



MATHEMATICS



Homework Booklet

Simplifying an expression, multiplying brackets and factorising

1. Simplify:

(a) $2x - 3x + 5x$

(b) $8y - 5y - 3y$

(c) $2s + 3t - s + 5t$

(d) $x + x + x + x + x$

(e) $k + 3k + 4k$

(f) $12m + 9m - 2m$

(g) $4p + 2q + 3q$

(h) $5x - 5x$

(i) $3a + 5b - b - 2a$

2. Multiply out the brackets:

(a) $3(x + 5)$

(b) $4(a - 9)$

(c) $x(x + 2)$

(d) $y(b - 5)$

3. Multiply out the brackets:

(a) $5(3x + 4)$

(b) $6(2b + c)$

(c) $10(4 - 5d)$

(d) $8(7y - 6)$

4. Multiply out the brackets and simplify:

(a) $3(x + 7) + 2x$

(b) $5(2y + 3) - 6y$

(c) $7(s - 4) + 13$

5. Multiply out the brackets and simplify

(a) $-2(b + 4)$

(b) $2(a + 2d) - 3(d - 2a)$

6. Factorise: (a) $3x + 9$ (b) $8x - 12$

7. Factorise:

(a) $12b + 8$

(b) $x^2 + 5x$

(c) $ab + ac$

(d) $6b - 9c$

(e) $2y^2 - 4y$

(f) $4ab^2 - 6abc$

Expressions and Formulae

Evaluating an expression or formulae which has more than one variable

1. If $x = 5$ and $y = 3$, find the value of

(a) $x + y$ (b) $2x - 4$ (c) $x^2 + 6y$

2. (a) $s = u + at$. Find s when $u = 3$, $a = 5$ and $t = 6$

(b) $E = mc^2$ Find E when $m = 7$ and $c = 5$

(c) $b = \sqrt{\frac{c}{d}}$ Find b when $c = 100$ and $d = 4$

3. The cost of using a photocopier is £2 plus 5 pence for each copy printed.

The cost £ C of printing n copies is given by the formula

$$C = 2 + 0.05n$$

(a) Find the cost of printing a class set of 30 worksheets.

(b) Peter was charged £4.75 for a number of copies.

How many copies did he have made?

4. $W = \sqrt{\frac{V}{h}}$. Calculate W when $V = 81$ and $h = 9$.

5. Using the formula $F = \frac{\sqrt{E}}{g h^2}$, calculate F when $E = 3600$, $g = 3$ and $h = 2$.

6. The formula to calculate acceleration is given as

$$a = \frac{2d}{t^2}$$

Where a is the acceleration, d is the total distance and t is the time.

Calculate the acceleration when the distance is 100 metres and the time is 8 seconds.

Give your answer correct to 1 decimal place.

Extending a pattern and determining its formula

1. For their barbeque Mr and Mrs Goldie allowed 2 burgers for each person attending and an extra 8 to be on the safe side.

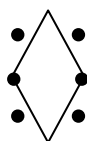
- (a) Complete this table for the numbers of burgers they would need:



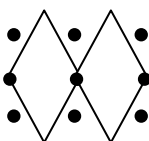
Number of people attending (n)	1	2	3	4	5	6	10	15	20
Number of burgers required (b)									

- (b) Find a formula for the number of burgers for 'n' people attending the barbeque.
 (c) How many burgers would be needed for a barbeque with 23 people attending?

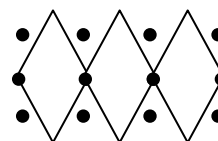
2. A pattern is built up as shown in this diagram:



Pattern 1
1 Diamond
6 Beads



Pattern 2
2 Diamonds
9 Beads



Pattern 3
3 Diamonds
12 Beads

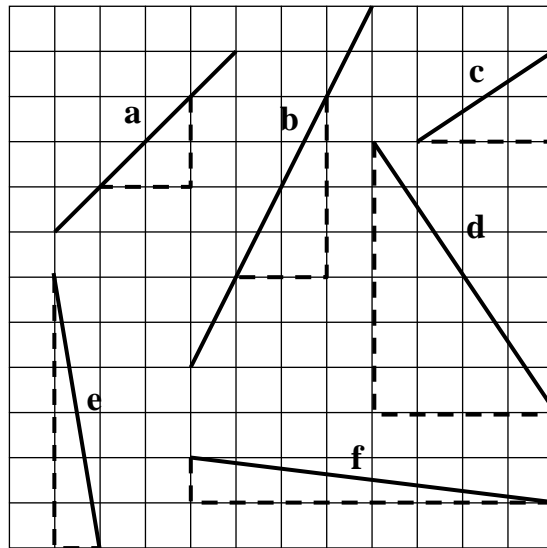
- (a) Complete the table for the number of diamonds and number of beads in other patterns.

Number of Diamonds	1	2	3	4	5		12
Number of Beads	6	9	12				

- (b) Write down a rule, in symbols, for finding the number of beads needed for any number of diamonds.
 (c) Jasper has 57 beads, how many diamonds would he need to use up all of the beads?

Calculating the gradient of a straight line from horizontal and vertical distances

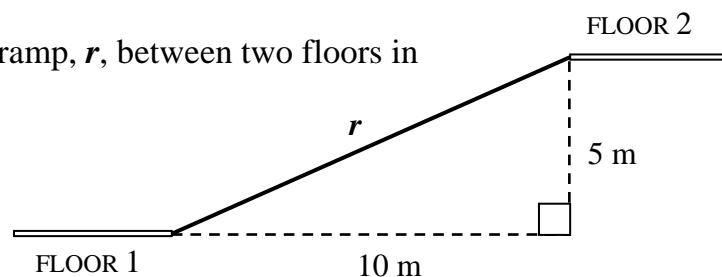
1. Find the **gradients** of the lines shown in the diagram below



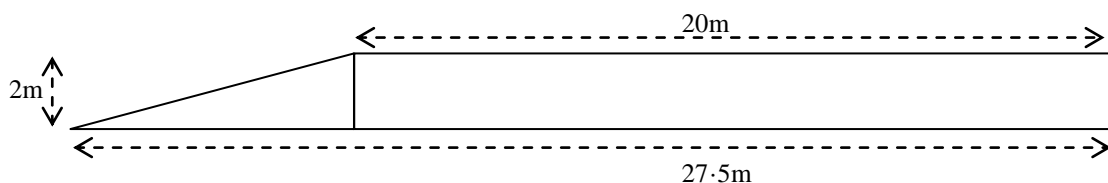
2. (a) Draw a coordinate diagram and plot the following pairs of points.
- (i) $A(3, 8)$ and $B(7, 10)$ (ii) $C(-8, 2)$ and $D(3, -4)$
- (b) Calculate the gradient of the lines AB and CD.

3. The diagram shows a moving ramp, r , between two floors in a shopping centre.

Find the gradient of the ramp.



4. A special stage is being built for an outdoor concert. It has to be 20 metres wide, 2 metres high and have a ramp on one side.



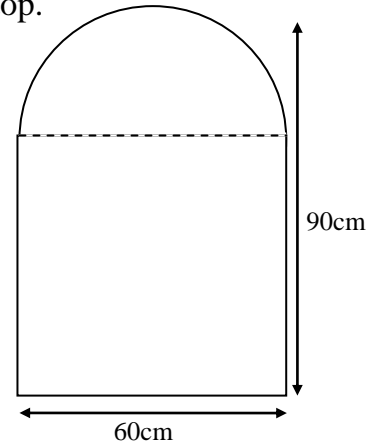
To be safe the gradient of the ramp should be between 0.25 and 0.3.

Is this ramp safe? Show all your working and give a reason for your answer.

Calculating the circumference and area of a circle

- In this exercise, answers should be given correct to one decimal place where necessary.

- Find the circumference of a circle with a diameter of 24cm.
- A window is in the shape of a rectangle with a semi-circle on top. The total height of the window is 90cm and the total width is 60cm.

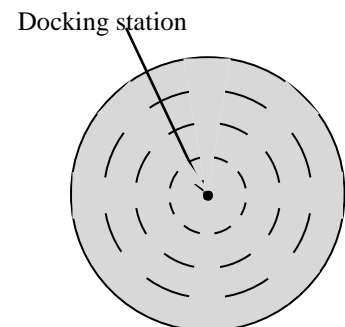


- Calculate the area of glass needed to glaze the window. A rubber gasket forms a seal between the glass and the window frame.

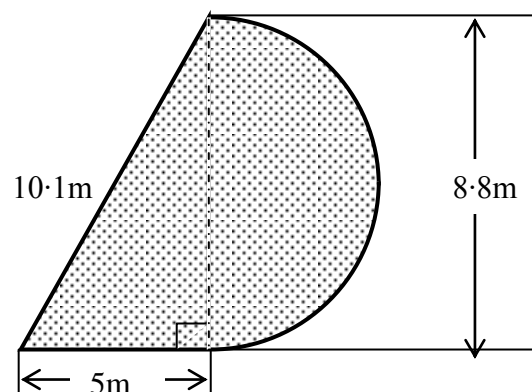
- Calculate the length of the gasket.

- A wireless telephone has a range of 50m. This means that it can receive and transmit calls up to 50m from its docking station.

Calculate the area in which it can receive and transmit calls.



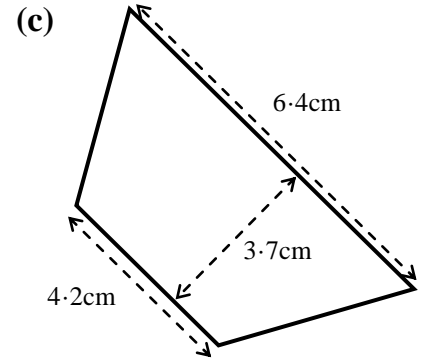
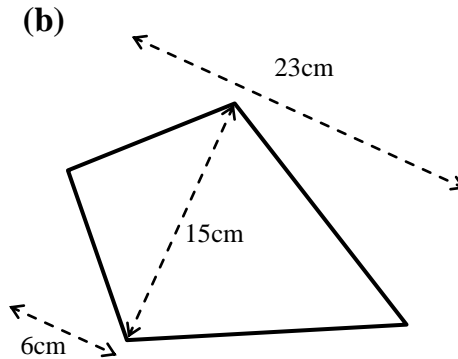
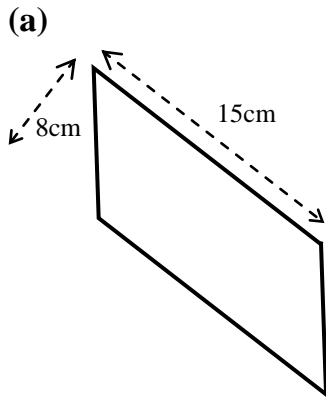
- The patio area of my garden is shaped as shown in the diagram. It is in the shape of a semi-circle and a right angled triangle.



- Calculate the area of the patio.
- Calculate the perimeter of the patio.

