

Mathematics Department

To support our Year 10 Foundation 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	62	Averages and the Range	Probability	2
Foundation/Higher	63	Data - Discrete and Continuous	Probability	2
Foundation/Higher	130a	Averages from a table - Basics	Probability	3
Foundation/Higher	130b	Averages from a table - Estimate for the Mean	Probability	3
Foundation/Higher	152	Sampling Populations	Probability	4
Foundation/Higher	176	Stratified sampling	Probability	5
Week 2				
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 3				
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	119	Volume of a Prism	Geometry	3
Week 4				
Foundation/Higher	169	Spheres	Geometry	5
Foundation/Higher	170	Pyramids	Geometry	5
Foundation/Higher	171	Cones	Geometry	5
Foundation/Higher	172	Frustums	Geometry	5
Week 5				
Foundation/Higher	8	Coordinates	Algebra	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
Week 6				
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 7				
Foundation/Higher	38	Introduction to Ratio	Ratio	2
Foundation/Higher	39	Using Ratio for Recipe Questions	Ratio	2
Foundation/Higher	41	Value for Money	Ratio	2
Foundation/Higher	42	Introduction to Proportion	Ratio	2

Foundation/Higher	105	Exchanging Money	Ratio	3
Foundation/Higher	106	Sharing using Ratio	Ratio	3
Foundation/Higher	107	Ratios, Fractions and Graphs	Ratio	3
Week 8				
Foundation/Higher	150a	Pythagoras' Theorem - A Simple Approach	Geometry	4
Foundation/Higher	150b	Pythagoras' Theorem - An Algebraic Approach	Geometry	4
Foundation/Higher	150c	Pythagoras' Theorem - Line on a Graph	Geometry	4
Week 9				
Foundation/Higher	173	Exact Trigonometric Values	Geometry	5
Foundation/Higher	168	Trigonometry	Geometry	5
Week 10				
Foundation/Higher	14	The Probability Scale	Probability	1
Foundation/Higher	57	Frequency Trees	Probability	2
Foundation/Higher	58	Listing Outcomes	Probability	2
Foundation/Higher	59	Calculating Probabilities	Probability	2
Week 11				
Foundation/Higher	60	Mutually Exclusive Events	Probability	2
Foundation/Higher	61	Two-Way Tables	Probability	2
Foundation/Higher	125	Experimental Probabilities	Probability	3
Foundation/Higher	126	Possibility Spaces	Probability	3
Foundation/Higher	127a	Venn Diagrams - Introduction	Probability	3
Foundation/Higher	127b	Venn Diagrams - Notation	Probability	3
Week 12				
Foundation/Higher	151	Simple Tree Diagrams	Probability	4
Foundation/Higher	175	Harder Tree Diagrams	Probability	5
Foundation/Higher	124	Bearings	Geometry	3
Foundation/Higher	145	Bisecting an Angle	Geometry	4
Week 13				
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
Foundation/Higher	165	Loci	Geometry	5
Week 14				
Foundation/Higher	51	Plans and Elevations	Geometry	2
Foundation/Higher	19	Multiplying Integers	Number	2
Foundation/Higher	20	Dividing Integers	Number	2
Foundation/Higher	30	Multiplying and Dividing by Powers of 10	Number	2
Foundation/Higher	66	Multiplying Decimals	Number	3
Foundation/Higher	67	Dividing Decimals	Number	3

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





- 1) Kaya made a list of his homework marks.

3 2 3 4 1 4 5 4

- Write down the mode of Kaya's marks.
- Work out his mean homework mark.

- 2) Lydia rolled an 8-sided dice ten times.
Here are her scores.

5 1 2 5 3 8 6 6 3 2

- Work out Lydia's median score.
- Work out the mean of her scores.



- 3) In a two-week period, a train was this many minutes late each day:

3 0 0 0 7 4 5 2 0 1 14 0 5 1

- What was the mean average number of minutes late?
- What was the median average number of minutes late?



- 4) Two small Year 10 classes, Set A and Set B, sat the same Science test.

Set A had these scores for the test:

63%, 71%, 48%, 95%, 46%, 82%, 77%, 36%, 73%

Set B had these scores:

58%, 63%, 85%, 61%, 59% 38%, 90%, 84%, 75%, 48%

How much bigger was Set B's mean average score than Set A's mean average score?
Give your answer correct to 1 decimal place.



- 5) A rugby team played six games.

The mean score for the six games is 15

The rugby team played one more game.

The mean score for all seven games is 16

Work out the number of points the team scored in the seventh game.

- 1) Out of the following types of data, decide which is continuous and which is discrete:

The lengths of some roads.

The number of 'cats eyes' on a one mile stretch of road.

The time it takes twenty students to complete an English essay.

The number of pages in twenty students English essays.

The weights of sacks of potatoes.

The number of potatoes in some sacks of potatoes.

The depth of water as the tide comes in and goes out.

The number of crackers in some packets of biscuits.

The weight of the crackers in some packs of biscuits.

- 2) Write a short statement which explains what continuous data is.
- 3) Write a short statement which explains what discrete data is.

Averages From a Table



- 1) The number of pens in each pupil's pencil case in a classroom has been counted. The results are displayed in a table.

Number of pens	Number of pupils
0	4
1	6
2	7
3	5
4	3
5	1

- Work out the total number of pens in the classroom.
- Write down the modal number of pens in a pencil case.
- Work out the mean number of pens in a pencil case.
- Work out the range of the number of pens in a pencil case.



- 2) Thomas is analysing the local football team. He records the number of goals scored in each football match in the past twelve months.

Thomas said that the mode is 7
Thomas is wrong.

- Explain why.
- Calculate the mean number of goals scored.

Goals scored	Frequency
0	7
1	5
2	3
3	6
4	2
5	1
6	1



- 3) Sindy recorded the time, in minutes, that her train was late over 100 days. Information about these times is shown in the table.

Time (t minutes)	Frequency		
$0 < t < 6$	15		
$6 < t < 12$	23		
$12 < t < 18$	28		
$18 < t < 24$	19		
$24 < t < 30$	15		

Calculate an estimate for the mean time that her train was late.
Give your answer to 1 decimal place.

- 1) In a school there were 800 students who regularly had a school dinner.

The Headteacher of the school wanted to know whether the students liked the dinners.

- a) What is the main advantage of asking a sample of the students whether they like school dinners rather than asking all of them?
- b) The Headteacher asked 100 KS3 students whether they liked the dinners and 40 of them said they did.

Use this information to estimate how many of the 800 students liked school dinners.

- c) In finding your answer to part b), what assumption have you made?
- d) What could be done to make your estimate more accurate?

- 2) A park-keeper wanted to know how many fish there were in the park pond.

He went to the pond early one morning and used his fishing rod to catch 20 fish. The bait he used was maggots.

Then, he marked each of the fish with a white dot on their tail and released them.

A week later, he used his fishing rod and maggots to catch another 20 fish.

He found that 4 of these 20 fish had the white dot on their tails.

- a) Use this information to estimate how many fish there are in the pond.
- b) In finding your estimate, what assumption have you made?

Stratified Sampling



- 1) Ellen wants to do a survey with Years 9, 10 and 11 at her school.
The table shows the number of students in each of these year groups.

Year 11	Year 10	Year 9
750	700	900

Ellen takes a sample of 50 students stratified by year group.

Work out the number of students from Year 10 in the sample.



- 2) The table shows information about the year groups of 1000 students in a school.

Year group	7	8	9	10	11	12	13
Number in year	157	180	166	140	132	114	111

Tony takes a sample of 50 of these students, stratified by year group.

Calculate the number of Year 8 students he should have in his sample.



- 3) The table shows information about Ben's collection of 652 coins.

Country	France	Spain	Germany	Italy	Total
Number of coins	240	182	133	97	652

Ben takes a sample of 50 coins stratified by country.

Work out the number of coins from Italy in this sample.



- 4)

	Male	Female
Lower sixth	399	602
Upper sixth	252	198

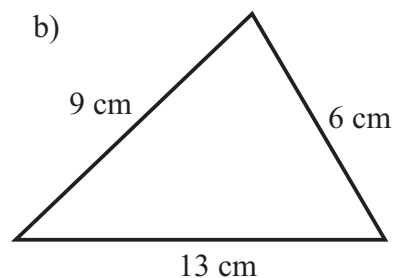
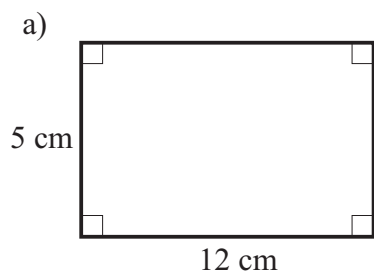
The table gives information about the number of students in the two years of a sixth form.

Amy wants to interview some of these students.

She takes a random sample of 70 students stratified by year and by gender.

Work out the number of students in the sample who are male and in the lower sixth.

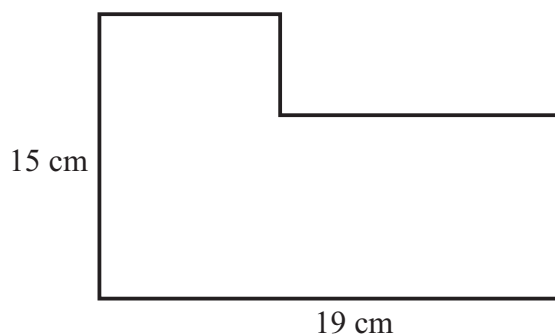
- 1) Find the perimeters of the following two shapes.



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

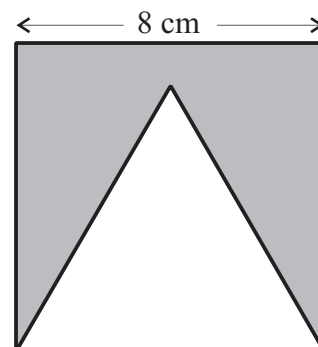
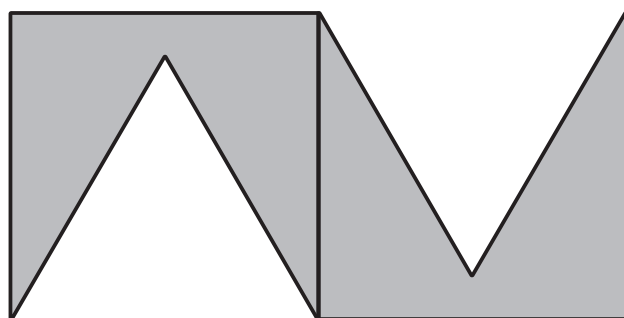
Calculate the length of the width of the rectangle.

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



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

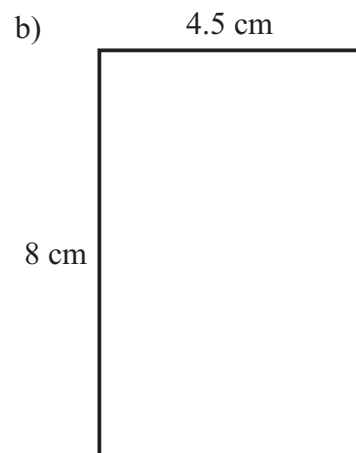
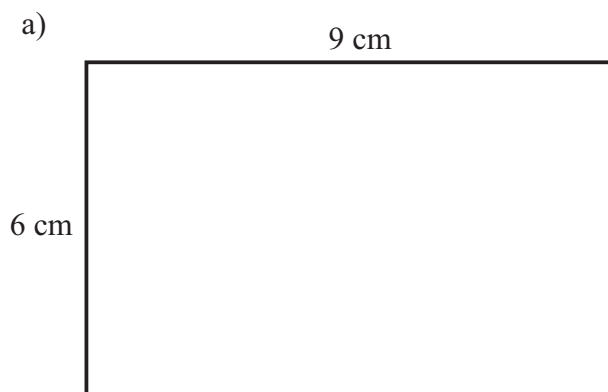
Two of these shapes are then put together to make this shape.



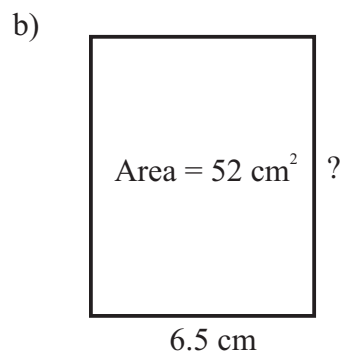
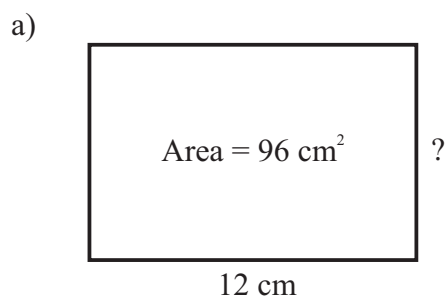
Work out the perimeter of this new shape.

Area of a Rectangle

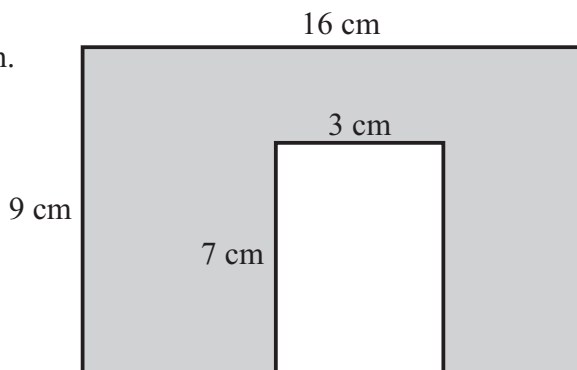
- 1) Find the areas of these two rectangles.



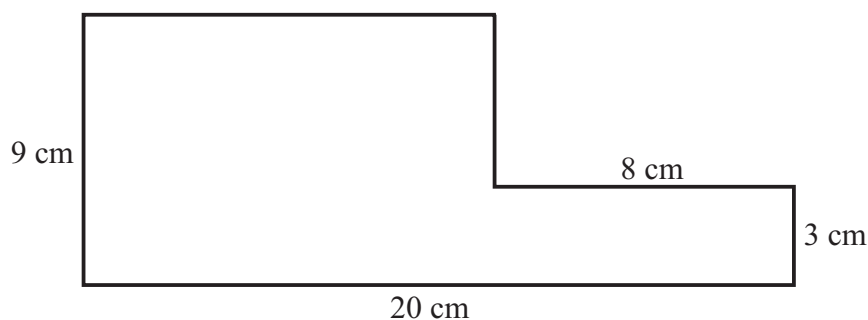
- 2) Find the size of the missing sides in these two rectangles.



- 3) Find the area of the shaded section.

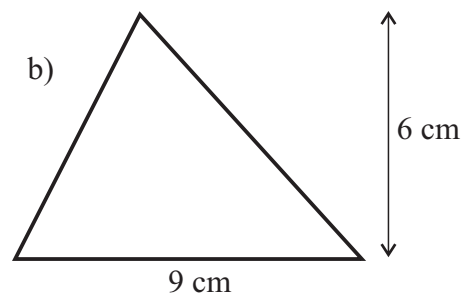
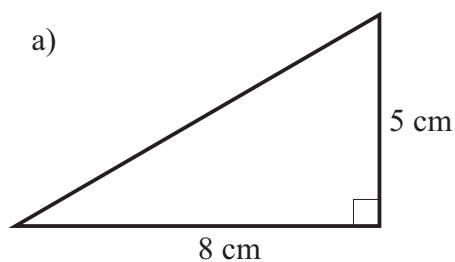


- 4) Find the area of the L shape.

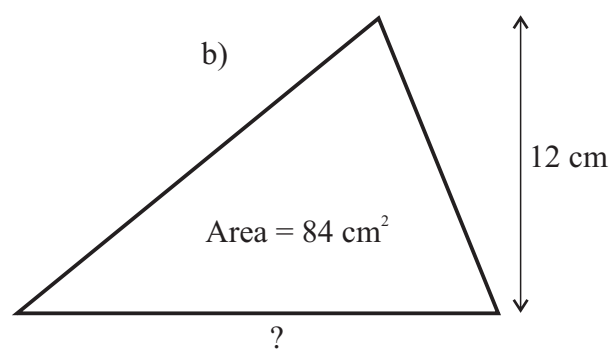
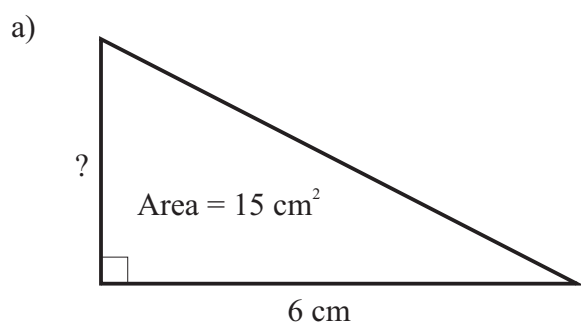


Area of a Triangle

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

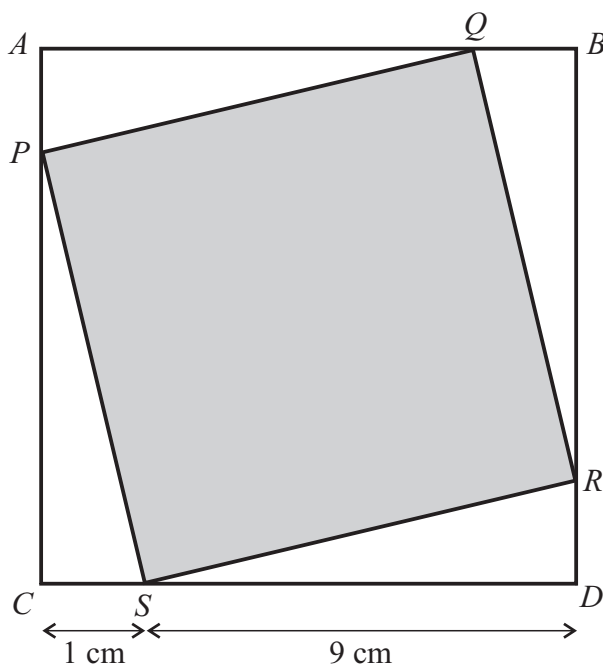


- 2) Find the missing lengths.



- 3) $ABCD$ is a square.

