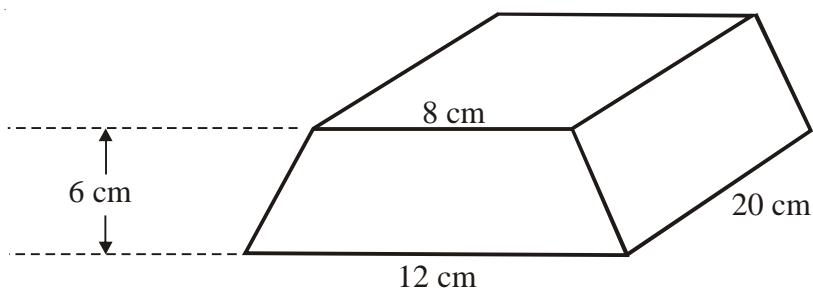


A solid cylinder has a radius of 5 cm and a height of 10 cm.

Work out the volume of the cylinder.

Give your answer correct to 3 significant figures.

3)



The diagram shows a solid prism made from metal.

The cross-section of the prism is a trapezium.

Find the volume of the prism.

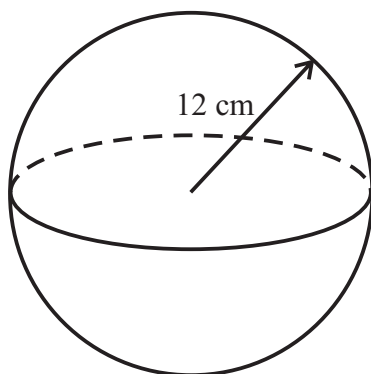
You must state your units.

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

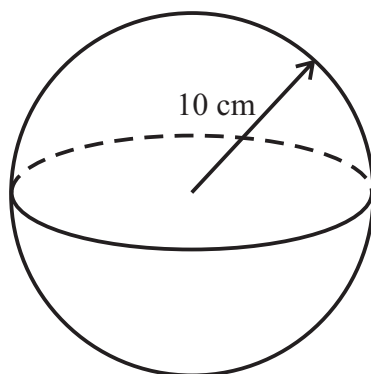
$$\text{Surface area of a sphere} = 4\pi r^2$$



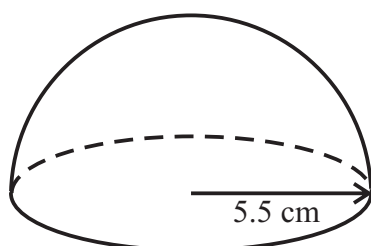
- 1) a) Work out the volume of the sphere.
b) Work out the surface area of the sphere.



- 2) a) Work out the volume of the sphere, leaving your answer in terms of π .
b) Work out the surface area of the sphere, leaving your answer in terms of π .

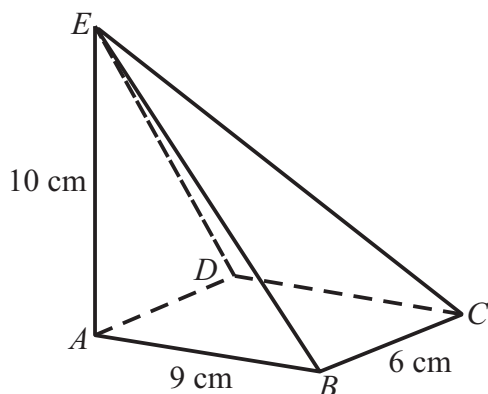


- 3) a) Work out the volume of the solid hemisphere.
b) Work out the surface area of the solid hemisphere.



$$\text{Volume of a pyramid} = \frac{1}{3} \times \text{base area} \times \text{height}$$

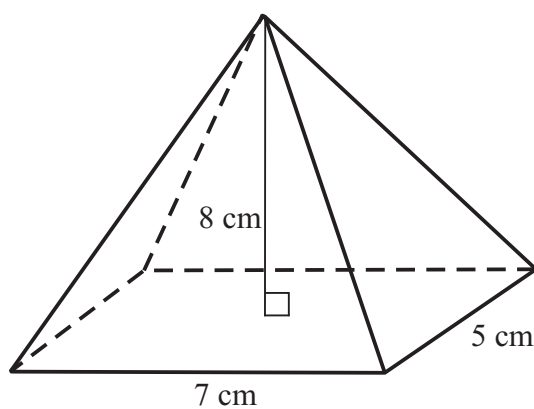
- 1) The pyramid has a rectangular base and E is vertically above A .



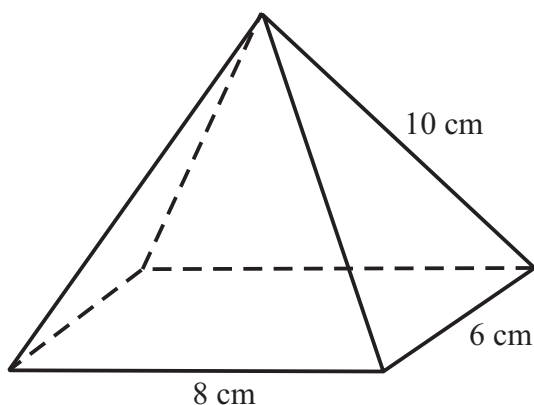
Find the volume of the pyramid.



- 2) Find the volume of this pyramid.



- 3) Find the volume of this pyramid.

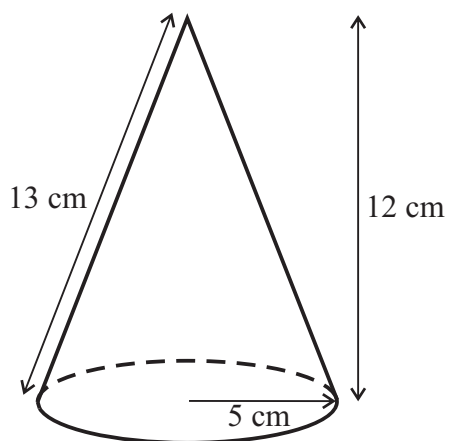


$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

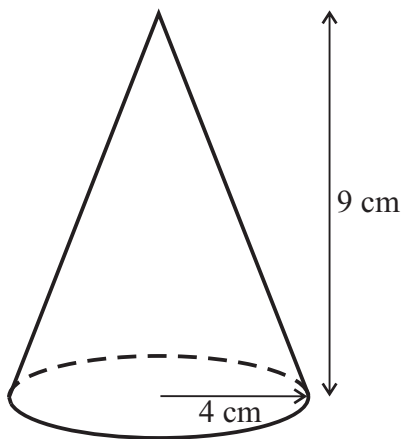
$$\text{Curved surface area} = \pi r l$$



- 1)
 - a) Work out the volume of the cone.
 - b) Work out the curved surface area of the cone.
 - c) The total surface area of the cone.



- 2) Work out the volume of the cone, leaving your answer in terms of π .

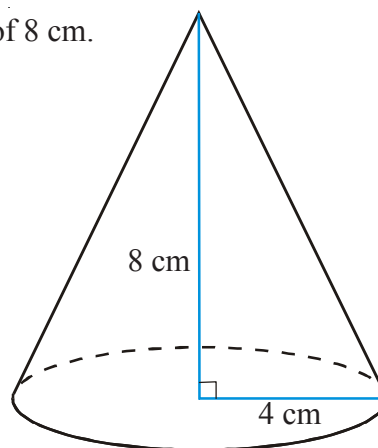


Spheres and Cones



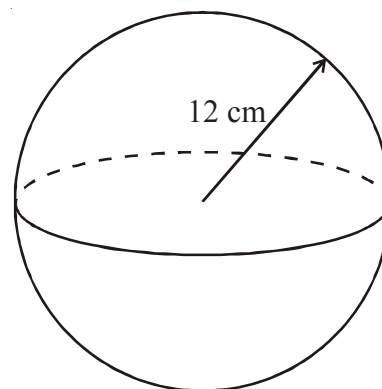
- 1) A cone has a base radius of 4 cm and a vertical height of 8 cm.

- Calculate the volume of the cone.
Take π to be 3.142.
Give your answer correct to 3 significant figures.
- Use Pythagoras' Theorem to find the slant height of the cone.
Give your answer correct to 1 decimal place.
- Find the curved surface area of the cone.
Take π to be 3.142.
Give your answer correct to 3 significant figures.



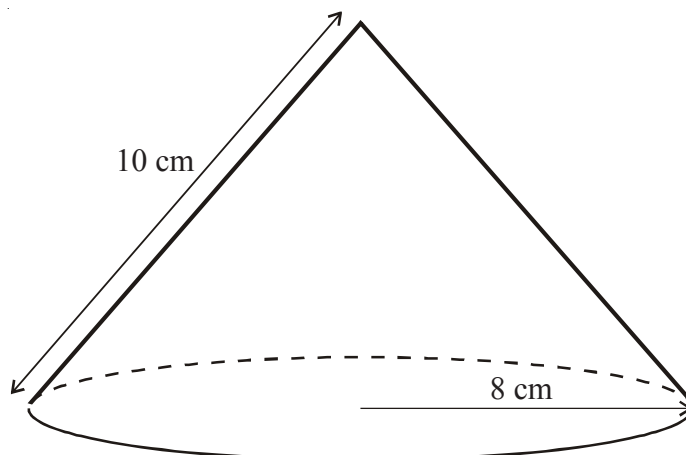
- 2) A sphere has a radius of 12 cm.

- Calculate the volume of the sphere.
Take π to be 3.142.
Give your answer correct to 3 significant figures.
- Find the curved surface area of the sphere.
Take π to be 3.142.
Give your answer correct to 3 significant figures.

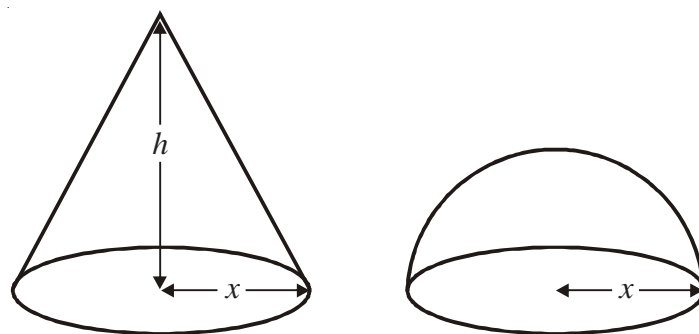


- 3) A cone has a base radius of 8 cm and a slant height of 10 cm.

Calculate the volume of the cone.
Leave your answer in terms of π .



1)



The diagram shows a solid cone and a solid hemisphere.

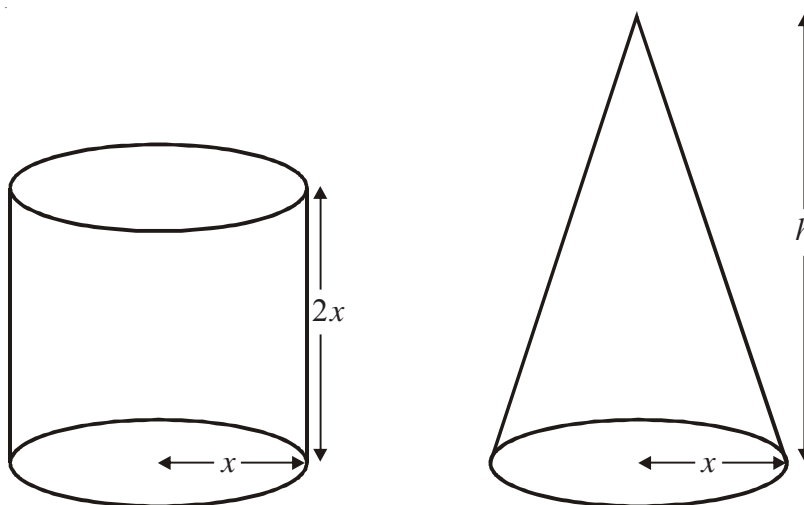
The cone has a base of radius x cm and a height of h cm.

The hemisphere has a base of radius x cm.

The surface area of the cone is equal to the surface area of the hemisphere.

Find an expression for h in terms of x .

2)



A cylinder has base radius x cm and height $2x$ cm.

A cone has base radius x cm and height h cm.

The volume of the cylinder and the volume of the cone are equal.

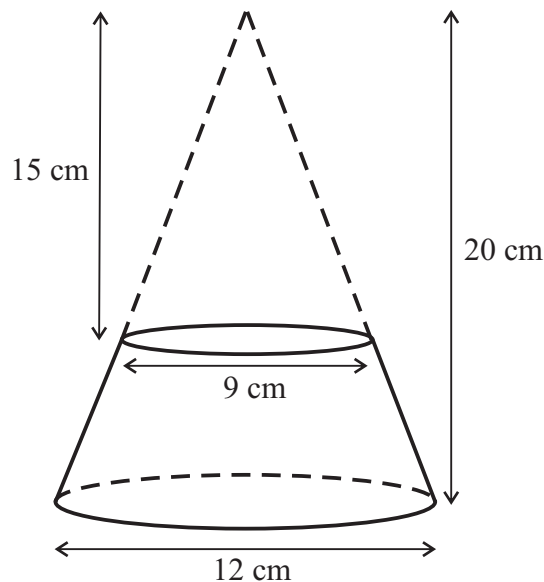
Find h in terms of x .

Give your answer in its simplest form.

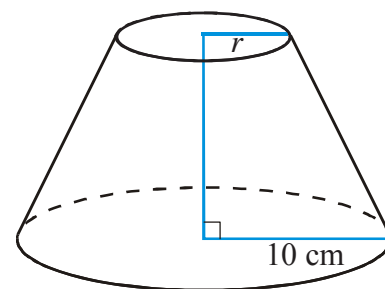
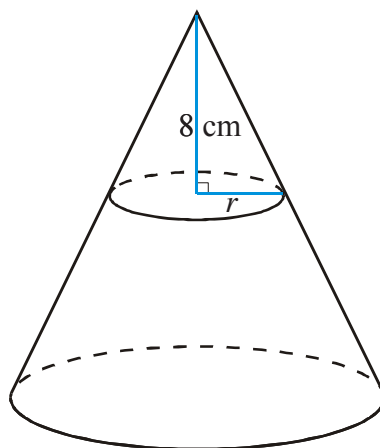
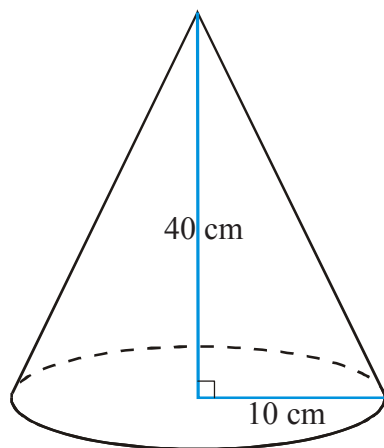


- 1) A frustum is made by removing a small cone from a similar larger cone.

Work out the volume of the frustum.



- 2) The diagram shows a cone of height 40 cm and base radius 10 cm. A smaller cone of height 8 cm is removed to form a frustum.



- a) Work out the radius r of the base of the smaller cone.

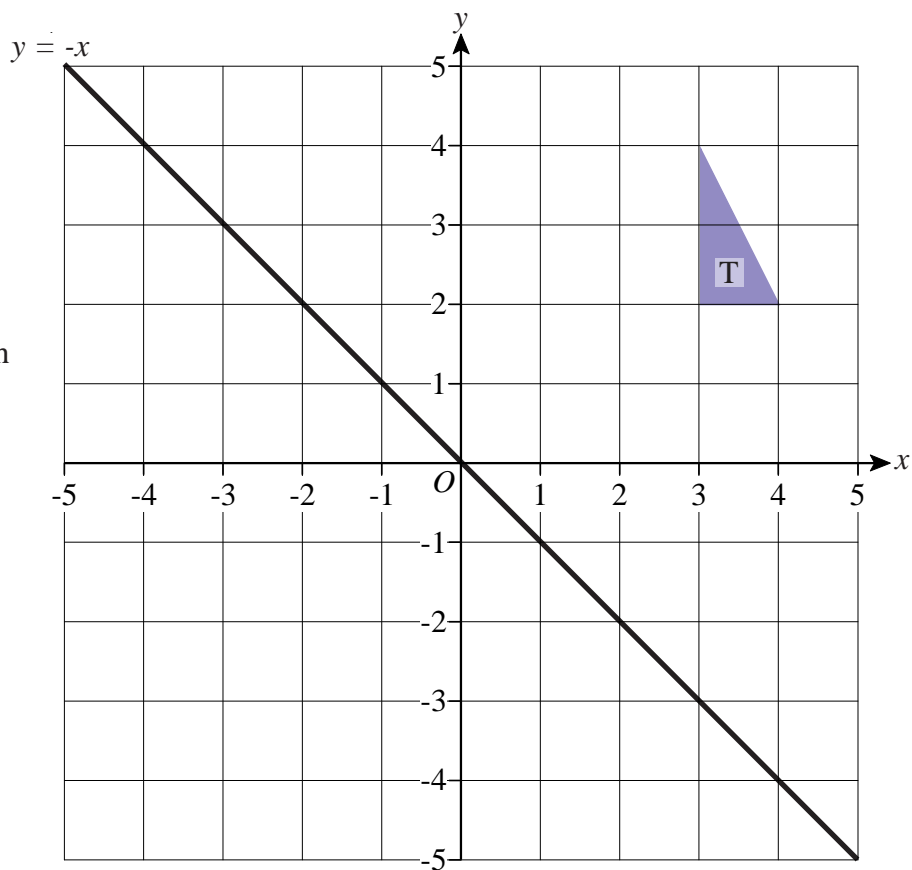
Calculate, to the nearest cm^3

- b) The volume of the larger cone.
c) The volume of the smaller cone.
d) The volume of the frustum.

Reflections

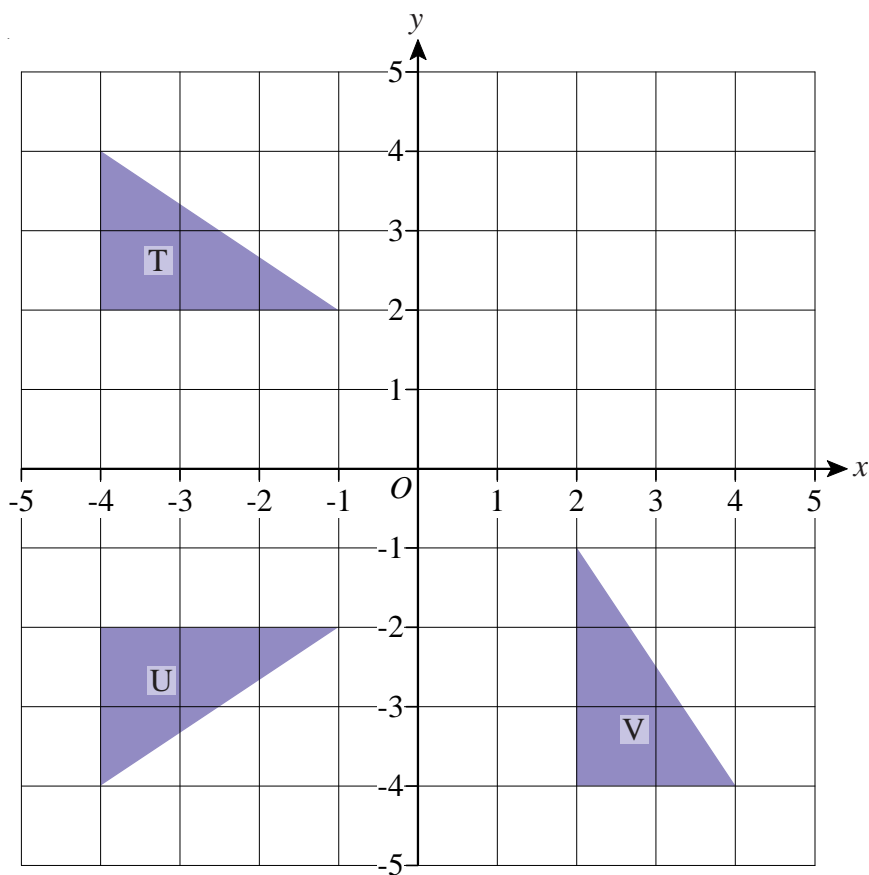
- 1) a) Reflect triangle T in the x axis.
Label your new triangle U.

- b) Reflect triangle T in the line with equation $y = -x$.
Label your new triangle V.



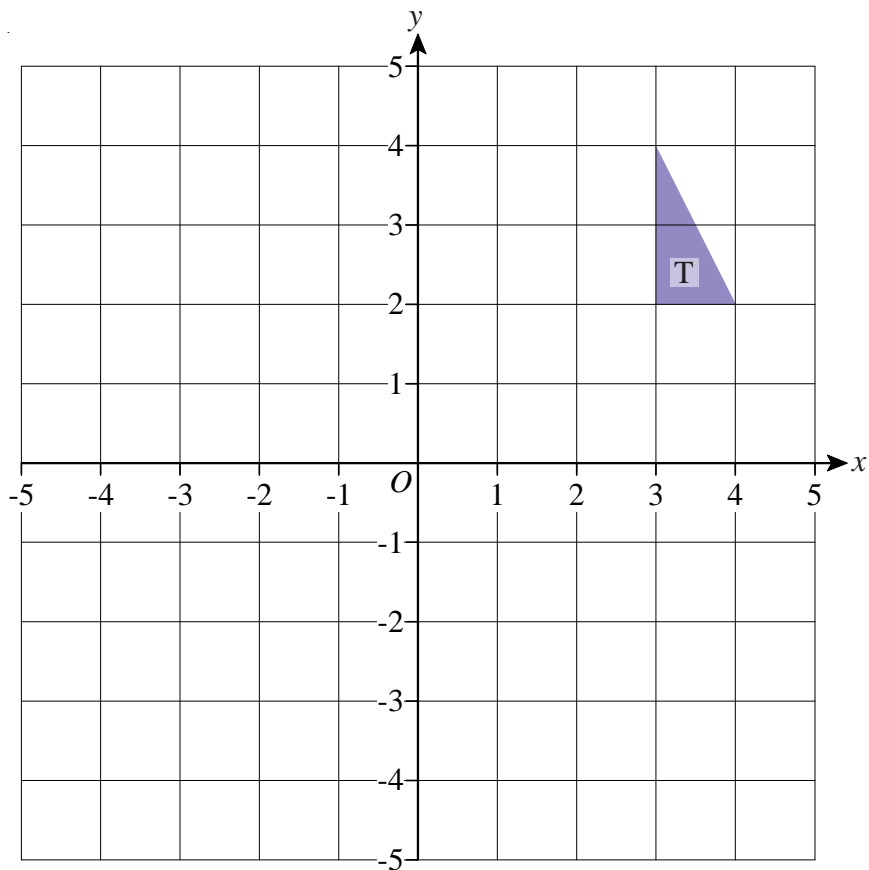
- 2) a) Describe fully the single transformation which maps triangle T to triangle U.

- b) Describe fully the single transformation which maps triangle T to triangle V.