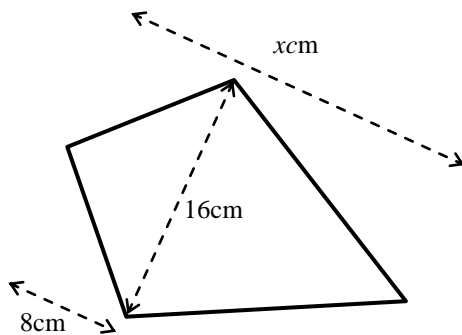
Calculating the area of a parallelogram, kite and trapezium

1. Calculate the areas of these shapes:

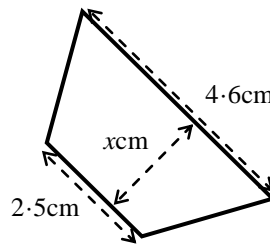


2. The areas of these shapes have been given. Calculate the value of x in each one.

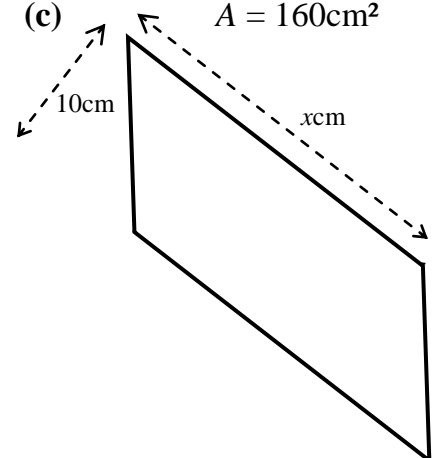
(a) $A = 96\text{cm}^2$



(b) $A = 42.6\text{cm}^2$

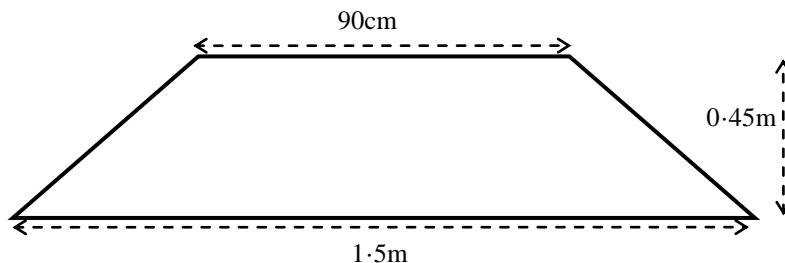


(c) $A = 160\text{cm}^2$



3. A window ledge is shaped like a trapezium with dimensions as shown in the diagram.

It is to be tiled with tiles which cost £12.40 per square metre.

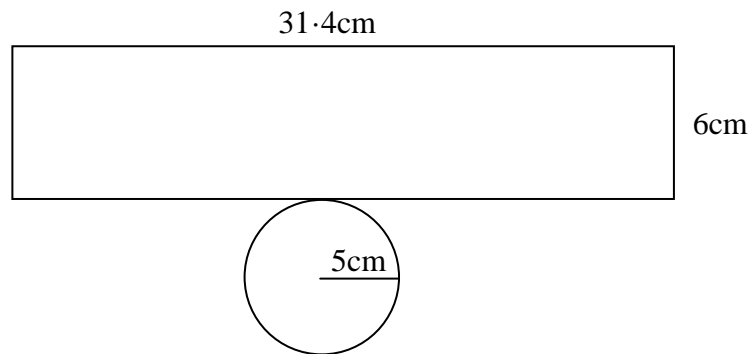


Calculate the cost of tiling the window ledge.

Investigating the surface of a prism

- In this exercise, answers should be given correct to one decimal place where necessary.

1. A container designed to hold mustard is open ended and has the net shown in the diagram below

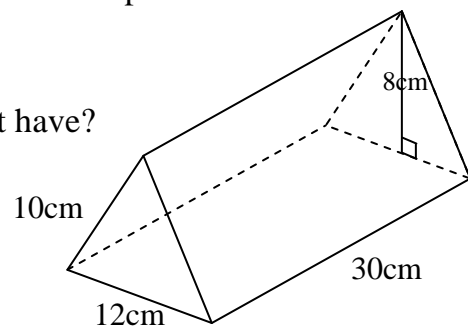


Calculate the area of this net.

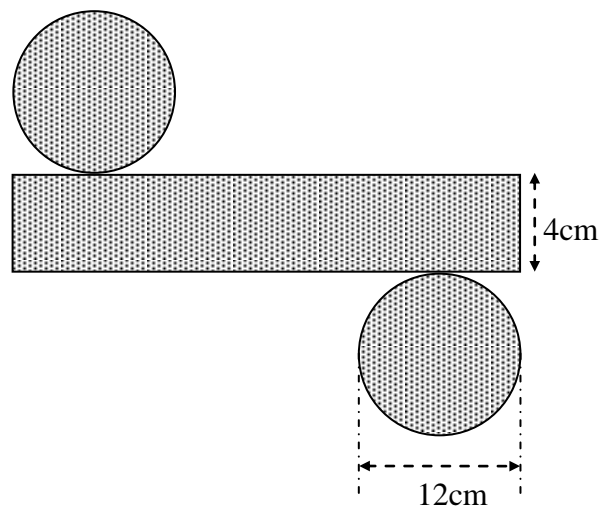
2. (a) What is the mathematical name given to this 3D shape?

- (b) How many faces, edges and vertices does it have?

- (c) Calculate the surface area of it.



3. A gift box is made up from the net shown in the diagram.

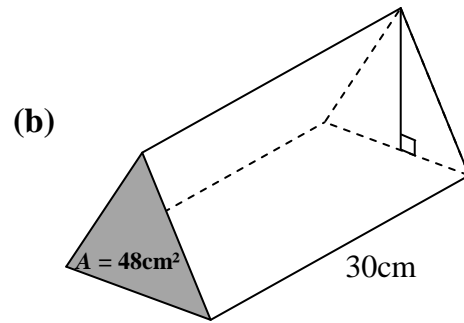
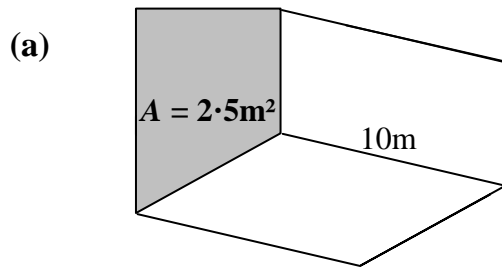


- (a) What is the mathematical name given to the 3D shape made from this net?

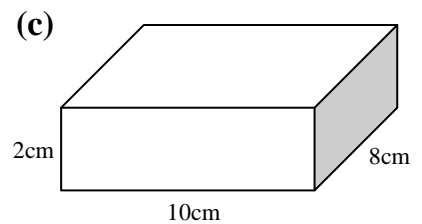
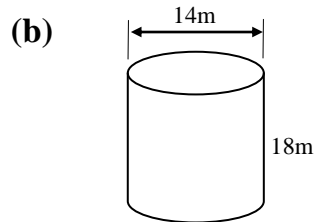
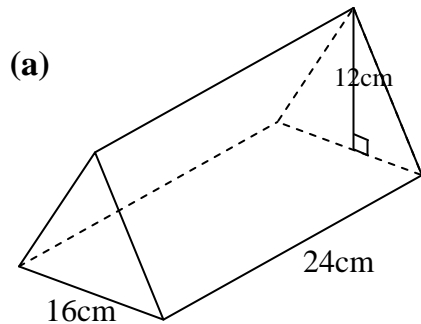
- (b) Given that the circles in the net have diameter 12 cm and the height of the 3D shape is 4 cm, calculate the curved surface area of the shape.

Calculating the volume of a prism

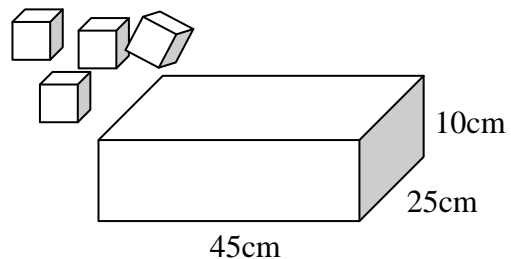
1. Calculate the volumes of these prisms.



2. Calculate the volumes of these prisms:

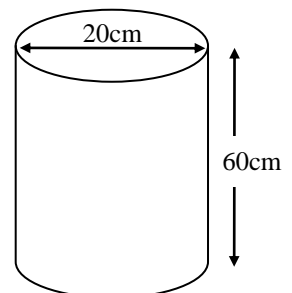


3. Jake has 100 cube shaped building blocks of side 5 centimetres which he is trying to pack into a box measuring 45cm by 25cm by 10cm.



Will all the blocks fit in the box? If not, how many will he be left with?

4. A water container in the shape of a cylinder with diameter 20 centimetres and height 60 centimetres is shown below.
[diagrams are not drawn to scale]

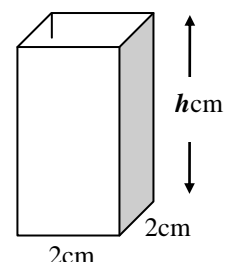


- (a) Calculate the volume of the cylinder, in cm^3 .
- (b) The cylinder is full of water. The water is then poured from the cylinder into 1000 small cuboid-shaped containers which will be frozen to produce small ice blocks.

The water in the cylinder **exactly fills** the 1000 containers.

Each cuboid has a square base of side 2cm and a height of $h\text{cm}$.

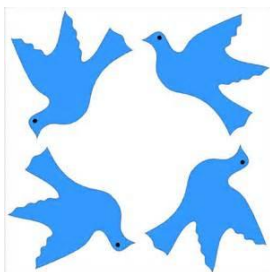
Calculate the height (h) of each small container.



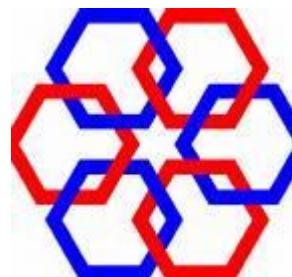
Using rotational symmetry

1. Write down the order of rotational symmetry of these shapes:

(a)



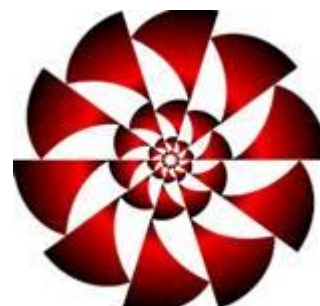
(b)



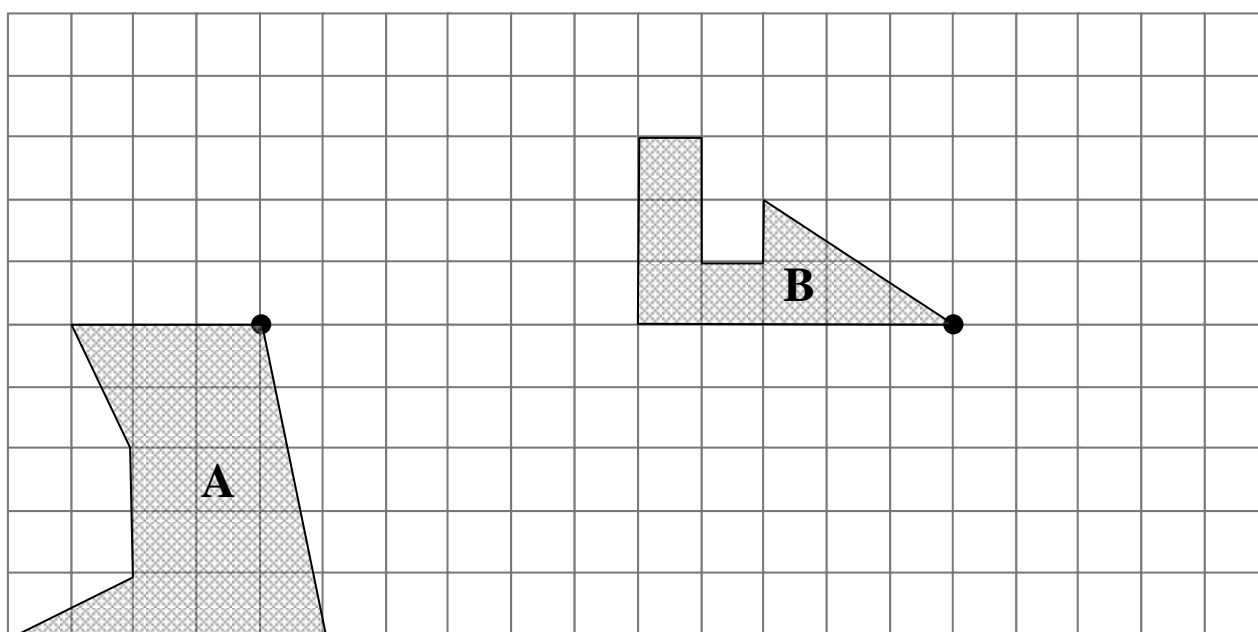
(c)



(d)



2. Complete shape **A** so that it has half turn symmetry and shape **B** so that it has turn symmetry of order 4 about the dot.