$PQRS$ is a square.

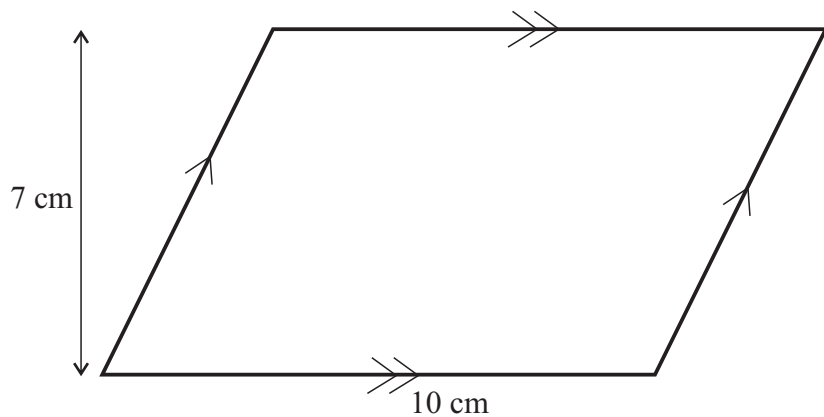


Find the area of the shaded square, $PQRS$.

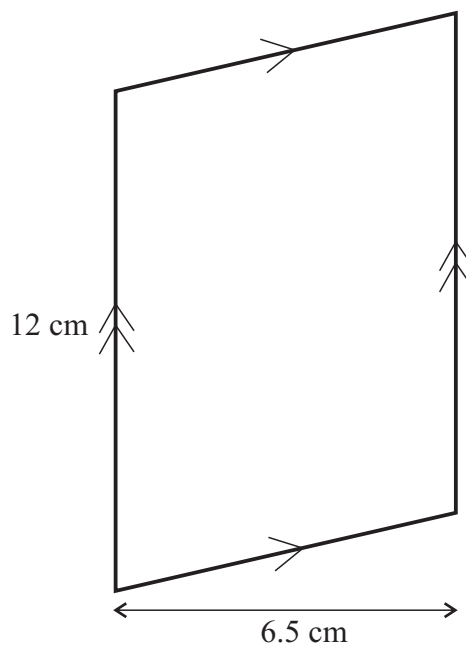
Area of a Parallelogram

1) Find the area of each of these parallelograms.

a)

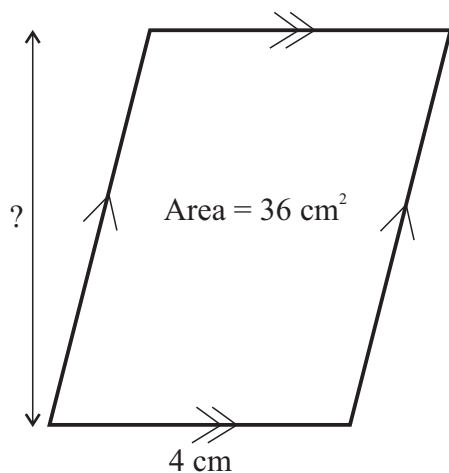


b)

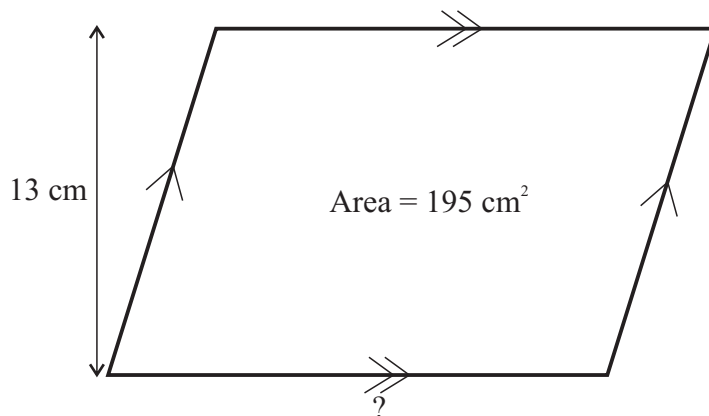


2) Find the missing lengths in these two parallelograms.

a)

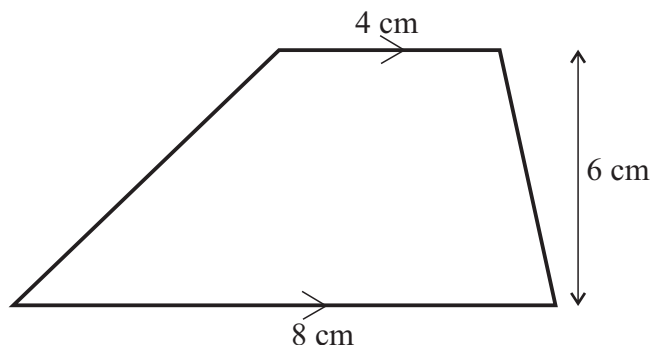


b)

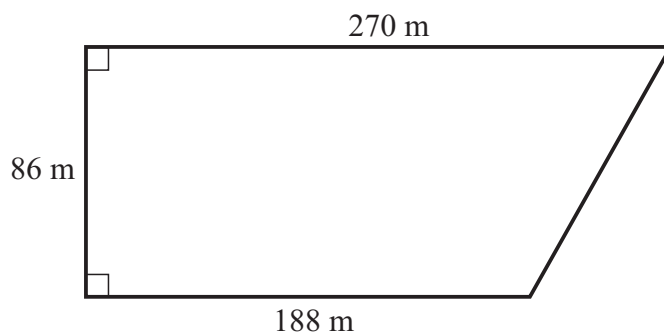


Area of a Trapezium

- 1) Find the area of this trapezium.



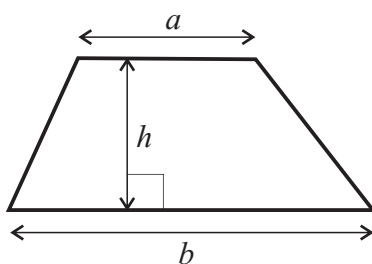
- 2) The diagram shows a field.



Work out the area of the field.



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

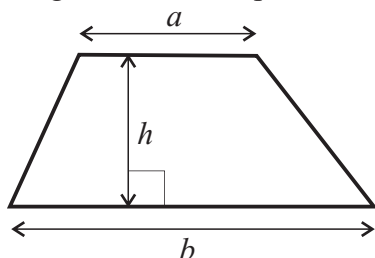


Work out the area of the trapezium.

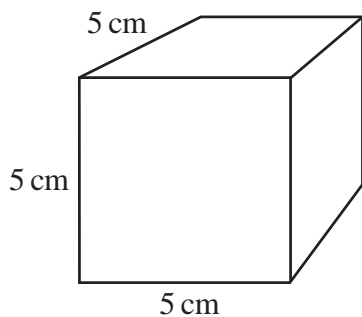


- 4) In the trapezium below, the area is 45 cm^2 .
 $a = 5$ cm and $b = 10$ cm.

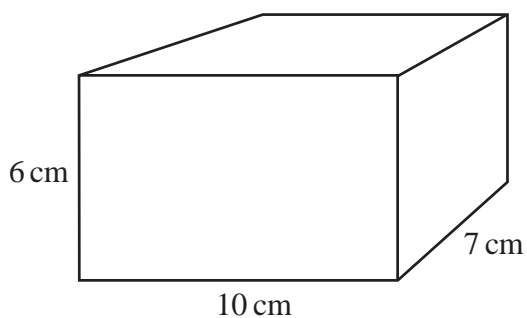
Calculate the height, h , of the trapezium.



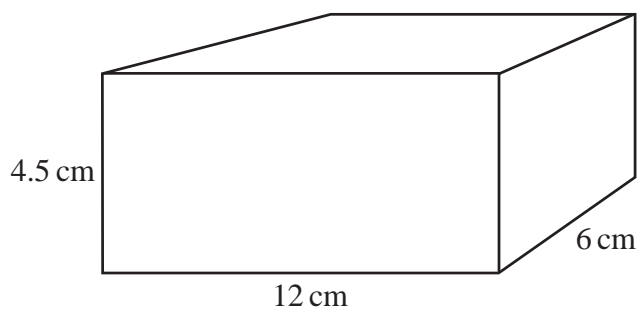
- 1) A cube has sides of length 5 cm.
Find the total surface area of the cube.



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

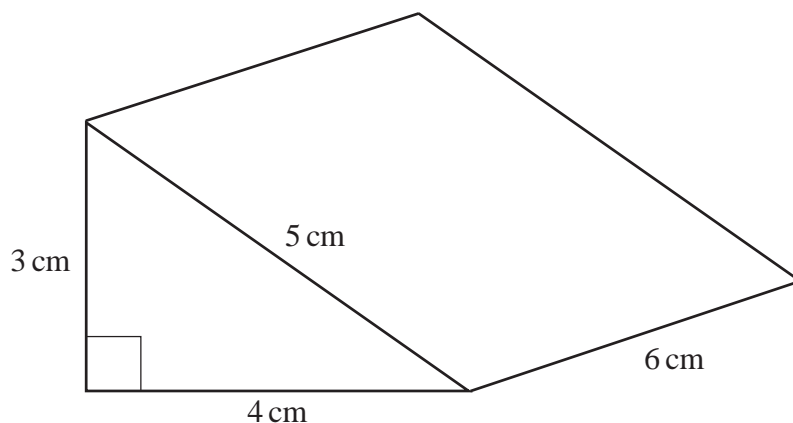


- 3) A cuboid has sides of length 12 cm, 4.5cm and 6 cm.
Find the total surface area of the cuboid.

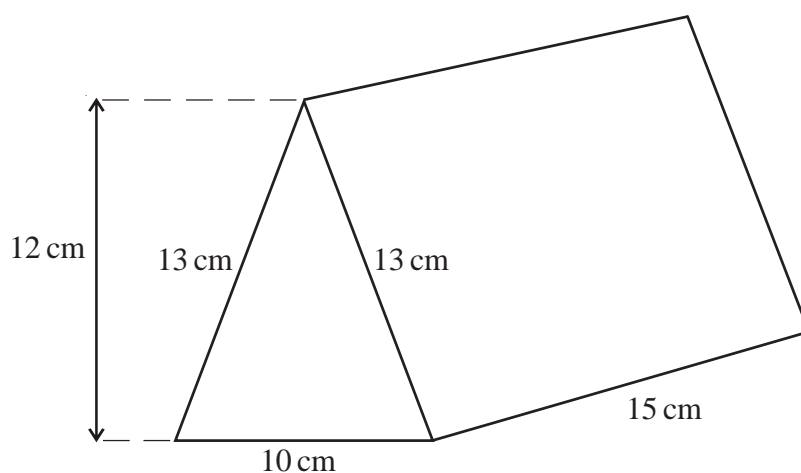


Surface Area of a Prism - Triangular Prisms

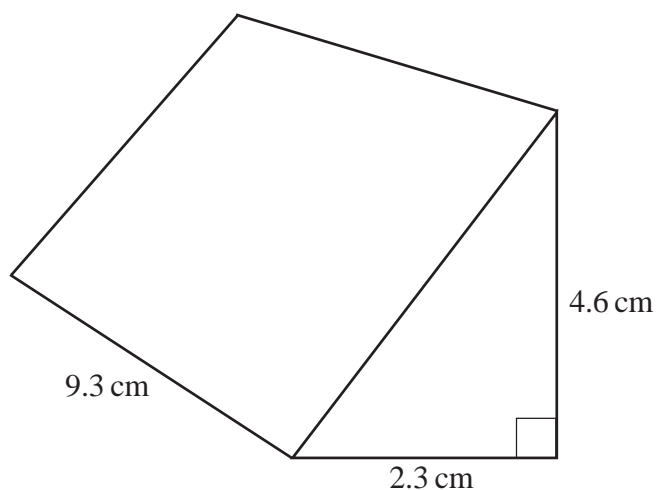
- 1) Find the surface area of this triangular prism.



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

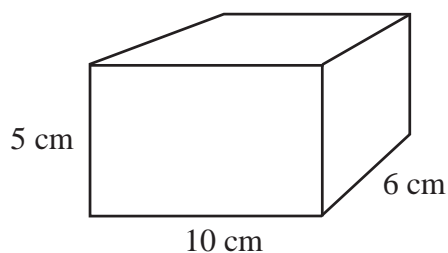


- 3) With the aid of Pythagoras' Theorem, find the surface area of this triangular prism.
Give your answer correct to 2 significant figures.

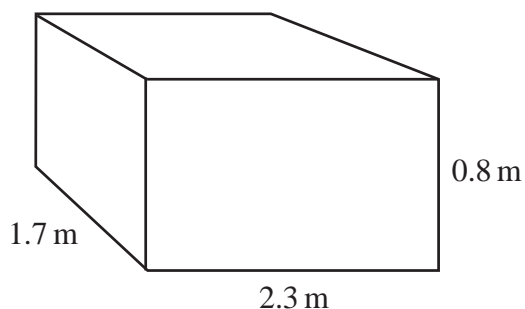


Volume of a Cuboid

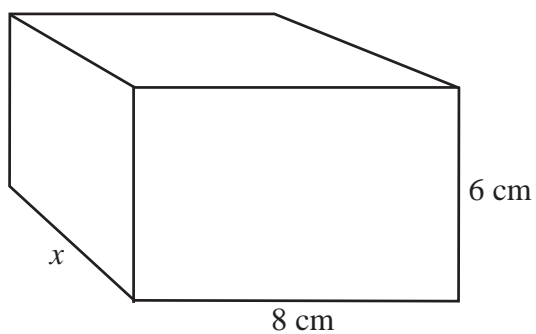
- 1) Find the volume of this cuboid.



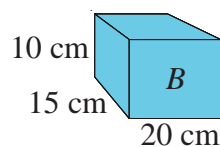
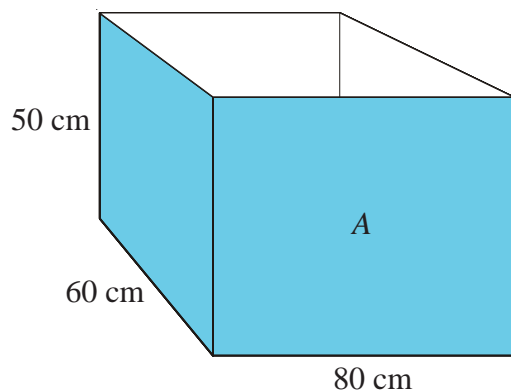
- 2) Find the volume of this cuboid.



- 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 ?

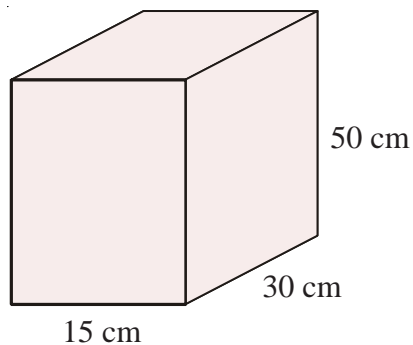


Volume of a Prism

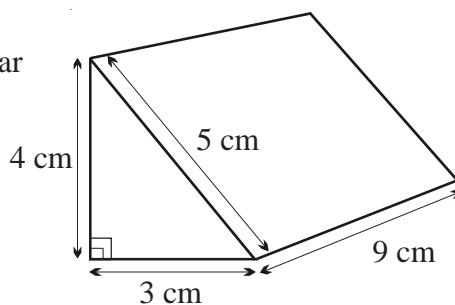


- 1) The diagram shows a cuboid.

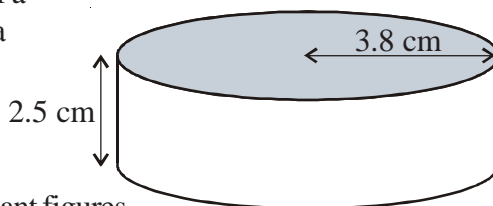
Work out the volume of the cuboid.



- 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.

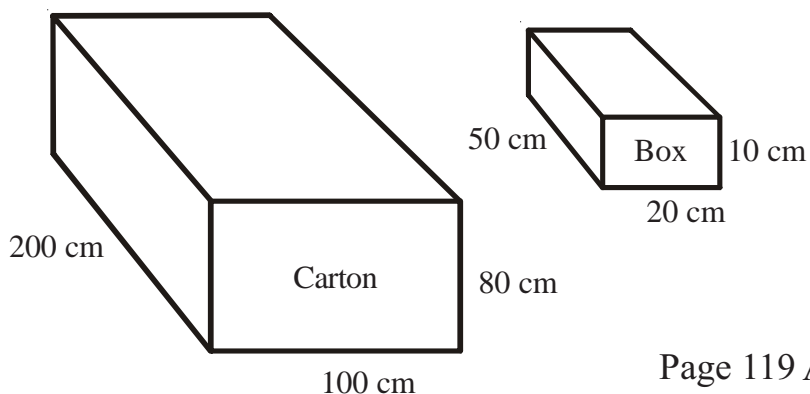
Work out the volume of the puck.
Give your answer correct to 3 significant figures.

- 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.

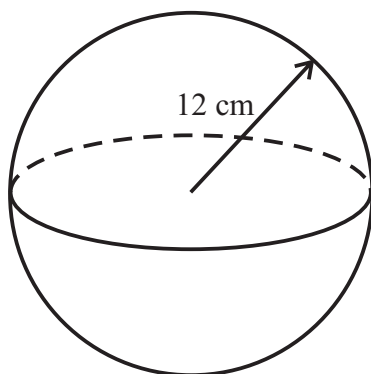


$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

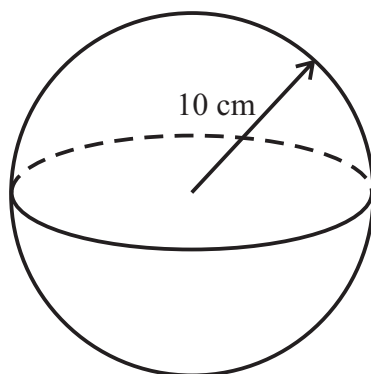
$$\text{Surface area of a sphere} = 4\pi r^2$$



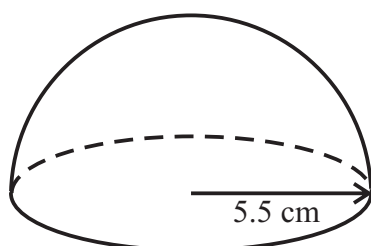
- 1) a) Work out the volume of the sphere.
b) Work out the surface area of the sphere.