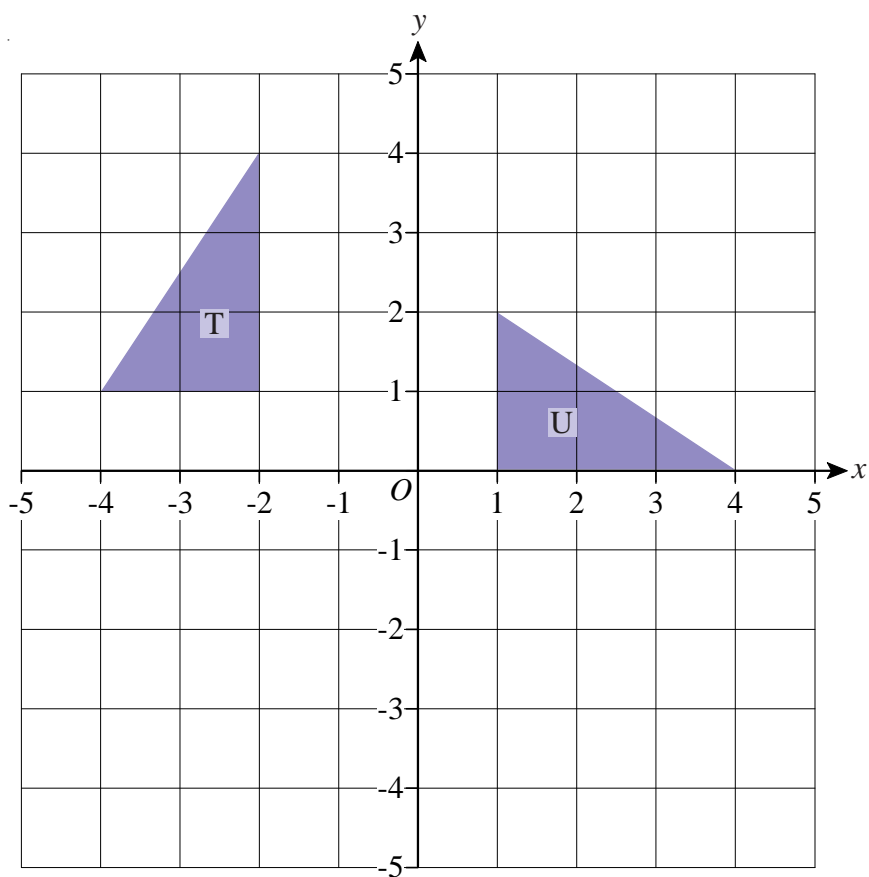


Rotations

- 1) a) Rotate triangle T 90° anti-clockwise about the point $(0, 0)$.
Label your new triangle U.
- b) Rotate triangle T 180° about the point $(2, 0)$.
Label your new triangle V.



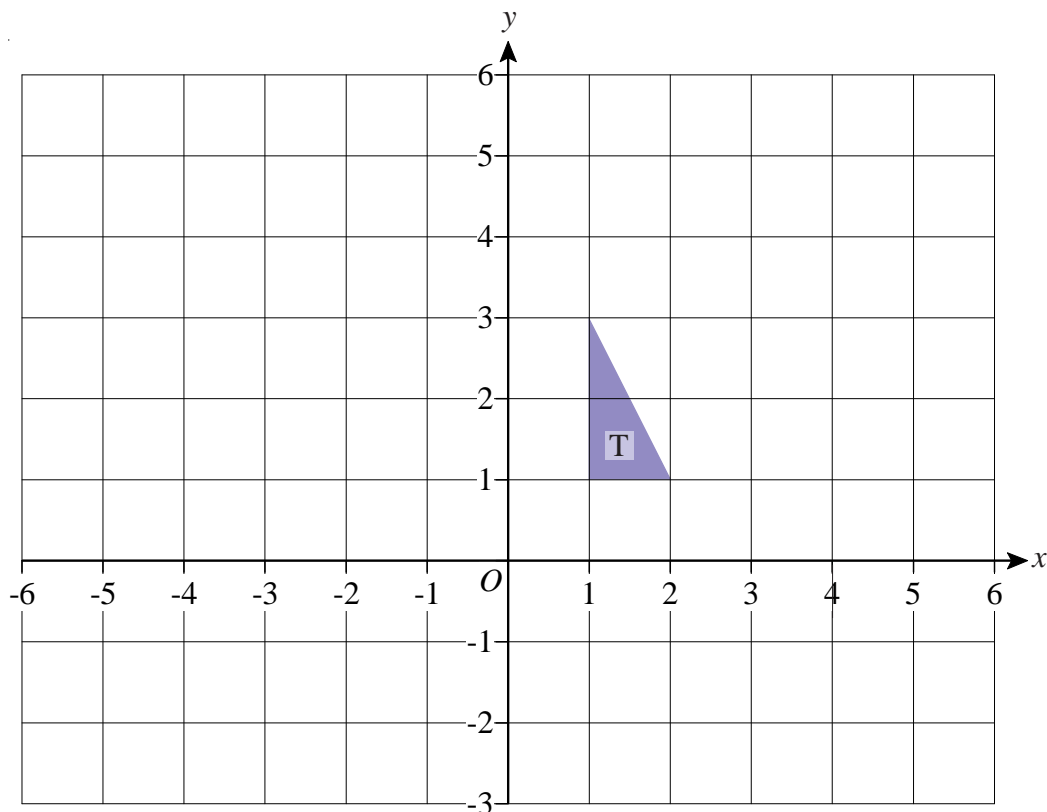
- 2) Describe fully the single transformation which maps triangle T to triangle U.



Translations

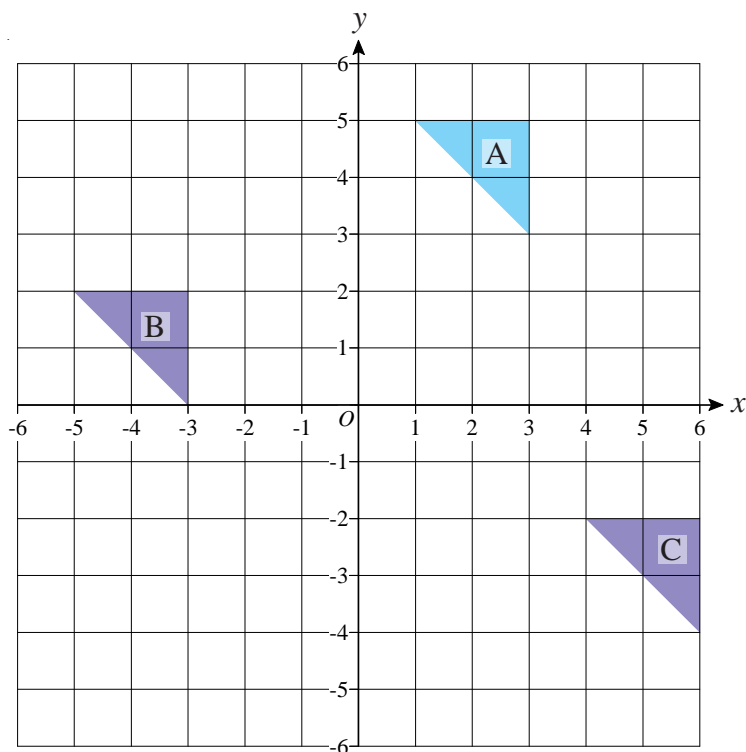
1) a) Translate triangle T by vector $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$ and label it U.

b) Translate triangle T by vector $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$ and label it V.



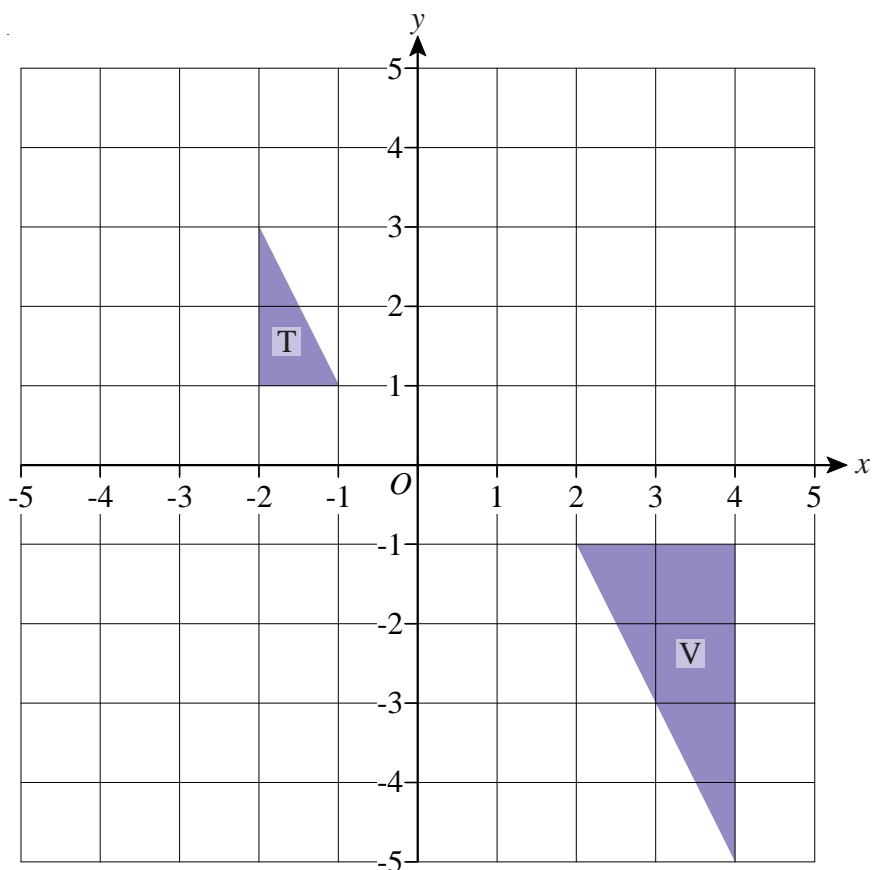
2) a) Describe fully the single transformation which maps triangle A to triangle B.

b) Describe fully the single transformation which maps triangle A to triangle C.

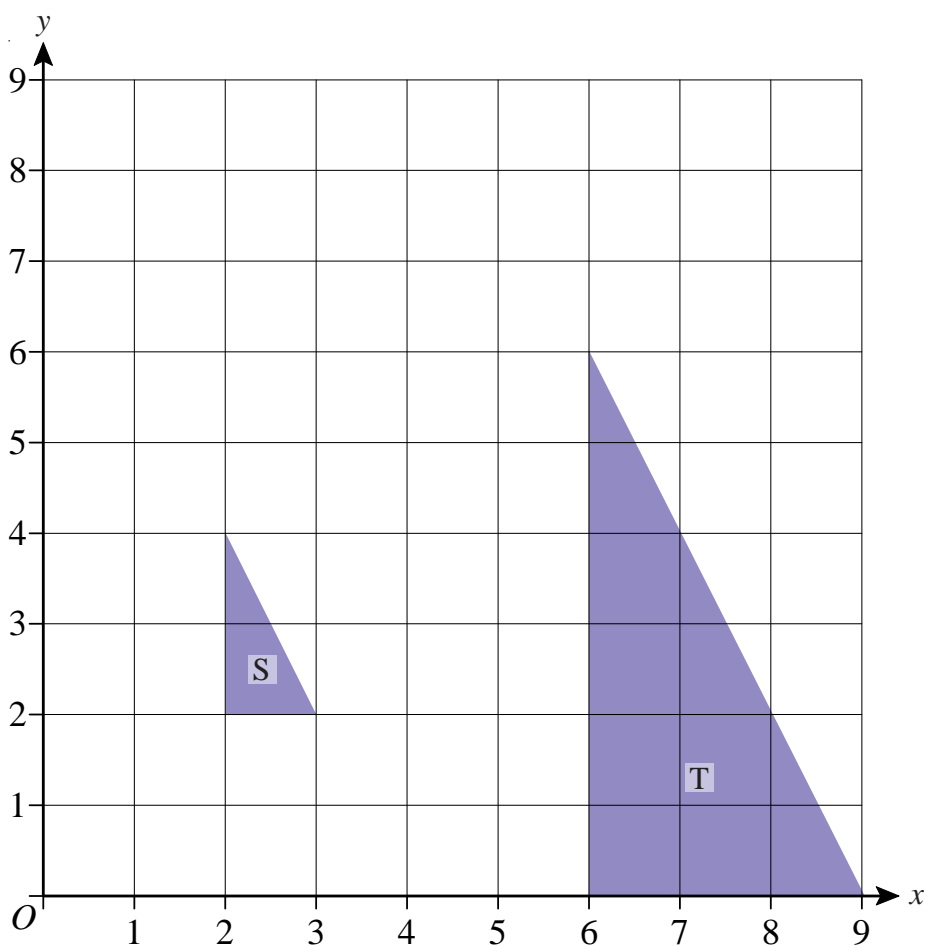


Enlargements

- 1) a) Enlarge triangle T by scale factor 2 using point $(-5, 2)$ as the centre of enlargement. Label your new triangle U.
- b) Enlarge triangle V by scale factor a half using the point $(-2, -3)$ as the centre of enlargement. Label your new triangle W.

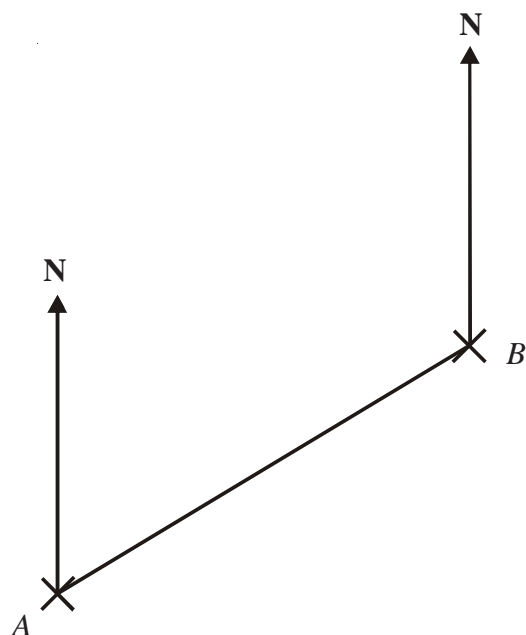


- 2) Describe fully the single transformation which maps triangle S to triangle T.



Bearings

- 1) The diagram shows the position of two telephone masts, A and B , on a map.

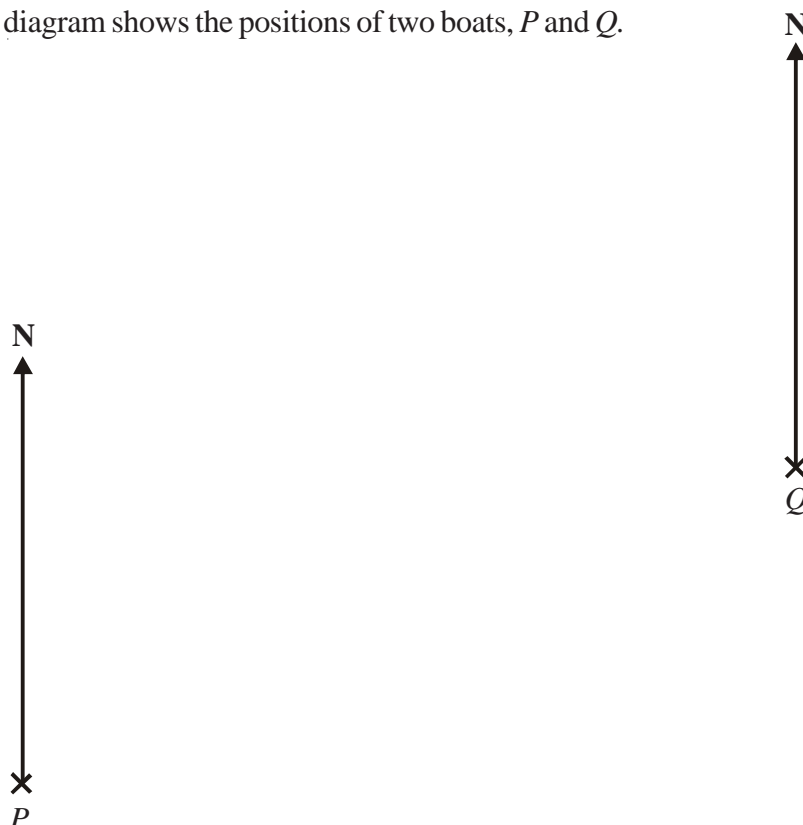


- a) Measure the bearing of B from A .

Another mast C is on a bearing of 160° from B .
On the map, C is 4 cm from B .

- b) Mark the position of C with a cross and label it C .

- 2) The diagram shows the positions of two boats, P and Q .



The bearing of a boat R from boat P is 050°

The bearing of boat R from boat Q is 320°

In the space above, draw an accurate diagram to show the position of boat R .
Mark the position of boat R with a cross (\times). Label it R .

Bearings

- 1) School B is due east of school A .
 C is another school.
 The bearing of C from A is 065° .
 The bearing of C from B is 313° .

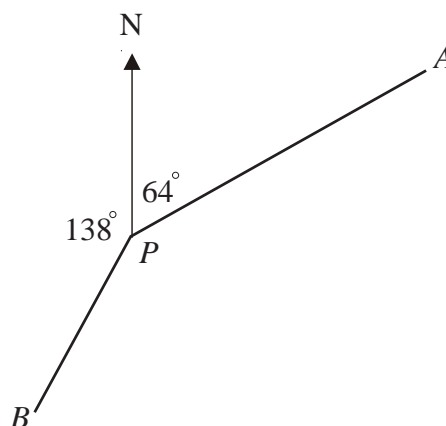
Complete the scale drawing below.
 Mark with a cross the position of C .



- 2) In the diagram, point A marks the position of Middlewich.
 The position of Middlemarch is to be marked on the diagram as point B .
 On the diagram, mark with a cross the position of B given that:
 B is on a bearing of 320° from A and
 B is 5 cm from A



- 3) **Work out** the bearing of
 a) B from P
 b) P from A



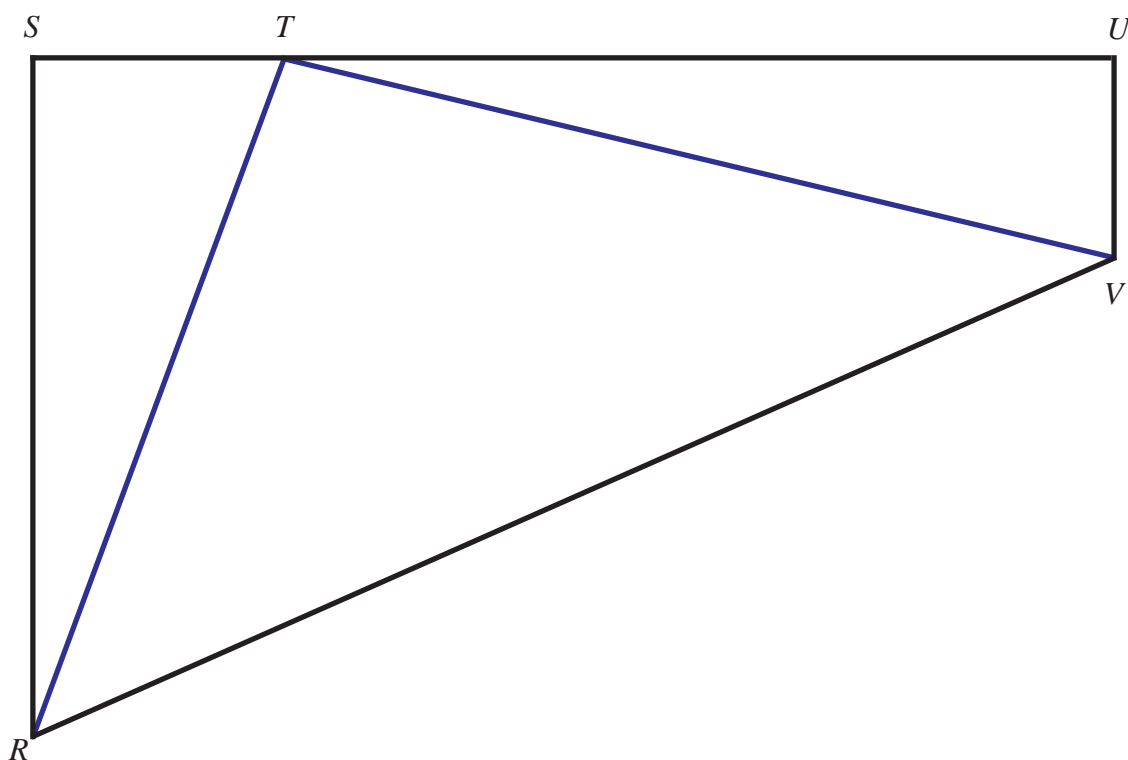
*Diagram NOT
accurately drawn.*

Bisecting an Angle

- 1) Using ruler and compasses, bisect angle ABC .



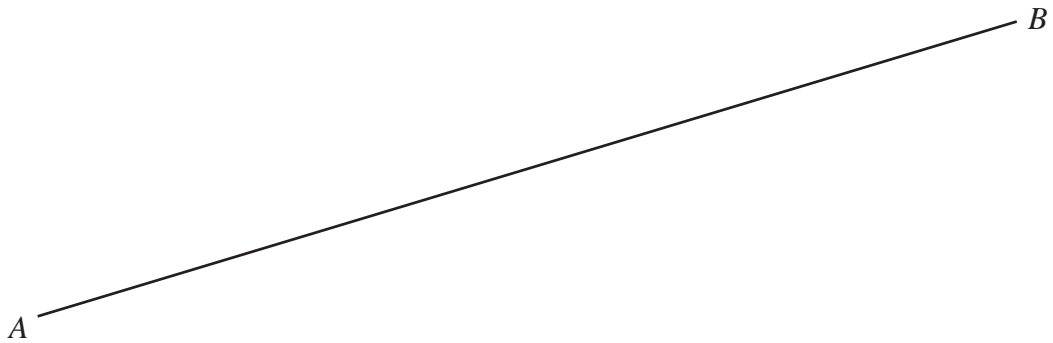
- 2) The diagram below shows the plan of a park.
The border of the park is shown by the quadrilateral $RSTUV$



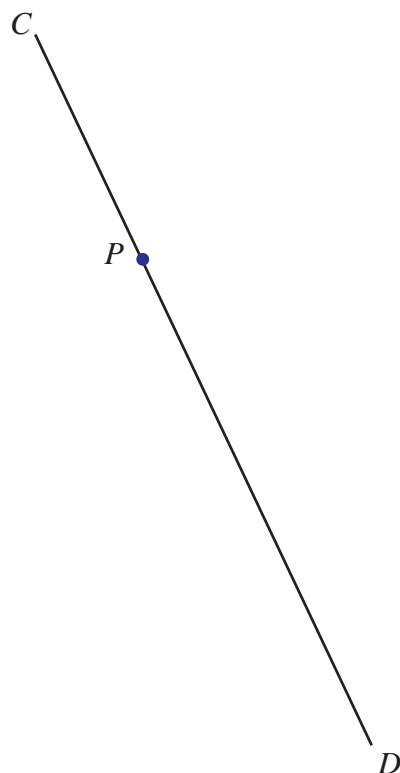
There are two paths in the park. One is labelled TR and the other TV
A man walks in the park so that he is always the same distance from both paths.
Using ruler and compasses show exactly where the man can walk.

Constructing Perpendiculars

- 1) Use ruler and compasses to bisect the line segment AB .
You must show all construction lines.