Expressions and Formulae

Constructing a frequency table with class intervals from raw data

1. A class of second year pupils had a test recently and the following marks were obtained:

32 43 23 18 36 21 9 45 45 32 33 46
7 12 24 20 32 11 48 21 37 42 42 41

Copy and complete this tally table for the above data.

Mark	Tally Marks	Number
1–10		
11–		
–50		

2. A sample of 25 Christmas trees was selected and the heights of them measured. The results are shown here.

[Measurements are in metres.]

1.3 2.4 1.5 3.3 1.1
2.1 2.2 2.7 1.7 2.3
1.5 2.4 1.1 4.0 2.6
3.5 3.3 2.8 1.0 2.7
4.1 3.2 1.9 3.8 2.7

Height	Tally	Frequency
1.0 – 1.4		
2.5 –		
– 4.4		

Complete the table for the figures given.



Expressions and Formulae

Determining mean, median, mode and range of a data set

1. The ages of the players in a local football team are given below:

19 23 30 24 19 25 31 27 28 30 19

Calculate the mean, median, mode and range for the above data.

2. The weights, in kilograms, of 20 new-born babies are shown below.

2.8 3.4 2.8 3.1 3.0 4.0 3.5 3.8 3.9 2.9
2.7 3.6 2.5 3.3 3.5 4.1 3.6 3.4 3.2 3.4

Find the (a) mean (b) median
 (c) mode (d) range.

3. The weekly takings in small store, to the nearest £, for a week in December and March are shown below

December	2131	2893	2429	3519	4096	4810
March	1727	2148	1825	2397	2901	3114

- (a) Calculate the mean takings for December and March.
(b) Give a reason for the difference in the answers in part (a).

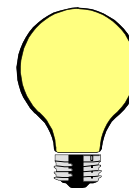
4. A footballer scored the following numbers of goals for 9 matches.

1 0 3 3 2 4 1 4 3

After his tenth match his mean score was 2.6 goals per match.

How many goals did he score in the tenth match?

- | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|
| 1503 | 1469 | 1511 | 1494 | 1634 | 1601 | 1625 | 1492 | 1495 | 1505 |
| 1487 | 1493 | 1006 | 1512 | 1510 | 1599 | 1501 | 1486 | 1471 | 1598 |



Do you agree with their claim?

- | | | | | | | | | |
|---|---|---|---|---|---|---|--|---------|
| 2 | 2 | | | | | | | paper 1 |
| 3 | 0 | 3 | | | | | | |
| 4 | 0 | 2 | 4 | | | | | |
| 5 | 1 | 1 | 1 | | | | | |
| 6 | 2 | 5 | 5 | 6 | | | | |
| 7 | 0 | 0 | 1 | 5 | 5 | | | |
| 8 | 1 | 3 | 3 | 4 | 6 | 8 | | |
| 9 | 0 | 1 | 1 | 4 | 5 | | | |

$$n = 29; 2 \mid 2 \text{ represents } 22$$
[illegible]

- (b)** In which paper did the pupils do better?

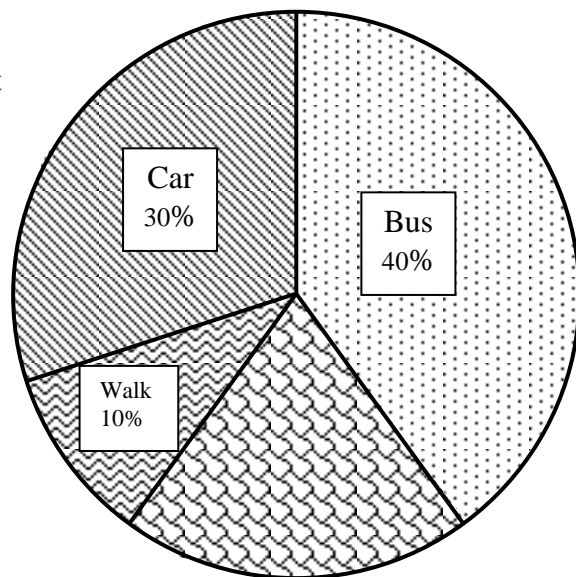
- £9 £11 £15 £13 £9 £20 £12 £18 £10

Which one would you choose and why?

Representing raw data in a pie chart

1. A class of 30 pupils was asked about how they travelled to school and this pie chart drawn.

- (a) How many
- (i) walked
 - (ii) came by bus
 - (iii) came by car
 - (iv) cycled?
- (b) What was the least popular method of travel?



2. As people left a Sports Centre they were asked which sport they had taken part in. The table shows the results.

Sport	Number of people
Squash	4
Swimming	17
Badminton	8
Skating	11

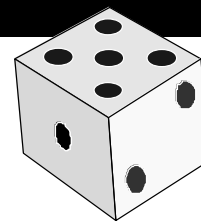
Draw a pie-chart to show this information.

3. A group of pupils are asked their favourite type of music. The results are shown below.

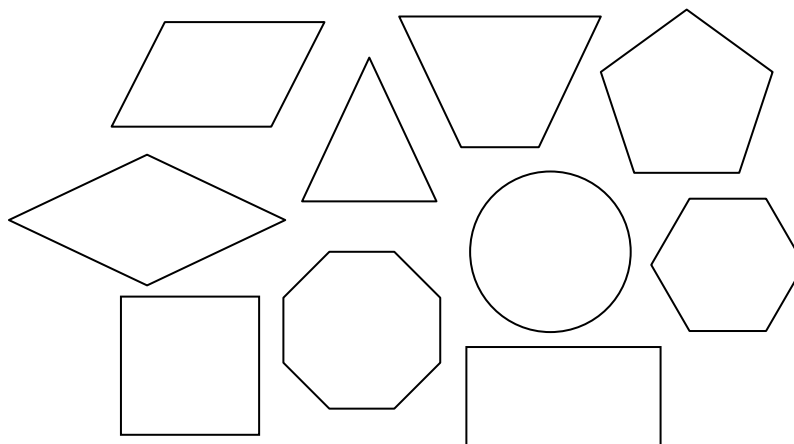
Type of Music	Number of Pupils
Pop	43
Rock	12
Hip-Hop	9
R and B	18
Disco	23
Rap	15

Show this information in a pie chart.

Using probability



- A die is rolled. Find the probability that it lands showing
 - 1
 - an odd number
 - a prime number
 - a multiple of 3
 - a number less than 3
- If one of these geometric shapes is picked at random, what is the probability that it has



- 4 sides
 - a centre of symmetry
 - less than 3 sides
- Darren and his friend are playing with a pack of cards from which his maths teacher has confiscated the Ace of Spades and the King of Hearts.
What is the probability that the first card he deals is
 - an Ace
 - a black card
 - a Queen
 - the 4 of clubs?
 - A coin is tossed and a die thrown.

Copy and complete this table to show all the possible results:

	1	2	3	4	5	6
Heads(H)		2H				
Tails(T)				4T		

What is the probability of getting:

- Heads and an even number?
- Tails and a prime number?

Relationships

Drawing and recognising the graph of a linear equation

1. (a) Copy and complete the table of values for the line with equation $y = 2x - 1$.

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

- (b) Write down the set of points to be plotted.
 $(-2, -5)$, $(-1, \quad)$, $(0, -1)$ $(3, \quad)$

- (c) Draw and label a set of axes, and plot the points.

- (d) Draw the line with equation $y = 2x - 1$.

2. (a) Draw the line with equation $y = -2$

- (b) Draw the line with equation $x = 3$

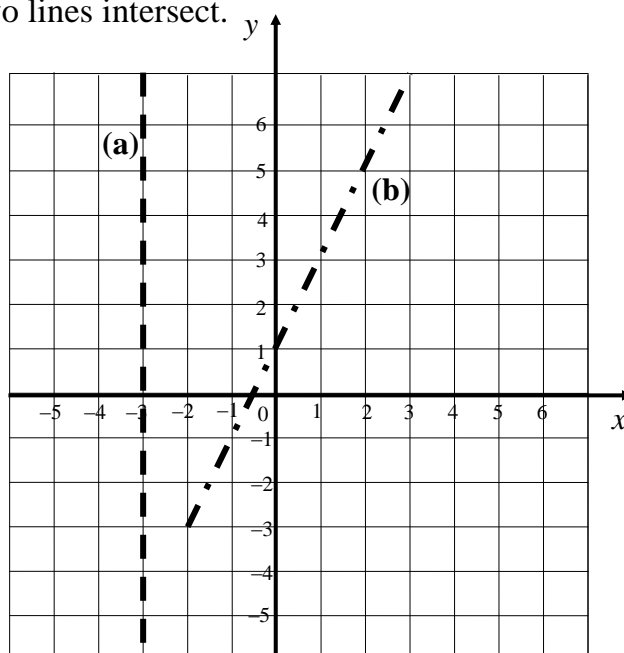
- (c) Write down the coordinates of the point where these two lines intersect.

3. (a) Draw the line with equation $y = x - 2$.

- (b) On the same diagram, draw the line with equation $y = 4$.

- (c) Write down the point where the two lines intersect.