- 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 .

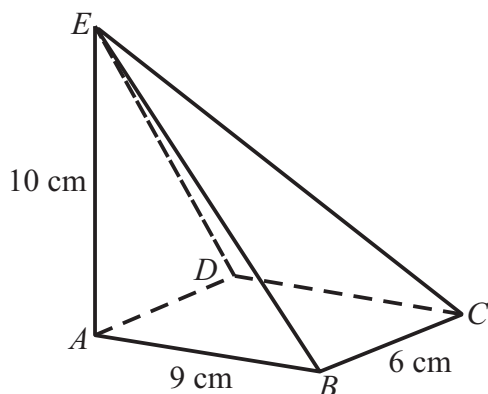


- 3) a) Work out the volume of the solid hemisphere.
b) Work out the surface area of the solid hemisphere.



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

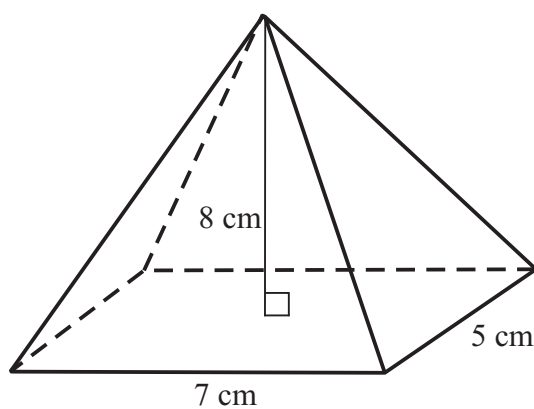
- 1) The pyramid has a rectangular base and E is vertically above A .



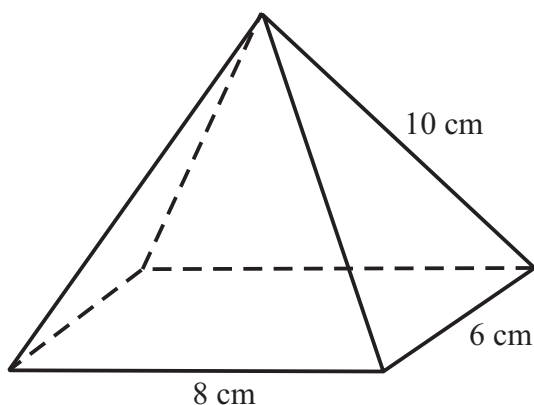
Find the volume of the pyramid.



- 2) Find the volume of this pyramid.



- 3) Find the volume of this pyramid.

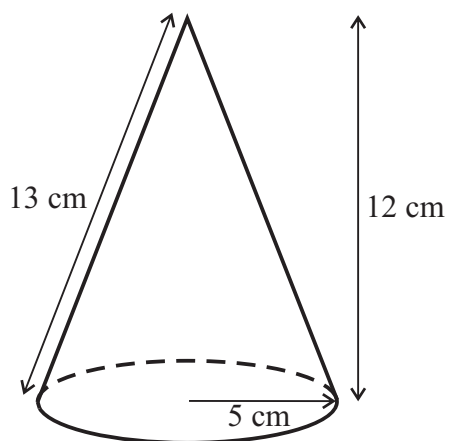


$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

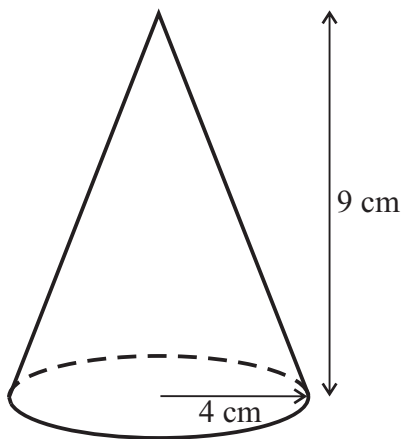
$$\text{Curved surface area} = \pi r l$$



- 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 .

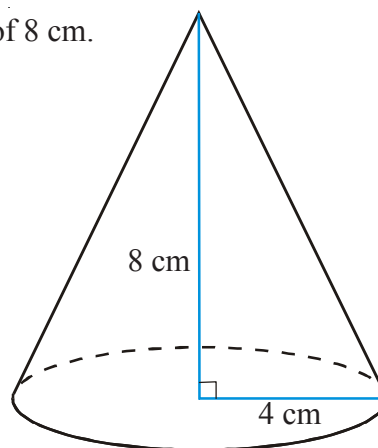


Spheres and Cones



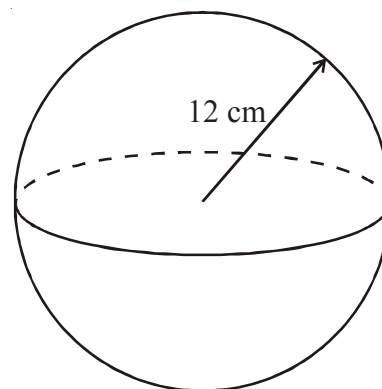
- 1) A cone has a base radius of 4 cm and a vertical height of 8 cm.

- 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.



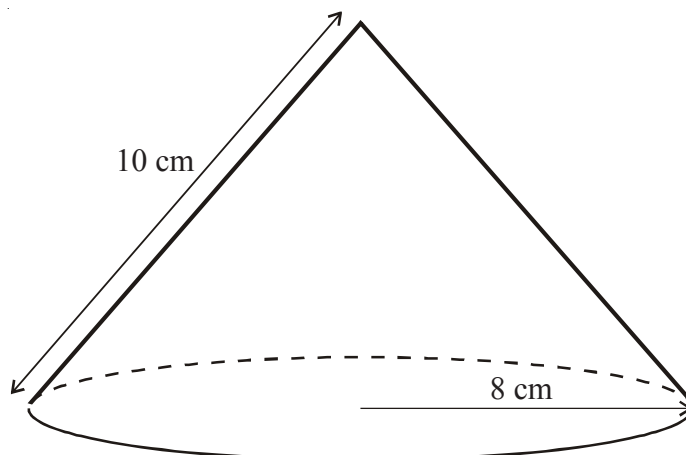
- 2) A sphere has a radius of 12 cm.

- 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.

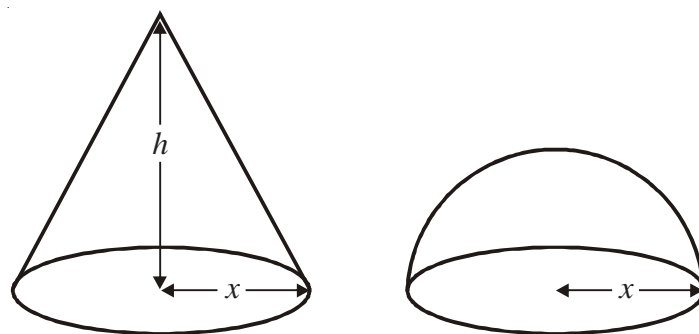


- 3) A cone has a base radius of 8 cm and a slant height of 10 cm.

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



1)



The diagram shows a solid cone and a solid hemisphere.

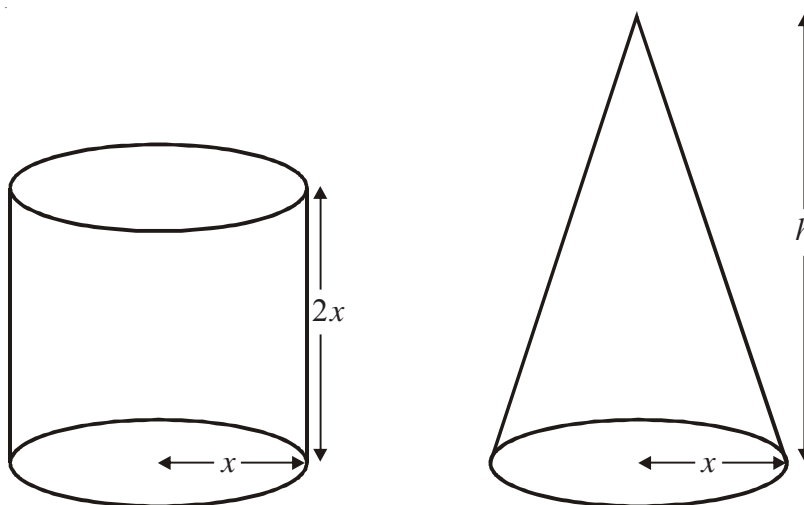
The cone has a base of radius x cm and a height of h cm.

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.

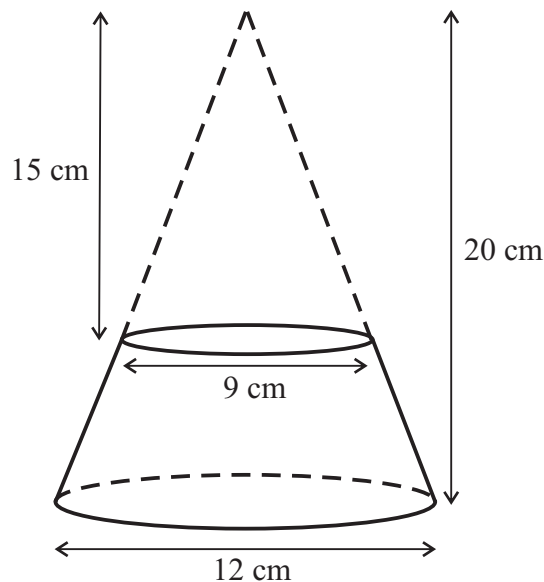
Find h in terms of x .

Give your answer in its simplest form.

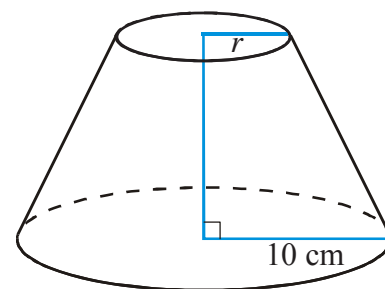
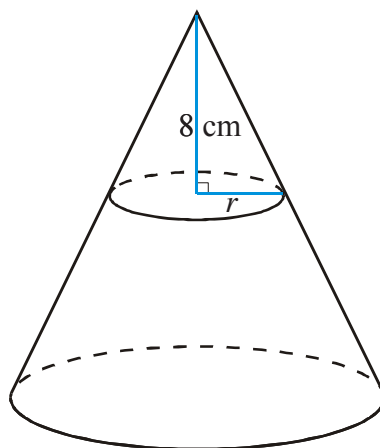
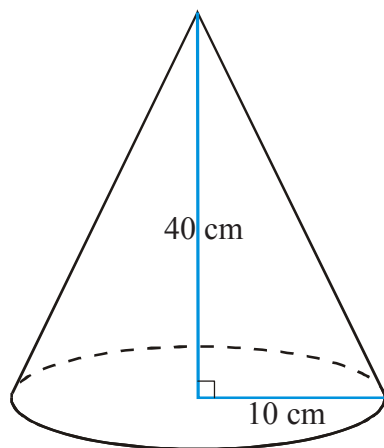


- 1) A frustum is made by removing a small cone from a similar larger cone.

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.



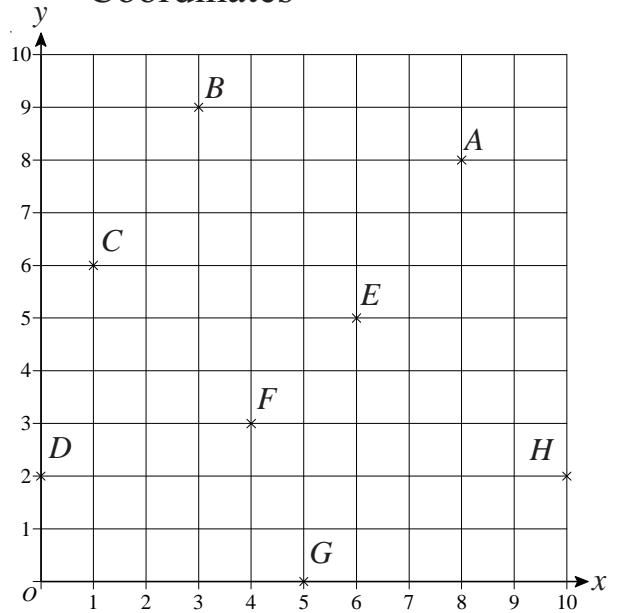
- a) Work out the radius r of the base of the smaller cone.

Calculate, to the nearest cm^3

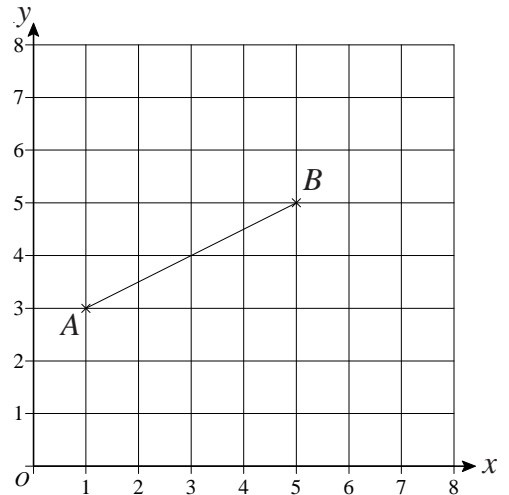
- b) The volume of the larger cone.
c) The volume of the smaller cone.
d) The volume of the frustum.

Coordinates

- 1) Write down the coordinates of the points A to H .



- 2) a) Write down the coordinates of: (i) A (ii) B
 b) Write down the coordinates of the midpoint of the line AB .



- 3) Using the pair of axes,
 a) Plot the points $A(2, 0)$, $B(4, 0)$, $C(5, 2)$ and $D(3, 2)$.

- b) Join the points in order, to form a shape and name the shape.

M is the midpoint of the line segment AC .

- c) Find the coordinates of M .

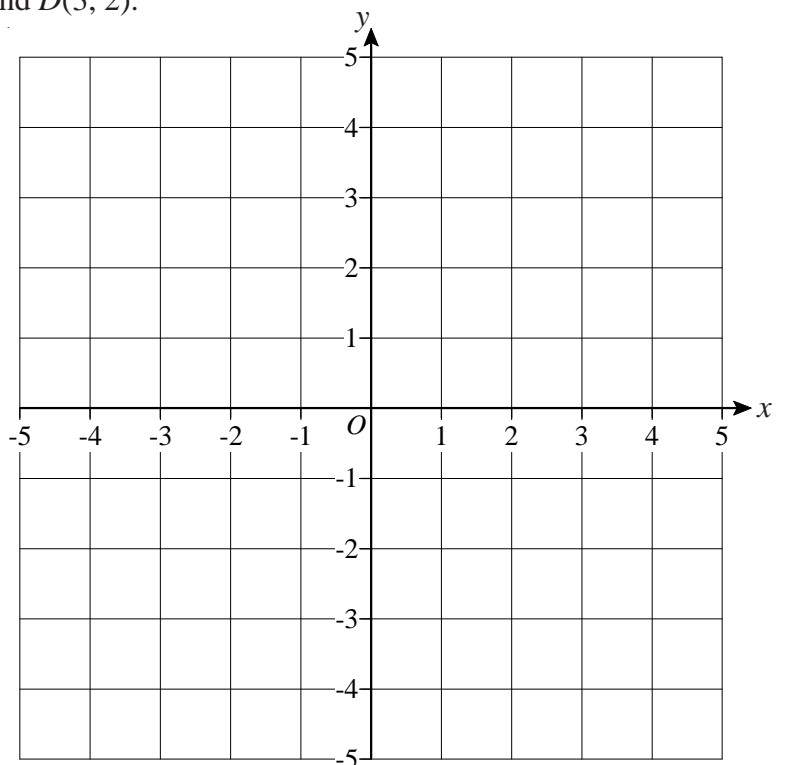
- 4) Using the same pair of axes,

- a) Plot the points $R(-1, -2)$, $S(1, 1)$ and $T(-1, 2)$.

- b) Join R to S and S to T .

$RSTU$ is a kite.

- c) Write the coordinates of point U .