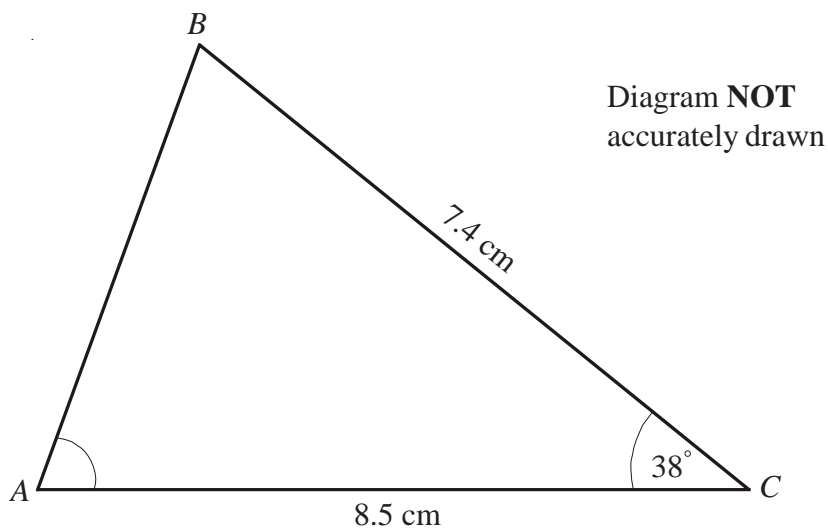


- 2) Use ruler and compasses to **construct** the perpendicular to the line segment CD that passes through the point P .
You must show all construction lines.



Drawing a Triangle Using Compasses

- 1) The diagram shows a sketch of triangle ABC .



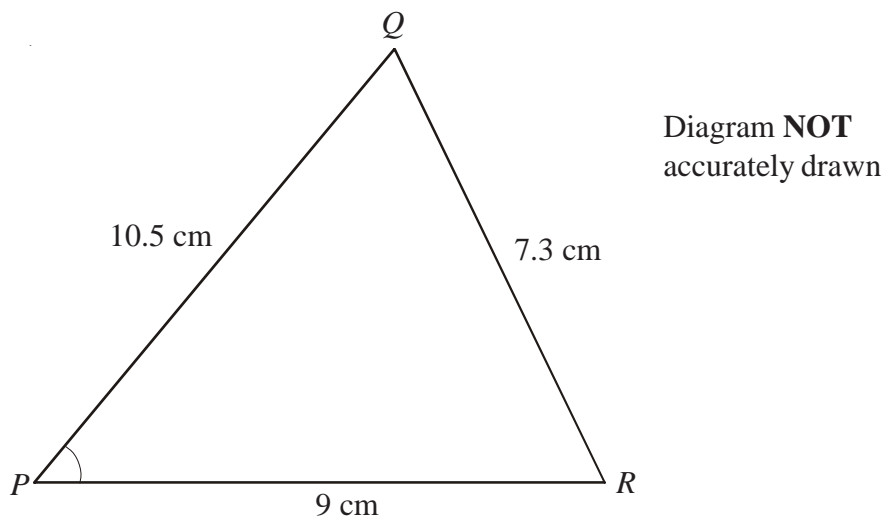
$$BC = 7.4 \text{ cm}$$

$$AC = 8.5 \text{ cm}$$

$$\text{Angle } C = 38^\circ$$



- a) Make an accurate drawing of triangle ABC .
 - b) Measure the size of angle A on your diagram.
- 2) Use ruler and compasses to **construct** an equilateral triangle with sides of length 6 centimetres.
You must show all construction lines.

- 3) The diagram shows a sketch of triangle PQR .

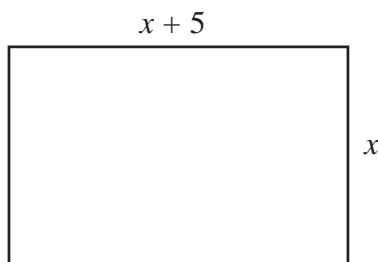


- a) Use ruler and compasses to make an accurate drawing of triangle PQR .
- b) Measure angle P .

Solving Equations

- 1) Solve $2x - 3 = 17$
- 2) Solve $3x + 2 = 14$
- 3) Solve $5x - 7 = 33$
- 4) Solve $4x + 7 = 19$
- 5) Solve $x + x + x + x = 20$
- 6) Solve $x + 3x = 24$
- 7) Solve $2(x + 3) = 8$
- 8) Solve $2(3x - 4) = 22$
- 9) Solve $5(t - 1) = 20$
- 10) Solve $3(2x + 5) = 36$
- 11) Solve $2x + 7 = x + 11$
- 12) Solve $5y - 2 = 3y + 10$
- 13) Solve $2x + 1 = 5x - 20$
- 14) Solve $p - 3 = 3p - 11$
- 15) Solve $2d + 5 = 20 - 3d$
- 16) Solve $4 - e = 2e - 8$
- 17) Solve $2(x + 3) = x + 9$
- 18) Solve $x - 7 = 3(2x - 4)$
- 19) Solve $5(x + 3) = 2(x + 6)$
- 20) Solve $4(2y + 1) = 2(12 - y)$
- 21) Solve $7 - 3x = 2(x + 1)$
- 22) Solve $\frac{x}{2} = 5$
- 23) Solve $\frac{x}{5} = 6$
- 24) Solve $\frac{2x}{3} = 4$
- 25) Solve $\frac{5x}{2} = 15$
- 26) Solve $\frac{x - 2}{3} = 1$
- 27) Solve $\frac{x + 5}{2} = 7$
- 28) Solve $\frac{2x + 1}{4} = 2$
- 29) Solve $\frac{5x - 3}{3} = 4$
- 30) Solve $\frac{x + 2}{3} = x + 4$
-  31) Solve $\frac{3x - 1}{4} = 2x - 3$
-  32) Solve $\frac{4x + 3}{5} = \frac{2x - 1}{2}$

- 1) The width of a rectangle is x centimetres.
The length of the rectangle is $(x + 5)$ centimetres.



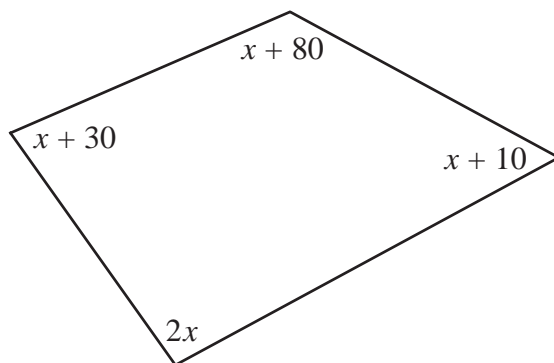
- a) Find an expression, in terms of x , for the perimeter of the rectangle.
Give your answer in its simplest form.

The perimeter of the rectangle is 38 centimetres.

- b) Work out the length of the rectangle.



2)



*Diagram **NOT** accurately drawn*

The sizes of the angles, in degrees, of the quadrilateral are

$x + 10$
 $2x$
 $x + 80$
 $x + 30$

- a) Use this information to write down an equation in terms of x .
b) Use your answer to part (a) to work out the size of the smallest angle of the quadrilateral.



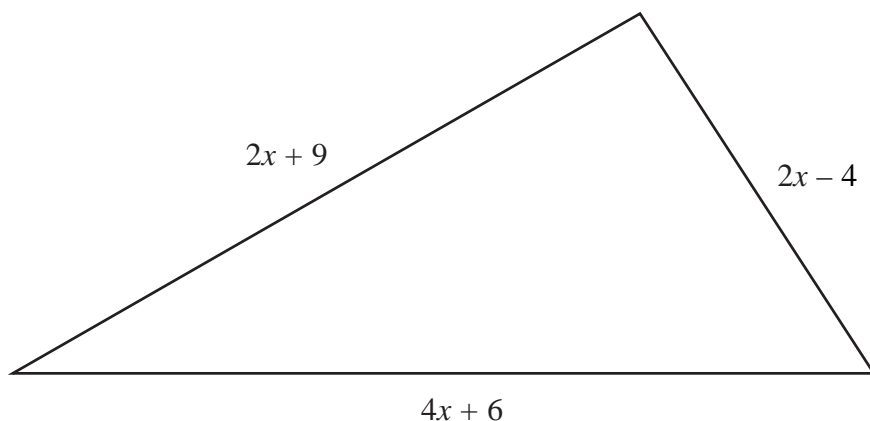
- 3) Sarah buys 6 cups and 6 mugs

A cup costs $£x$

A mug costs $£(x + 3)$

- a) Write down an expression, in terms of x , for the total cost, in pounds, of 6 cups and 6 mugs.
b) If the total cost of 6 cups and 6 mugs is $£48$, write an equation in terms of x .
c) Solve your equation to find the cost of a cup and the cost of a mug.

1)



In the diagram, all measurements are in centimetres.

The lengths of the sides are

$$2x + 9$$

$$2x - 4$$

$$4x + 6$$

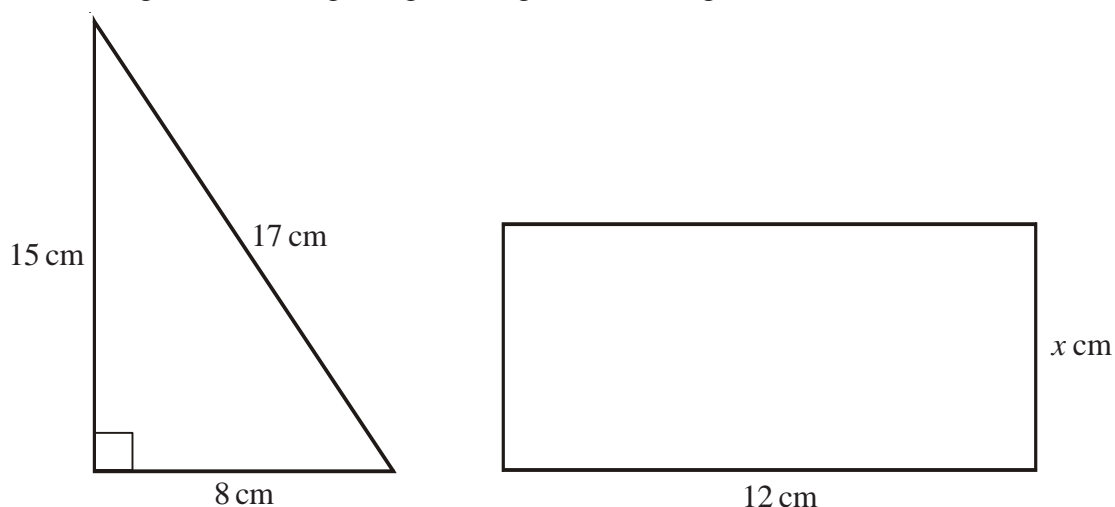
- a) Find an expression, in terms of x , for the perimeter of the triangle.
Give your expression in its simplest form.

The perimeter of the triangle is 39 cm.

- b) Find the value of x .



- 2) The diagram shows a right-angled triangle and a rectangle.



The area of the right-angled triangle is equal to the area of the rectangle.

Find the value of x .

- 1) A shop sells small boxes and large boxes for storing CDs.

A small box stores x CDs.

A large box stores y CDs.

Emma buys 8 small boxes and 5 large boxes.

Emma can store a total of T CDs in these boxes.

Write down a formula for T in terms of x and y .

- 2) Batteries are sold in packets and boxes.

Each packet contains 4 batteries.

Each box contains 20 batteries.

Tony buys p packets of batteries and b boxes of batteries.

Tony buys a total of N batteries.

Write down a formula for N in terms of p and b .

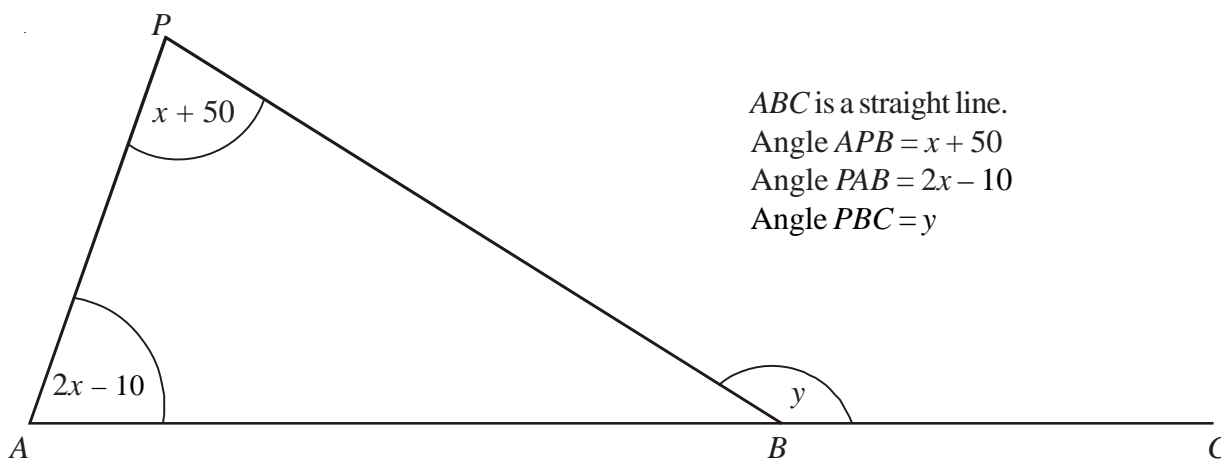
- 3) Compasses cost c pence each.

Rulers cost r pence each.

Write down an expression for the total cost, in pence, of 2 compasses and 4 rulers.



4)



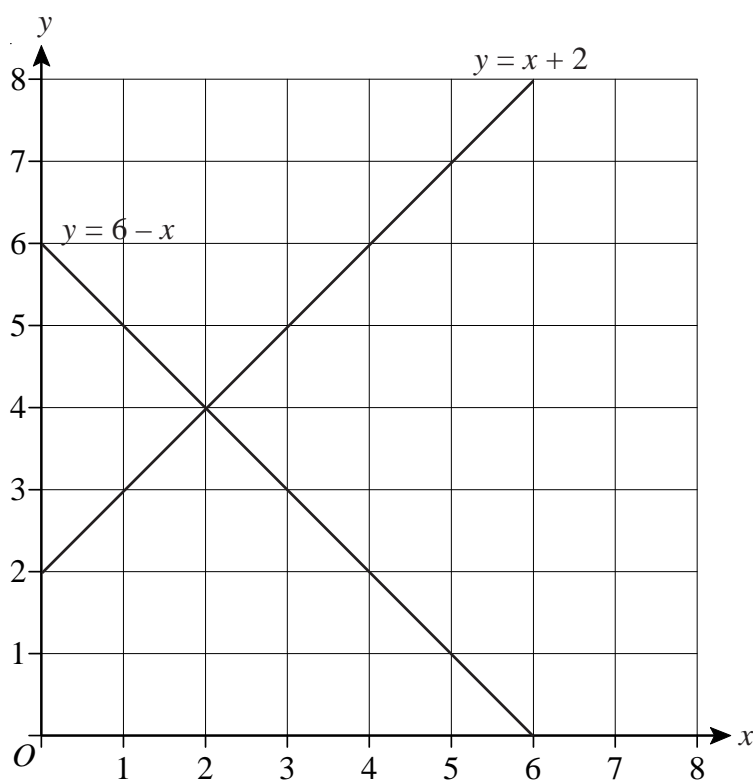
- a) Show that $y = 3x + 40$
 Give reasons for each stage of your working.

- b) Given that y equals 145 degrees

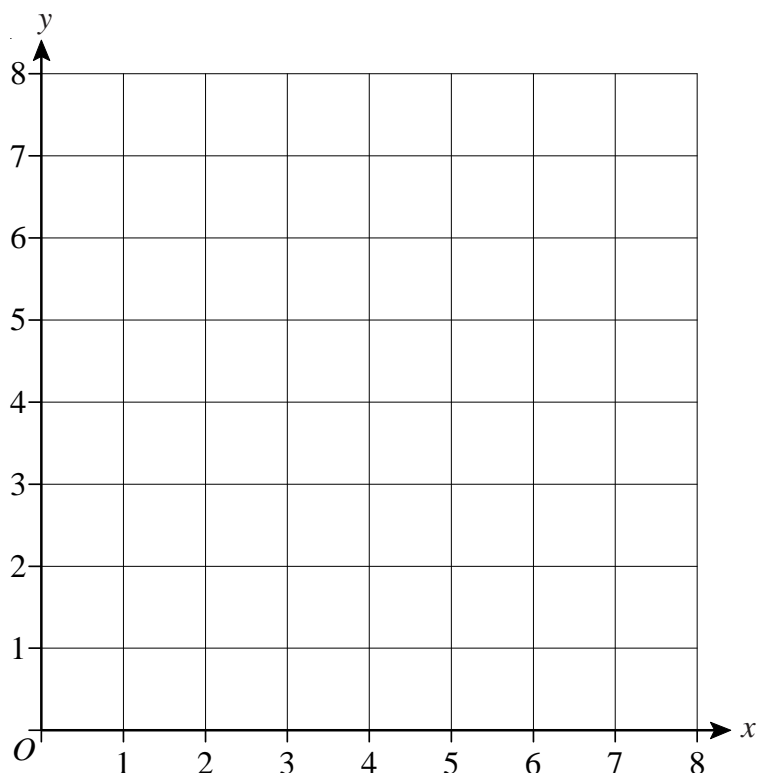
- (i) Work out the value of x .
 (ii) Work out the size of the largest angle in triangle APB .

Simultaneous Equations Graphically

- 1) On the axes below, the graphs of $y = x + 2$ and $y = 6 - x$ have been drawn.
Use the graphs to solve the simultaneous equations $y = x + 2$ and $y = 6 - x$



- 2) On the axes below draw the graphs of $y = 2x + 1$ and $y = 7 - x$
Use your graphs to solve the simultaneous equations $y = 2x + 1$ and $y = 7 - x$



Factorising and Solving Quadratics

1) Factorise and solve the following equations:

a) $x^2 + 5x + 6 = 0$

b) $x^2 + 9x + 20 = 0$

c) $x^2 + x - 6 = 0$

d) $x^2 + 5x - 24 = 0$

e) $x^2 - 6x + 8 = 0$

f) $x^2 - 3x - 28 = 0$

g) $2x^2 + 7x + 3 = 0$

h) $6x^2 + 11x + 3 = 0$

i) $3x^2 + 13x - 10 = 0$

j) $3x^2 - 34x + 63 = 0$

2) Lucy said that -1 is the only solution of x that satisfies the equation

$$x^2 + 2x + 1 = 0$$

Was Lucy correct?

Show working to justify your answer

3) Ben said that -5 is the only solution of x that satisfies the equation

$$x^2 + 10x + 25 = 0$$

Was Ben correct?

Show working to justify your answer

Simultaneous Equations Algebraically

1) Solve

$$\begin{aligned} 4x + 3y &= 6 \\ 5x - 3y &= 21 \end{aligned}$$

2) Solve

$$\begin{aligned} 4x + 3y &= 19 \\ 3x - 5y &= 7 \end{aligned}$$

3) Solve

$$\begin{aligned} 3x + 5y &= 13 \\ 2x + 3y &= 8 \end{aligned}$$



4) Solve

$$\begin{aligned} x + 4y &= 5 \\ 4x - 2y &= 11 \end{aligned}$$



5) Solve

$$\begin{aligned} 2a + b &= 3 \\ 4a - 5b &= 20 \end{aligned}$$

6) Solve

$$\begin{aligned} 5x + 3y &= 4 \\ 3x + 4y &= 9 \end{aligned}$$



7) Solve

$$\begin{aligned} 6x - 2y &= 13 \\ 2x + 3y &= -3 \end{aligned}$$



8) Solve

$$\begin{aligned} 3a - 2b &= 14 \\ 4a + 3b &= 13 \end{aligned}$$



9) Solve

$$\begin{aligned} 5x + 4y &= 5 \\ 2x + 7y &= 29 \end{aligned}$$

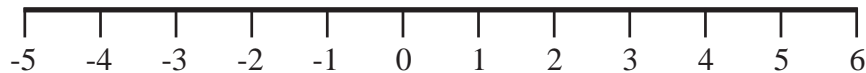


10) Solve

$$\begin{aligned} 6x - 4y &= 39 \\ 2x + y &= 6 \end{aligned}$$

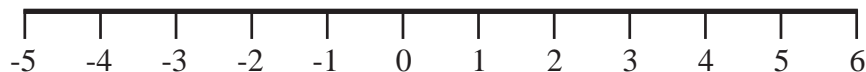
- 1) Represent this inequality on the number line

$$-3 < x \leq 2$$

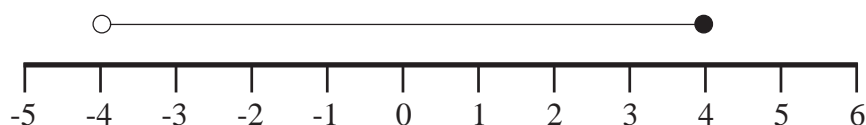


- 2) Represent this inequality on the number line

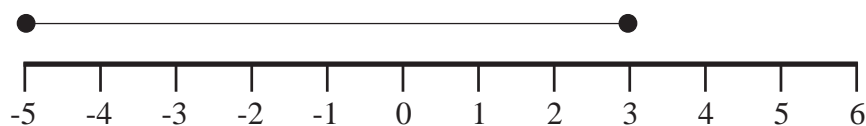
$$-1 < x < 5$$



- 3) Write down the inequality shown



- 4) Write down the inequality shown



- 5) If y is an integer, write down all the possible values of

$$-2 < y < 5$$

- 6) If x is an integer, write down all the possible values of

$$-9 < x < -5$$

Solving Linear Inequalities

1) Solve

a) $3x - 1 > 5$

b) $7y + 2 \leq 30$

c) $\frac{x}{2} - 3 \geq 2$

d) $5 + 2x > 7$

e) $8 < 5p - 2$

f) $\frac{y}{3} + 5 \geq 3$

g) $\frac{2x}{3} - 5 \geq -3$

h) $6x - 5 > 2x + 3$

i) $3p - 9 < 6 - 2p$

j) $5 - 3y < 2y - 10$

2) a) Solve the inequality

$$2z + 2 \geq 7$$

b) Write down the smallest **integer** value of z which satisfies the inequality

$$2z + 2 \geq 7$$

3) $5x + 2y < 10$

x and y are both integers.

Write down two possible pairs of values that satisfy this inequality.

$x = \dots\dots\dots$, $y = \dots\dots\dots$

and

$x = \dots\dots\dots$, $y = \dots\dots\dots$

- 1) Two dice are rolled and their scores are multiplied together.
 - a) Complete the possibility space to show all the possible results.

		First dice					
		1	2	3	4	5	6
Second dice	1						
	2						
	3				12		
	4						
	5						
	6			18			

- b) What is the probability of getting a result that is an even number?
- 2) Suppose there are three cards:

A **black card** that is black on both sides,

A **white card** that is white on both sides,

A **mixed card** that is black on one side and white on the other side.

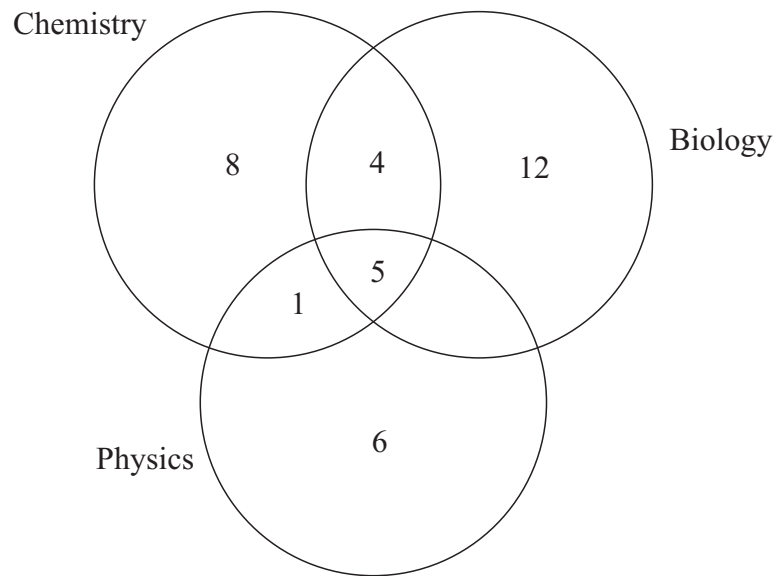
All the cards are placed into a hat and one is taken out at random.