4. Write down the equations of the lines shown in the diagram.



5. Write down the gradient and y - intercept of the line with equation $y = 3 - 4x$.

Relationships

Solving linear equations and inequations

1. Solve these equations:

(a) $x + 5 = 3$

(b) $y - 4 = 1$

(c) $z + 3 = -2$

2. Solve these equations:

(a) $5x = 20$

(b) $3z = 15$

(c) $2y = 1$

3. Solve these equations:

(a) $2x - 12 = -3$

(b) $5z + 9 = 4$

(c) $6y - 9 = 2y + 5$

(d) $8k - 5 = 5k + 1$

(e) $6(a - 1) = 4(a + 2)$

(f) $6x + 11 = 9x + 2$

4. Solve these equations:

(a) $7x + 7 = 5x - 11$

(b) $3x + 13 = 9 - 5x$

(c) $4x - 8 = 6x - 14$

5. Solve these inequalities:

(a) $7x > 42$

(b) $5x - 3 \leq 22$

(c) $3x - 2 > -11$

Changing the subject of a formula

1. Change the subject of each formula to x .

(a) $y = x - 3$

(b) $y = x + b$

(c) $y = 3x$

(d) $y = 3p + x$

2. Make a the subject of each formula.

(a) $c = 7 + a$

(b) $g = a - 2x$

3. Change the subject of the formula to x .

(a) $y = ax + b$

(b) $k = h - mx$

4. Change the subject of each formula to the letter shown in brackets.

(a) $P = 6l$ [l] (b) $V = IR$ [I] (c) $P = 2w + 2b$ [b]

5. Change the subject of each formula to y .

(a) $v = \frac{1}{2}y$

(b) $c = \frac{1}{5}y$

6. Make x the subject of each formula.

(a) $a = \frac{7}{x}$

(b) $m = \frac{y}{x}$

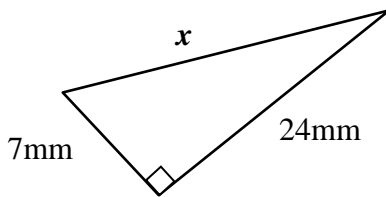
(c) $p = \frac{3}{x} - 2$

Relationships

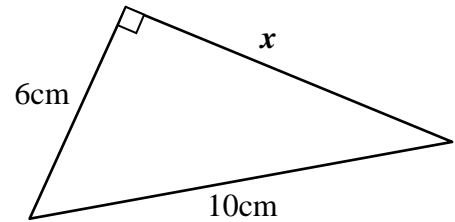
Using Pythagoras' Theorem

1. Find the length of x in each of the triangles below.

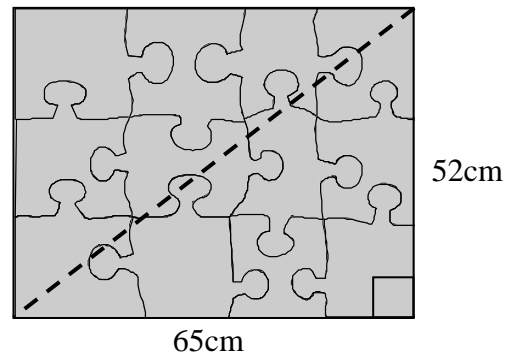
(a)



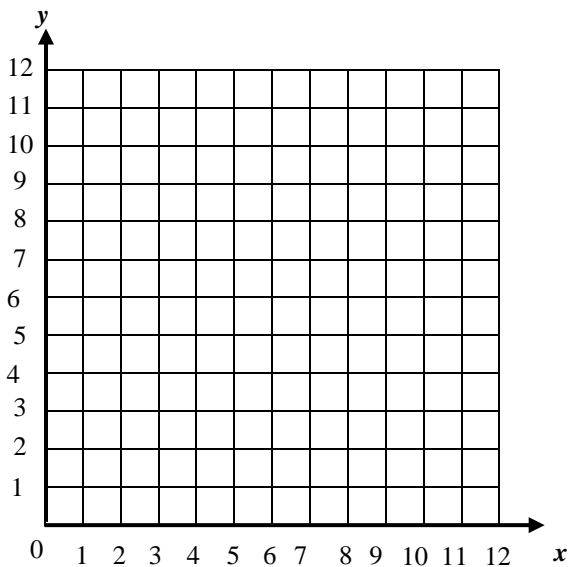
(b)



2. A rectangular jigsaw measures 65cm by 52cm. What length is its diagonal?



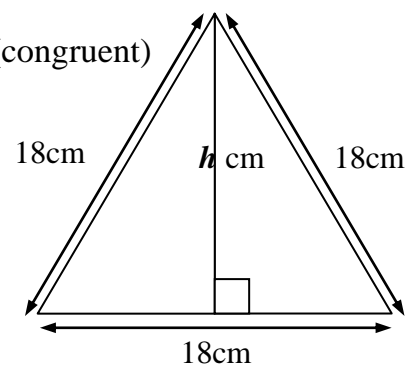
3.



- (a) Plot the points A(3, 1) and B(10, 10)
- (b) Make a right-angled triangle and mark in the lengths of the sides.
- (c) Calculate the length of AB, to 1 dp.

4. An equilateral triangle can be split into two identical (congruent) right angled triangles, as shown here

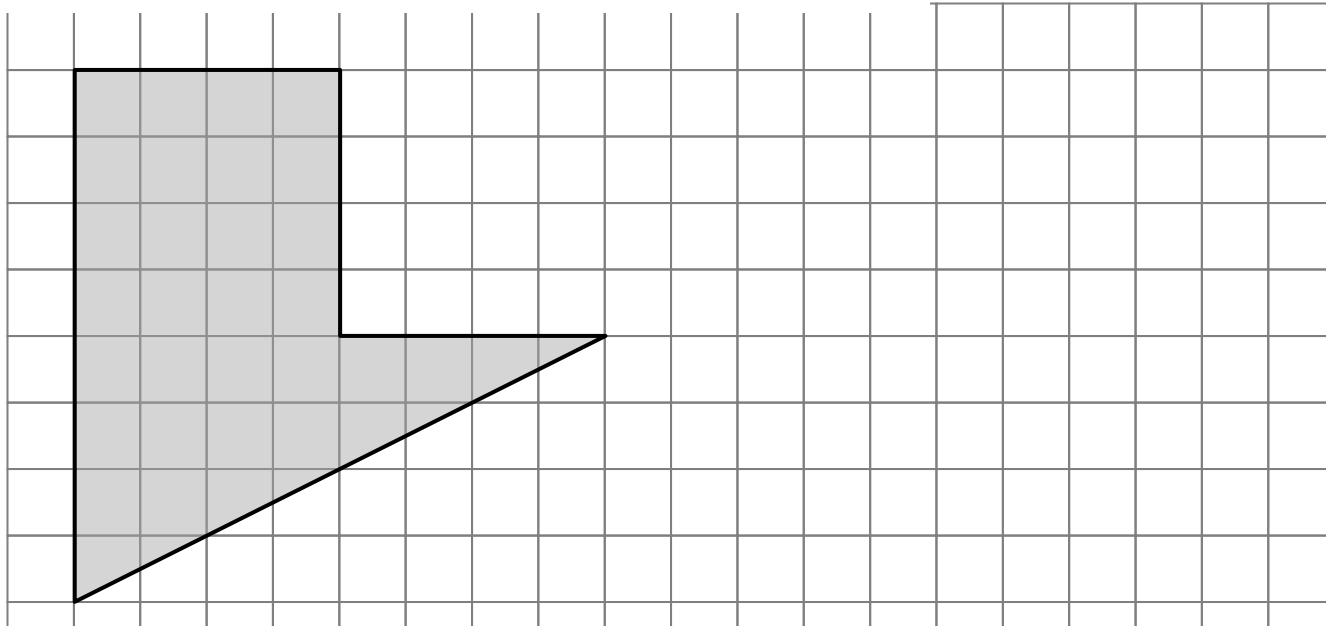
Calculate the height, h cm, of an equilateral triangle whose sides are each 18cm long.



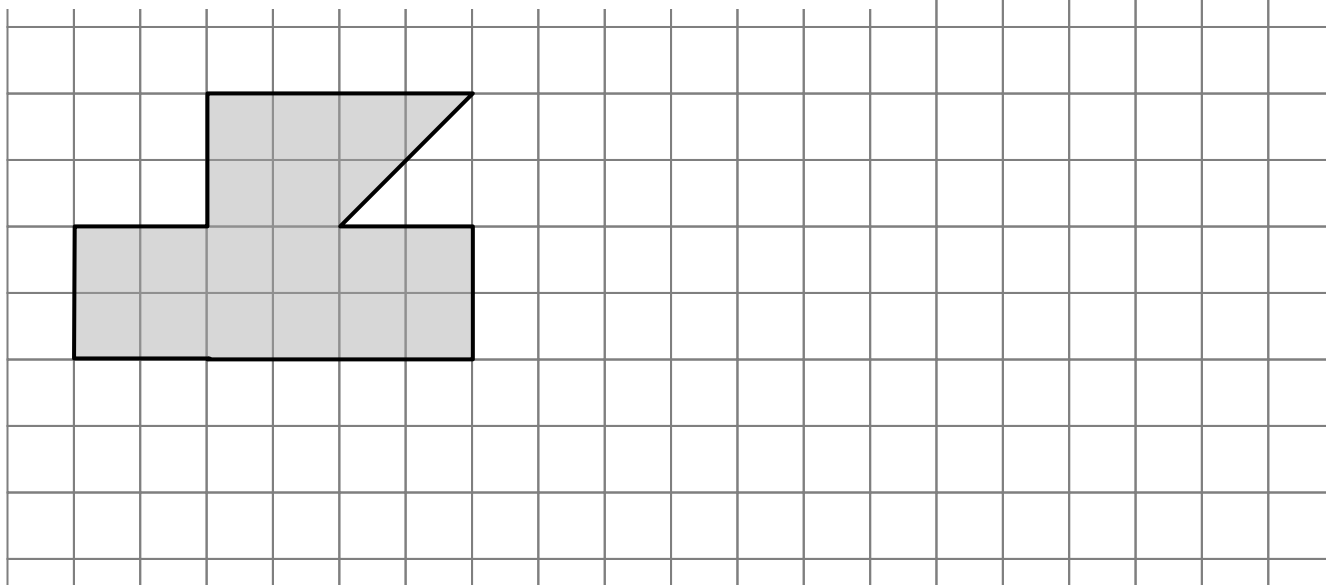
Relationships

Using a fractional scale factor to enlarge or reduce a shape

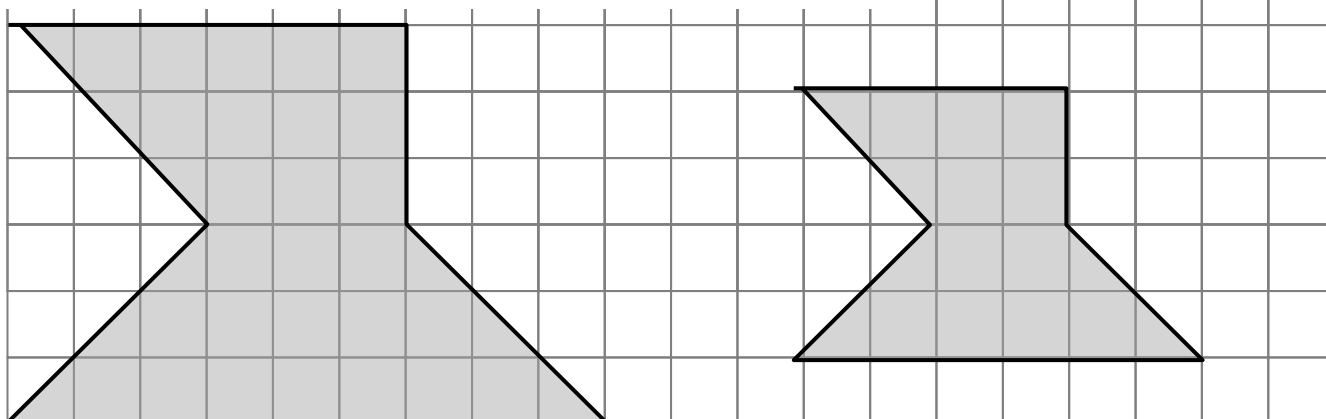
1. Use a scale factor of $\frac{3}{4}$ to reduce this shape.