Straight Line Graphs

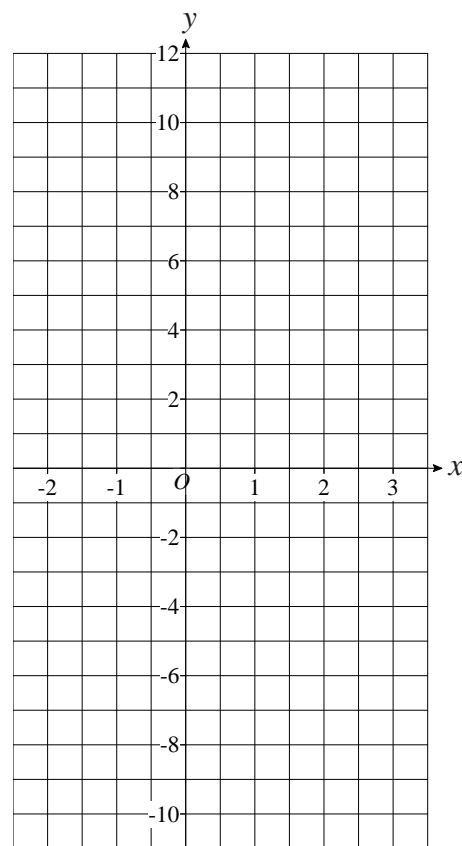
- 1) a) Complete the table of values for $y = 4x - 2$

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 $x = 2.5$

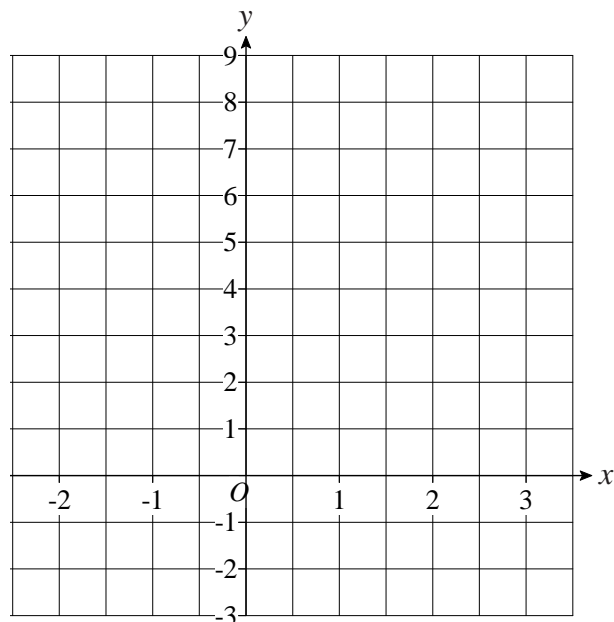
- d) Use the graph to find the value of x when $y = -8$



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

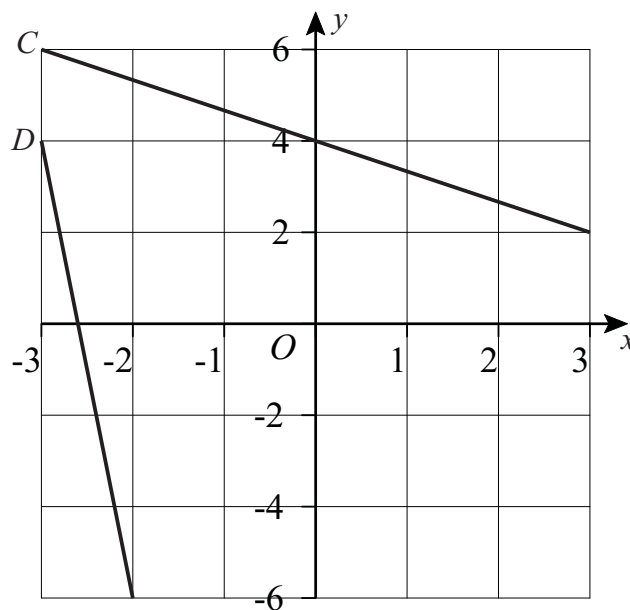
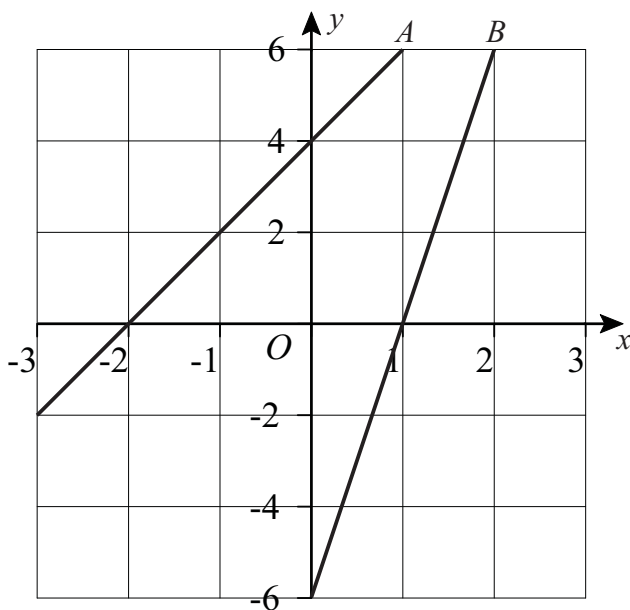
x	-2	-1	0	1	2	3
y		0	2			

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

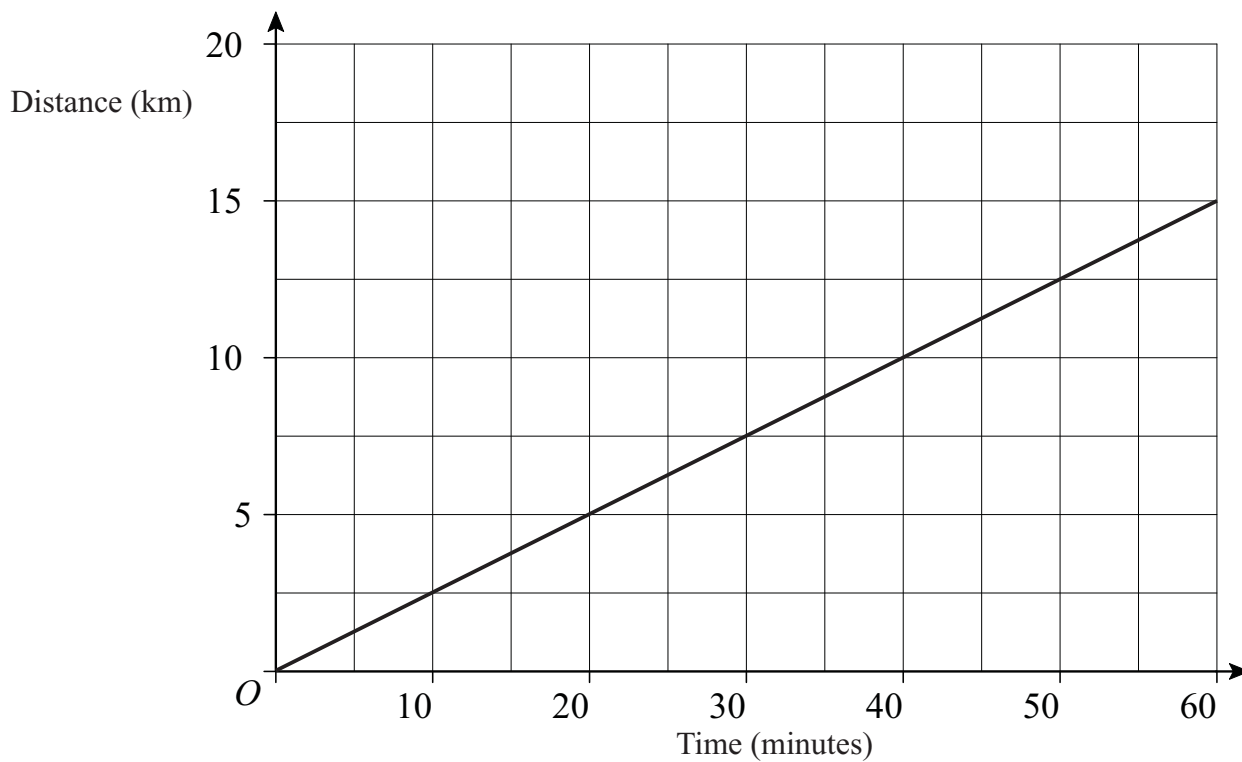


The Gradient of a Line

- 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.



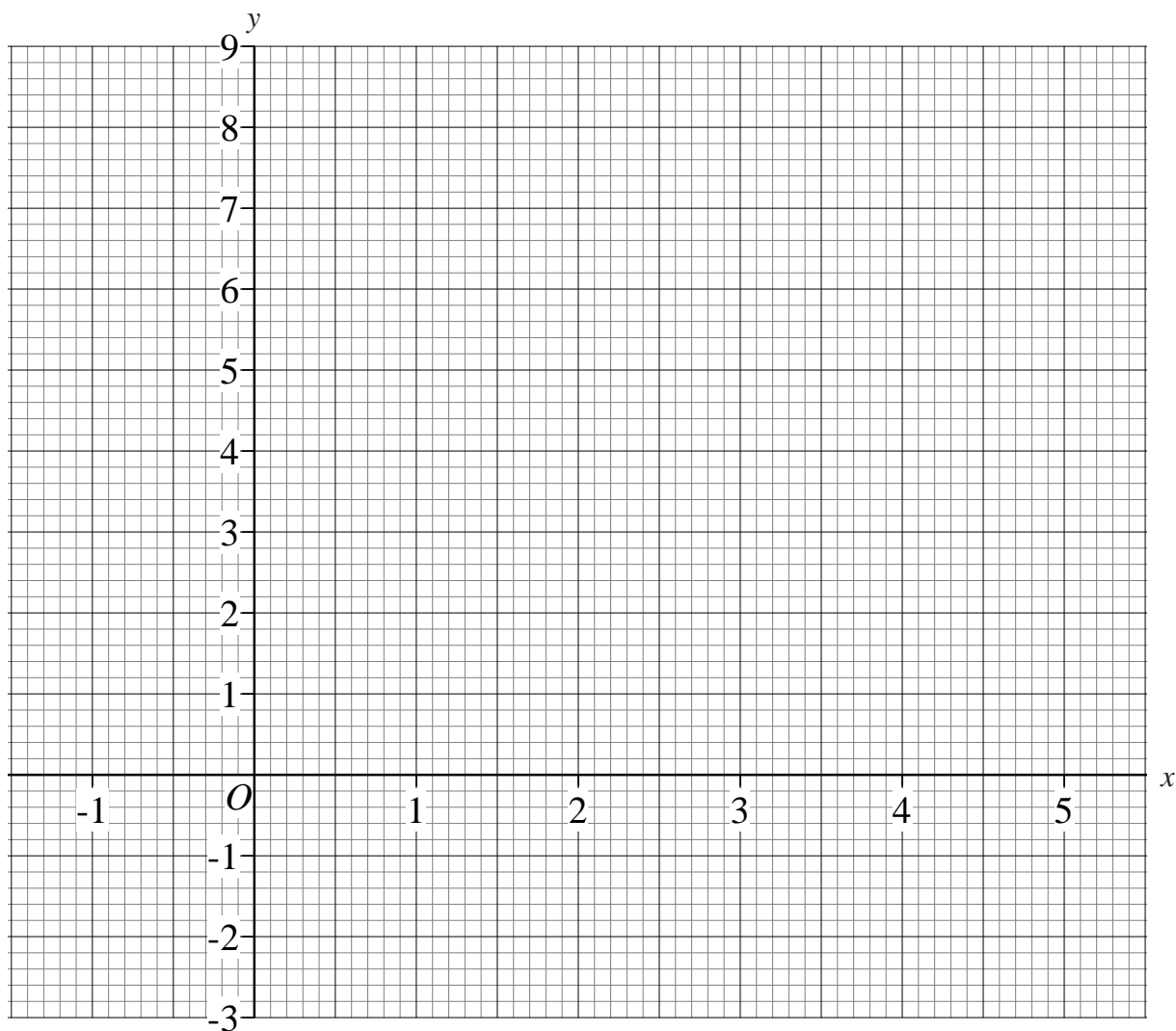
- Find the gradient of the line.
- What does the gradient show?

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

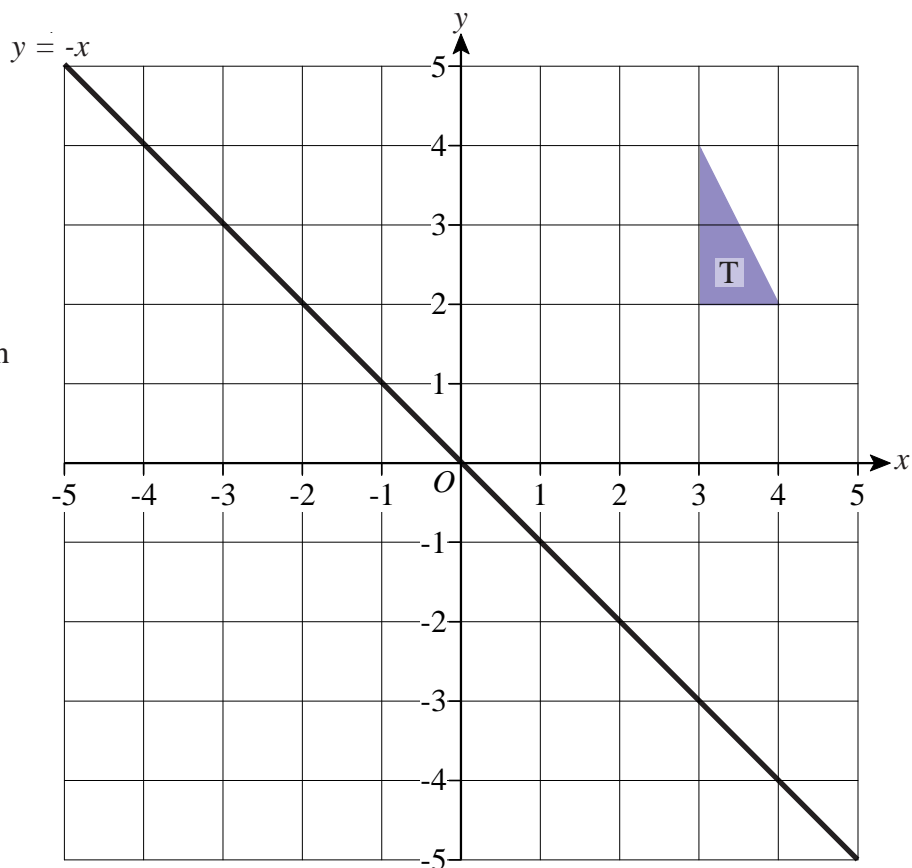
On the grid, draw the graph of $y = x^2 - 4x + 3$



Reflections

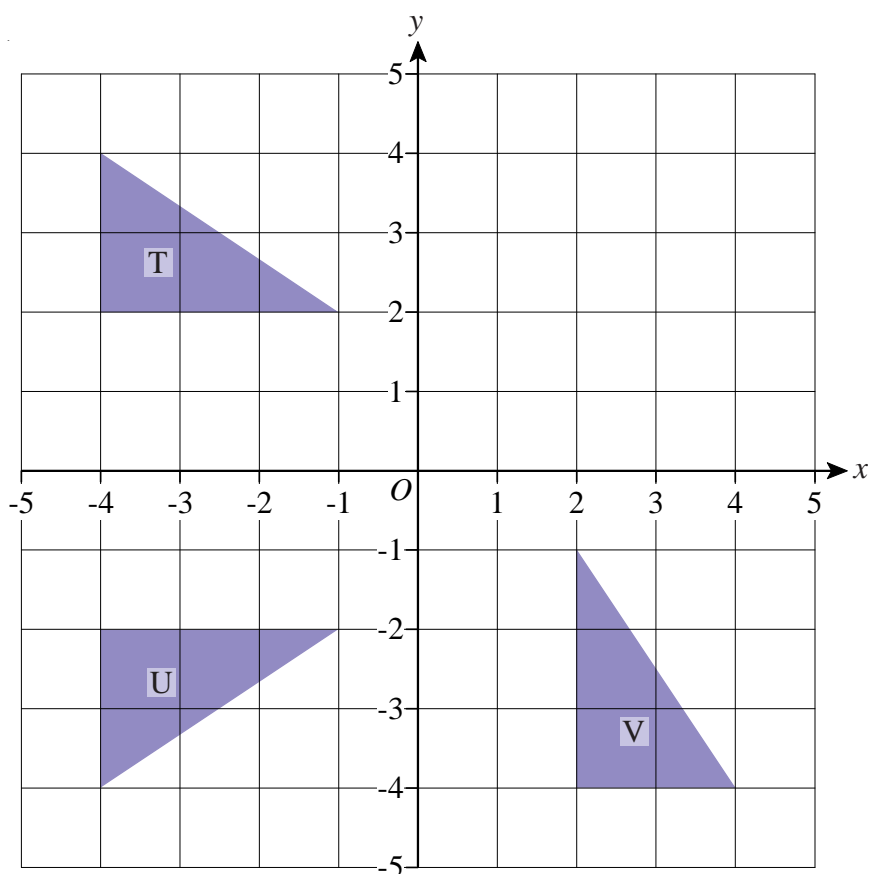
- 1) a) Reflect triangle T in the x axis.
Label your new triangle U.

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



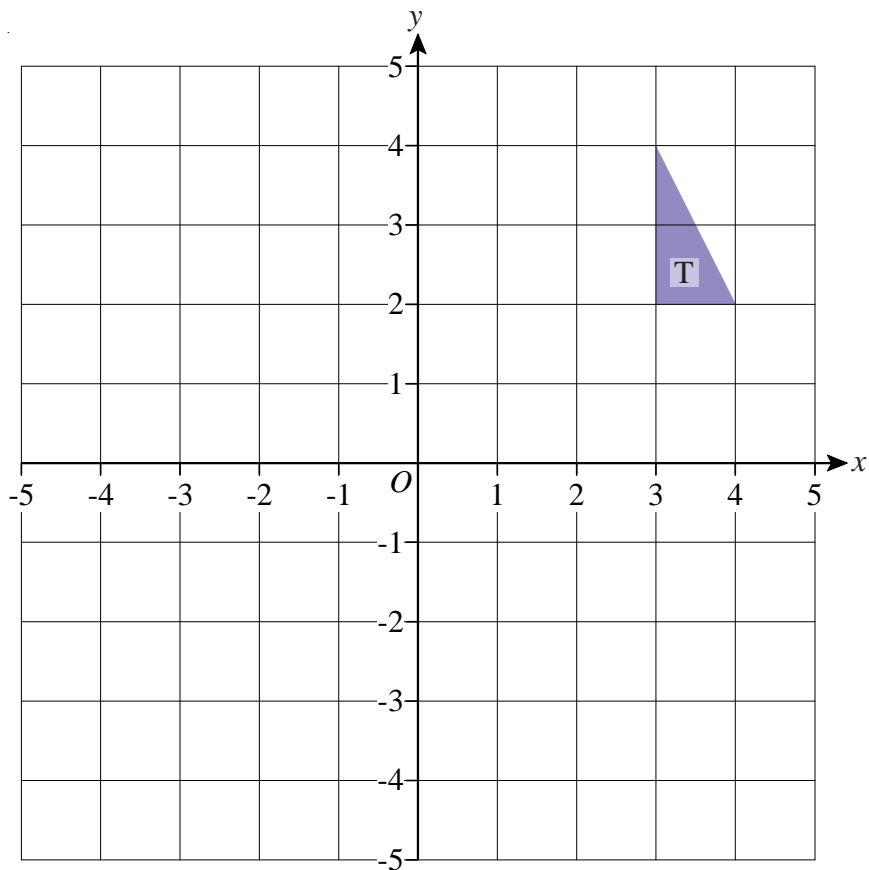
- 2) a) Describe fully the single transformation which maps triangle T to triangle U.