It is placed on a table and the side facing up is black.

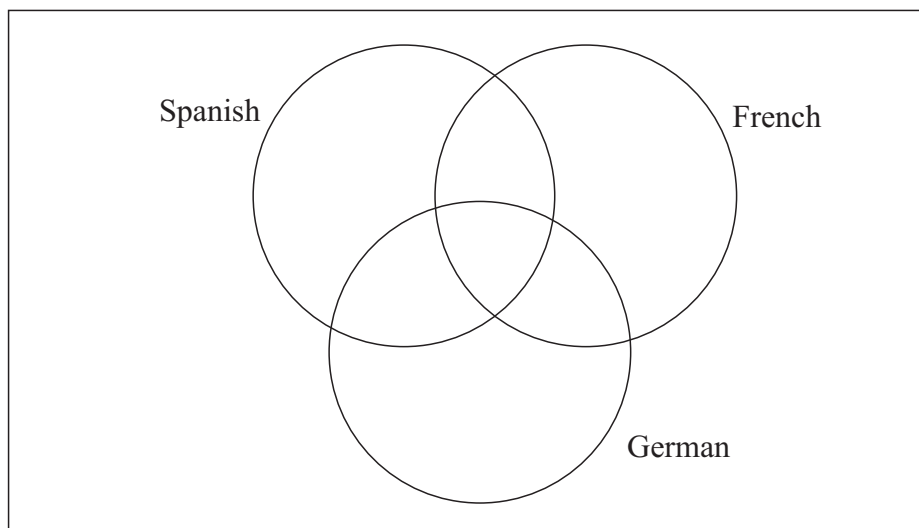
What is the probability that the other side of the card is also black?

Venn Diagrams

- 1) The Venn diagram shows the number of students studying one or more of the sciences Chemistry, Biology and Physics.



- a) How many students are represented in this Venn diagram?
- b) How many students are studying exactly two sciences?
- c) What is the probability that a student chosen at random is not studying Physics?
- 2) There are 31 student who study languages.
 All 31 study at least one of Spanish, French or German.
 4 study all three languages.
 9 study Spanish and French.
 7 study French and German.
 6 study Spanish and German.
 7 study only French and 5 study only German.
 Complete the Venn diagram to show this information.



Listing Outcomes

- 1) List all the outcomes if two coins are flipped.

- 2)
 - a) How many possible outcomes are there if three coins are flipped?
 - b) List them all - the first one has been done for you: H H H

- 3)
 - a) How many possible outcomes are there if two six-sided dice are rolled?
 - b) List them all.

- 4)
 - a) How many possible outcomes are there if a coin is flipped and a dice is rolled?
 - b) List them all.

- 5)
 - a) How many possible outcomes are there if two coins are flipped and a dice is rolled?
 - b) List them all.

- 6) How many possible outcomes are there if 6 coins are flipped?



- 7) If Carly has each fingernail painted at a salon and can choose between red, blue and green for each nail, how many different combinations are there for her to choose from?

- 1) A box contains 3 grey counters and 2 white counters.
A counter is taken from the box at random.
What is the probability of choosing a white counter?



- 2) There are 3 blue counters, 5 red counters and 7 green counters in a bag.
A counter is taken from the bag at random.
- What is the probability that a green counter will be chosen?
 - What is the probability that a blue or red counter will be chosen?

- 3) In a class there are 10 boys and 15 girls.
A teacher chooses a student at random from the class.
Eric says that the probability a boy will be chosen is 0.5 because a student can be either a boy or a girl.
Jenny says that Eric is wrong.
Decide who is correct - Eric or Jenny - giving reasons for your answer.

- 4) Spinner A has numbers 1 to 4 on it.
Spinner B has numbers 1 to 3 on it.
Both spinners are spun and the numbers on each are added together to give a score.
What is the probability that the score will be
- 7?
 - 3 or 4?

Mutually Exclusive Events

- 1) If the probability of passing a driving test is 0.54,
what is the probability of failing it?
- 2) The probability that a football team will win their next game is $\frac{2}{11}$.
The probability they will lose is $\frac{3}{11}$.
What is the probability the game will be a draw?



- 3) On the school dinner menu there is only ever one of four options.
Some of the options are more likely to be on the menu than others.
The table shows the options available on any day, together with three of the probabilities.

Food	Curry	Sausages	Fish	Casserole
Probability	0.36	0.41		0.09

- a) Work out the probability of the dinner option being Fish.
- b) Which option is most likely?
- c) Work out the probability that it is a Curry or Sausages on any particular day.
- d) Work out the probability that it is **not** Casserole.



- 4) Julie buys a book every week.
Her favourite types are Novel, Drama, Biography and Romance.
The table shows the probability that Julie chooses a particular type of book.

Type of book	Novel	Drama	Biography	Romance
Probability	0.24	0.16	x	x

- a) Work out the probability that she will choose a Novel or a Drama.
- b) Work out the probability that she will choose a Biography or a Romance.

The probability that she will choose a Biography is the same as the probability she will choose a Romance.

- c) Work out the probability that she will choose a Biography.

Two-Way Tables

- 1) Billy has been carrying out a survey.
He asked 100 people the type of water they like to drink (still, sparkling or both).
Here are part of his results:

	Still	Sparkling	Both	Total
Male	26			53
Female		20	10	
Total			16	100

- a) Complete the two-way table.
- b) How many males were in the survey?
- c) How many females drink only still water?
- d) How many people drink only sparkling water?
- 2) 90 students each study one of three languages.
The two-way table shows some information about these students.

	French	German	Spanish	Total
Female				
Male		7		
Total	20	18		90

- 50 of the 90 students are male.
29 of the 50 male students study Spanish.
- a) Complete the two-way table.
- b) How many females study French?
- c) How many people study Spanish?
- 3) Karen asks 100 students if they like milk, plain or white chocolates best.
36 of the students are girls.
19 of these girls like milk chocolates best.
16 boys like white chocolates best.
8 out of the 24 students who like plain chocolates best are girls.
Work out the number of students who like milk chocolates the best.

- 1) Ahmad does a statistical experiment.
He throws a dice 600 times.
He scores one, 200 times.
Is the dice fair? Explain your answer

- 2) Chris has a biased coin.
The probability that the biased coin will land on a tail is 0.3
Chris is going to flip the coin 150 times.
Work out an estimate for the number of times the coin will land on a tail.

- 3) On a biased dice, the probability of getting a six is $\frac{2}{3}$.
The dice is rolled 300 times.
Work out an estimate for the number of times the dice will land on a six.

- 4) On a biased dice, the probability of getting a three is 0.5
The dice is rolled 350 times.
Work out an estimate for the number of times the dice will land on a three.

- 5) Jenny throws a biased dice 100 times.
The table shows her results.

Score	Frequency
1	15
2	17
3	10
4	24
5	18
6	16

- a) She throws the dice once more.
Find an estimate for the probability that she will get a four.

- b) If the dice is rolled 250 times, how many times would you expect to get a five?

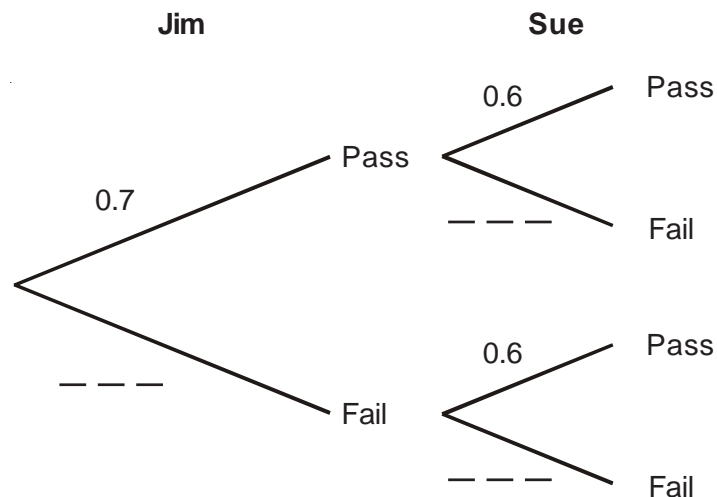
Simple Tree Diagrams

- 1) Jim and Sue each take a driving test.

The probability that Jim will pass the driving test is 0.7

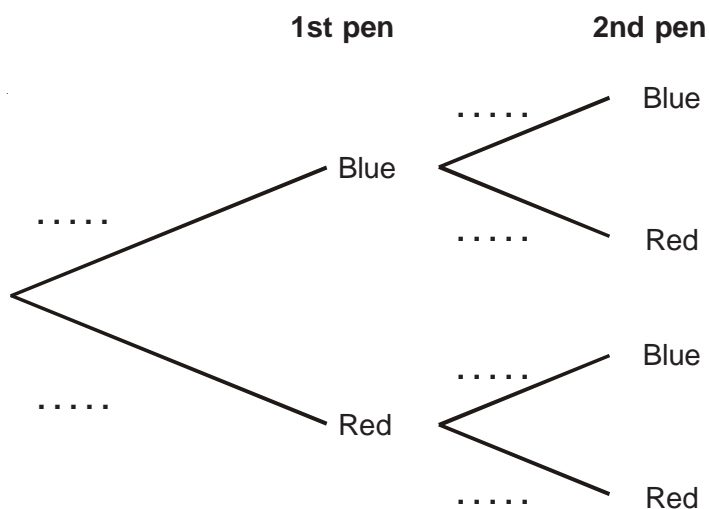
The probability that Sue will pass the driving test is 0.6

- a) Complete the probability tree diagram.



- b) Work out the probability that both Jim and Sue will pass the driving test.
- c) Work out the probability that only one of them will pass the driving test.
- 2) Terri has 7 pens in a box.
2 of the pens are blue.
5 of the pens are red.
- Terri takes at random a pen from the box and writes down its colour.
Terri puts the pen back in the box.
- Then Terri takes at random a second pen from the box and writes down its colour.

- a) Complete the probability tree diagram.



- b) Work out the probability that Terri takes exactly one pen of each colour from the box.

Harder Tree Diagrams

- 1) There are 5 red pens, 3 blue pens and 2 green pens in a box.
Jerry takes at random a pen from the box and gives the pen to his friend.
Jerry then takes at random another pen from the box.
Work out the probability that both pens are the same colour.



- 2) There are 3 red sweets, 2 blue sweets and 4 green sweets in a bag.
Jack takes a sweet at random.
He eats the sweet.
He then takes another sweet at random.

Work out the probability that both sweets are the same colour.



- 3) There are 13 buttons in a bag.
9 buttons are white.
4 buttons are black.

Carol takes a button at random from the bag, and keeps it.
She now takes another button from the bag.

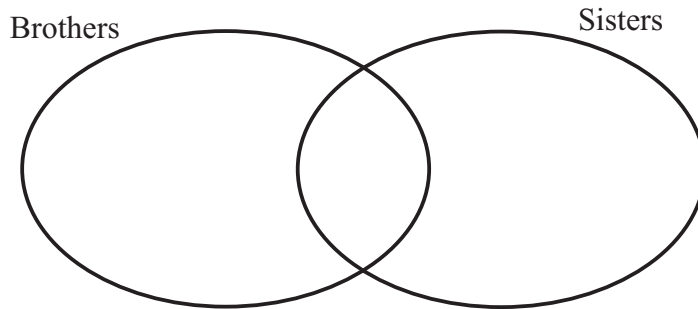
Work out the probability that Carol takes a button of each colour.

- 1) In a class of 30 students, all of them have brothers or sisters or both.

19 have a brother.

16 have a sister.

- a) Complete the Venn diagram.



- b) Find the probability that a student in the class has a brother and a sister.
- c) If it is known that a student has a sister, what is the probability that they also have a brother?
- 2) A cafeteria serves only main courses and desserts. Some people just have a main, some have just a dessert and some have both.
- One day, 65% of the customers had a main course and 90% had a dessert.
- a) Show this information on a Venn diagram.
- b) What is the probability that a customer had a main course and a dessert?
- c) If it is known that a customer had a dessert, what is the probability that they also had a main course?



- 1) Jordan designs a game for a school fair.
He has two 8-sided spinners.
The spinners are equally likely to land on each of their sides.

One spinner has 3 blue sides, 2 yellow sides and 3 white sides.
The other spinner has 2 blue sides, 2 green sides and 4 white sides.

Calculate the probability that the two spinners will land on the same colour.



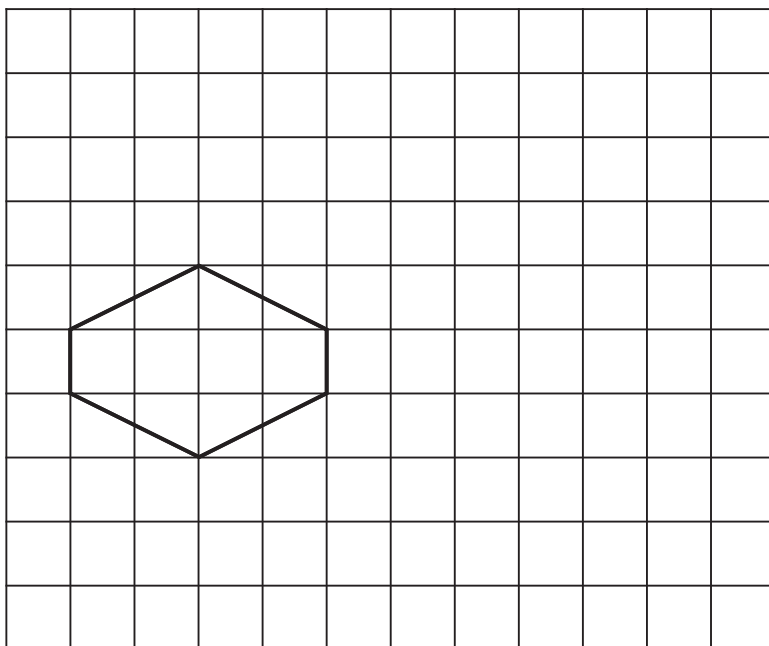
- 2) The probability that it will snow in Paris on Christmas day is 0.06.
- a) Work out the probability that it will snow in Paris on **both** Christmas day 2015 **and** Christmas day 2016.
 - b) Work out the probability that it will snow in Paris on **either** Christmas Day 2015 **or** Christmas Day 2016, but **not** on both.



- 3) A bag contains 2 black beads, 5 yellow beads and 3 red beads.
Natalie takes a bead at random from the bag, records its colour and replaces it.
She does this two more times.

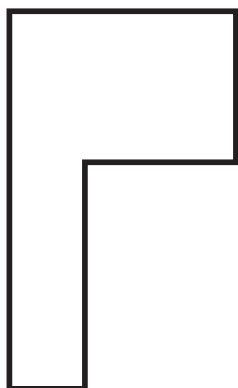
Work out the probability that, of the three beads Natalie takes, exactly two are the same colour.

- 1) Show how this shape will tessellate.
You must draw six more shapes.

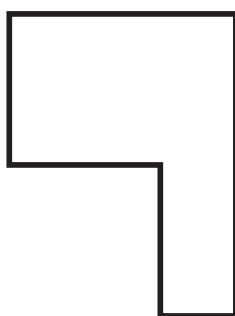


- 2) Two of these shapes are congruent.
Which are they?

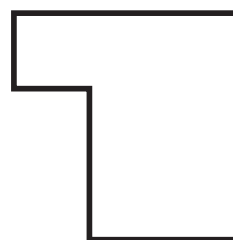
a)



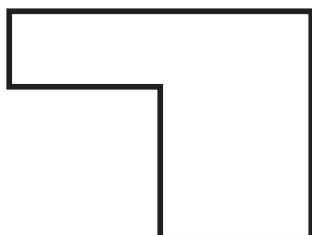
b)



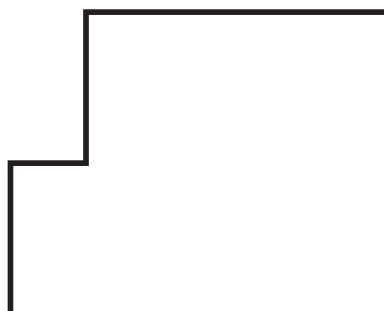
c)



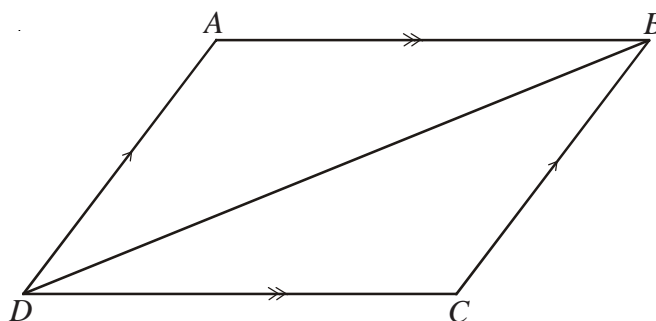
d)



e)



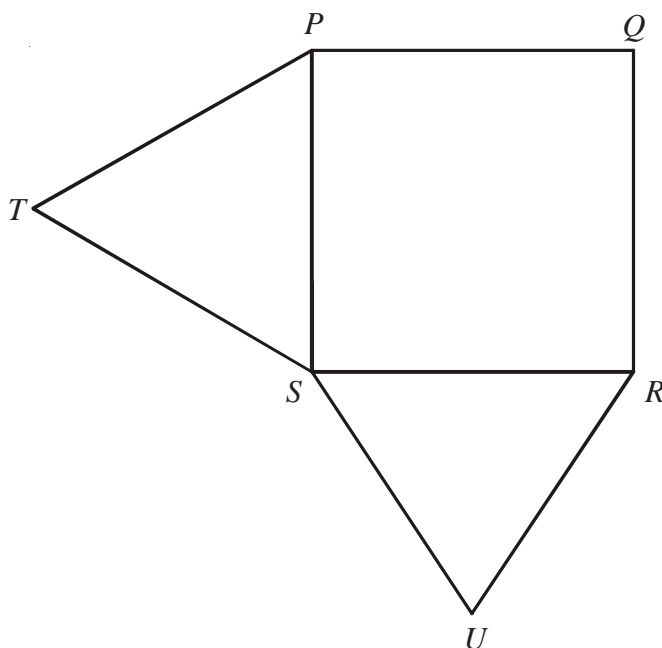
- 1) $ABCD$ is a quadrilateral.



AB is parallel to DC .
 DA is parallel to CB .

Prove that triangle ABD is congruent to triangle CDB .

- 2)



$PQRS$ is a square.
 PTS and SUR are equilateral triangles.

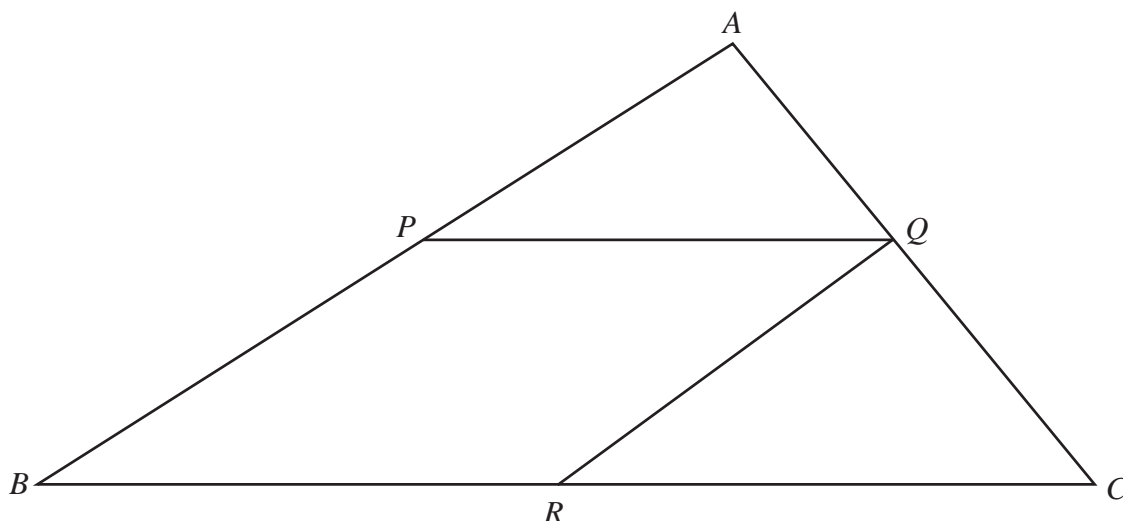
- a) Prove that triangle USP is congruent to triangle TSR .

X is the point such that $RUXT$ is a parallelogram.

- b) Prove that $UP = UX$

Congruent Triangles

1)



The diagram shows a triangle ABC .

$PQRB$ is a parallelogram where

P is the midpoint of AB ,

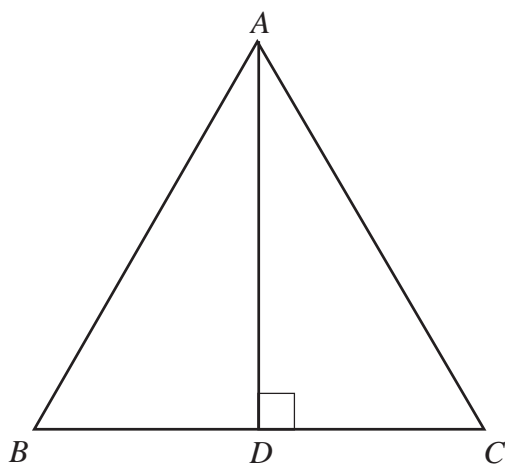
Q is the midpoint of AC ,

and R is the midpoint of BC .

Prove that triangle APQ and triangle QRC are congruent.

You must give reasons for each stage of your proof.

2)



ABC is an equilateral triangle.

D lies on BC .

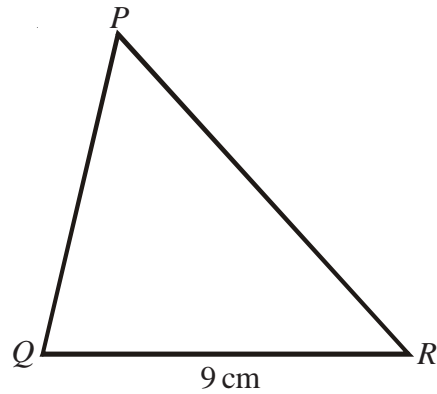
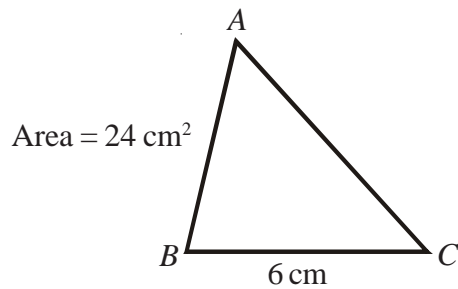
AD is perpendicular to BC .

a) Prove that triangle ADC is congruent to triangle ADB .

b) Hence, prove that $BD = \frac{1}{2} AB$



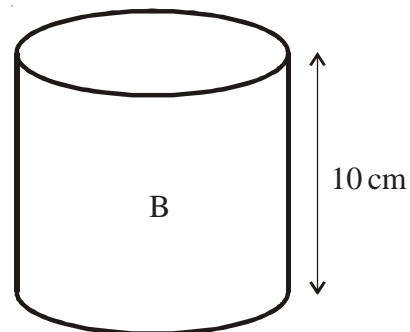
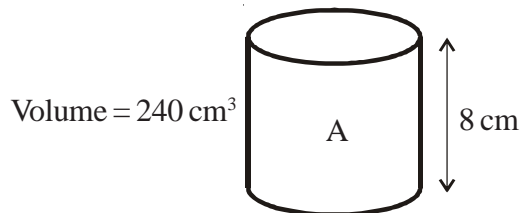
- 1) Triangle ABC is similar to triangle PQR .