2. Use a scale factor of $\frac{3}{2}$ to enlarge this shape.

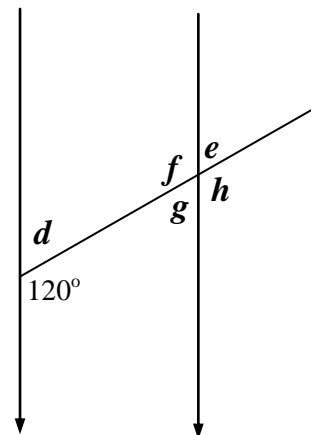
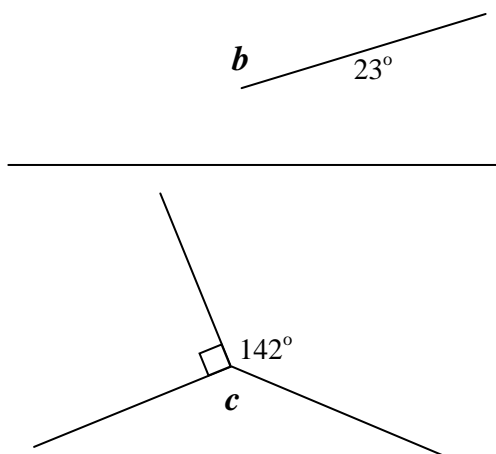
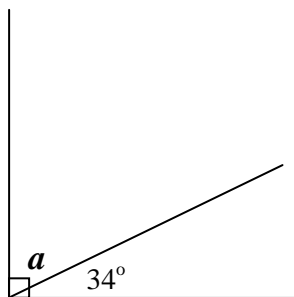


3. What scale has been used to reduce this shape?

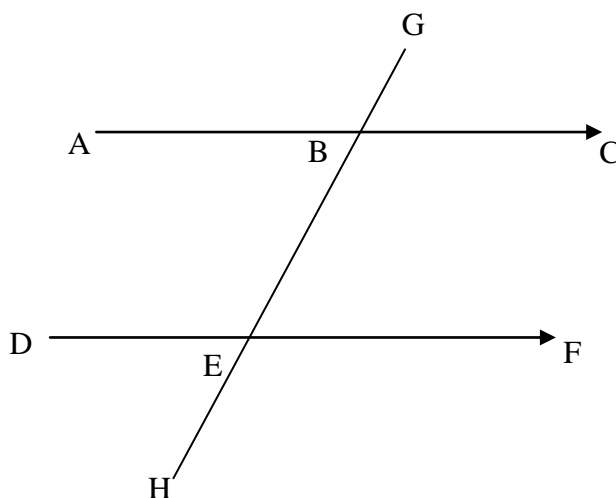


PART 1

1. Calculate the sizes of the missing angles in the diagrams below.



- 2.

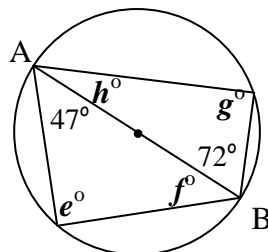
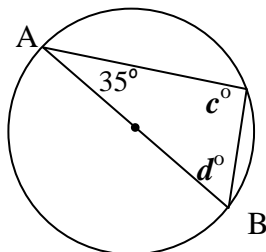
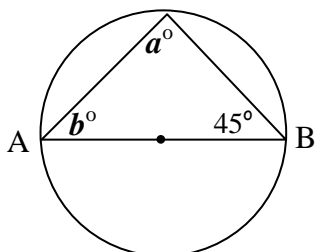


If $\angle ABG = 125^\circ$, calculate the size of

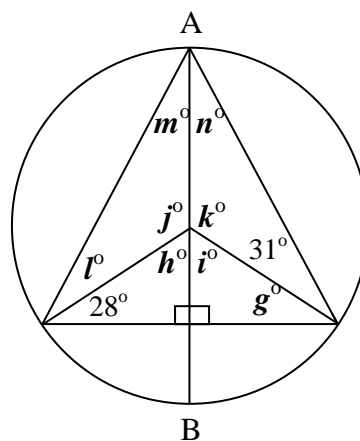
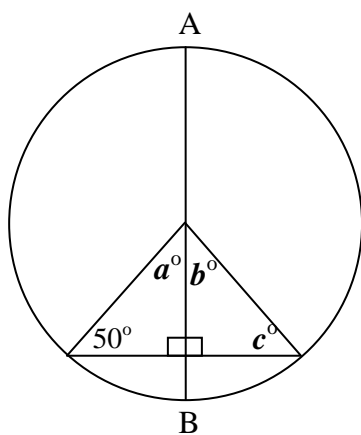
- (a) $\angle ABE$ (b) $\angle DEH$ (c) $\angle BEF$ (d) $\angle GBC$

PART 2

1. In each of the diagrams below AB is a diameter. Find the missing angles in each diagram.



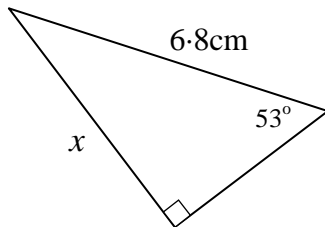
2. Use the symmetry properties of the circle to find the missing angles in the diagrams below. In each diagram AB is a diameter.



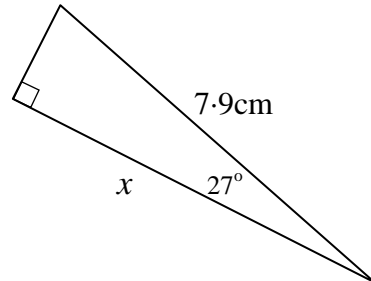
Calculating a side in a right-angled triangle

1. Calculate the length of the side marked x in each diagram below. *Show all your working.*

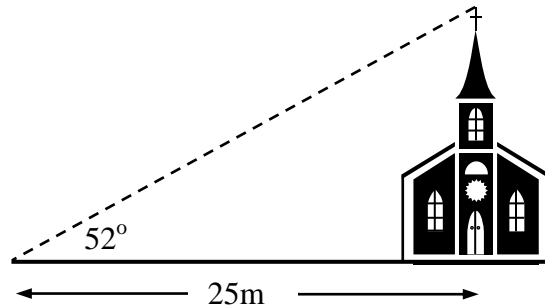
(a)



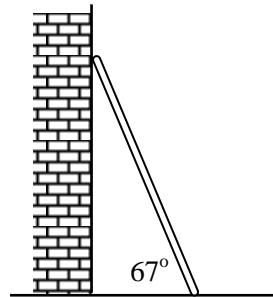
(b)



2. Jenny is standing 25 metres away from the bottom of a church tower. She looks up at the top at an angle of elevation of 52° . Calculate the height of the tower.



3. A ladder, which is 6.4 metres long, leans against a vertical wall and makes an angle of 67° with the ground.

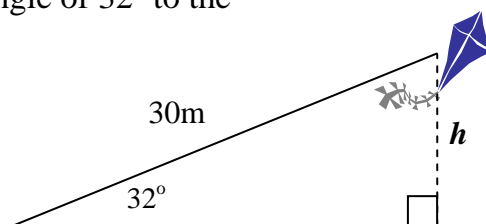


Calculate, to the nearest 0.1m, how far the bottom of the ladder is from the wall.

4. Eddie is flying his kite. The string is at an angle of 32° to the horizontal.

He lets out 30 metres of string.

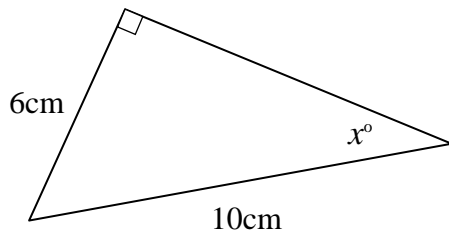
How high is the kite above the ground?



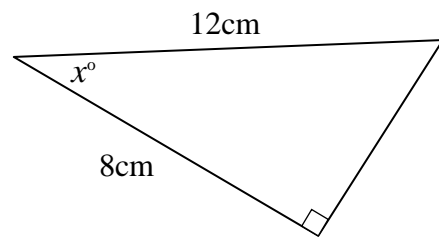
Calculating an angle in a right-angled triangle

1. Calculate the size of the angle marked x° in these right-angled triangles.

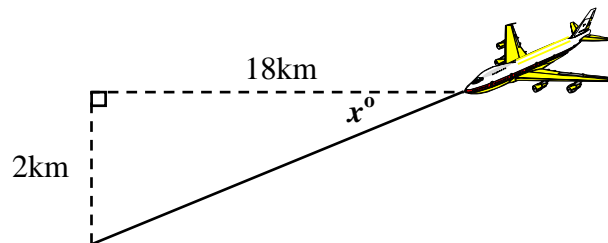
(a)



(b)

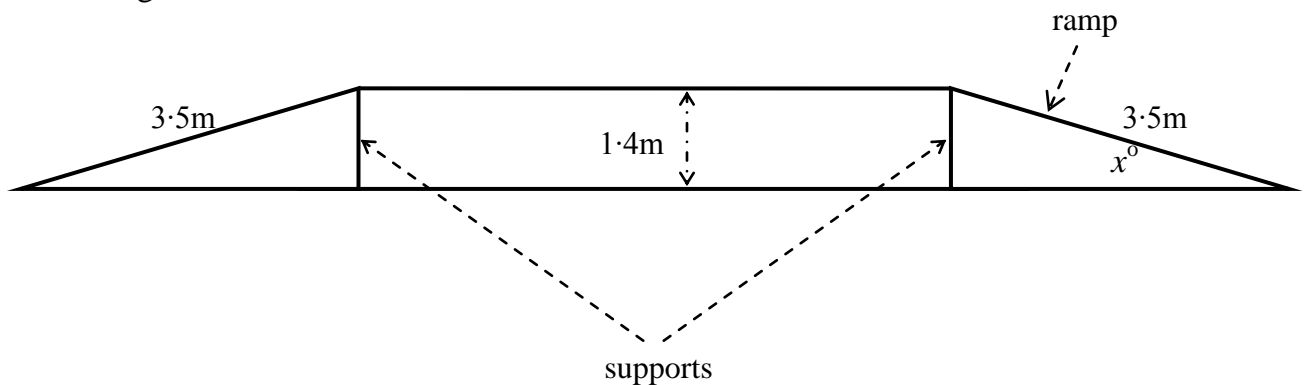


2. An aircraft making a steady descent decreases height by 2km in 18km. What is the angle of descent, x° ?



3. In a woodland walk there is a bridge over a stream.

The diagram shows the side view of it.