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

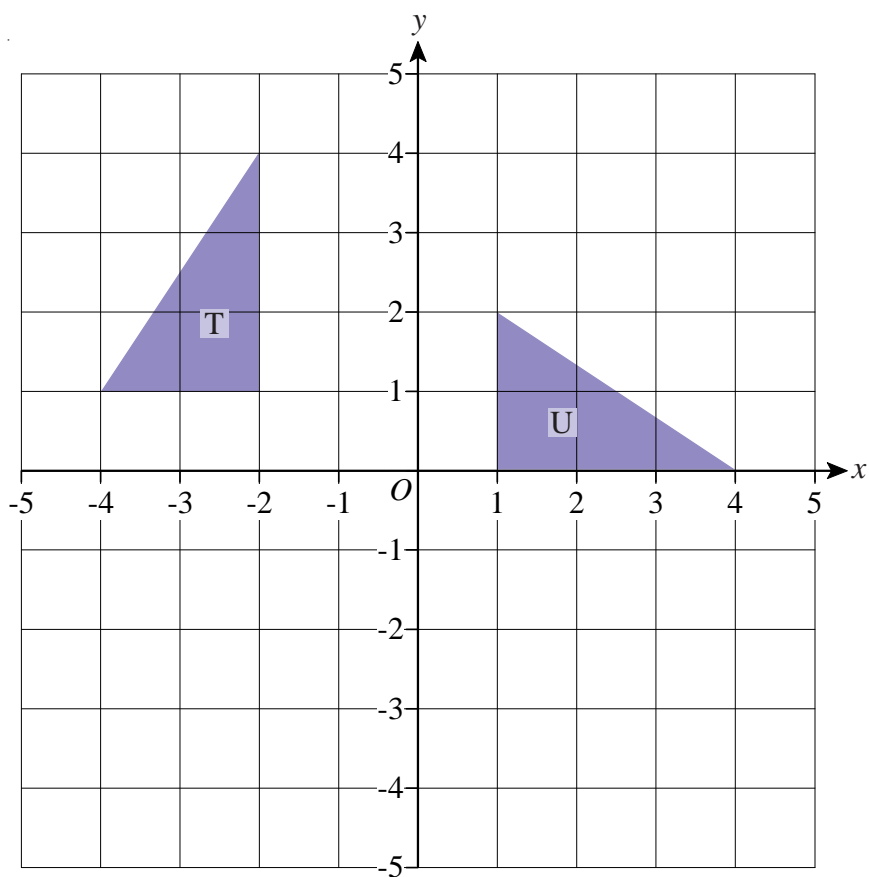


Rotations

- 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.



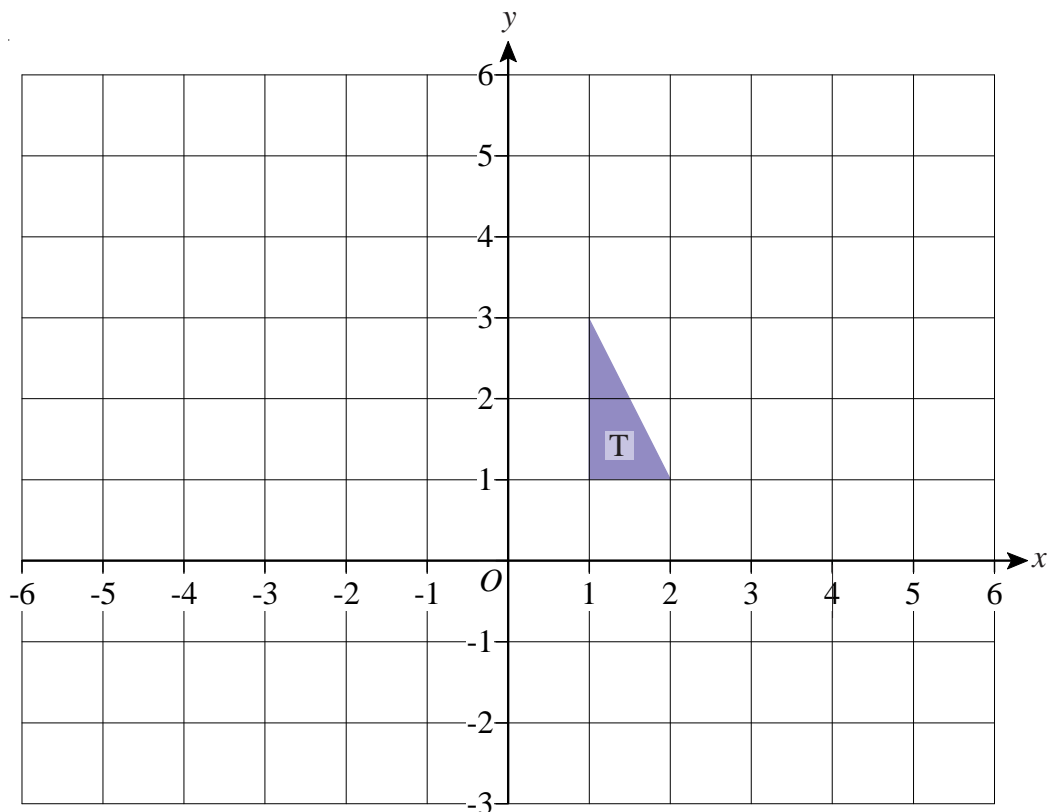
- 2) Describe fully the single transformation which maps triangle T to triangle U.



Translations

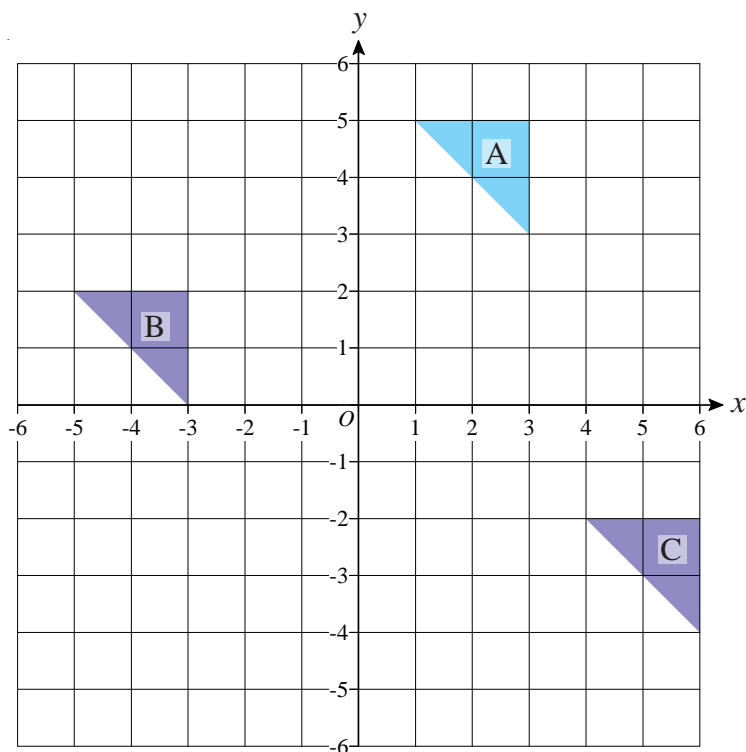
1) a) Translate triangle T by vector $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$ and label it U.

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



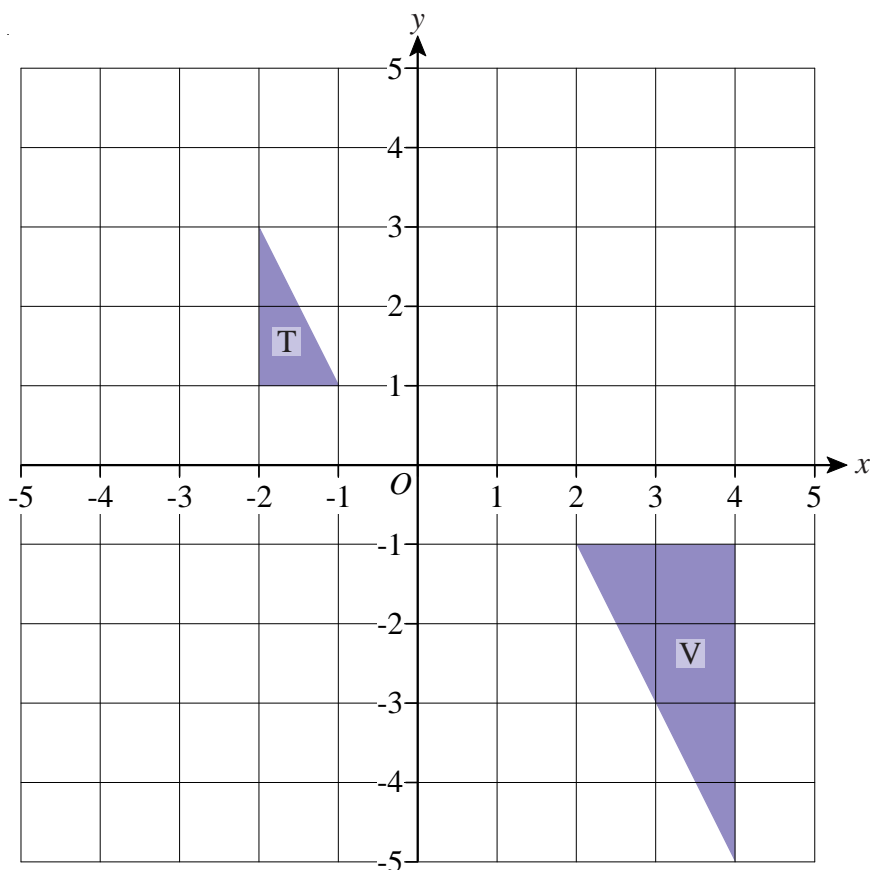
2) a) Describe fully the single transformation which maps triangle A to triangle B.

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

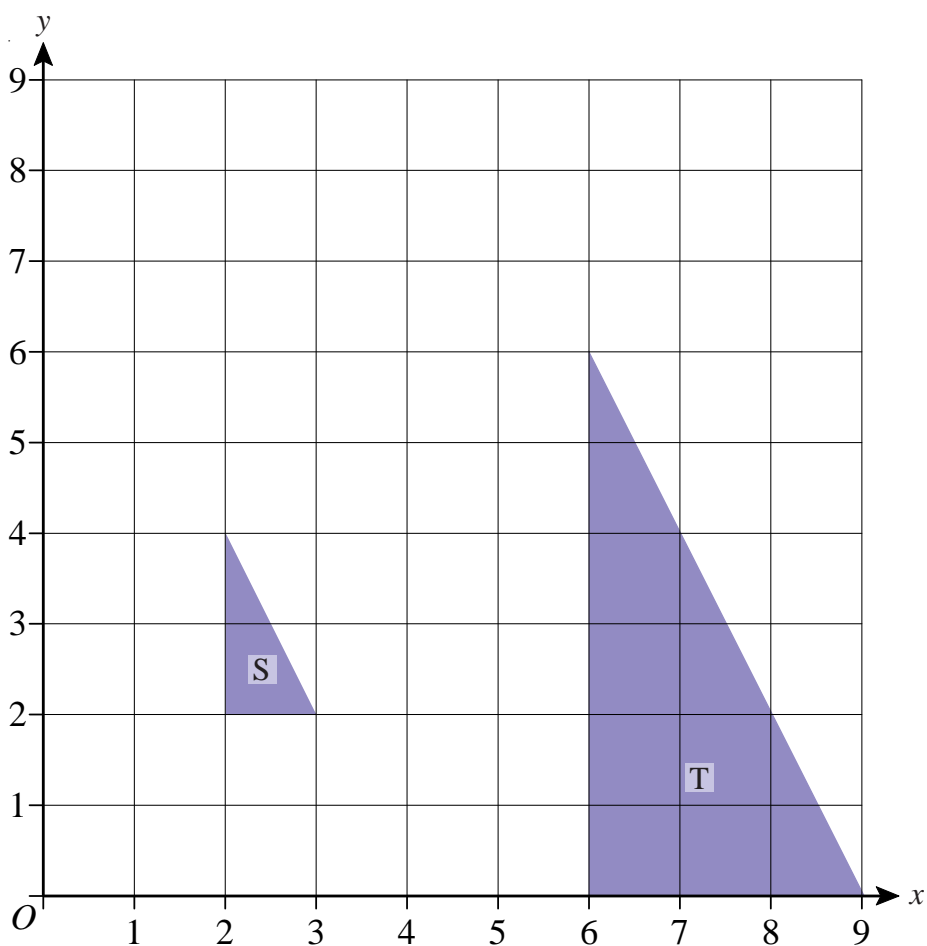


Enlargements

- 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.



1) Write the following ratios in their simplest form:

- a) $6 : 9$
- b) $10 : 5$
- c) $7 : 21$
- d) $4 : 24$
- e) $12 : 40$
- f) $4 : 2 : 8$
- g) $18 : 63 : 9$

2) Write the missing value in these equivalent ratios:

- a) $3 : 5 = 12 : \square$
- b) $4 : 9 = \square : 27$
- c) $\square : 7 = 16 : 14$

3) The ratio of girls to boys in a class is $4 : 5$.

What fraction of the class are girls?

4) A model of a plane is made using a scale of $1 : 5$.

- a) If the real length of the plane is 20 m, what is the length of the model?
- b) If the wings of the model are 1.2 m long, what is the actual length of the wings on the plane?

- 1) Here are the ingredients needed to make 8 pancakes.
James makes 24 pancakes.

Pancakes
Ingredients to make 8 pancakes
250 ml milk
1 egg
140 g flour
5 g butter

- a) Work out how much milk he needs.

Kate makes 12 pancakes.

- b) Work out how much flour she needs.



- 2) Here are the ingredients for making fish pie for 6 people.

Fish pie for 6 people
180 g flour
240 g fish
80 g butter
4 eggs
180 ml milk

Jill makes a fish pie for 3 people.

- a) Work out how much flour she needs.

Tim makes a fish pie for 15 people.

- b) Work out how much milk he needs.



- 3) Here are the ingredients for making pineapple sorbet for 6 people.

Pineapple sorbet for 6 people
800 g of pineapple
4 egg whites
$\frac{1}{2}$ lemon
100 g caster sugar

Trevor makes pineapple sorbet for 18 people.

- a) Work out how much caster sugar he uses.

Sid makes a pineapple sorbet.

He uses 2 lemons.

- b) Work out how many people he makes pineapple sorbet for.

- 1) Which of the following offer better value for money?

Working must be shown

a) 200ml of toothpaste for 50p or 400ml of toothpaste for 90p

b) 600g of bananas for 70p or 200g of bananas for 22p

c) 2 litres of paint for £1.60 or 5 litres of paint for £3.50

d) 60 teabags for £1.62 or 40 teabags for £0.96



- 2) Which of these is the best buy?

20 exercise books
for £4.00

35 exercise books
for £7.80

- 3) Hamza needs to buy 2 litres of paint.

At the shop he gets two choices:

500ml for £2.55 or 1 litre for £4.79.

a) Work out which of these would be the best buy for Hamza.

b) How much does he save if he buys the 'best buy' rather than the 'worst buy'?

You must show all your working.



- 4) Honey pots are sold in two sizes.

A small pot costs 45p and weighs 450g.

A large pot costs 80p and weighs 850g.

Which pot of honey is better value for money?

You must show all your working.

- 1) 8 bananas cost £4
Work out the cost of 5 bananas.
- 2) Emily bought 4 identical pairs of socks for £3.60
Work out the cost of 9 pairs of these socks.
- 3) The price of 36 chocolates is £7.20
Work out the cost of 8 chocolates.

- 4) Theresa bought 5 theatre tickets for £60
Work out the cost of 9 theatre tickets.
- 5) Jenny buys 4 folders.
The total cost of these 4 folders is £6.40
Work out the total cost of 7 of these folders.



- 6) The cost of 15 litres of petrol is £12
Work out the cost of 20 litres of petrol.



- 7) 3 maths books cost £7.47
Work out the cost of 5 of these.
- 8) 1 person can cut a large area of grass in 5 hours.
How long would it take 2 people to cut the grass?
- 9) 5 people take 12 hours to build a wall.
How long would it take 3 people to build the wall?
- 10) 9 people can paint a bridge in 5 hours.
How long would it take 2 people to paint the bridge?

Exchanging Money



- 1) Lance goes on holiday to France.
The exchange rate is $\text{£}1 = 1.15$ Euros.

He changes $\text{£}350$ into Euros.

- a) How many Euros should he get?

In France, Lance buys a digital camera for 115 Euros.

- b) Work out the cost of the camera in pounds.



- 2) Whilst on holiday in Spain, Gemma bought a pair of sunglasses for 77 Euros.

In England, an identical pair of sunglasses costs $\text{£}59.99$.

The exchange rate is $\text{£}1 = 1.40$ Euros.

In which country were the glasses the cheapest, and by how much?

Show all your working.



- 3) Luke buys a pair of trainers in Switzerland.
He can pay either 86 Swiss Francs or 56 Euros.

The exchange rates are:

$\text{£}1 = 2.10$ Swiss Francs

$\text{£}1 = 1.40$ Euros

Which currency should he choose to get the best price, and how much would he save?

Give your answer in pounds (£).



- 4) The exchange rate in London is $\text{£}1 = \text{€}1.14$
The exchange rate in Paris is $\text{€}1 = \text{£}0.86$

Tony wants to change some pounds into euros.

In which of these cities would Tony get the most euros?

All working must be shown.

Sharing Using Ratio

- 1) Tom and Julie share £48 in the ratio 5 : 3
Work out how much more money Tom gets than Julie gets.
- 2) Ben and Sue share £60 in the ratio 2 : 3
Work out how much each person gets.
- 3) A box contains milk chocolates and plain chocolates only.
The number of milk chocolates to the number of plain chocolates is in the ratio 2 : 1
There are 24 milk chocolates.
Work out the total number of chocolates.
- 4) Andy, Ben and Claire share £54
Ben gets three times as much money as Andy.
Claire gets twice as much money as Ben.

How much money does Claire get?



- 5) There are some marbles in a bag.
18 of the marbles are blue.
12 of the marbles are red.
 - a) Write down the ratio of the number of blue marbles to the number of red marbles.
Give your ratio in its simplest form.

There are some apples and pears in a box.
The total number of apples and pears is 54.
The ratio of the number of apples to the number of pears is 1 : 5
b) Work out the number of pears in the box.