The area of triangle ABC is 24 cm^2 .
Calculate the area of triangle PQR .



- 2) Cylinder A is mathematically similar to cylinder B.



The volume of cylinder A is 240 cm^3 .
Calculate the volume of cylinder B.



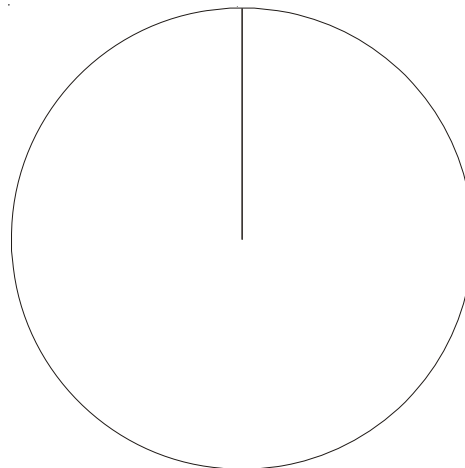
- 3) P and Q are two geometrically similar solid shapes.
The total surface area of shape P is 540 cm^2 .
The total surface area of shape Q is 2160 cm^2 .
The volume of shape P is 2700 cm^3 .
Calculate the volume of shape Q.

Representing Data

- 1) Patrick asked some of his colleagues which was their favourite holiday destination.
The table shows the results.

City	Frequency
Alicante	8
Paris	7
Ibiza	15
St Lucia	1
Biarritz	9

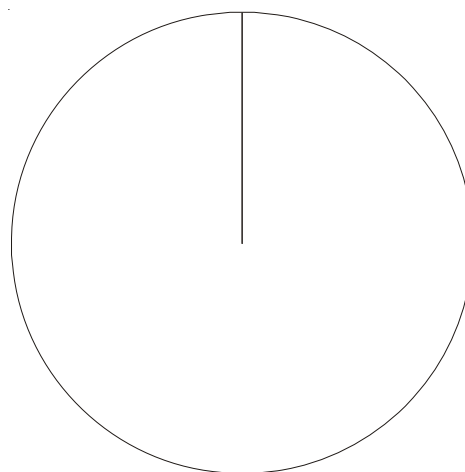
Draw a pie chart to illustrate the information.



- 2) Brian asked 60 people which region their favourite rugby team came from.
The table shows the results.

Region	Frequency
Southern England	9
London	23
Midlands	16
Northern England	12
Total	60

Draw a pie chart to illustrate the information.



- 3) The stem and leaf diagram, below, shows information about the times, in minutes, it takes a group of people to eat their breakfast.

0	5	7	9		
1	0	0	5	8	8
2	0	2	3	5	7
3	2	5			

Key: 1|0 represents 10 minutes.

- How many people are in the group?
- How many people spend 15 minutes or more eating their breakfast?
- Find the median time that it took to eat breakfast.

Scatter Diagrams

- 1) The scatter graph shows some information about the marks of six students.

It shows each student's marks in Maths and Science.

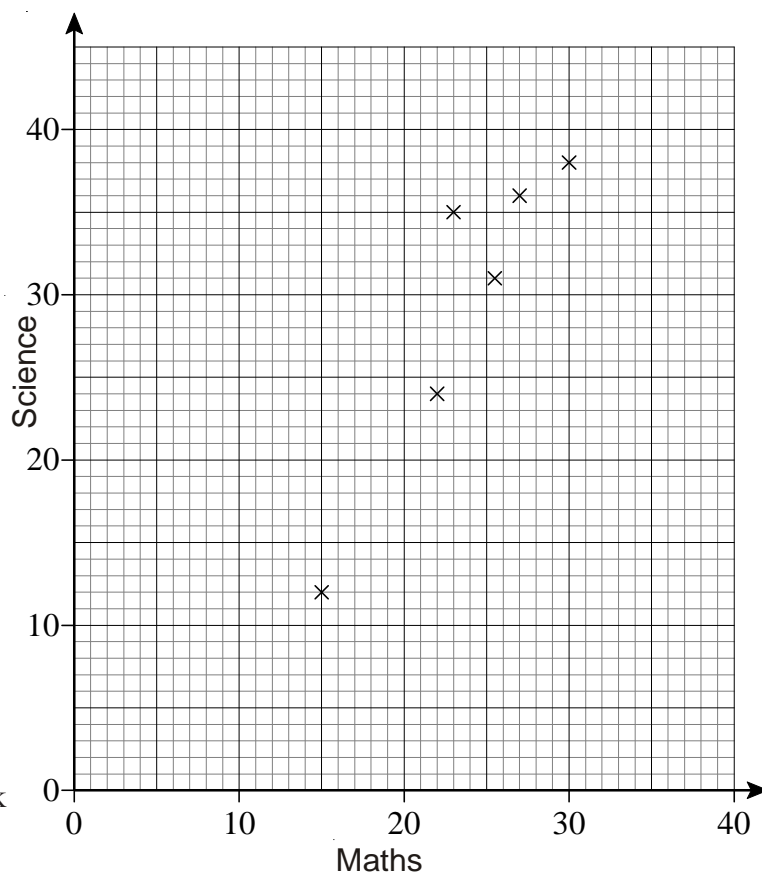
The table below shows the marks for four more students.

Maths	22	8	17	26
Science	30	12	24	24

- On the scatter graph, plot the information from the table.
- Draw a line of best fit.
- Describe the correlation between the marks in Maths and the marks in Science.

Another student has a mark of 18 in Science.

- Use the line of best fit to estimate the mark in Maths of this student.

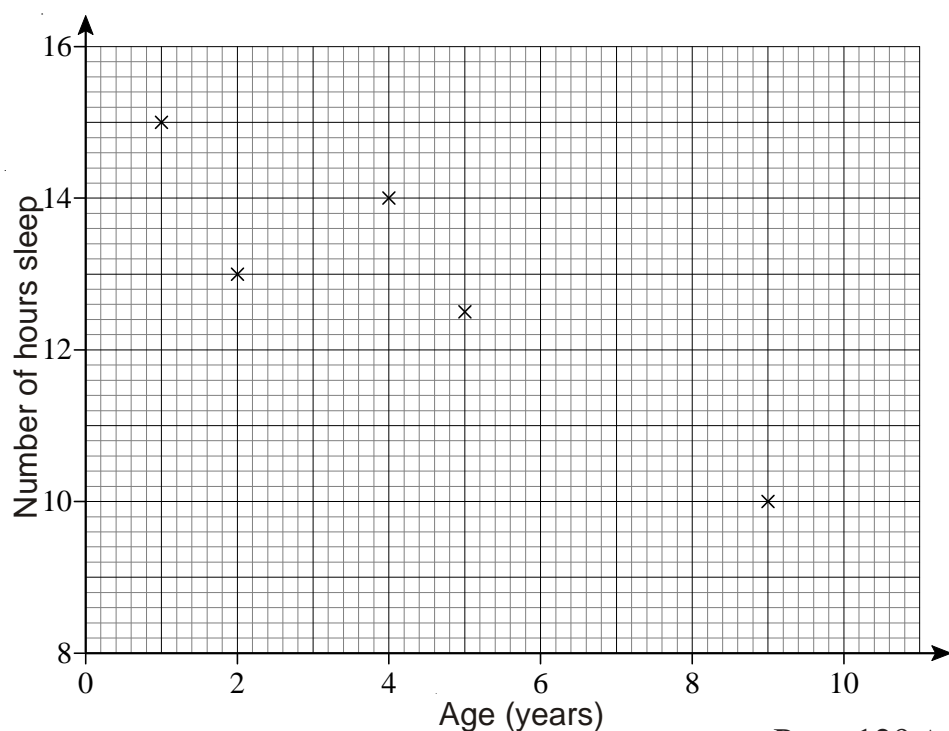


- 2) The table below shows the average daily number of hours sleep of 10 children.

Age (years)	4	2	5	1	9	6	8	7	10	1.5
Number of hours sleep	14	13	12.5	15	10	12.5	10.8	12	11	14

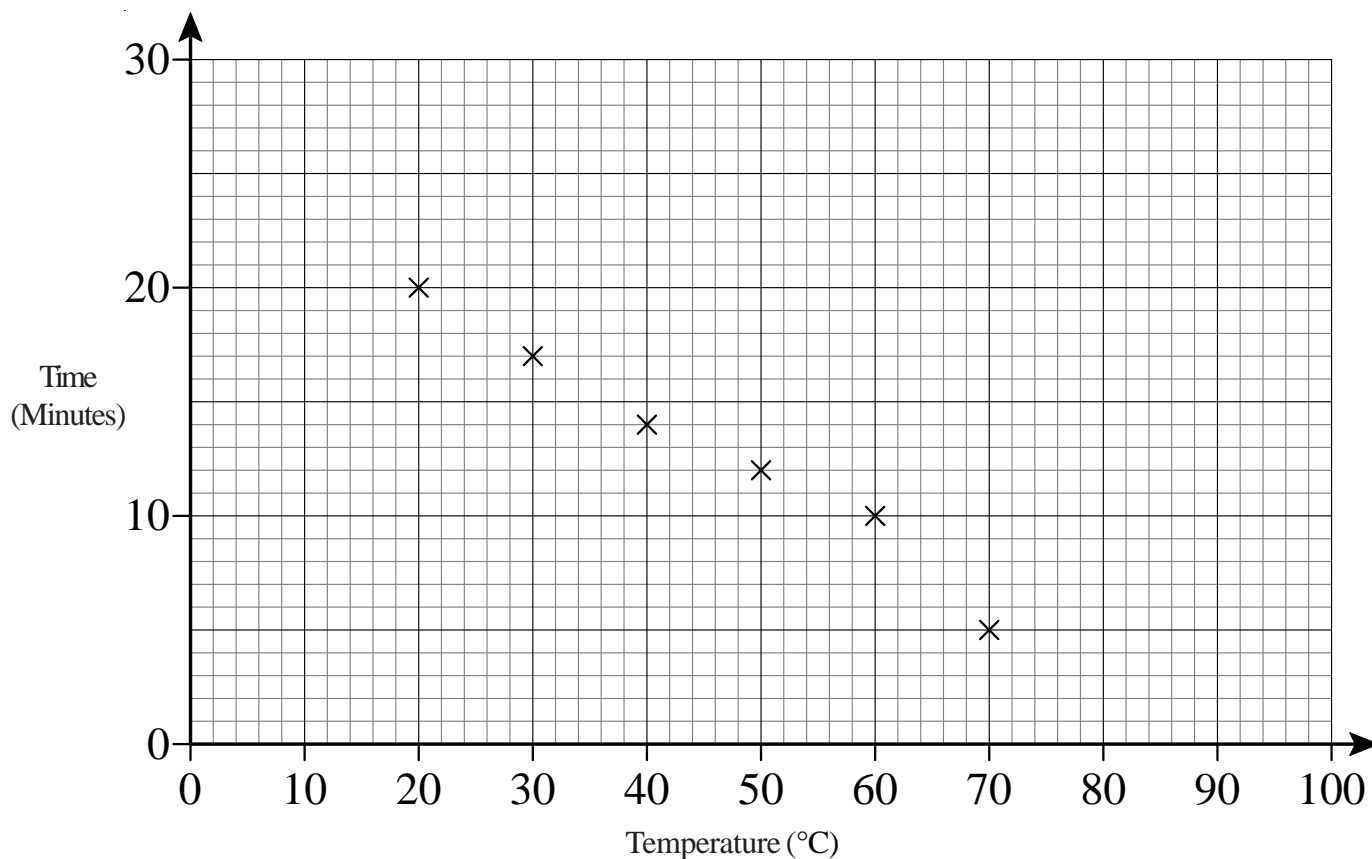
The first five results have been plotted on the scatter diagram.

- Plot the next five points.
- Draw a line of best fit.
- Describe the relationship between the age of the children and their number of hours sleep per day.
- Use your scatter graph to estimate the number of hours sleep for a 3 year old child.



Scatter Diagrams

- 1) Sue did an experiment to study the times, in minutes, it took 1 cm ice cubes to melt at different temperatures.
Some information about her results is given in the scatter graph.



The table shows the results from two more experiments.

Temperature (°C)	15	55
Time (Minutes)	21	15

- On the scatter graph, plot the results from the table.
- Describe the relationship between the temperature and the time it takes a 1 cm ice cube to melt.
- Find an estimate for the time it takes a 1 cm ice cube to melt when the temperature is 25 °C.

Sue's data cannot be used to predict how long it will take a 1 cm ice cube to melt when the temperature is 100 °C.

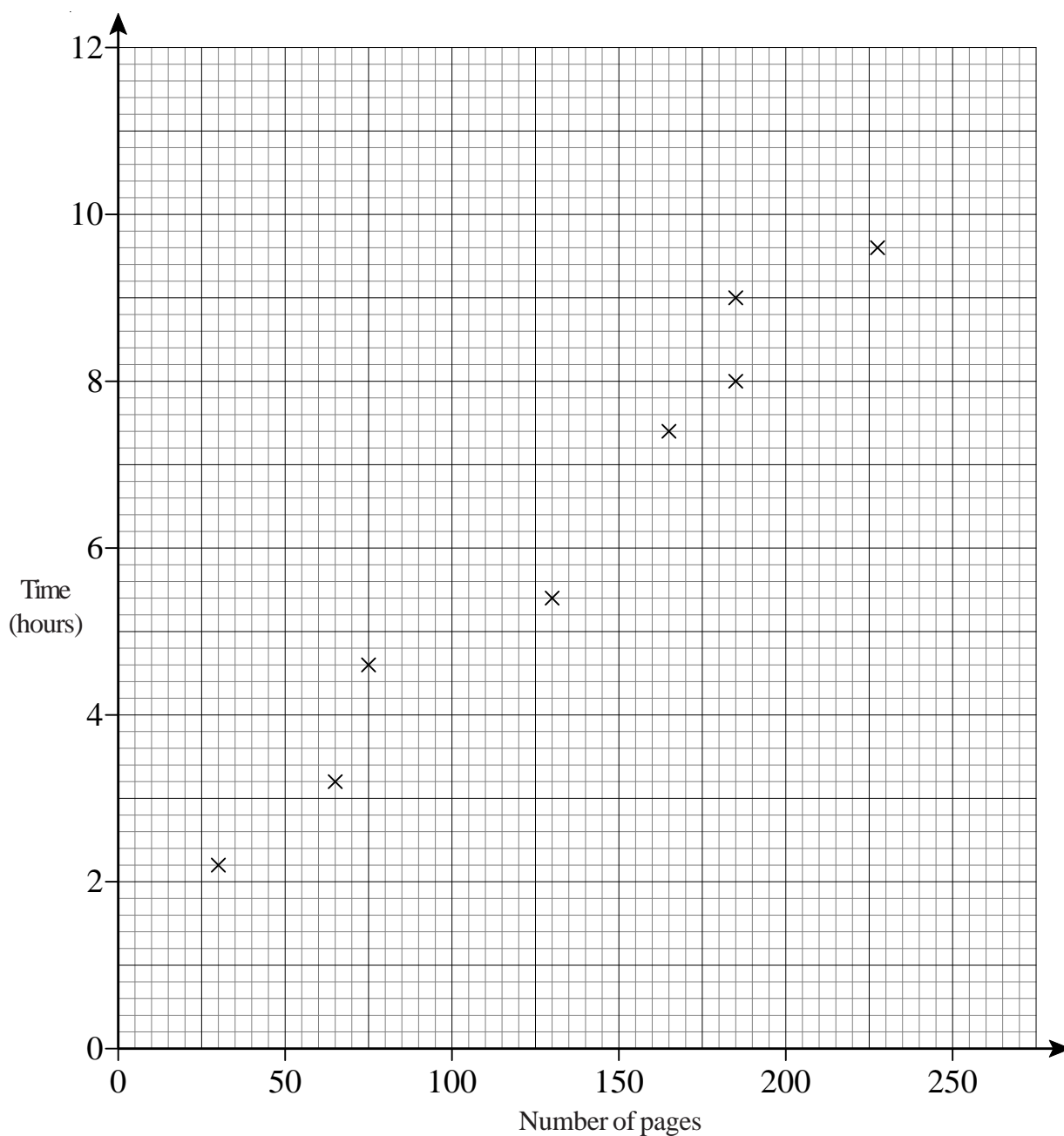
- Explain why.

Scatter Diagrams

- 1) Henry reads eight books.

For each book he recorded the number of pages and the time he took to read it.

The scatter graph shows information about his results.



- a) Describe the relationship between the number of pages in a book and the time Henry takes to read it.

Henry reads another book.

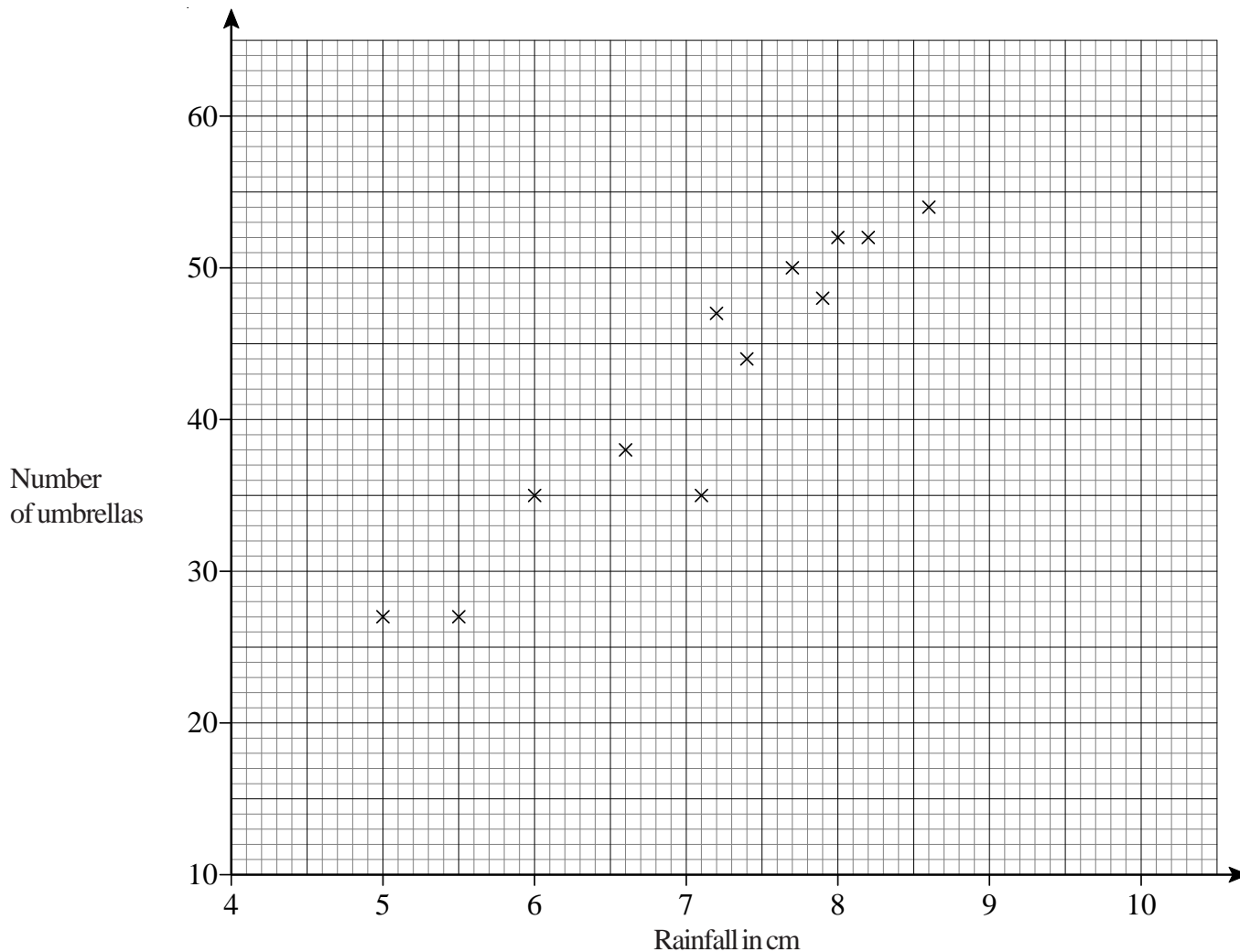
The book has 150 pages.

- b) Estimate the time it takes Henry to read it.

Scatter Diagrams

- 1) Mr Jones sells umbrellas.

The scatter graph shows some information about the number of umbrellas he sold and the rainfall, in cm, each month last year.



In January of this year, the rainfall was 6.2 cm.

During January, Mr Jones sold 32 umbrellas.

- Show this information on the scatter graph.
- What type of correlation does this scatter graph show?

In February of this year, Mr Jones sold 40 umbrellas.

- Estimate the rainfall for February.