The ramps at the side are 3.5metres long and the supports are 1.4 metres high.

To be safe the angle that the ramp makes with the ground should be between 21° and 23° .

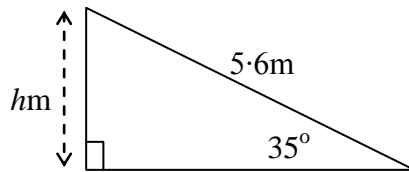
Are the ramps on the bridge safe?

You must show all working and give a reason for your answer.

Relationships

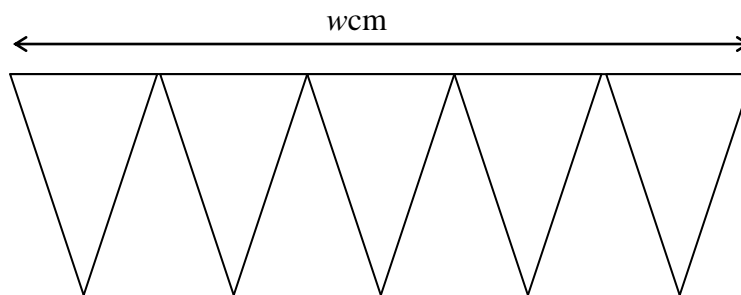
Mixed Examples

1. The staircase in my house is 5.6 metres long and rises at an angle of 35° to the floor.

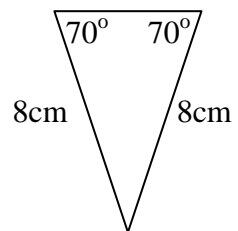


Calculate the height, 'hm', of the staircase.

2. The pattern in the diagram is formed from a series of isosceles triangles in a line.

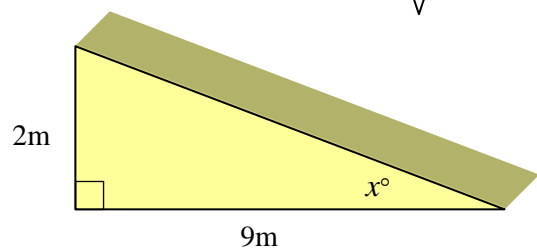


Each triangle has its equal sides 8cm long and its equal angles 70° .



Calculate the width, wcm, of the pattern.

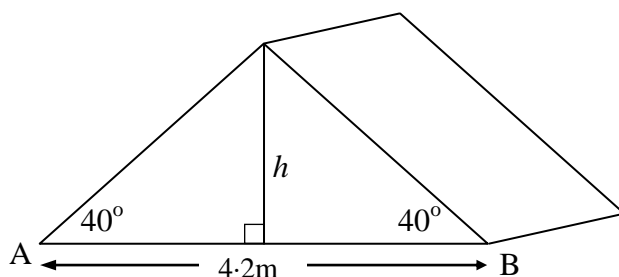
3. A skateboard ramp has been designed with the dimensions as shown.



The ramp can only be used in competitions if the angle marked x is between 10 and 15 degrees.

Can this ramp be used in a competition? **You must show all your working**

4. The distance between the tent pegs at A and B is 4.2m and the angle of elevation of the sides of the tent is 40° , as shown.



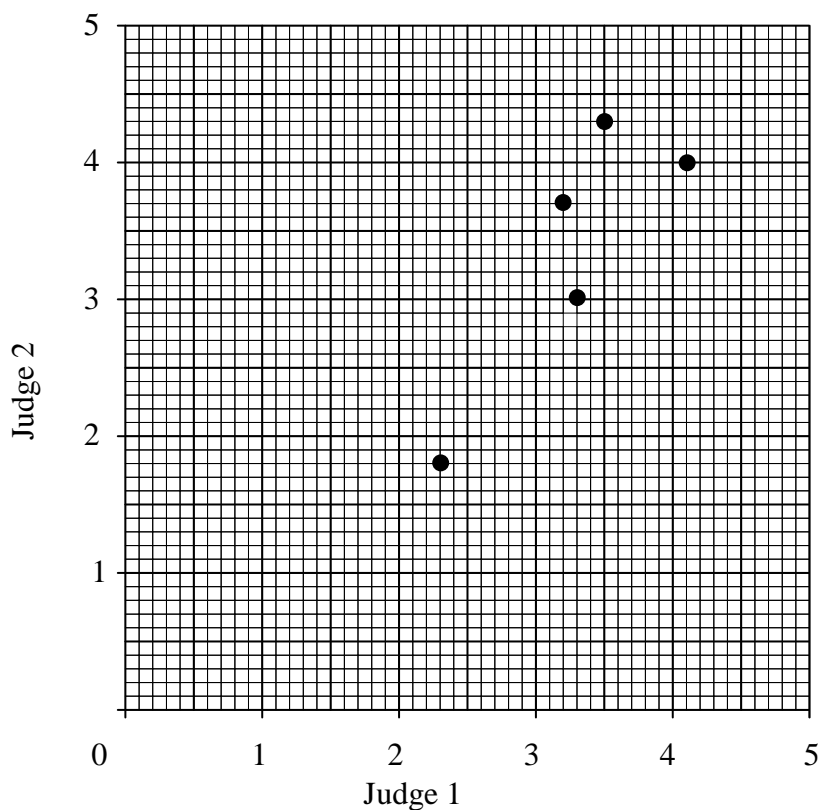
Calculate the height, h , of the tent.

Relationships

Scattergraphs

1. Two judges, Judge 1 and Judge 2, were scoring athletes in a competition. Each judge awarded points out of 5.

The scattergraph shows the marks for five out of the seven athletes who took part.



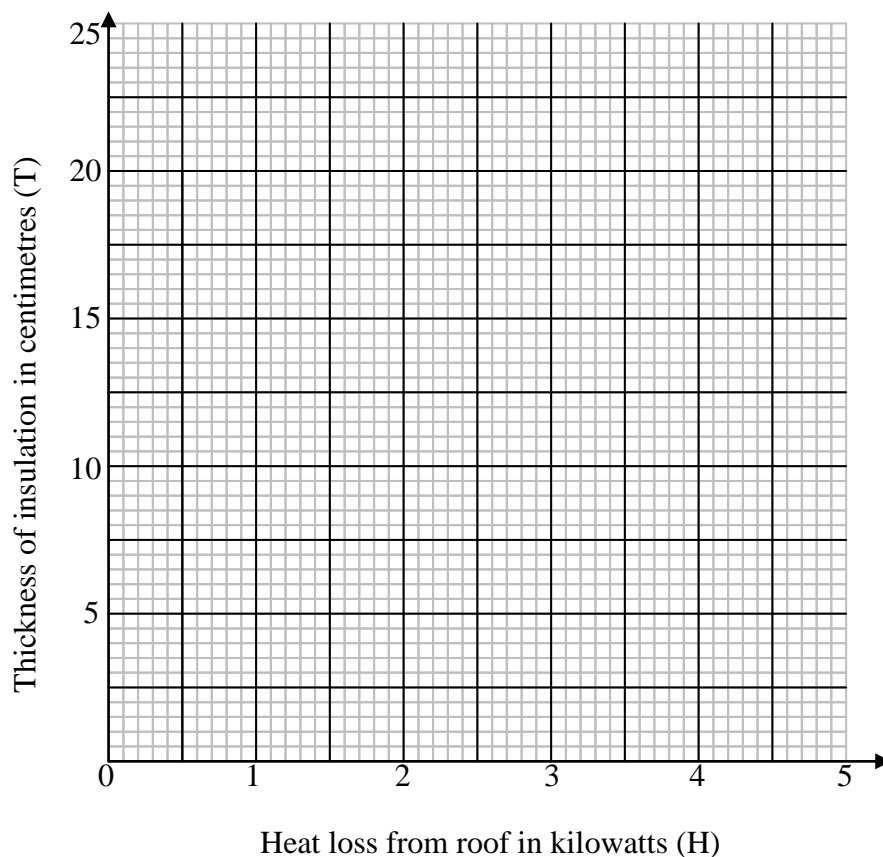
- (a) Helen was given a score of 4.3 by Judge 1 and 4.6 by Judge 2. Mark Helen's score with an **X** on the scattergraph.
- (b) **Draw a line of best fit** on the scattergraph.
- (c) John was scored 3.7 by Judge 1.

From your line of best fit, estimate the score that Judge 2 may have awarded him.

2. The table below shows the connection between the thickness of insulation in a roof and the heat lost through the roof.

Heat loss in kilowatts (H)	1.5	1.8	3	4	4.4	4.6
Thickness in cm (T)	22.5	18	10	11	6.5	2.5

- (a) Draw a scatter diagram on the graph below.



- (b) Draw the best fitting straight line through the points.
- (c) Use your graph to estimate the heat loss from 15 centimetres of insulation.

3. The following table gives the temperature of a bottle of water as it is heated.

Time (mins) T	1	3	5	7	9
Temp (°C) C	20	23	27	31	36

- (a) Plot the information on a graph and draw a line of best fit.
- (b) Use your graph to estimate the temperature after 6 minutes.

Four Rules

1. Martin is reading a book with 200 pages. There are 360 words on each page. How many words are there in total?

2. Two bunches of grapes are weighed in grams. The weights are shown below.



Find:

- (a) the total weight of the 2 bunches (b) the difference in their weights

3. Calculate:

(a) $3.5 + 2.9$ (b) $8.57 - 1.68$ (c) 6.7×8 (d) $7.56 \div 7$

4. Amanda collects music magazines which are printed monthly. Each magazine is 5 millimetres thick. A shelf, 0.4 metres long, is filled with these magazines. How many magazines are on the shelf?

5. A section of the Clyde walkway is 17km long. Kashef and his friend walked different parts of it on three different days. On day 1 they walked 5.73km and on day 2 they walked 4.05km.

(a) How far did they walk altogether over the two days?

(b) If they walked the remainder of the 17km on day 3, how far did they walk on that day?

6. A pack of breakfast cereal weighs 285 grams.

Calculate, to the nearest **kilogram**, the weight of a carton containing 60 packs.

7. A coffee table top measures 1.1 metres by 80 centimetres. Calculate its area, giving your answer in **square metres**, correct to 1 decimal place.

4. In the triangular number table shown opposite,
Line 2 is formed by adding the 2 cells
directly below in Line 1. ($-2 + 5 = 3$)
Line 3 is formed by adding the 2 cells
directly below in Line 2. ($3 + (-4) = -1$)



-
- | | | |
|----|---|----|
| | | |
| | | |
| -8 | 2 | -5 |

				0			
			-2		2		
		-7				-3	

- What is the difference in the operating temperatures of these two freezers?

Percentages

1. Find: (a) 1% of 5000 (b) 10% of 120 (c) 70% of 230

2. In a class of 30 pupils, 9 had brown eyes. What percentage is this?

3. In a sale all prices are reduced by 35%. What would be the sale price of an item which originally cost £200?

4. Universal DVD increased their hire charges by 12%.
What would it now cost to rent a DVD that used to cost £3 to hire?

5. Bookworms Bookstore reduce the prices of their books by $33\frac{1}{3}\%$.
How much would you pay for a book that was originally priced at £18?

6. James buys a house costing £45 000.
The building Society will only give him a 90% mortgage.
How much does he need to pay for the deposit?