- 6) A piece of string is 180 cm long.
Jim cuts it into three pieces in the ratio 2 : 3 : 4
Work out the length of the longest piece.



- 7) Sally is 13 years old.
Tammy is 12 years old.
Danny is 10 years old.

Sally, Tammy and Danny share £28 in the ratio of their ages.
Tammy gives a third of her share to her mother.
How much should Tammy now have?

1) In a box of chocolates, the ratio of plain chocolates to milk chocolates is 2 : 5.

a) What fraction of the chocolates are plain ones?

b) What fraction of the chocolates are milk ones?

2) If the ratio of $x : y$ is 3 : 7, which of the following statements are correct?

a) x is $\frac{3}{7}$ of $(x + y)$

b) x is $\frac{3}{10}$ of $(x + y)$

c) y is $\frac{7}{10}$ of x

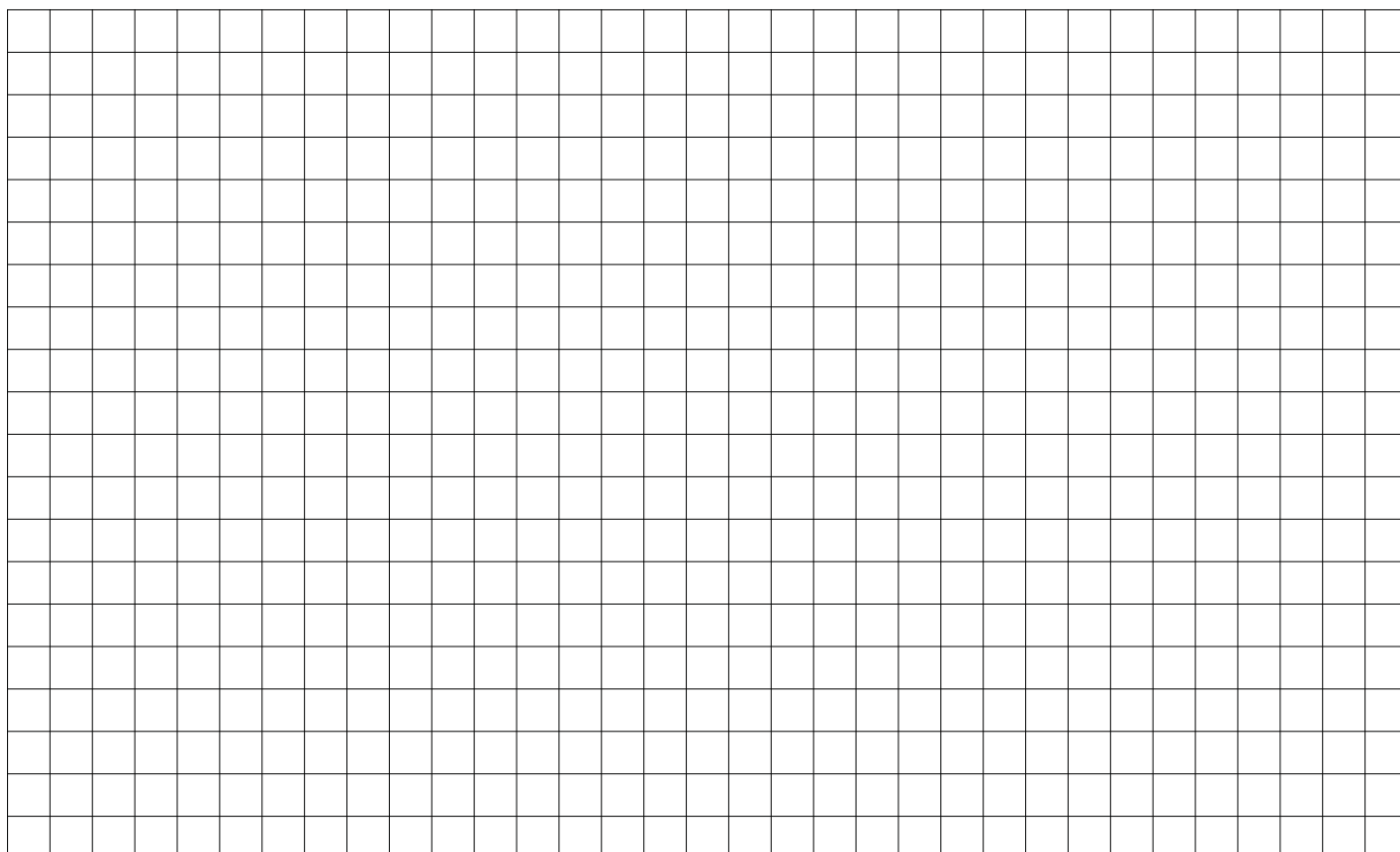
d) y is $\frac{7}{10}$ of $(x + y)$

3) Pounds can be converted to kilograms using the ratio 11 : 5.

a) Use the squares, below, to draw a conversion graph to illustrate this.

b) Convert 24 pounds to kilograms.

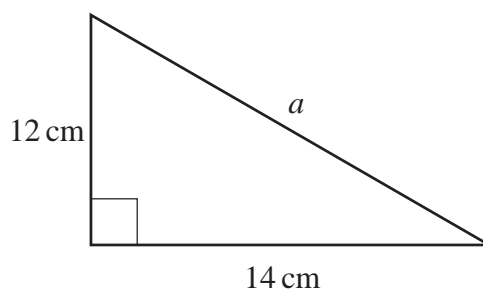
c) Convert 14 kilograms to pounds.



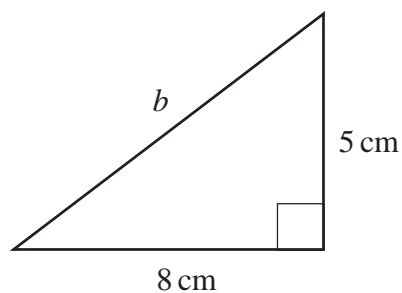
Pythagoras' Theorem



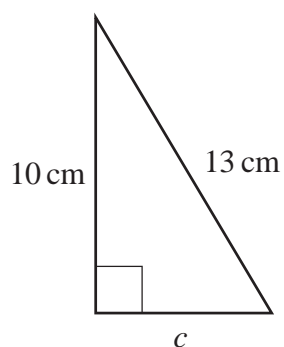
- 1) Find the length of side a .
Give your answer to 1 decimal place.



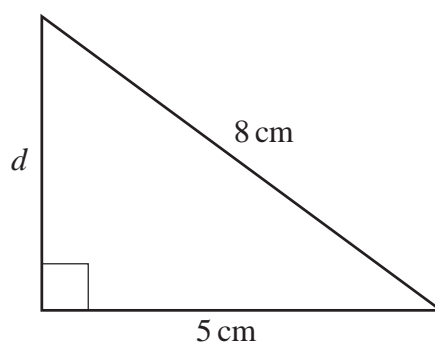
- 2) Find the length of side b .
Give your answer to 1 decimal place.



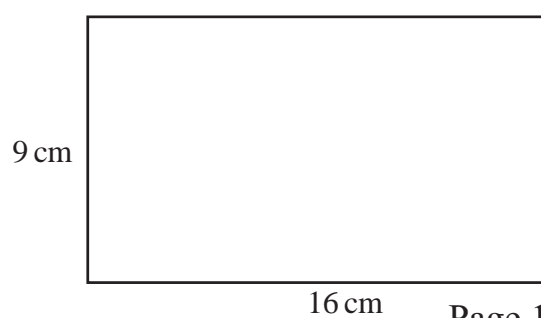
- 3) Find the length of side c .
Give your answer to 1 decimal place.



- 4) Find the length of side d .
Give your answer to 1 decimal place.

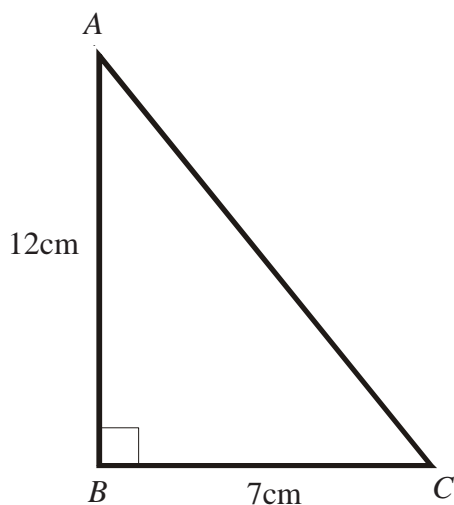


- 5) Find the length of the diagonal of this rectangle.
Give your answer to 1 decimal place.

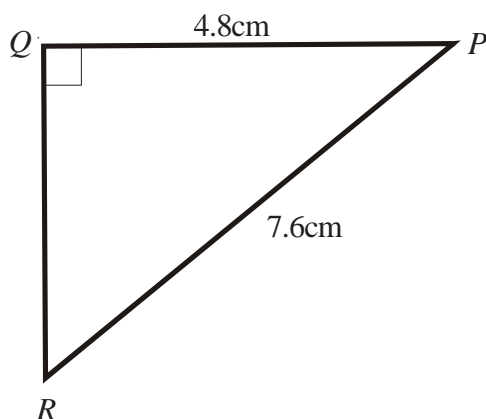




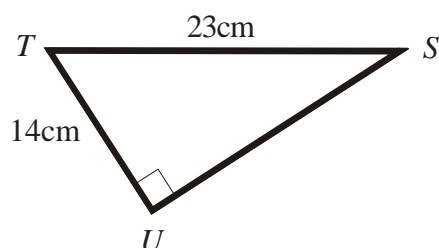
- 1) Find the length of side AC .
Give your answer to 1 decimal place.



- 2) Find the length of side QR .
Give your answer to 1 decimal place.



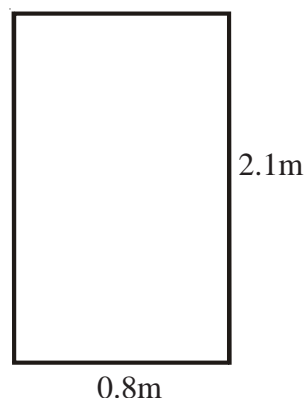
- 3) Find the length of side SU .
Give your answer to 1 decimal place.



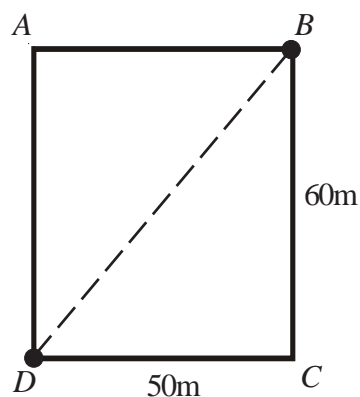
Pythagoras' Theorem



- 4) Below is a picture of a doorway.
Find the size of the diagonal of the doorway.
Give your answer to 1 decimal place.



- 5) In the sketch of the rectangular field, below, James wants to walk from B to D .



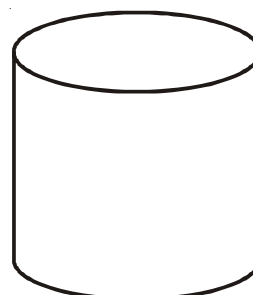
Which of the following routes is shorter and by how much?

From B to C to D or straight across the field from B to D .

Give your answer to the nearest metre.

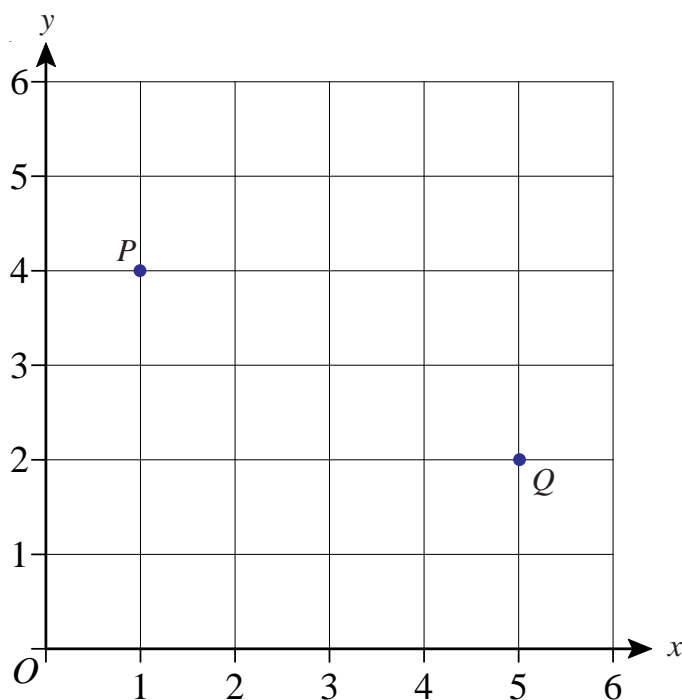


- 6) Fiona keeps her pencils in a cylindrical beaker as shown below.
The beaker has a diameter of 8cm and a height of 17cm.
Will a pencil of length 19cm fit in the beaker without poking out of the top?
All workings must be shown.

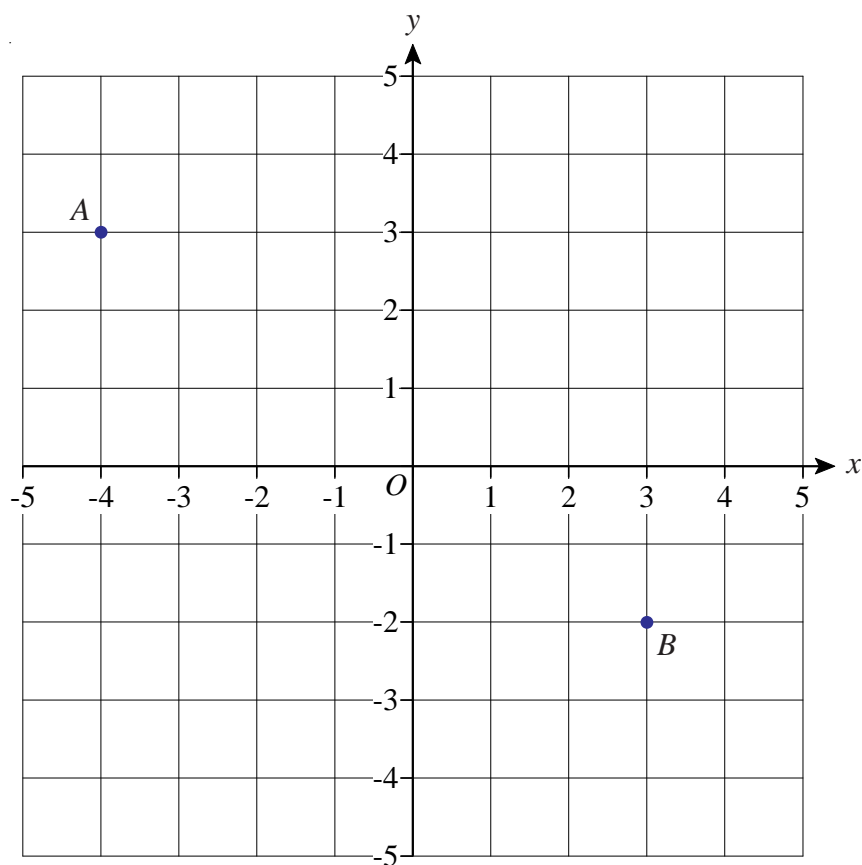




- 1) Points P and Q have coordinates $(1, 4)$ and $(5, 2)$.
Calculate the shortest distance between P and Q .
Give your answer correct to 1 decimal place.



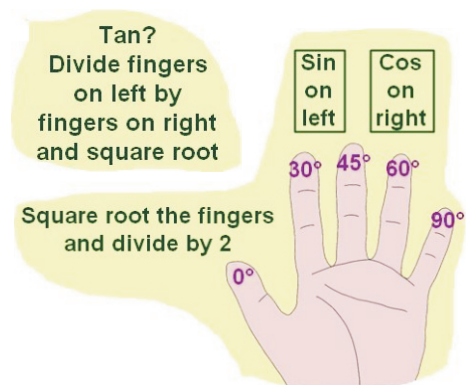
- 2) Points A and B have coordinates $(-4, 3)$ and $(3, -2)$.
Calculate the shortest distance between A and B .
Give your answer correct to 1 decimal place.



Exact Trigonometric Values

1) Write down the exact values of:

- a) $\sin 0^\circ$
- b) $\sin 30^\circ$
- c) $\sin 45^\circ$
- d) $\sin 60^\circ$
- e) $\sin 90^\circ$



2) Write down the exact values of:

- a) $\cos 0^\circ$
- b) $\cos 30^\circ$
- c) $\cos 45^\circ$
- d) $\cos 60^\circ$
- e) $\cos 90^\circ$

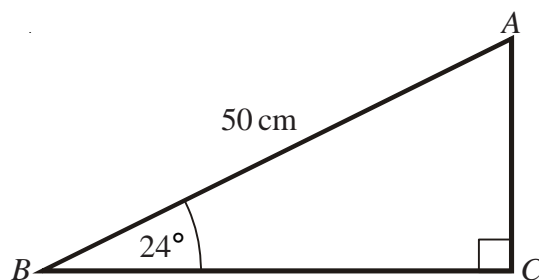
3) Write down the exact values of:

- a) $\tan 0^\circ$
- b) $\tan 30^\circ$
- c) $\tan 45^\circ$
- d) $\tan 60^\circ$

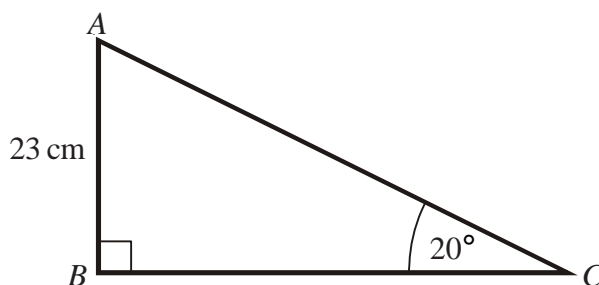
Trigonometry



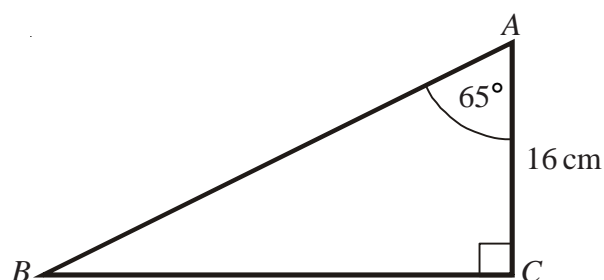
- 1) ABC is a right-angled triangle.
 $AB = 50$ cm.
 Angle $ABC = 24^\circ$
 Work out the length of BC .
 Give your answer correct to 1 decimal place.