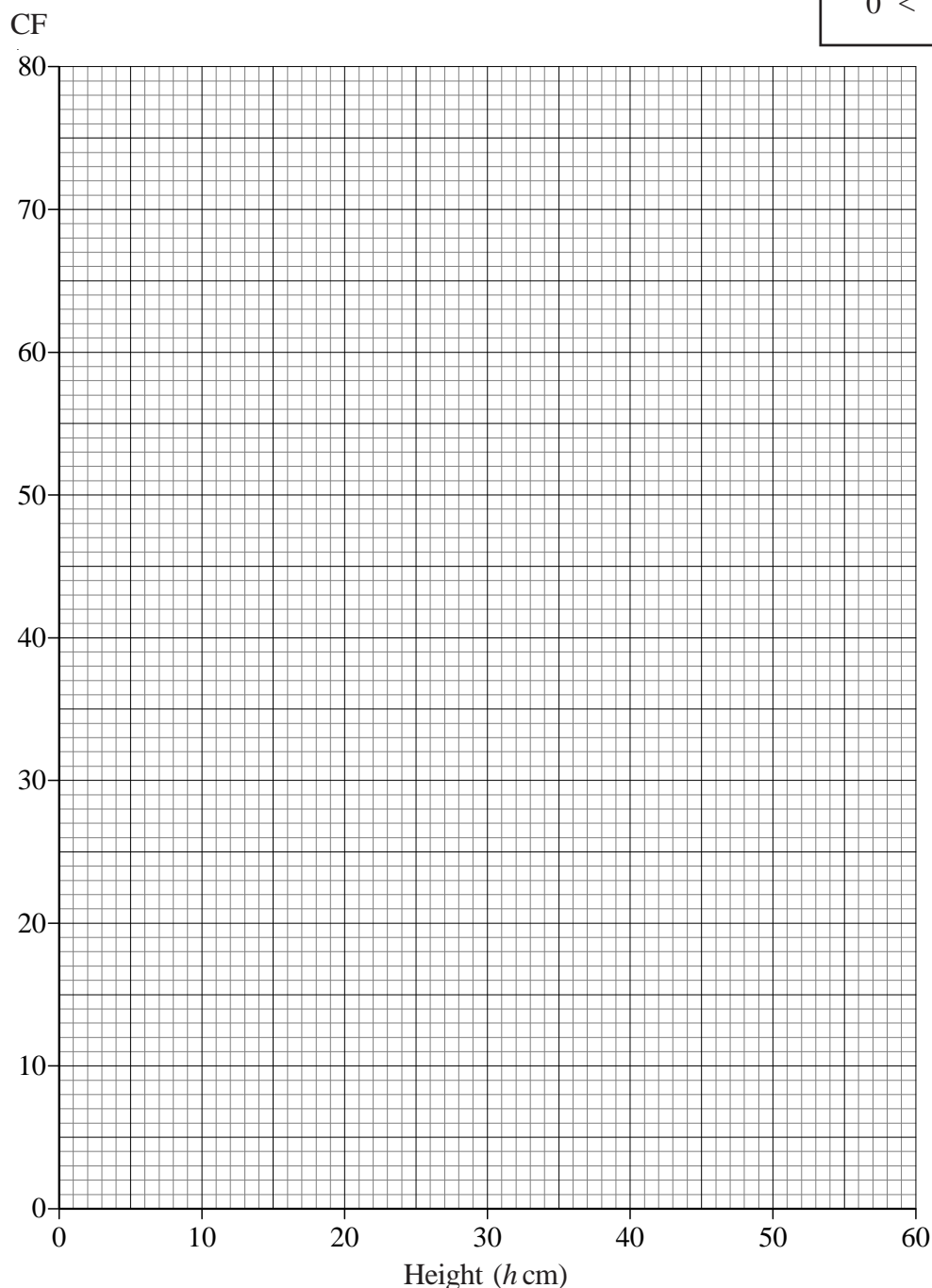
Cumulative Frequency

The heights of 80 plants were measured and can be seen in the table, below.

Height (h cm)	Frequency
$0 < h \leq 10$	2
$10 < h \leq 20$	5
$20 < h \leq 30$	19
$30 < h \leq 40$	38
$40 < h \leq 50$	13
$50 < h \leq 60$	3

a) Complete the cumulative frequency table for the plants.

Height (h cm)	Cumulative Frequency
$0 < h \leq 10$	2
$0 < h \leq 20$	
$0 < h \leq 30$	
$0 < h \leq 40$	
$0 < h \leq 50$	
$0 < h \leq 60$	



b) Draw a cumulative frequency graph for your table.

c) Use your graph to find an estimate for

(i) the median height of a plant.

(ii) the interquartile range of the heights of the plants.

d) Use your graph to estimate how many plants had a height that was greater than 45cm.

Cumulative Frequency

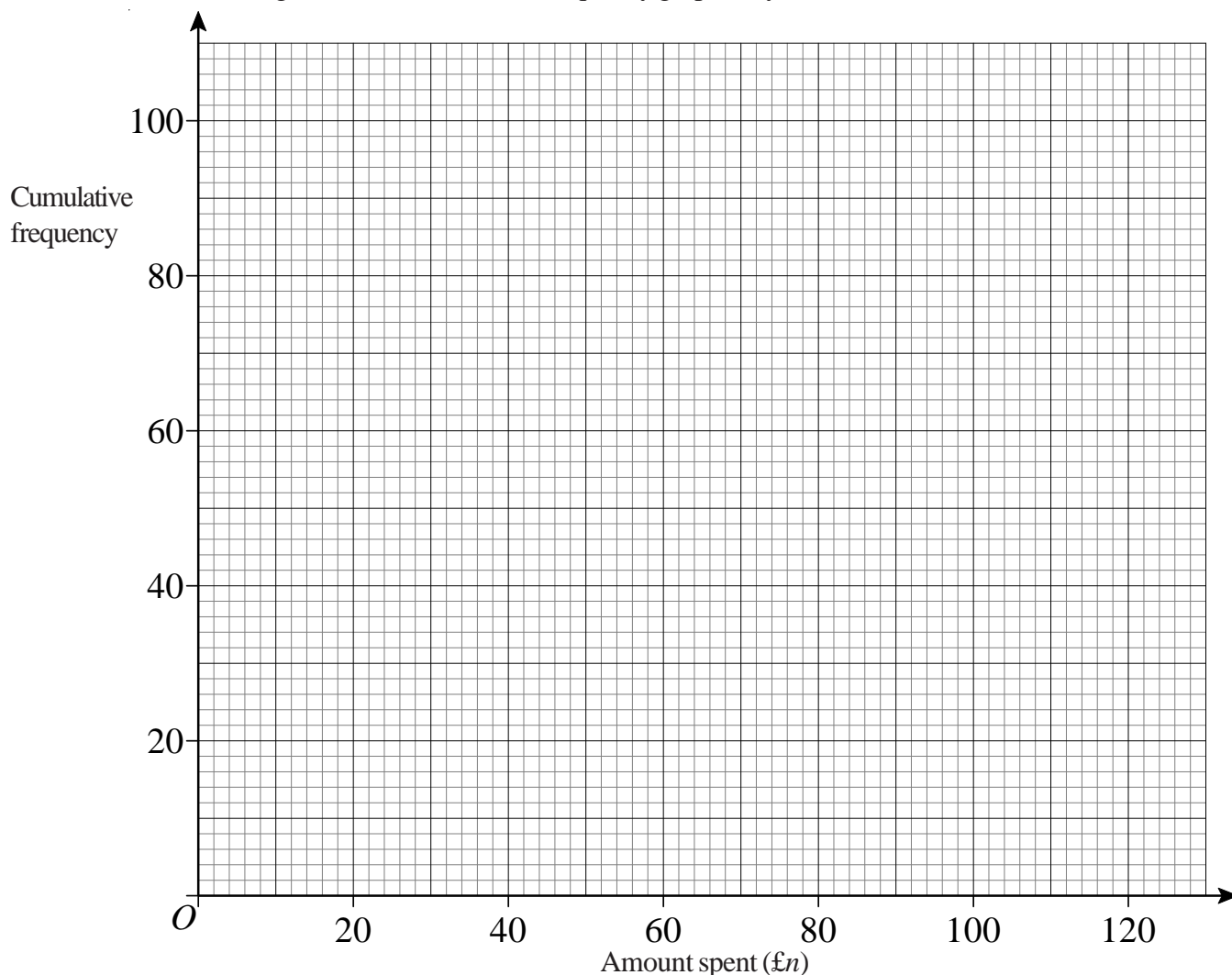
The table shows information about the amount spent by 100 customers in a supermarket.

Amount spent (£ n)	Frequency
$0 < n \leq 20$	17
$20 < n \leq 40$	23
$40 < n \leq 60$	36
$60 < n \leq 80$	14
$80 < n \leq 100$	8
$100 < n \leq 120$	2

- a) Complete the cumulative frequency table for this information.

Amount spent (£ n)	Cumulative frequency
$0 < n \leq 20$	17
$0 < n \leq 40$	
$0 < n \leq 60$	
$0 < n \leq 80$	
$0 < n \leq 100$	
$0 < n \leq 120$	

- b) On the grid, draw a cumulative frequency graph for your table.



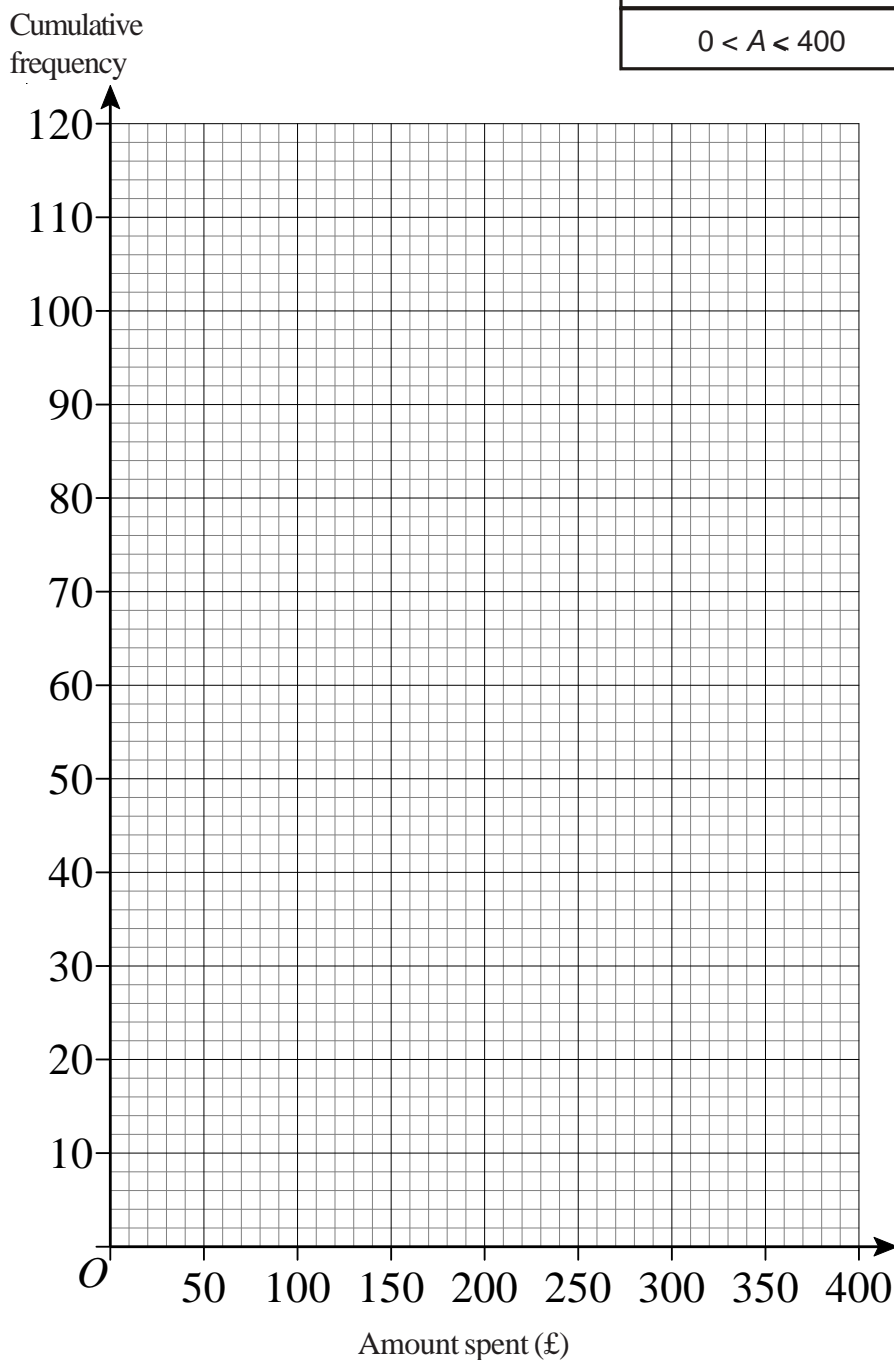
- c) Use your graph to find an estimate for the median amount spent.
d) Use your graph to find an estimate for the interquartile range of the amount of money spent.

Cumulative Frequency

Fred did a survey about the amount of money spent by 120 men at Christmas.
The cumulative frequency table gives some information about the amounts of money spent by the 120 men.

Amount (£A) spent	Cumulative frequency
$0 < A < 100$	12
$0 < A < 150$	26
$0 < A < 200$	42
$0 < A < 250$	64
$0 < A < 300$	93
$0 < A < 350$	112
$0 < A < 400$	120

- a) On the grid, draw a cumulative frequency diagram.



- b) Use your cumulative frequency diagram to estimate the median.
- c) Use your cumulative frequency diagram to estimate the interquartile range of the amount of money spent.
- d) Use your cumulative frequency diagram to estimate the number of men who spent more than £330.

Cumulative Frequency

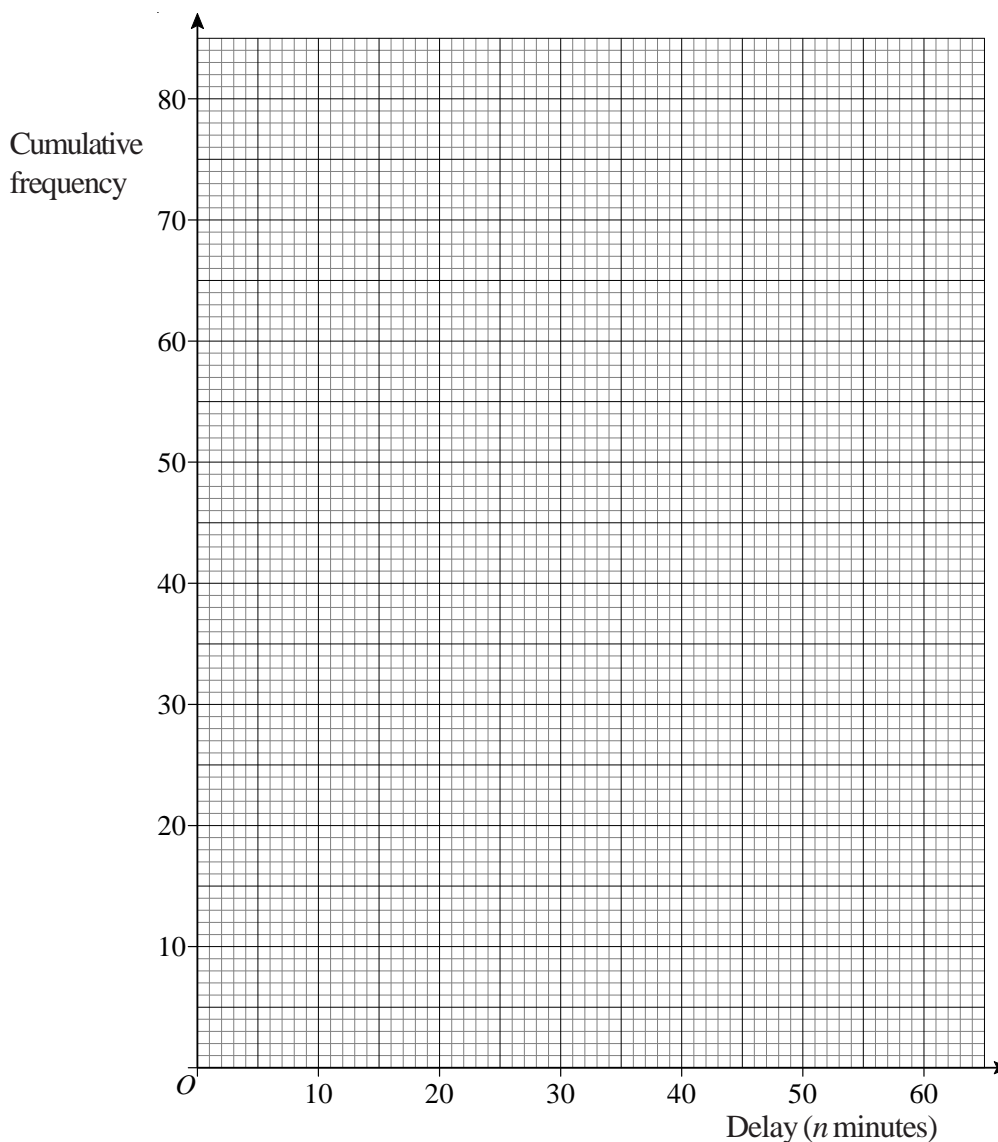
The table gives some information about the delay, in minutes, of 80 trains.

a) Complete the cumulative frequency table.

Delay (n minutes)	Frequency
$0 < n \leq 20$	16
$20 < n \leq 30$	27
$30 < n \leq 40$	22
$40 < n \leq 50$	10
$50 < n \leq 60$	5

Delay (n minutes)	Cumulative Frequency
$0 < n \leq 20$	
$20 < n \leq 30$	
$30 < n \leq 40$	
$40 < n \leq 50$	
$50 < n \leq 60$	

b) On the grid below, draw a cumulative frequency graph for your table.



c) Use your graph to find an estimate for

- the median delay.
- the interquartile range of the delays.
- the number of trains delayed for more than 53 minutes.

Cumulative Frequency

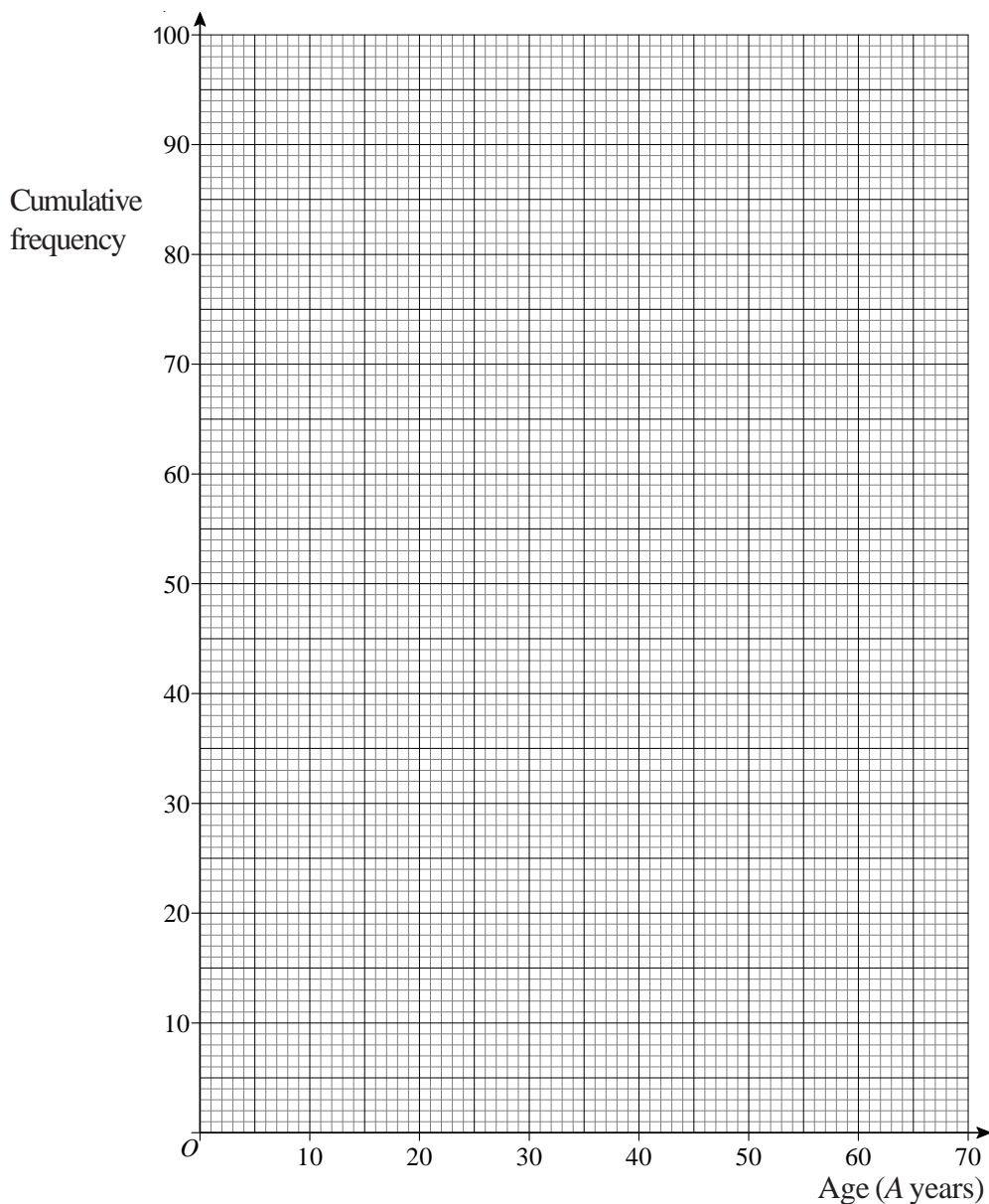
There are 100 teachers at Sam's school.
Sam found out the age of each teacher.

The table gives information about her results. a) Complete the cumulative frequency table

Age (A years)	Frequency
$20 < A < 30$	25
$30 < A < 40$	36
$40 < A < 50$	22
$50 < A < 60$	11
$60 < A < 70$	6

Age (A years)	Cumulative Frequency
$20 < A < 30$	25
$20 < A < 40$	
$20 < A < 50$	
$20 < A < 60$	
$20 < A < 70$	

b) On the grid, draw a cumulative frequency graph for your table.



- c) Use your graph to find an estimate for the median age.
d) Use your graph to find an estimate for the number of these teachers who are **older** than 56 years old.

Cumulative Frequency

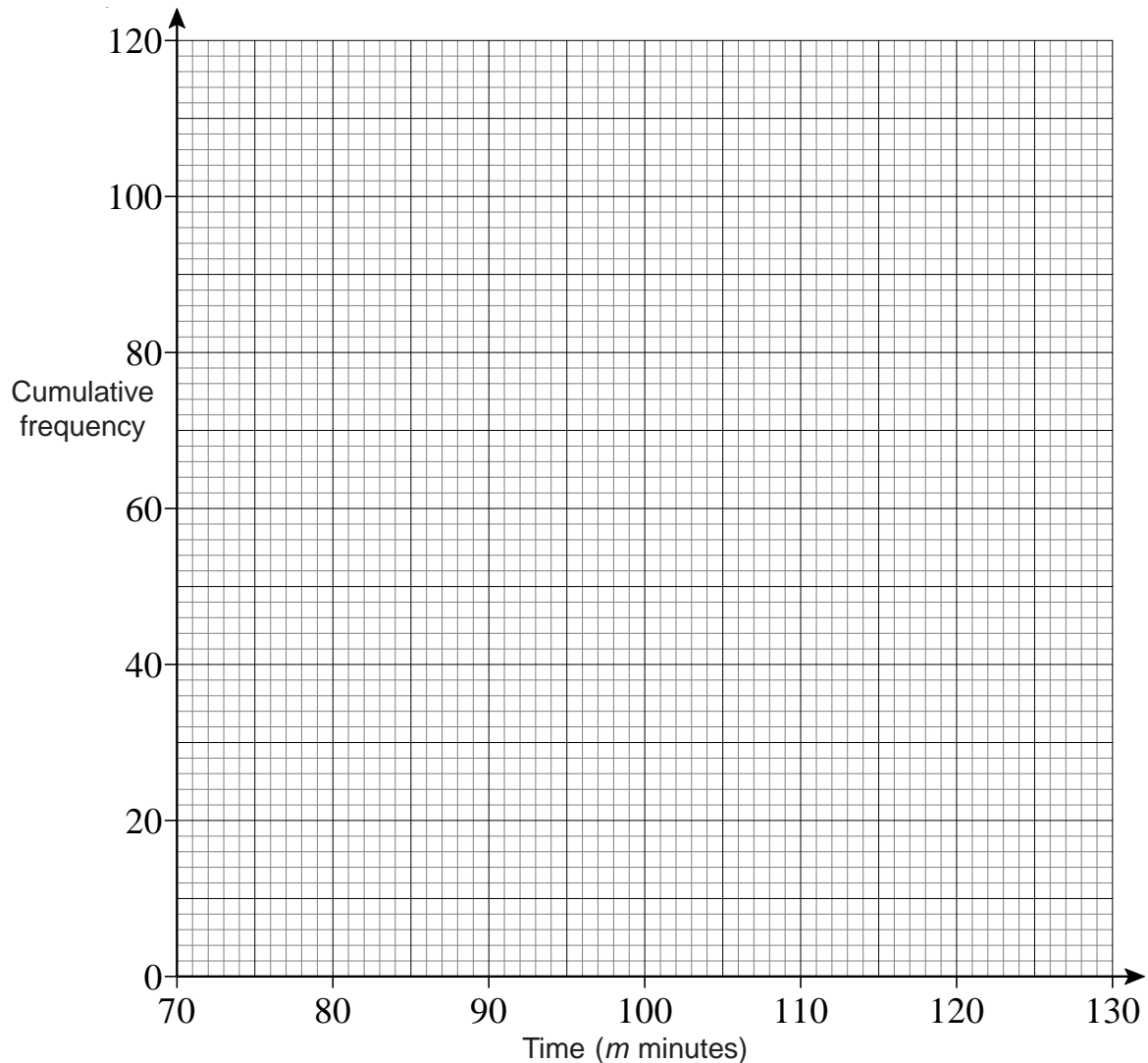
This table shows information about the time, m minutes, it takes to show each of 120 films.