7. Mrs Mitchell saw a new cooker priced at £1 150 in her local electrical store.
She found the same cooker on the internet at a cost of £640.
 - (a) How much did Mrs Mitchell save by buying on the internet?

 - (b) Express this amount as a percentage of the store price, rounding your answer to the nearest percent.

Fractions

1. Calculate: (a) $\frac{2}{3}$ of £42.60 (b) $\frac{4}{5}$ of £70 (c) $\frac{4}{9}$ of £144

2. Fiona earns £54 working in a Health Club on a Saturday.
She spends $\frac{2}{3}$ of it and saves the rest.

How much does she save?

3. An Orchestra has 72 members. $\frac{5}{8}$ of them play stringed instruments.
How many is this?

4. Jamil wants to buy a new phone which costs £288.

- (a) He has managed to save $\frac{2}{3}$ of it.

How much has he still to save?

- (b) His Gran tells him that she will give him 25% of what he still needs and his Mum gives him £70.

Does Jamil have enough to buy his new phone?

You must show all working and give a reason for your answer.

Rounding

1. Round each number to the nearest unit

(a) 5.5

(b) 12.3

(c) 172.8

(d) 32.56

2. Round each to the number of decimal places shown in brackets

(a) 3.76 (1)

(b) 18.324 (2)

(c) 12.8735 (2)

(d) 103.7839 (1)

3. Use your calculator to find the following. Answer to 2 significant figures where necessary.

(a) $\sqrt{25^2 - 16^2}$

(b) $8.4 \div (9.6 - 5.7)$

(c) $20 \times (2.1 + 5.9)$

(d) $\frac{58}{(1.2 \times 14)}$

Calculating speed, distance and time

1. An aeroplane flies at 420 miles per hour for 45 minutes.
Calculate the distance it has travelled.

2. (a) Julian is going on holiday and has to be at the airport, 165km from his home, by 12.30pm.
He leaves home at 9.30am and travels at an average speed of 60km/h.

Does Julian arrive at the airport on time? Give a reason for your answer.

(b) Julian's friend leaves his home at 9.15am and arrives at the airport 2 hours and 15 minutes later.
He has been travelling at an average speed of 70km/h.

How far from the airport does Julian's friend stay?

3. (a) A man travels a distance of 340 miles in his car.
If the time taken for the journey is 5 hours 18 minutes, calculate his average speed for the journey to the nearest mile per hour.

(b) A woman travels 54 miles to her work.
She leaves home at 0710 and arrives at her work at 0822.
Calculate the average speed for her journey.

(c) A lorry driver travels at an average speed of 40 mph.
He has to complete a journey of 130 miles.

How long will his journey take?

Time Intervals

1. A plane going to Malta leaves Edinburgh Airport at 9.50 pm. The flight lasts 3 hours and 45 minutes.
At what time does the plane land in Malta?

2. A nurse started 'night – shift' at 9.45pm and finished at 7.30am the next morning.
How long did her shift last?

3. A sponsored dance started on Friday 13th May at 3.45 pm and ended at 2.15 pm on Sunday 15th May.
 - (a) How long did it last?
Give your answer in hours.
 - (b) Fiona's Mum sponsored her for 50p an hour.
How much did her Mum have to give her?

4. Reece is a salesman and has to be at a meeting in Edinburgh at 10.15am.
He estimates that it will take him 1 hour 55 minutes to travel from his home to the meeting place.
If he wants to be at the meeting place **at least** 25 minutes before the start time, when is the **latest time** he should leave home to go to his meeting?

5. The timetable shows the times of both steam and diesel trains for the round trip to and from Sheringham on the North Norfolk Railway line.

	<i>Diesel</i>	<i>Steam</i>	<i>Diesel</i>	<i>Steam</i>	<i>Steam</i>
Sheringham	0910	1015	1145	1230	1430
Weybourne	0919	1025	1154	1240	1440
Kelling Heath	0922	–	1157	–	–
Holt <i>arr</i>	0929	1038	1204	1253	1453
<i>dep</i>	0941	1100	1216	1315	1515
Kelling Heath	0947	–	1222	–	–
Weybourne	0949	1112	1224	1327	1527
Sheringham	0958	1123	1233	1338	1538

- (a) How long does the diesel train take for the round trip?
- (b) How much longer does the steam train take for the same trip?

Ratio and direct proportion

1. For a certain concrete mixture sand and cement are mixed in the ratio 4 : 3.

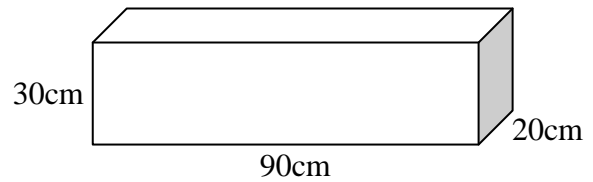
In one batch there are 32 bags of sand.

How many bags of cement are required?
2. The ratio of males to females in a club is 2 : 5.

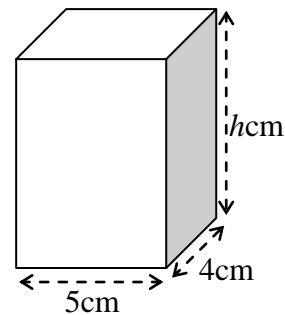
If there are 6 male members, how many members are there altogether in the club?
3. Michael & David win £1600 on the lottery and are going to split it in the ratio 3:5.
How much does each get?
4. Jafar's heart beats at the rate of 84 beats per minute. How many beats will it make in 5 minutes?
5. A jet can cover a distance of 2436 miles in 3.5 hours. What is its rate of travel in **miles per hour**?
6. Jack drives 400 km in 5 hours. At the same rate, how far could he drive in 8 hours?
7. Paula paid £22 for 40 litres of petrol. How much would she pay for 47 litres?

Calculating the volume of a cube and cuboid

1. A garden water trough is in the shape of a cuboid which measures 90cm by 30cm by 20cm.

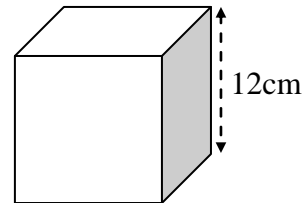


- (a) Calculate the number of litres that the trough holds when it is completely full. ($1000\text{cm}^3 = 1 \text{ litre}$)
- (b) The water is used to fill 300 small cuboid shaped vases like the one shown in the diagram.



Calculate the height, $h\text{cm}$, of the vases.

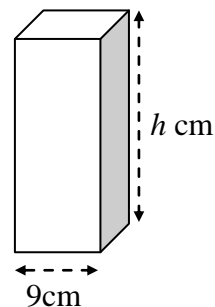
2. An ornament is packaged in a cardboard box which is a cube of side 12cm.



- (a) Find the volume of the box.
- (b) Calculate the area of card which would be needed to make the box. [Ignore any overlaps]

Another ornament is to be packed in a box which is a cuboid with **half** the volume of the cube.

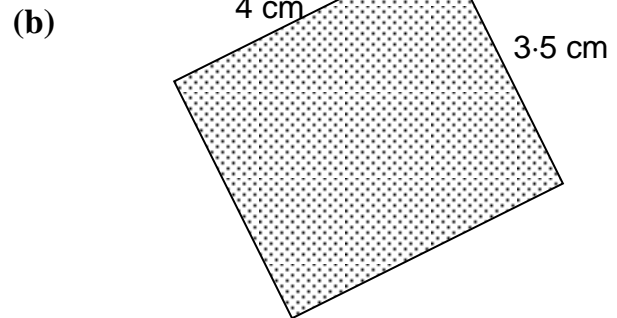
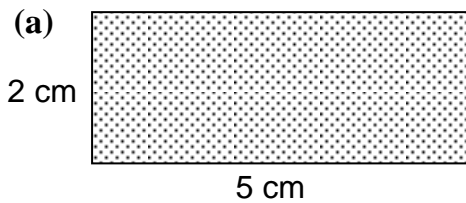
This box is to have a square base of side 9cm.



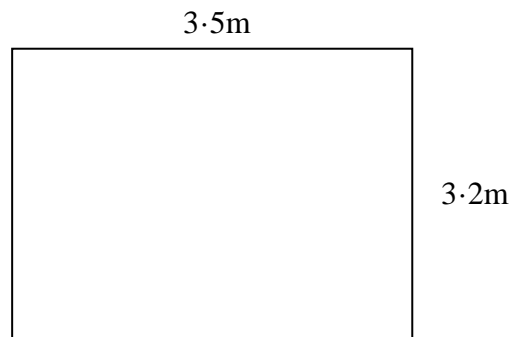
- (c) Calculate the height, $h\text{cm}$, of this new box giving your answer correct to 1 decimal place.

Finding the area and perimeter of a shape

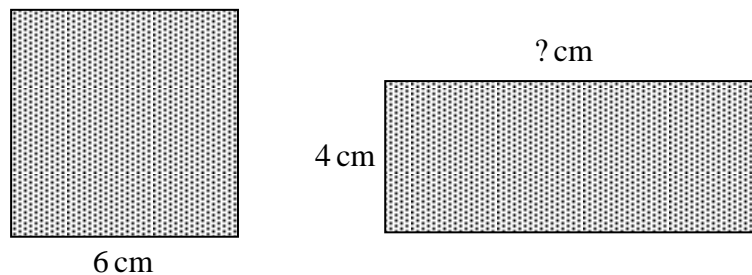
1. Calculate the perimeter and area of these rectangles:



2. My bedroom has dimensions as shown in the diagram.



- (a) Calculate the cost of carpeting the room if carpet costs £23.99 per square metre.
[carpet is sold in whole square metres only]
- (b) A border is to be put round the walls. Find the length of border required.
[ignore any gaps for windows and doors]
3. The square and the rectangle have the same perimeter. Find the missing length.



Hire Purchase and VAT

1. A mail order company sells a sofa for £469.95. It offers Hire Purchase terms of deposit of £69.95 and 24 monthly payments of £21.50

Calculate (a) the total HP cost.

(b) how much you save by paying cash?

2. Siobhan saw these two adverts for the same computer package.

COMPUTERS 'R' US

£910

VAT INCLUDED

COMPUTERS 4 U

£750

+ 20% VAT

Which shop is offering the best deal? Give a reason for your answer.

3. A colour television set can be bought in an electrical store for a cash price of £350 or by using one of two Hire Purchase agreements:

HP Silver

10% deposit

+

24 payments

of £14.70

HP Gold

25% deposit

+

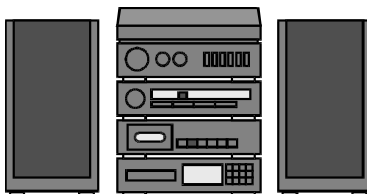
15 equal monthly

payments

The total HP cost for both agreements is the same.

What are the monthly instalments for HP Gold?

4. VAT is charged at 20%. How much VAT would be paid on a music system costing £99.90 before VAT?



Holiday money

1. In Australia the exchange rate for the British pound is 1.54 dollars to the pound.

How many Australian dollars would £500 be worth?

2. Kate is visiting Paris.

She books a train seat from the airport to her hotel.

The cost of the train fare in euros is €14.

If the exchange rate is £1 = €1.14, what is Kate's train fare in pounds sterling?