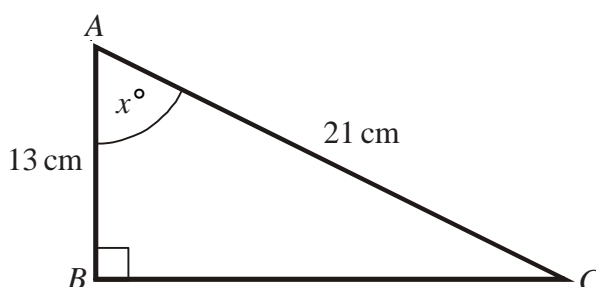
- 2) ABC is a right-angled triangle.
 $AB = 23$ cm.
 Angle $BCA = 20^\circ$
 Work out the length of AC .
 Give your answer correct to 1 decimal place.



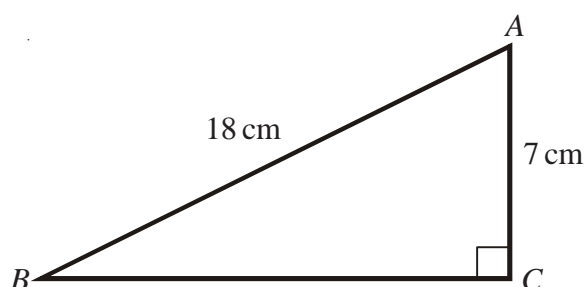
- 3) ABC is a right-angled triangle.
 $AC = 16$ cm.
 Angle $CAB = 65^\circ$
 Work out the length of BC .
 Give your answer correct to 1 decimal place.



- 4) ABC is a right-angled triangle.
 $AB = 13$ cm.
 $AC = 21$ cm.
 Work out the size of angle x .
 Give your answer correct to 1 decimal place.

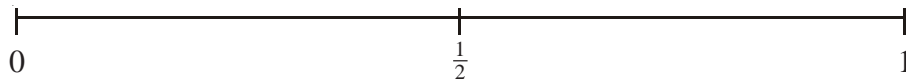


- 5) ABC is a right-angled triangle.
 $AB = 18$ cm.
 $AC = 7$ cm.
 Work out the size of angle ABC .
 Give your answer correct to 1 decimal place.

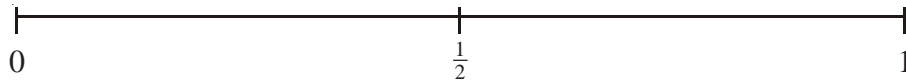


The Probability Scale

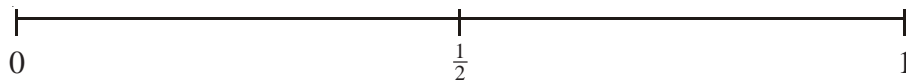
- 1) a) On the probability scale below, mark with a cross (×) the probability that it will snow in Birmingham in July.



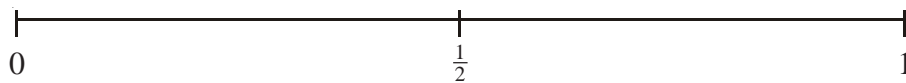
- b) On the probability scale below, mark with a cross (×) the probability that it will rain in Wales next year.



- c) On the probability scale below, mark with a cross (×) the probability that you will get a tail when you flip a fair coin.



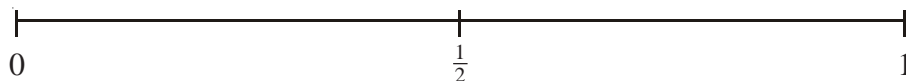
- d) On the probability scale below, mark with a cross (×) the probability that you will get a number bigger than 4 when you roll an ordinary dice.



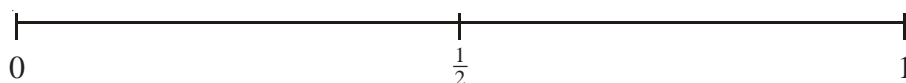
- 2) 4 jelly babies are in a bag.
2 are red, 1 is green and 1 is black.

Without looking in the bag, a jelly baby is taken out.

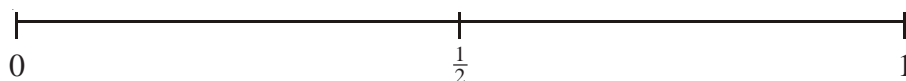
- a) On the probability scale below, mark with a cross (×) the probability that the jelly baby taken from the bag is green.



- b) On the probability scale below, mark with a cross (×) the probability that the jelly baby taken from the bag is green or black.



- c) On the probability scale below, mark with a cross (×) the probability that the jelly baby taken from the bag is red or black.



Frequency Trees

100 people underwent an operation at a hospital.

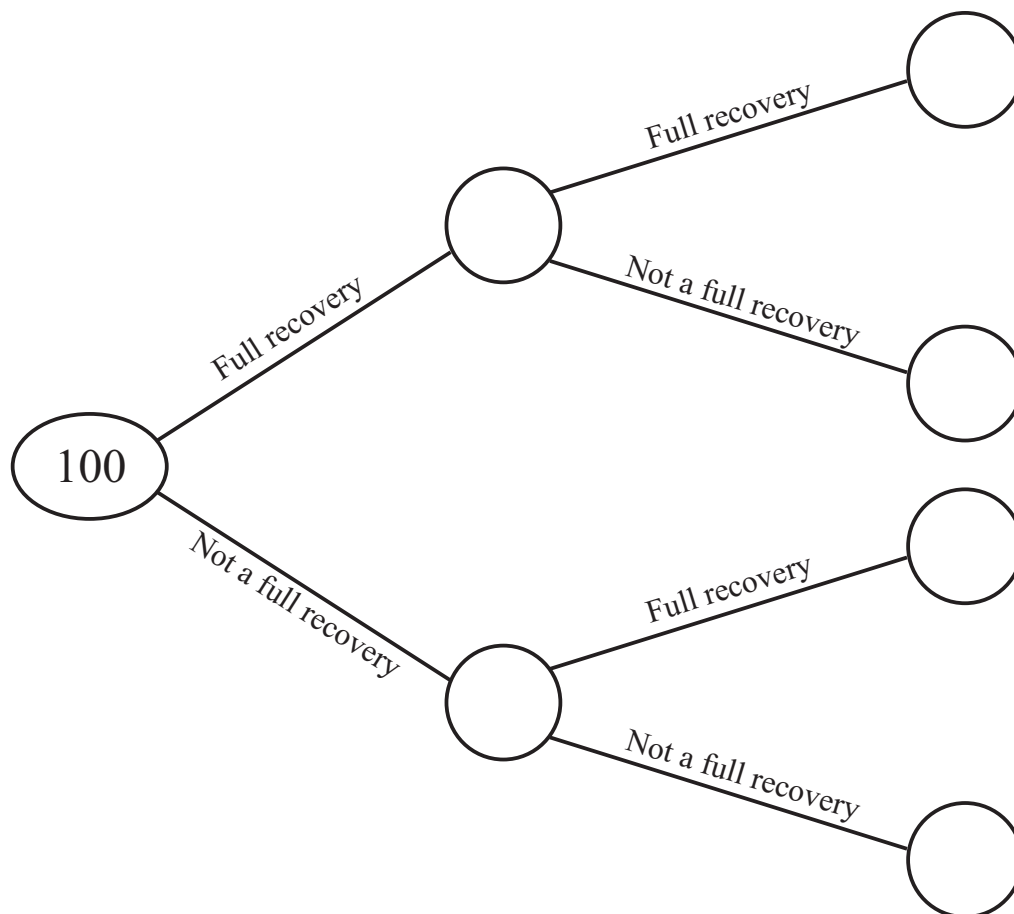
Before the operation, based on their medical notes, it was predicted whether each person would make a full recovery or not.

It was predicted that 85 people would make a full recovery.

It was later found that 6 of the people expected to fully recover, didn't.

Altogether, 87 people made a full recovery.

Complete the frequency tree.



- 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?

- 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.

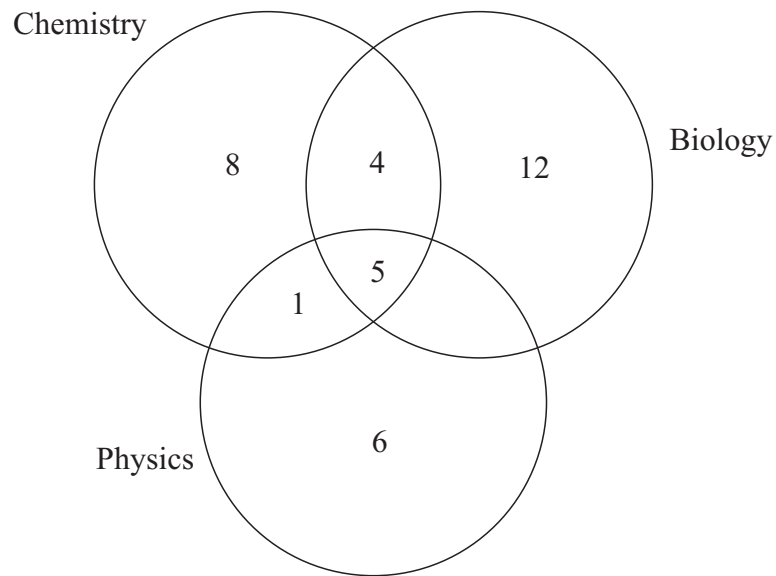
All the cards are placed into a hat and one is taken out at random.

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

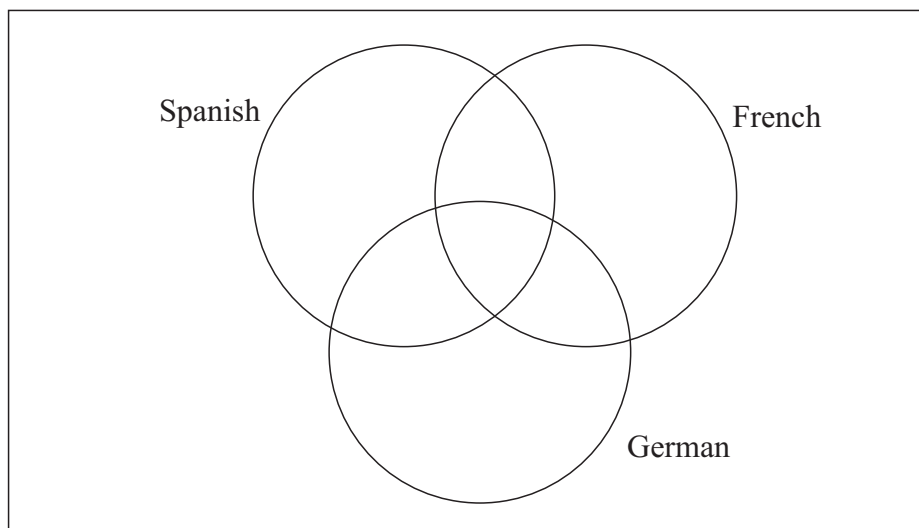
What is the probability that the other side of the card is also black?

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.



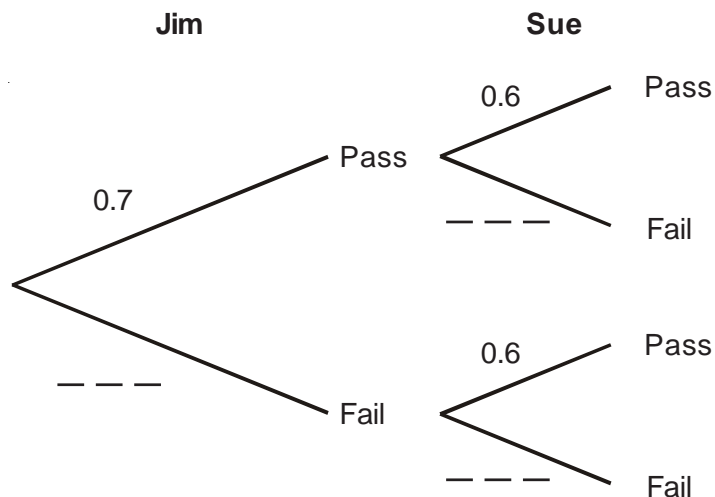
Simple Tree Diagrams

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

The probability that Jim will pass the driving test is 0.7

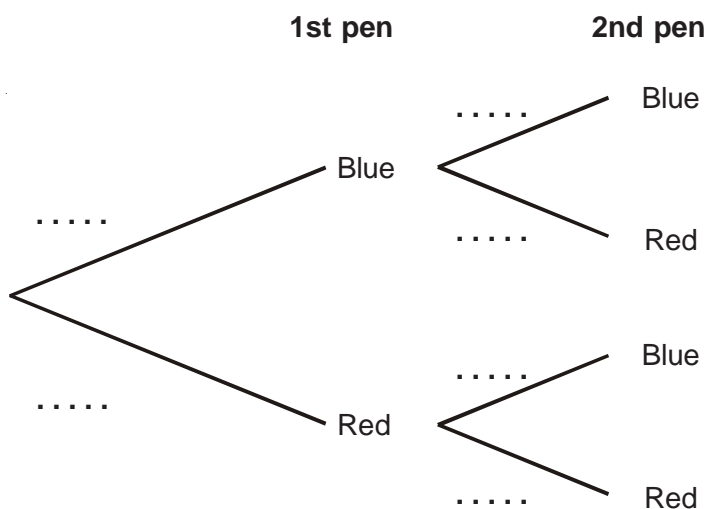
The probability that Sue will pass the driving test is 0.6

- 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.



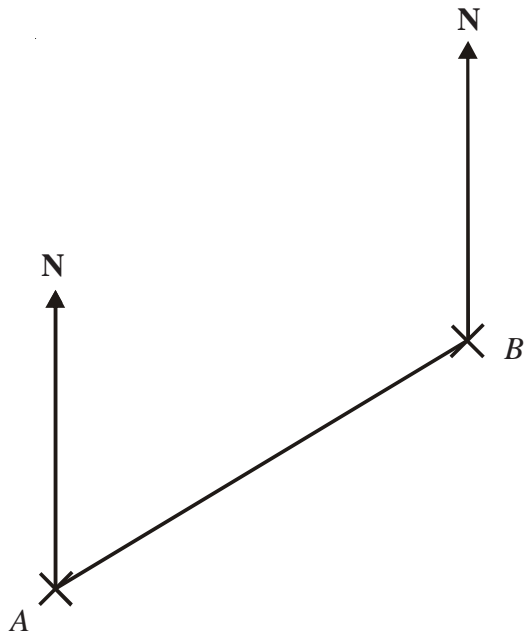
- 3) There are 13 buttons in a bag.
9 buttons are white.
4 buttons are black.

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.

Bearings

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

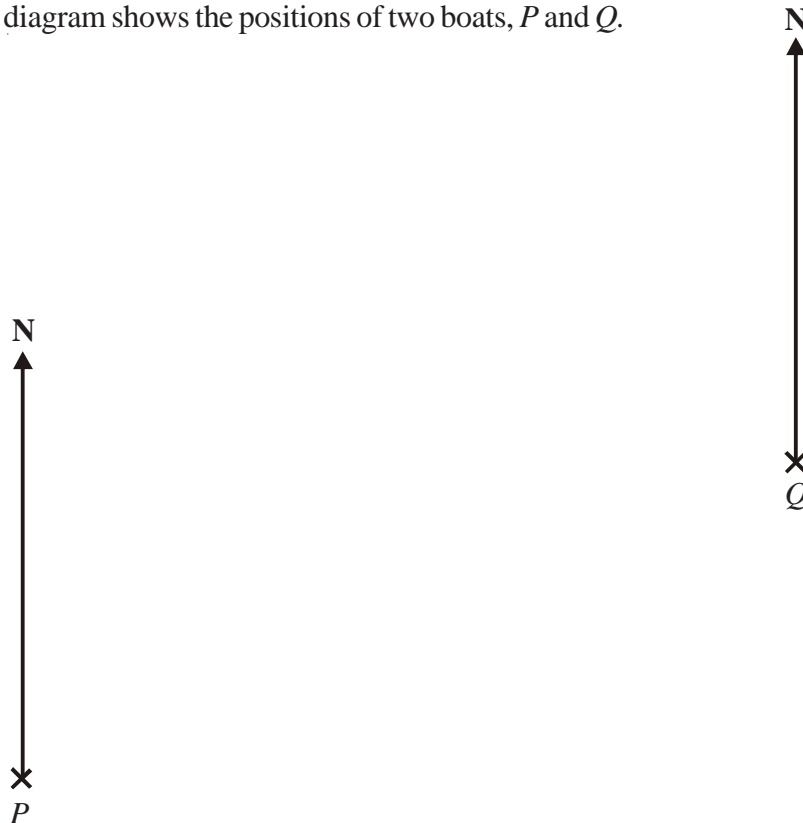


- a) Measure the bearing of B from A .

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° .

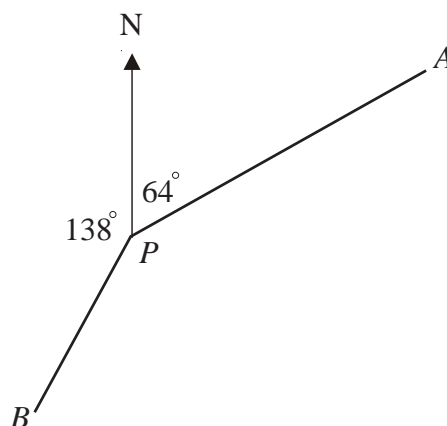
Complete the scale drawing below.
 Mark with a cross the position of C .