Time (m minutes)	Frequency
$70 < m \leq 80$	3
$80 < m \leq 90$	13
$90 < m \leq 100$	34
$100 < m \leq 110$	32
$110 < m \leq 120$	26
$120 < m \leq 130$	12

- a) Write down the modal class interval.
b) Complete this cumulative frequency table.

Time (m minutes)	Cumulative frequency
$70 < m \leq 80$	3
$80 < m \leq 90$	
$90 < m \leq 100$	
$100 < m \leq 110$	
$110 < m \leq 120$	
$120 < m \leq 130$	

- c) On the grid, draw a cumulative frequency graph for your cumulative frequency table.

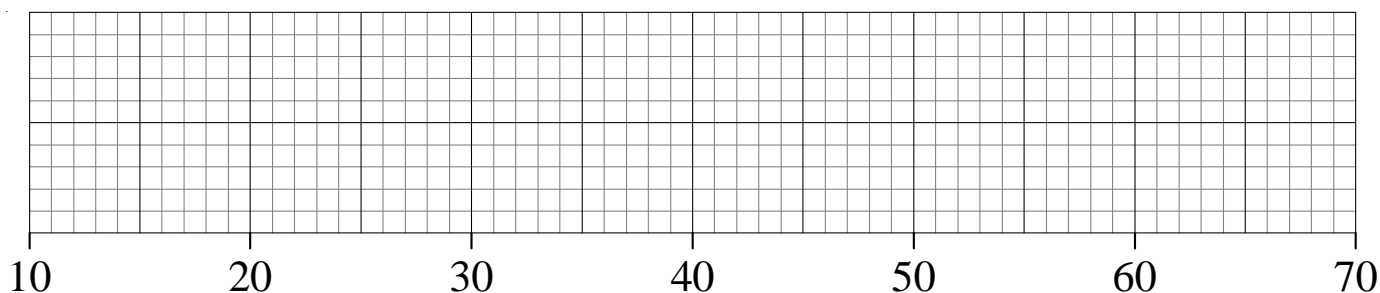


- d) Use your graph to find an estimate for the median.
e) Use your graph to find an estimate for the interquartile range of times.
f) Use your graph to find an estimate for the number of films which take longer than 115 minutes to show.

1) The ages of 20 teachers are listed below.

22, 22, 24, 25, 27, 27, 28, 29, 29, 29, 34, 35, 41, 43, 44, 49, 55, 57, 58, 58

a) On the grid below, draw a box plot to show the information about the teachers.



b) What is the interquartile range of the ages of the teachers?

2) A warehouse has 60 employees working in it.

The age of the youngest employee is 16 years.

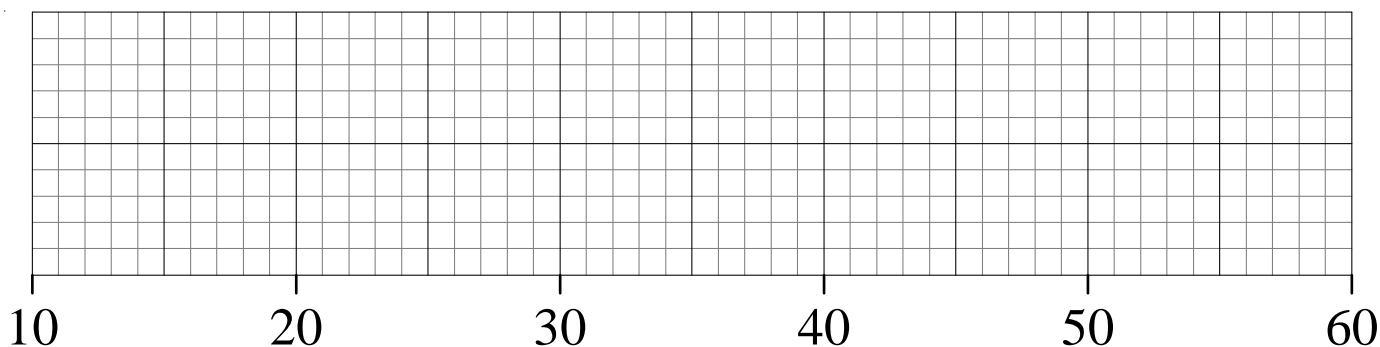
The age of the oldest employee is 55 years.

The median age is 37 years.

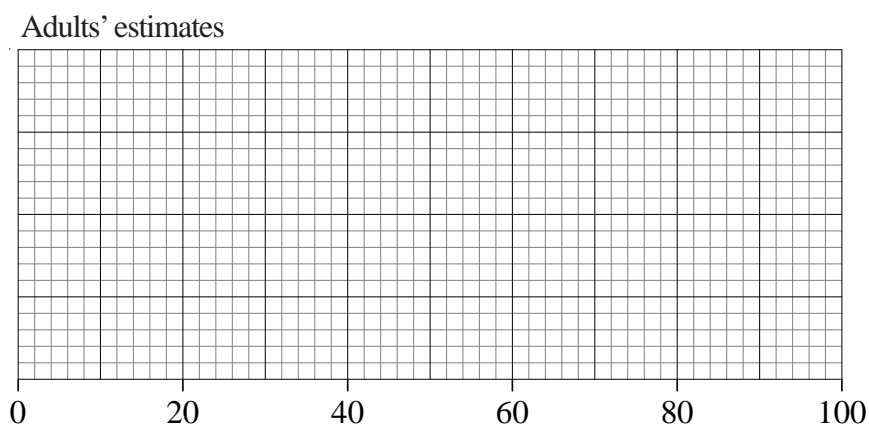
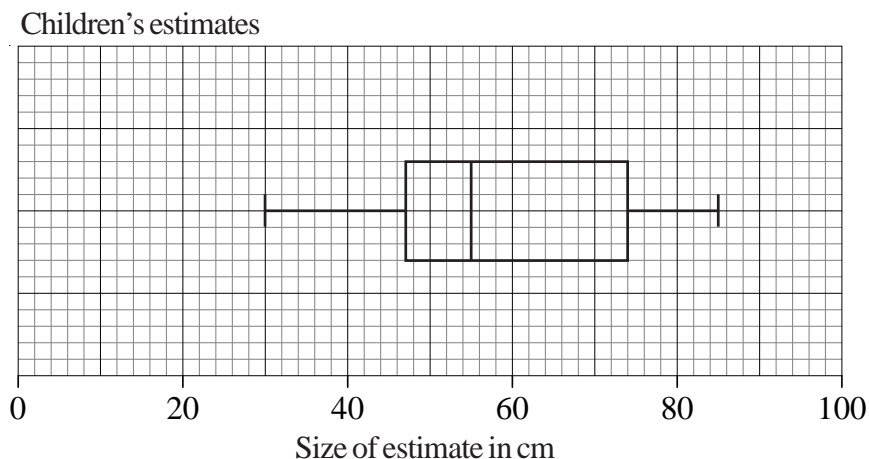
The lower quartile age is 29 years.

The upper quartile age is 43 years.

On the grid below, draw a box plot to show information about the ages of the employees.



Terry drew a line of length 60 cm.
He asked some children to estimate the length of the line he had drawn.
He recorded their estimates.
The box plot gives some information about these estimates.



- Write down the median of the children's estimates.
- Write down the interquartile range of the children's estimates.

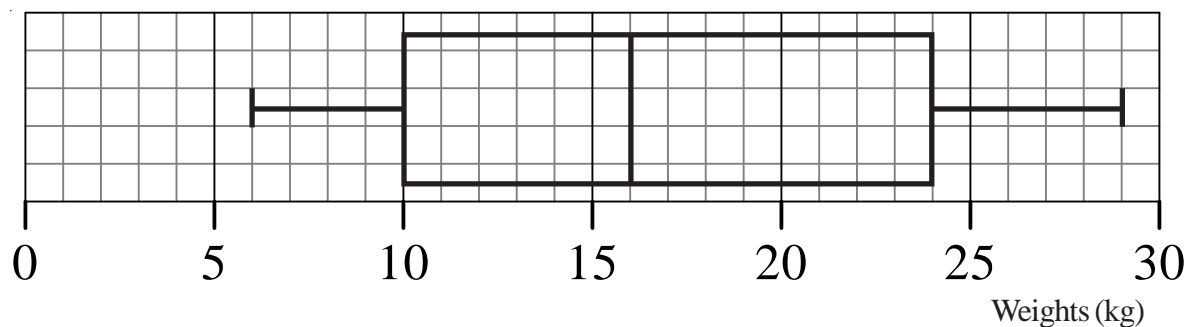
Terry then asked some adults to estimate the length of the line he had drawn.
The table gives some information about the adults' estimates.

	Length
Lowest estimate	20 cm
Lower quartile	45 cm
Median	62 cm
Upper quartile	75 cm
Highest estimate	95 cm

- On the grid above, draw a box plot to show this information.
- Use the two box plots to compare the distribution of the children's estimates with the distribution of the adults' estimates.

Boxplots

- 1) The box plot gives information about the distribution of the weights of bags on a plane.



- a) Claude says that the heaviest bag weighs 24 kg.
He is **wrong**.
Explain why.

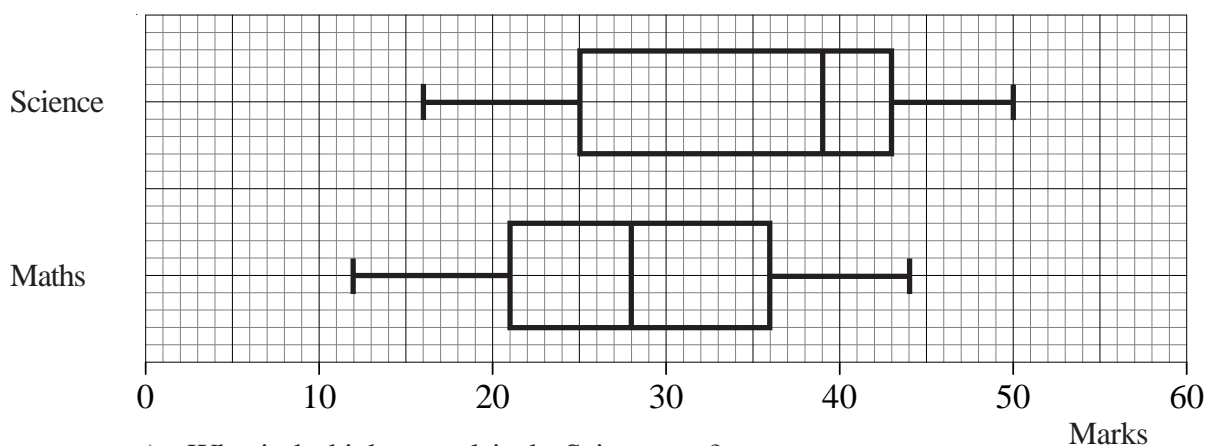
- b) Write down the median weight.

- c) Work out the interquartile range of the weights.

There are 240 bags on the plane.

- d) Work out the number of bags with a weight of 10 kg or less.

- 2) The box plots show the distribution of marks in a Science and Maths test for a group of students.



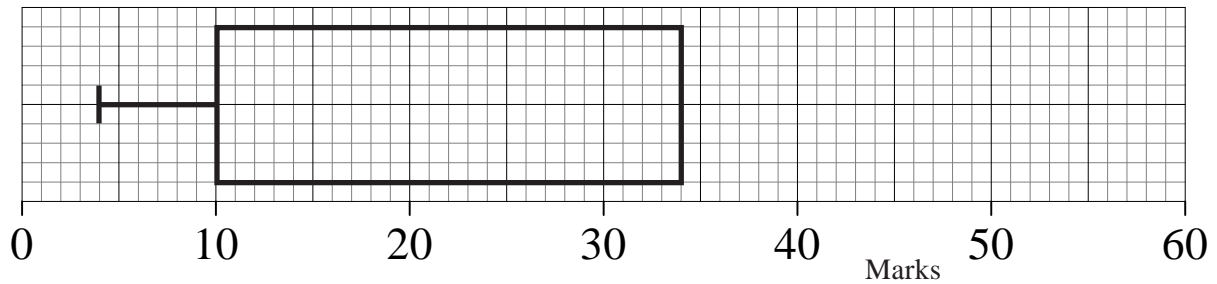
- a) What is the highest mark in the Science test?
- b) Compare the distribution of the marks in the Science test and marks in the Maths test.

1

2

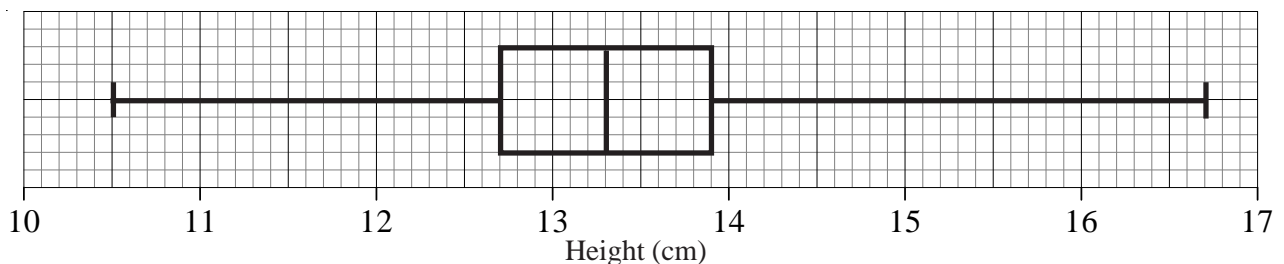
Boxplots

- 1) The incomplete box plot and table show some information about some marks.



	Marks
Lowest mark	4
Lower quartile	
Median	30
Upper quartile	34
Highest mark	55

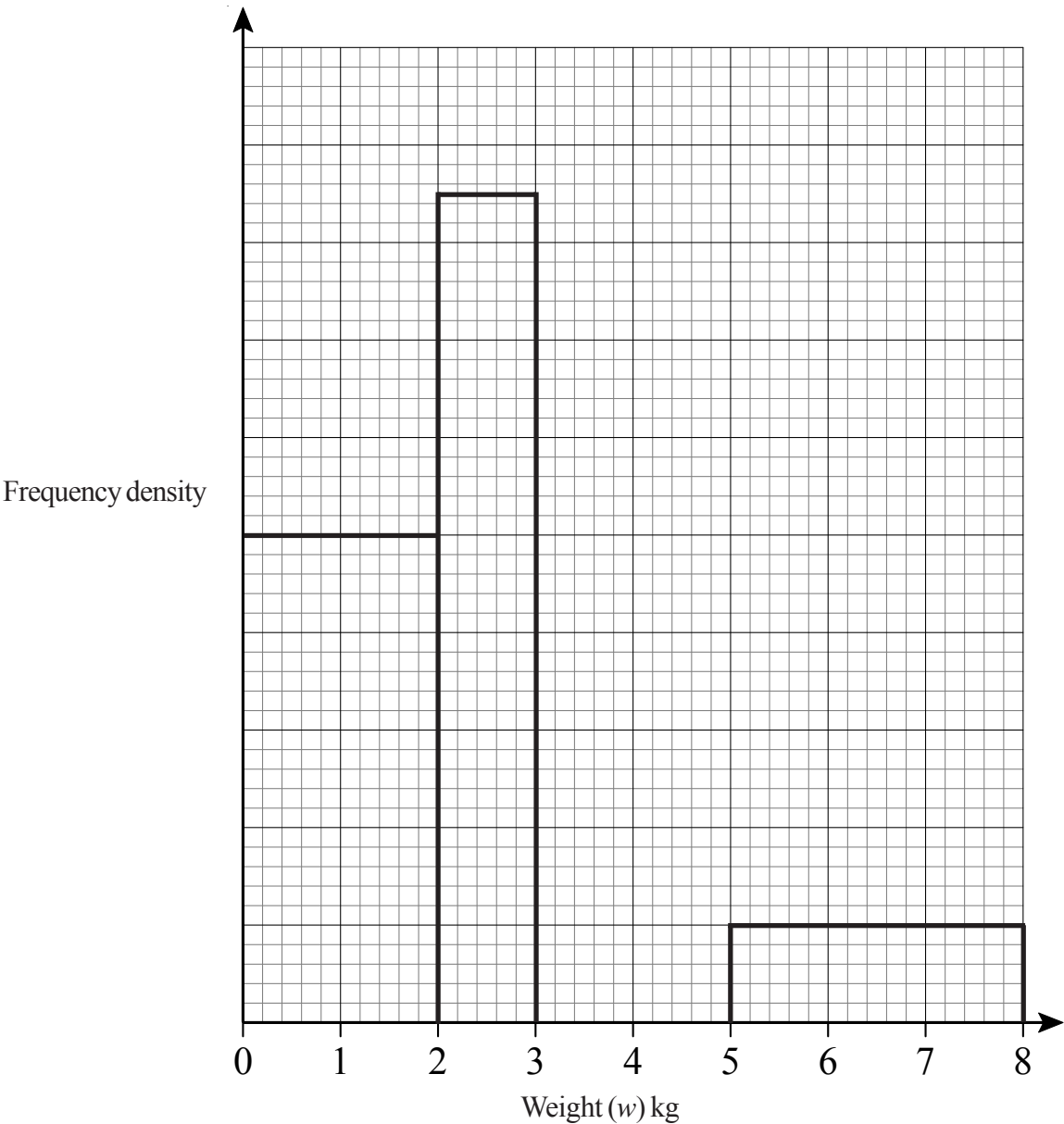
- a) Use the information in the table to complete the box plot.
- b) Use the information in the box plot to complete the table.
- 2) Kim measured the height, in cm, of each tomato plant in her greenhouse. She used the results to draw the box plot shown below.



- a) Write down the median height.
- b) Work out the interquartile range.
- c) Explain why the interquartile range may be a better measure of spread than the range.

Histograms

The table and histogram give some information about the weights of parcels received at a post office during one Thursday.



a) Use the histogram to complete the frequency table.

Weight (w) kg	Frequency
$0 < w \leq 2$	40
$2 < w \leq 3$	
$3 < w \leq 4$	24
$4 < w \leq 5$	18
$5 < w \leq 8$	

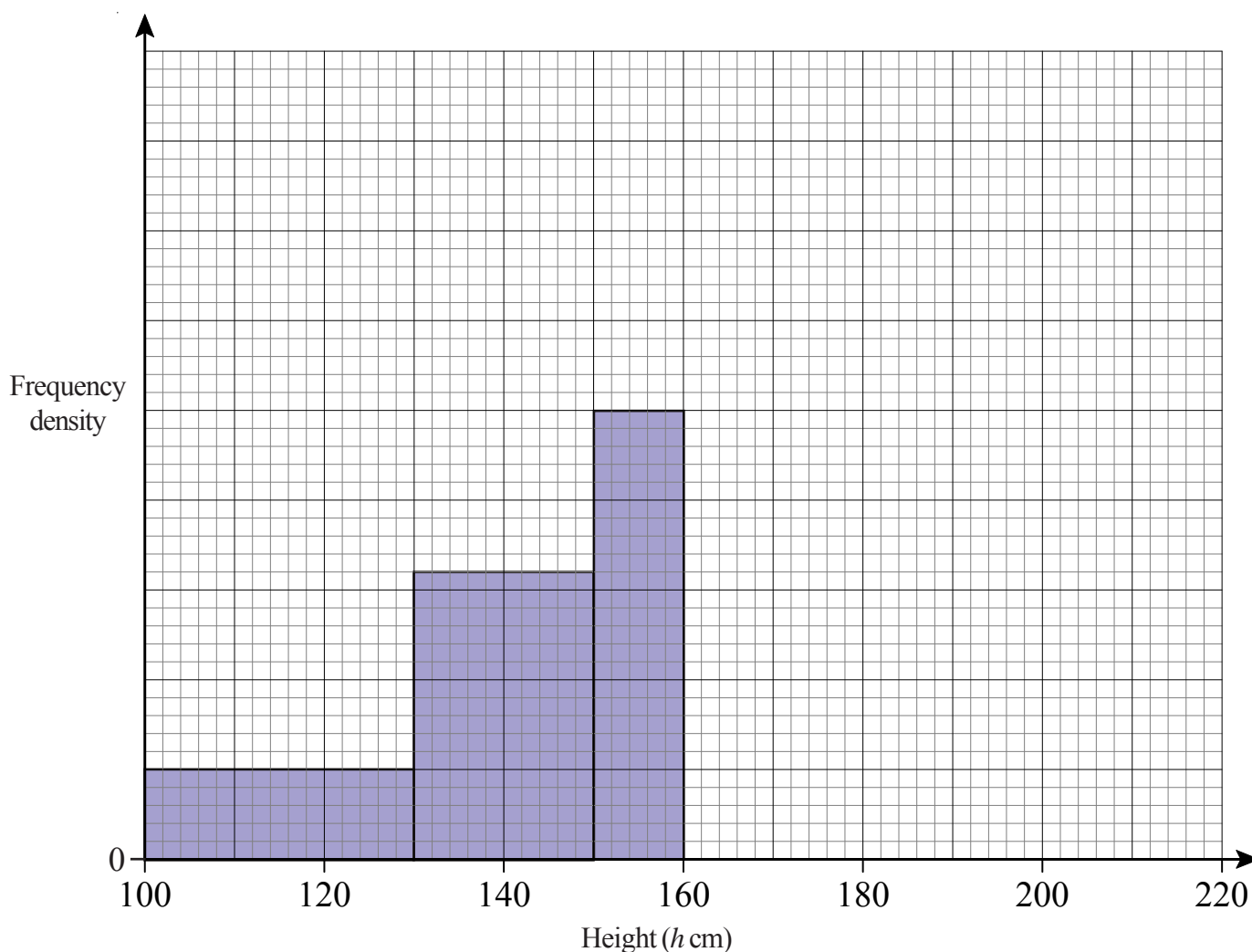
b) Use the table to complete the histogram.

Histograms



The incomplete table and histogram give some information about the heights (in cm) of some plants.

Height (h cm)	Frequency
$100 < h \leq 130$	30
$130 < h \leq 150$	
$150 < h \leq 160$	
$160 < h \leq 180$	40
$180 < h \leq 210$	18



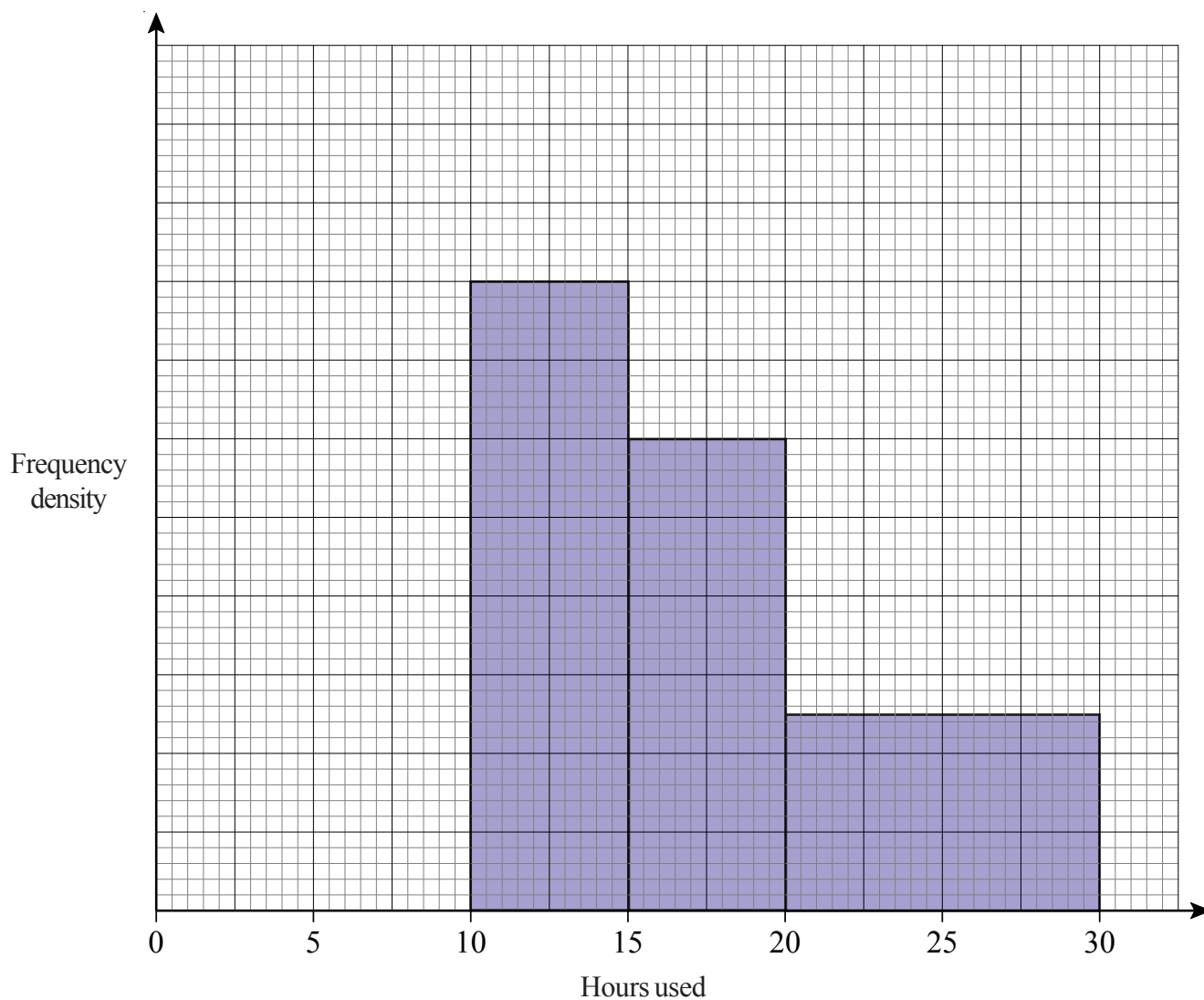
- Use the histogram to complete the table.
- Use the table to complete the histogram.

Histograms



Paul asked the students in his class how many hours they used the internet for last week.

The incomplete histogram was drawn using his results.



Eight students used the internet for between 10 and 15 hours.
Six students used it for between 0 and 10 hours.

a) Use this information to complete the histogram.

No students used the internet for more than 30 hours.

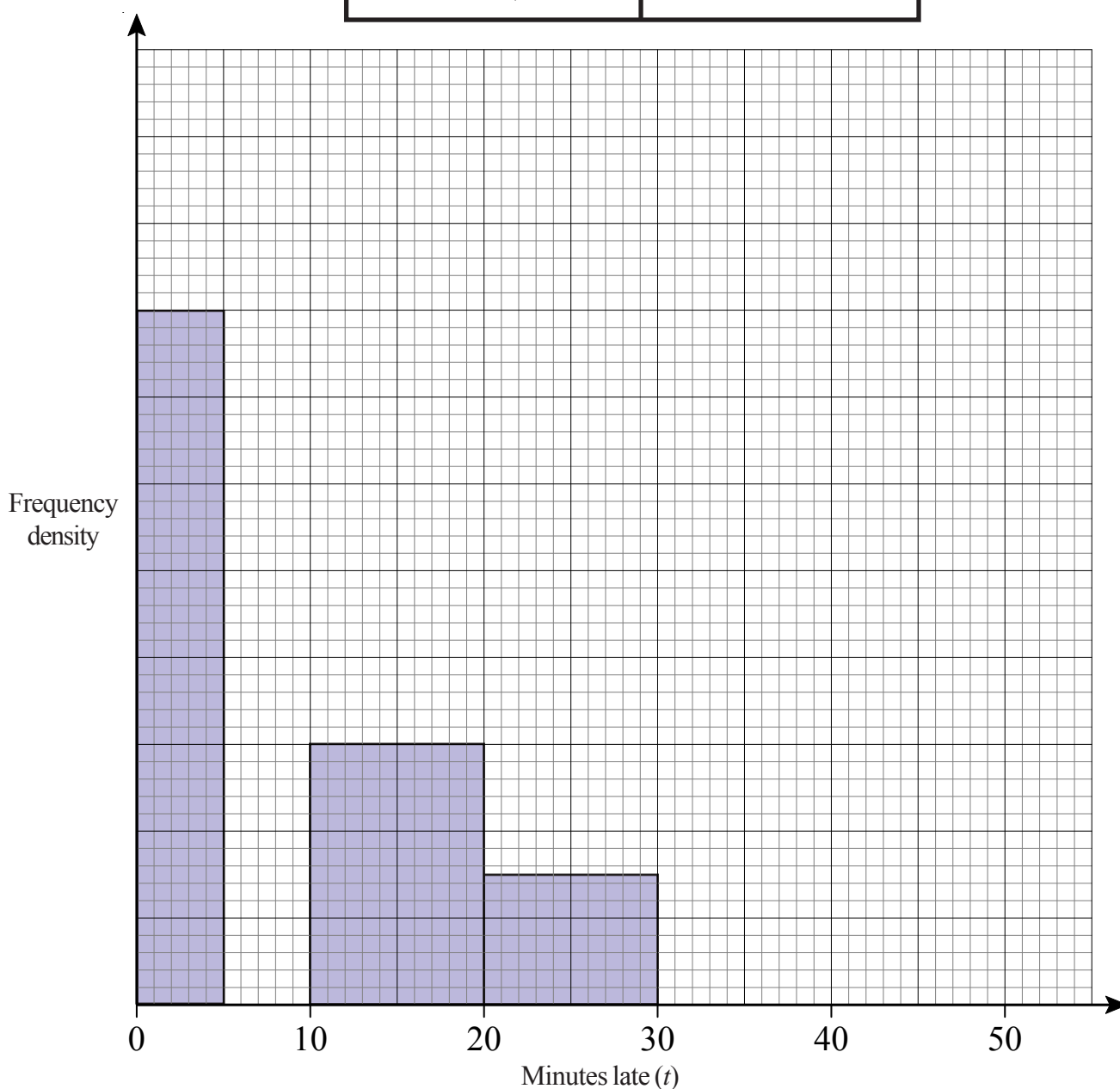
b) Work out how many students Paul asked.

Histograms



Some trains from Nottingham to Leeds were late.
The incomplete table and histogram give some information about how late the trains were.

Minutes late (t)	Frequency
$0 < t \leq 5$	16
$5 < t \leq 10$	10
$10 < t \leq 20$	
$20 < t \leq 30$	
$30 < t \leq 50$	8

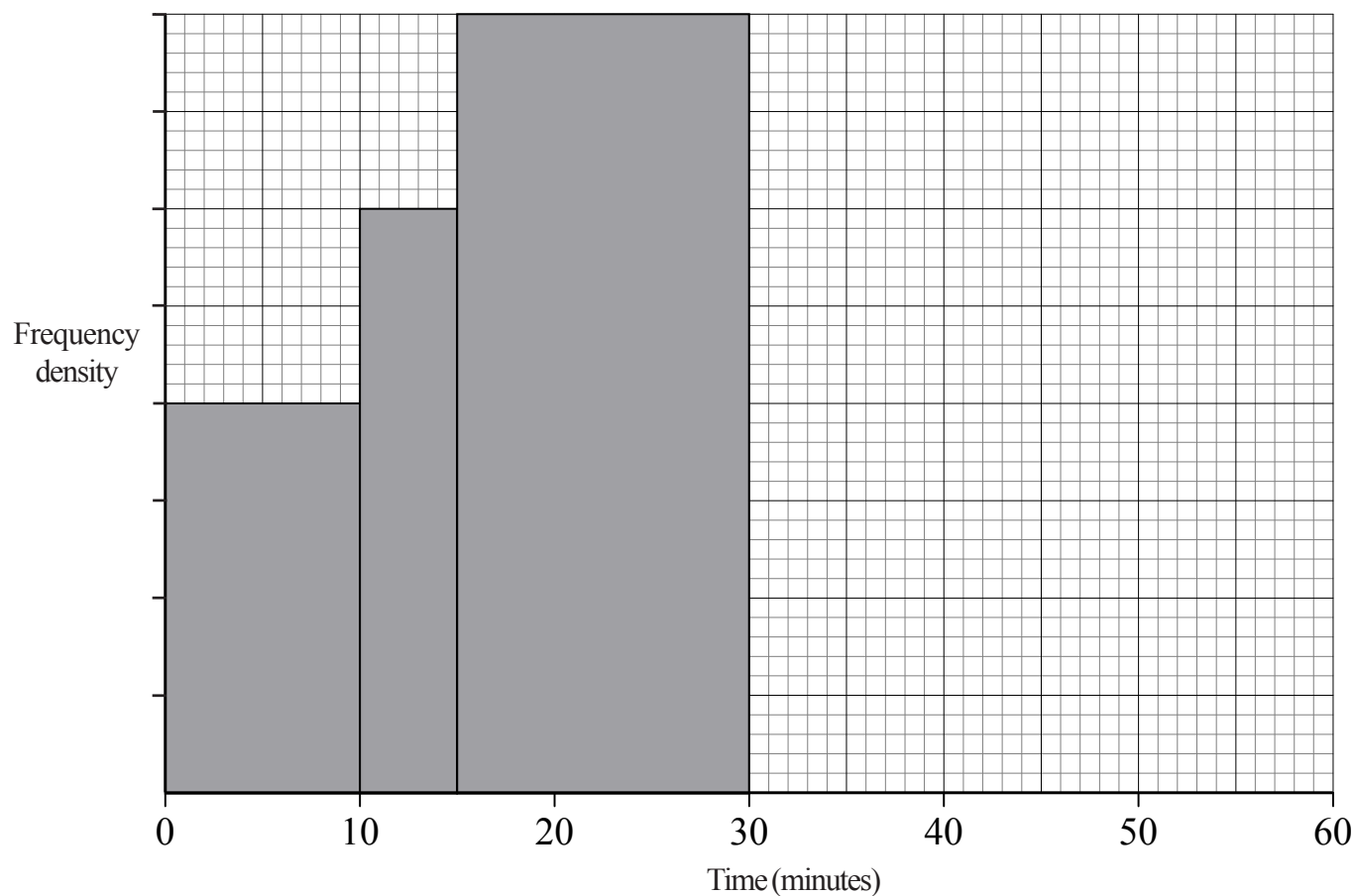


- Use the information in the histogram to complete the table.
- Use the information in the table to complete the histogram.



The table and histogram give information about how long, in minutes, some students took to complete a set of homework.

Time (t) in minutes	Frequency
$0 < t \leq 10$	20
$10 < t \leq 15$	
$15 < t \leq 30$	
$30 < t \leq 50$	62
$50 < t \leq 60$	23

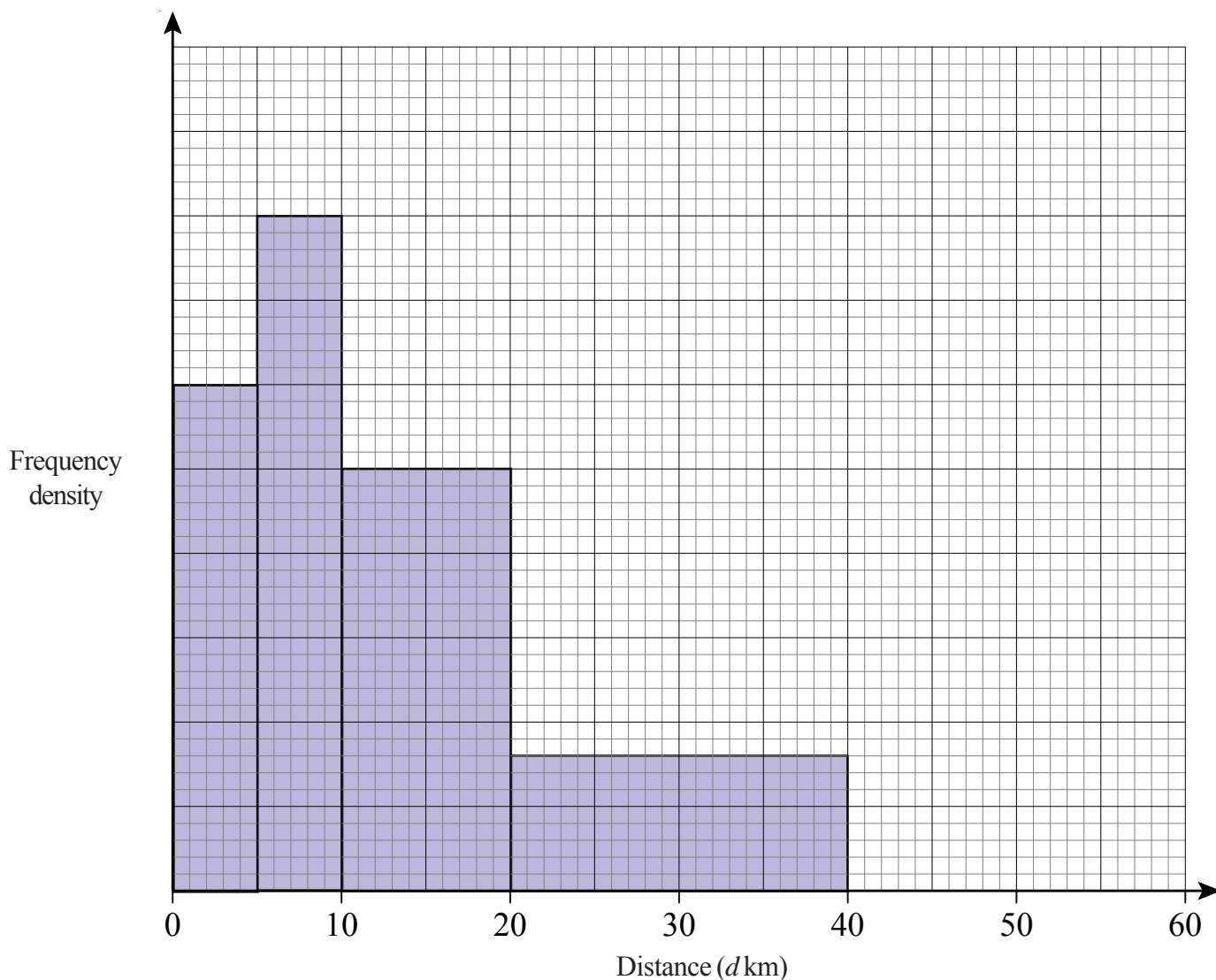


- Use the information in the histogram to complete the table.
- Use the table to complete the histogram.

Histograms



The incomplete histogram and table give some information about the distances some students travel to school.



- a) Use the information in the histogram to complete the frequency table.

Distance (d km)	Frequency
$0 < d \leq 5$	15
$5 < d \leq 10$	20
$10 < d \leq 20$	
$20 < d \leq 40$	
$40 < d \leq 60$	10

- b) Use the information in the table to complete the histogram.

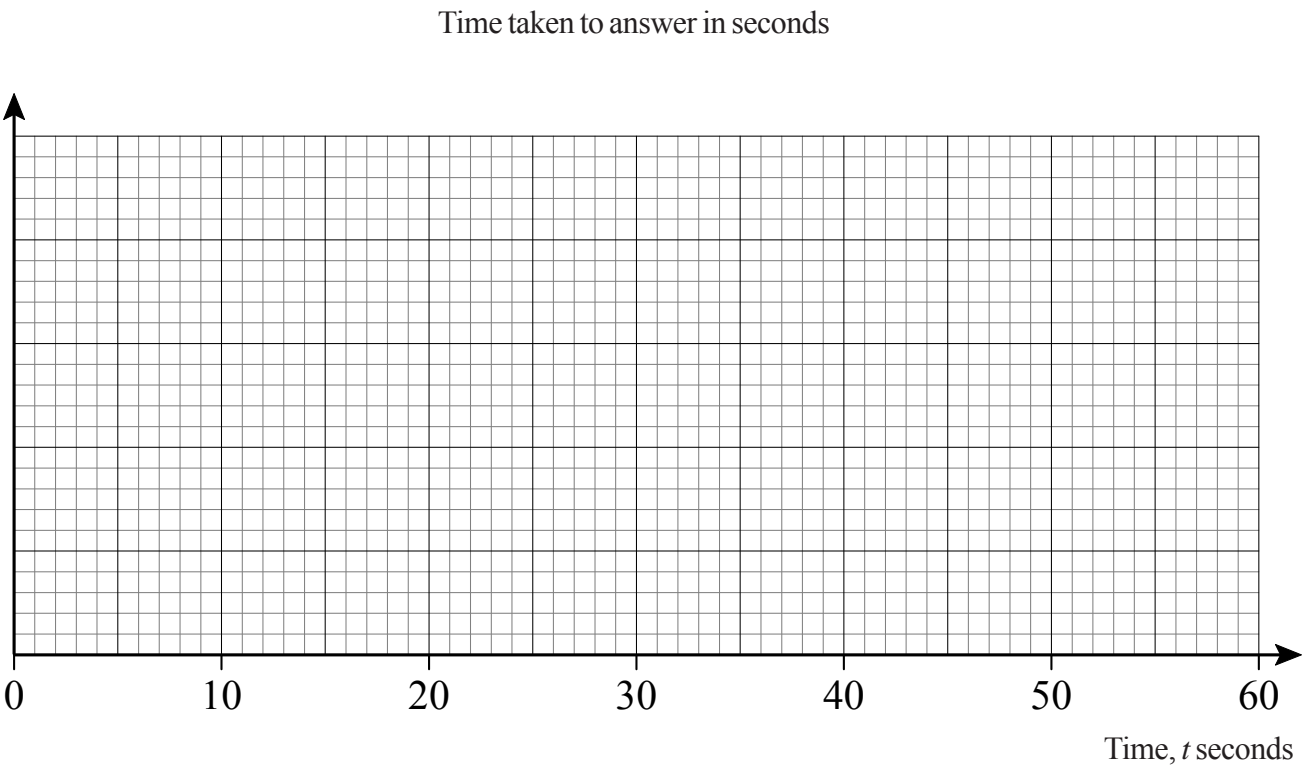
Histograms



There are 100 pupils in Year 11. The time taken by each pupil to answer a question was recorded. The following grouped frequency distribution was obtained.

Time, t seconds	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 60$
Number of pupils	6	19	25	36	14

Draw a histogram to illustrate the distribution on the graph paper below.



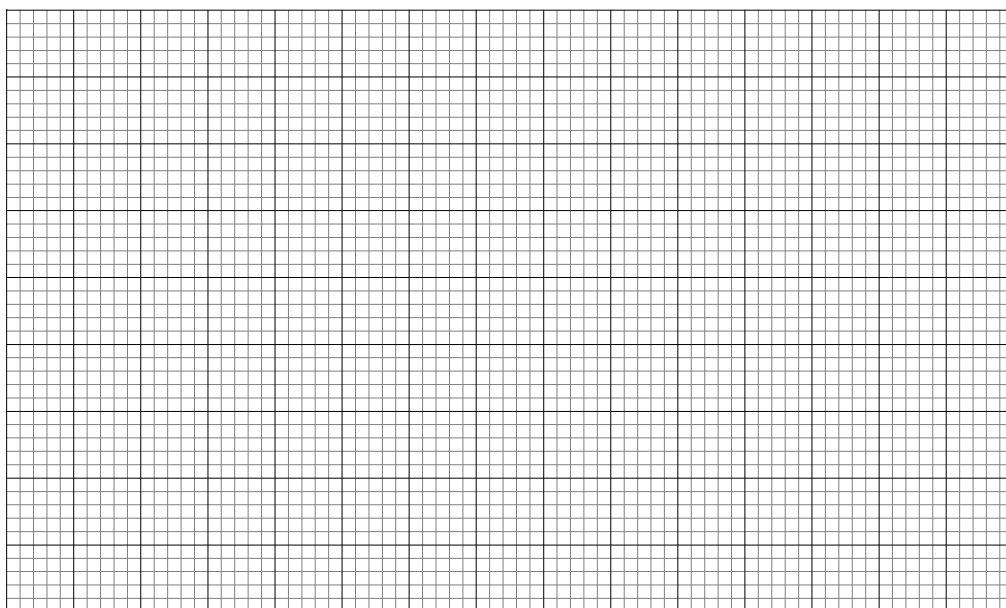
Histograms



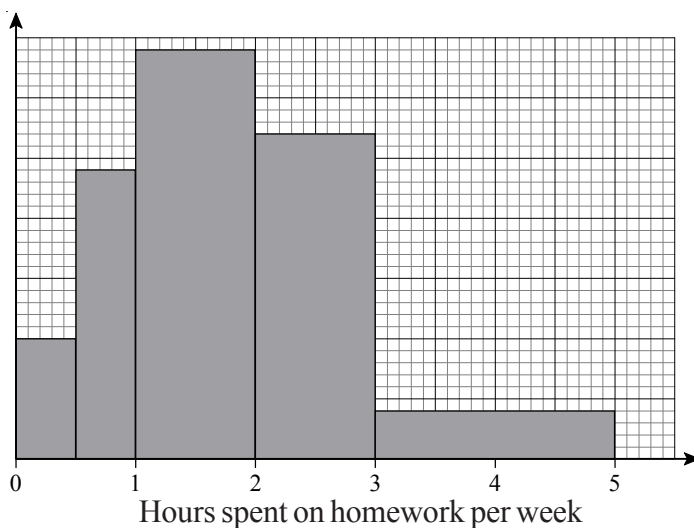
- 1) The table gives information about the heights, in centimetres, of some 18 year old students.

Height (h cm)	Frequency
$135 < h \leq 145$	12
$145 < h \leq 165$	46
$165 < h \leq 180$	45
$180 < h \leq 190$	25
$190 < h \leq 195$	4

Use the table to draw a histogram.



- 2) The histogram shows the amount of time, in hours, that students spend on their homework per week.



Use the histogram to complete the table.

Time (t hours)	Frequency
$0 < t \leq \frac{1}{2}$	
$\frac{1}{2} < t \leq 1$	
$1 < t \leq 2$	
$2 < t \leq 3$	27
$3 < t \leq 5$	