- 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



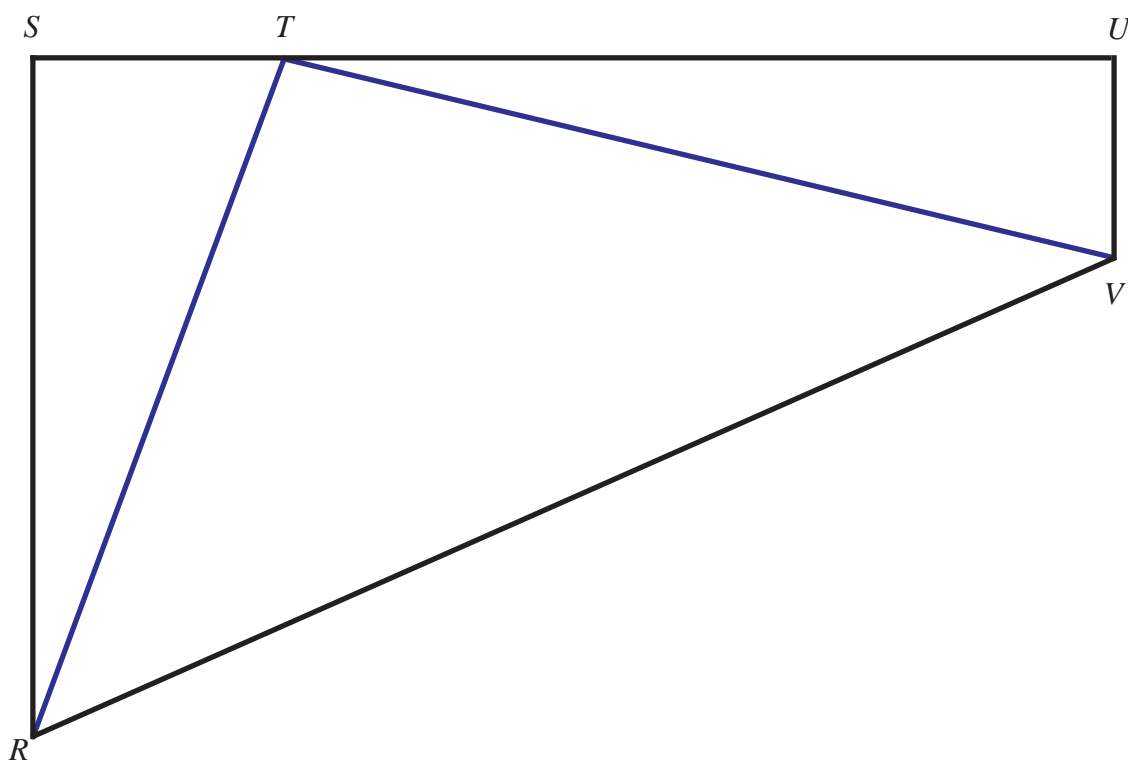
*Diagram NOT
accurately drawn.*

Bisecting an Angle

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



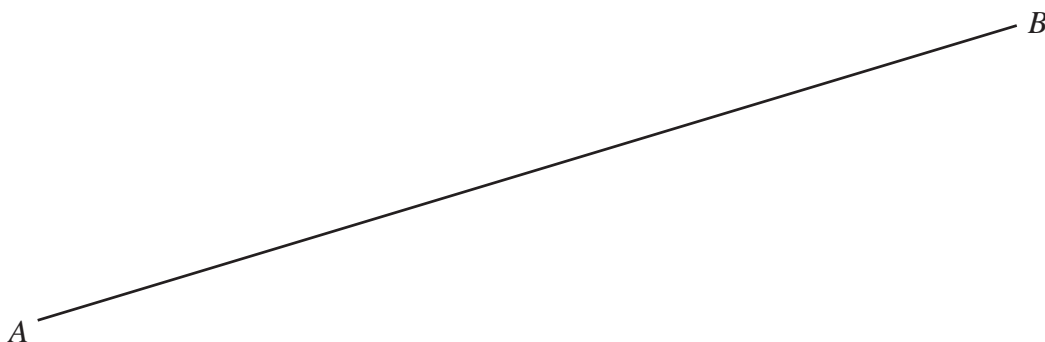
- 2) The diagram below shows the plan of a park.
The border of the park is shown by the quadrilateral $RSTUV$



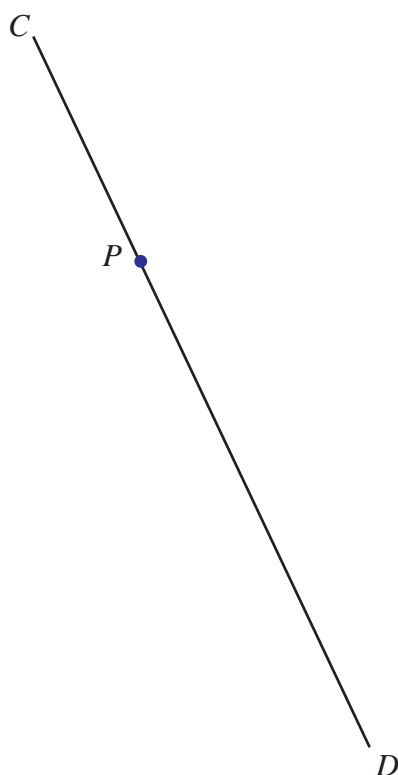
There are two paths in the park. One is labelled TR and the other TV .
A man walks in the park so that he is always the same distance from both paths.
Using ruler and compasses show exactly where the man can walk.

Constructing Perpendiculars

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

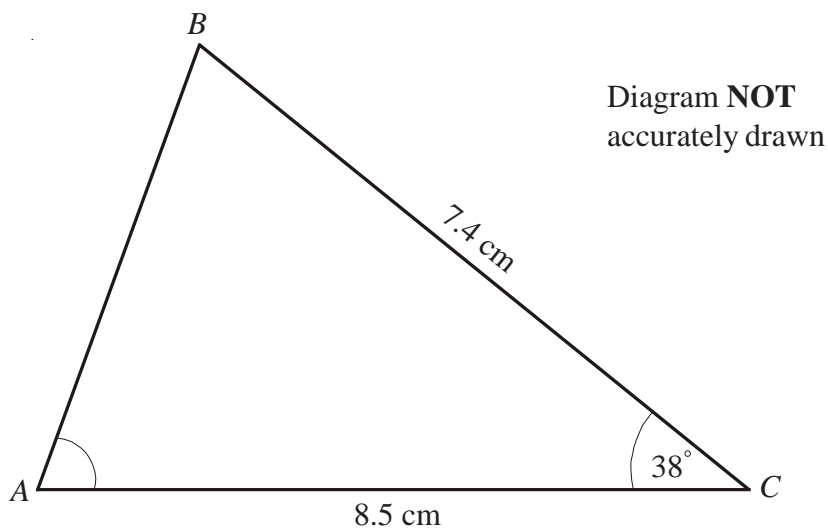


- 2) Use ruler and compasses to **construct** the perpendicular to the line segment CD that passes through the point P .
You must show all construction lines.



Drawing a Triangle Using Compasses

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



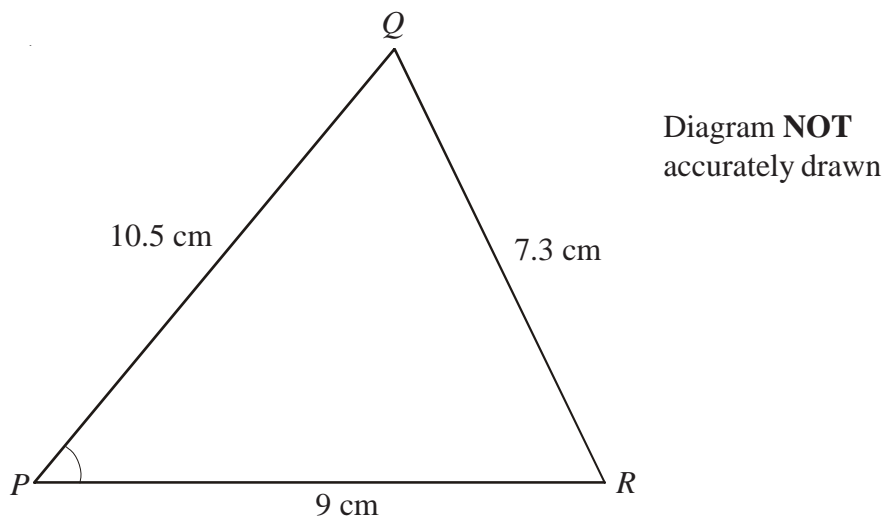
$$BC = 7.4 \text{ cm}$$

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

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

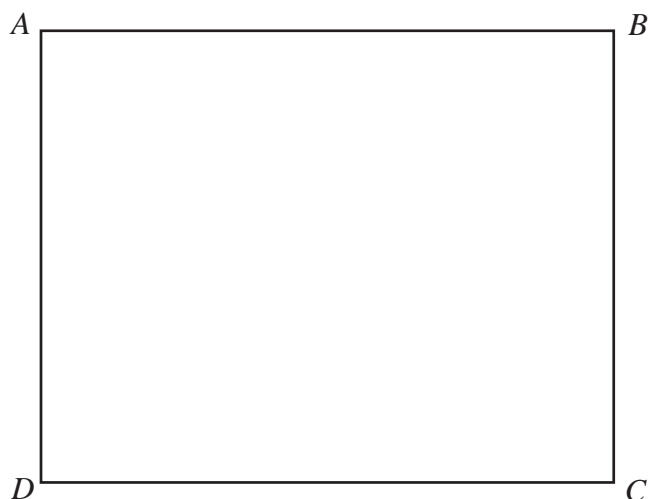
- Make an accurate drawing of triangle ABC .
 - Measure the size of angle A on your diagram.
- 2) Use ruler and compasses to **construct** an equilateral triangle with sides of length 6 centimetres.
You must show all construction lines.

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



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

1)



$ABCD$ is a rectangle.

Shade the set of points inside the rectangle which are **both**
 more than 4 centimetres from the point D
and more than 1 centimetre from the line AB .

2) Two radio transmitters, A and B , are situated as below.

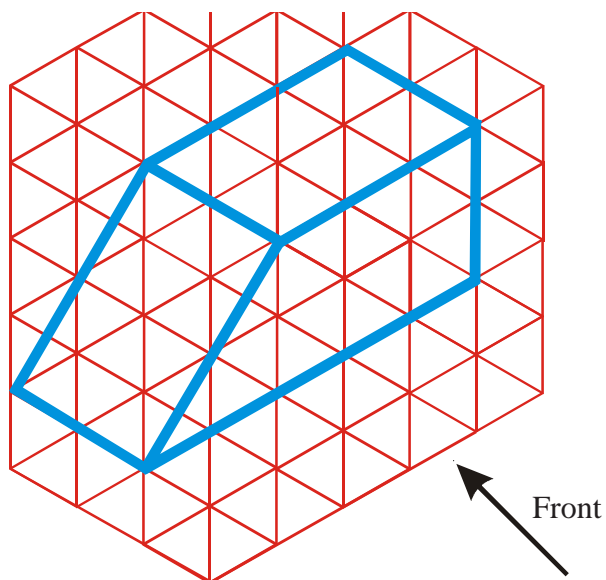


Transmitter A broadcasts signals which can be heard up to 3 km from A .

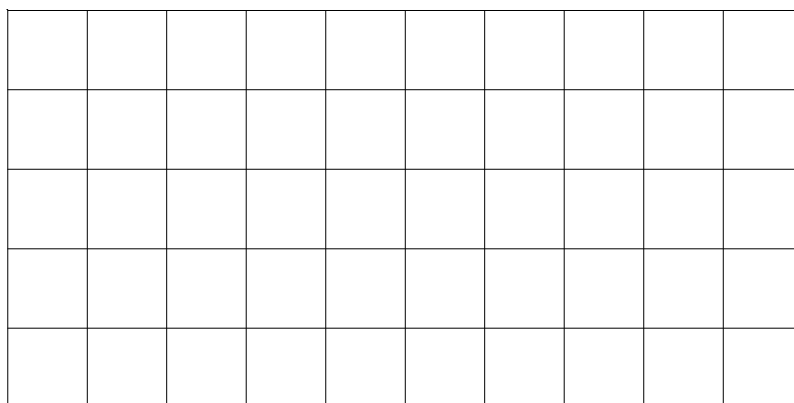
Transmitter B broadcasts signals which can be heard up to 6 km from B .

Shade in the area in which radio signals can be heard from both transmitters.
 Use a scale of 1 cm = 1 km.

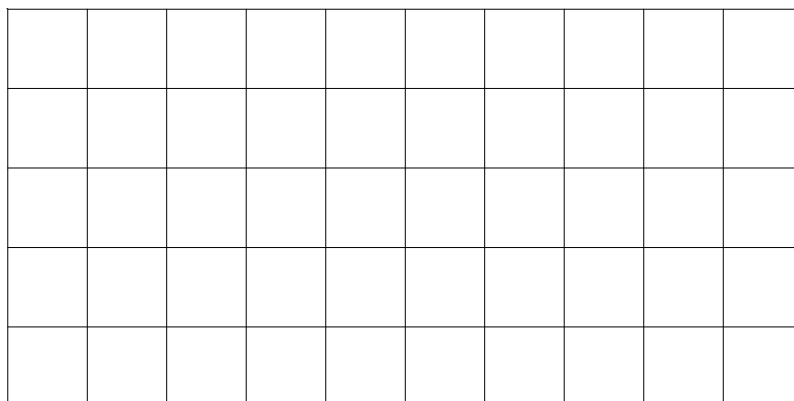
- 1) The diagram shows a prism drawn on an isometric grid.



- a) On the grid below, draw the front elevation of the prism from the direction marked by the arrow.



- b) On the grid below draw a plan of the prism.



1) Work out

a) 13×18

b) 135×27

c) 116×41

d) 264×43

e) 326×24

f) 281×59

g) 286×48

h) 428×34

i) 461×45

2) “MathsWatch Travel” has 36 coaches.

Each of these coaches can carry 53 passengers.

How many passengers in total can all the coaches carry?

3) “MathsWatch Tours” has a plane that will carry 47 passengers.

To fly from Manchester to Lyon, each passenger pays £65

Work out the total amount that the passengers pay.

4) A Science textbook costs £13.

Mr Jones buys a class set of 34 books.

How much do they cost him?

5) A graphical calculator costs £18.

How much would 43 calculators cost?

Dividing Integers

- 1) Work out

a) $325 \div 5$	d) $377 \div 29$	g) $75 \div 4$
b) $448 \div 8$	e) $27 \div 6$	h) $135 \div 20$
c) $221 \div 13$	f) $123 \div 15$	i) $381 \div 12$

- 2) A box can hold 19 books.
Work out how many boxes will be needed to hold 646 books.

- 3) The distance from Glasgow to Paris is 1290 km.
A flight from Glasgow to Paris lasts 3 hours.
Given that

$\text{Average speed} = \frac{\text{Distance}}{\text{Time}}$

 Work out the average speed of the aeroplane in km/h.

- 4) Pencils cost 25p each.
Mr Smith spends £15 on pencils.
Work out the number of pencils he gets.

- 5) Yesterday, Gino was paid £19.61 for delivering pizzas.
He is paid 53p for each pizza he delivers.
Work out how many pizzas Gino delivered yesterday.

- 6) Emma sold 38 teddy bears for a total of £513
She sold each teddy bear for the same price.
Work out the price at which Emma sold each teddy bear.

- 7)

Canal boat for hire £1855.00 for 14 days

 Work out the cost per day of hiring the canal boat.

- 8) A teacher has £539 to spend on books.
Each book costs £26
How many books can the teacher buy?

- 9) John delivers large wooden crates with his van.
The weight of each crate is 68 kg.
The greatest weight the van can hold is 980 kg.
Work out the greatest number of crates that the van can hold.

Multiply and Divide by Powers of 10

1) Multiply the following numbers by 10, 100 and 1000:

		$\times 10$	$\times 100$	$\times 1000$
<i>e.g.</i>	21	210	2100	21000
	9			
	63			
	845			
	3.65			
	0.4			
	1.324			

2) Divide the following numbers by 10, 100 and 1000:

		$\div 10$	$\div 100$	$\div 1000$
<i>e.g.</i>	21	2.1	0.21	0.021
	9			
	63			
	845			
	3.65			
	0.4			
	1.324			

3) Work out the following:

$$3 \times 100 =$$

$$65 \times 10 =$$

$$17 \div 10 =$$

$$359 \times 10 =$$

$$0.5 \div 100 =$$

$$2.3 \times 1000 =$$

$$42 \div 100 =$$

$$3582 \div 100 =$$

$$0.9 \times 10 =$$

$$3.645 \times 100 =$$

$$88 \div 1000 =$$

$$39.62 \times 1000 =$$

- 1) Work out
 - a) 6×0.2
 - b) 0.2×0.3
 - c) 0.4×7
 - d) 0.2×0.8
 - e) 0.03×0.9
 - f) 1.5×0.2

- 2) A box contains 7 books, each weighing 2.5 kg.
Work out the total weight of the box.

- 3) Jim takes 13 boxes out of his van.
The weight of each box is 25.5 kg.
Work out the total weight of the 13 boxes.

- 4) Tim has a job which pays £6.85 per hour.
If he works for 34 hours, one week, how much does he earn?

- 5) Sue has a part-time job and the hourly pay is £7.50 per hour.
How much does she earn if she works for 8.5 hours, one week?

- 6) Fencing costs £13.25 per metre.
How much does 12.5 m cost?

1) Work out

a) $9 \div 0.3$

b) $6 \div 0.1$

c) $12 \div 0.4$

d) $25 \div 0.5$

e) $21 \div 0.3$

f) $15 \div 0.2$

2) Work out

a) $3.6 \div 0.4$

b) $0.8 \div 0.2$

c) $2.4 \div 0.4$

d) $0.56 \div 0.08$

e) $5.5 \div 0.05$

f) $8.1 \div 0.09$

3) John takes boxes out of his van.

The total weight of the boxes is 4.9 kg

The weight of each box is 0.7 kg

Work out the number of boxes in John's van.

4) Mr Rogers bought a bag of elastic bands for £6

Each elastic band costs 12p.

Work out the number of elastic bands in the bag.