Give your answer to the nearest 1p.

3. Soraya is travelling to Europe and changes £245 into Euros at the rate of £1 = €1.14

(a) How many Euros does she receive?

(b) She spends 240 Euros. How much does she have left?

(c) When she returns she exchanges her Euros for British money.

Using the same exchange, how much will she get, to the nearest penny?

4. Kailey has £600 spending money for her trip to Malta.

She wants to bring at least a quarter of it back with her.

She returns with 190 euros which she changes back to British pounds at an exchange rate of £1 = 1.24 euros.

Did she return home with as much money as she hoped?

You must show your working and give a reason for your answer.

Reading tables

1. The table below shows the monthly premiums per £1000 insured for a whole-life policy.

Age	male	16 – 25	26	27	28	29	30	31	32
	female	16 – 32	33	34	35	36	37	38	39
non-smoker		2.70	2.70	2.80	2.80	3.00	3.10	3.20	3.35
smoker		3.40	3.50	3.65	3.75	3.90	4.05	4.20	4.45

Calculate the monthly premium for

- (a) David, 29, smoker for £8000 (b) Louise, 38, non-smoker for £5000

2. The table shows the interest rates on bank accounts.

REAL BANK OF SCOTLAND GOLD ACCOUNT

Amount	Annual Rate of Interest
Up to £5000	2.3%
£5001 - £10000	3.4%
£1001 - £20000	4.6%

Robert invests £5400 in a Gold Account with the Real Bank of Scotland.
What rate of interest should he gain?

3. The table below shows different rates of travel insurance.

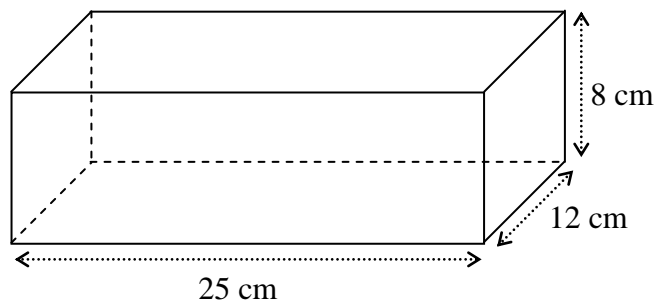
	Europe		Worldwide	
Up to	Adult	Child	Adult	Child
5 days	12.04	6.02	31.86	15.93
10 days	17.44	8.72	45.51	22.70
17 days	25.00	12.50	55.00	27.50
Annual Cover	Adult	Family	Adult	Family

Mr and Mrs Peterson and their two children are planning to spend a week in Europe and two weeks in the United States of America.
How much would they save by taking out an annual Worldwide policy instead of two individual policies?

Numeracy

Conversions

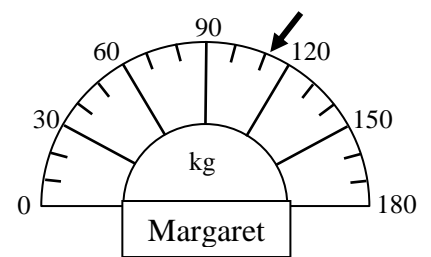
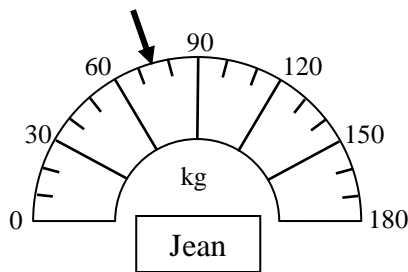
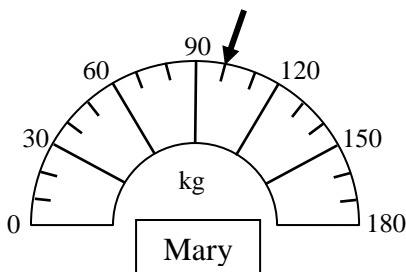
1. Change these lengths to centimetres
(a) 50mm (b) 23mm (c) 3m (d) 5.6m
2. Change these lengths to metres
(a) 500cm (b) 456cm (c) 7km (d) 9.23km
3. How many millilitres are there in $\frac{3}{4}$ litre?
4. Ice cream comes packed as cuboids with dimensions as shown in the diagram.



A serving of ice cream is 0.3 litres.

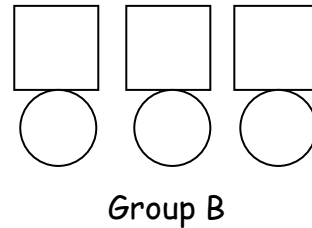
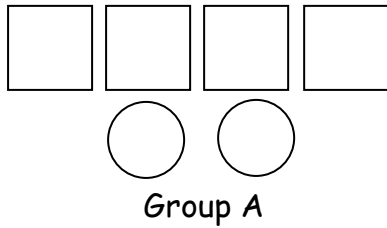
How many servings can be made from the cube?

5. Mary, Jean and Margaret joined a Slimming Club. Their weights at the beginning are shown on the scales:

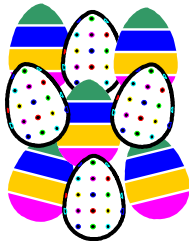


- (a) How much heavier than Jean was Margaret?
- (b) What was the total weight of all three ladies?

1. A square has to be picked from one of these sets. Which set gives the best chance?



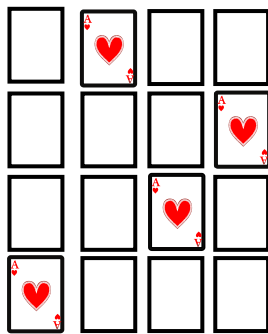
2. Which egg is more likely to be chosen from this group?
Stripes or dots?



3. Amy chooses a letter from the word: **SCOTLAND**

What are the chances that Amy's chosen letter will be a vowel? [simplest form]

4. In a game at the funfair you win if you throw a dart and it lands on an Ace.

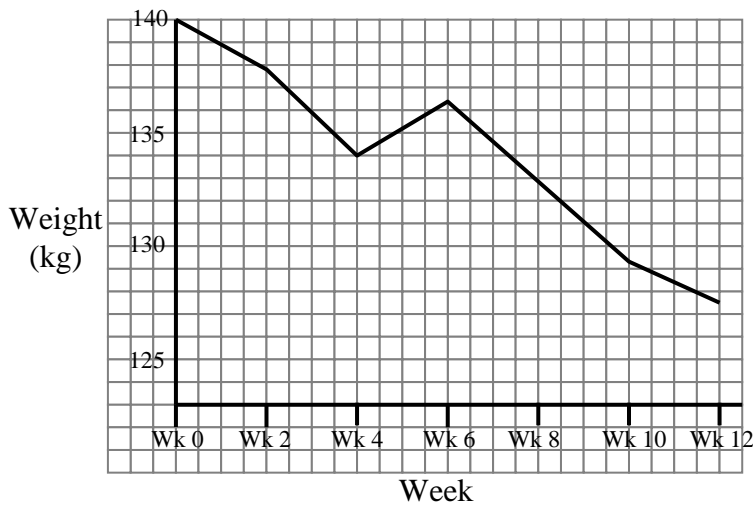


- (a) Is this a fair game?
(b) Why do you say this?
(c) Why do the fair owners do this?
(d) What are the chances that you will win a prize?
1]

5. At a fun fair a prize is won if you choose a red disc from a bag containing 1 red, 2 white, 3 blue and 4 green discs AND throw a six with a die.

- (a) What is the probability that you will win a prize with each try?
(b) If 360 people try their luck, how many prize winners would you expect to get?
(c) If it costs 50p for a try and you get £1 prize if you win, how much money would you expect to make from these 360 people?

1. Mrs. Parton decided to go on a 'new' diet. She weighed herself every 2 weeks and drew this chart.



Answer the following from the graph:

- (a) What did Mrs. Parton weigh before going on her diet?
- (b) What did she weigh in week 5?
- (c) How many weeks did it take her to lose 7 kg?
- (d) What happened during weeks 4 and 6?

- (e) Calculate, to the nearest kg, Mrs. Parton's mean weekly weight loss over the 12 weeks of her diet. [2]

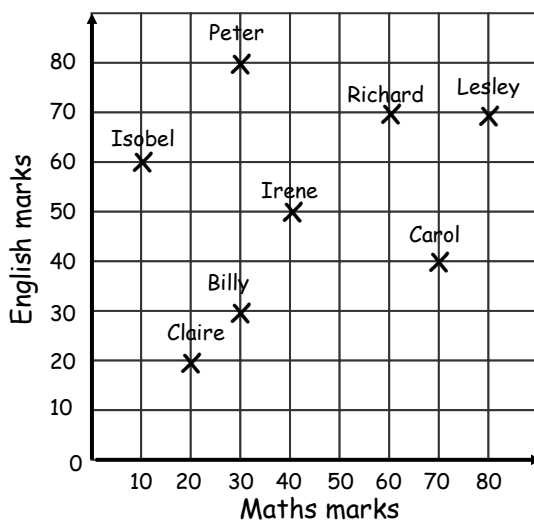
2. Your parents tell you that they have been thinking about the amount of pocket money that they give you. They have been asking other parents and give you a list of the amounts of pocket money your friends receive.

£7 £10 £13 £11 £7 £18 £10 £16 £8

They ask you to say whether you would like to have the mean, the median or the mode of the above figures.

Which one would you choose and why?

3. This scatter-graph shows the English and Maths marks for 8 S2 pupils.



Answer these questions from the graph:

- (a) Who got the highest Maths mark?
- (b) Who got the lowest English mark?
- (c) Which two people got the same English mark?
- (d) Billy scored 30 in English. What mark did he get for Maths?

Measurements

1. A primary school pupil wrote this in her news diary:

When my little brother was born he weighed 3 grams and was 45 metres long. My Dad drove 20 metres to the hospital to see him and while he was there he fed the baby 40 litres of milk.

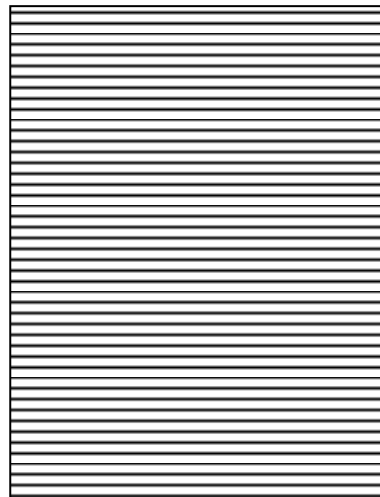
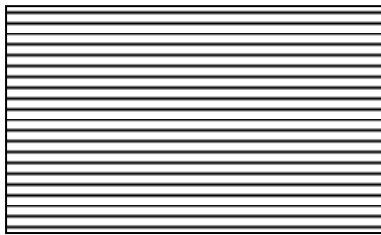
What is wrong with this story? Re – write it correctly.

2. My pet spider lives in a glass cage which measures 1m by 0.5m by 70cm.

(a) Calculate its volume of the case in m^3 . (b) What is this in cm^3 ?

3. The cost of advertising in a newspaper depends on the area of paper that the advert takes up. Each column of the paper measures 5cm in width and each cm in length costs £0.75.

Measure the length of these advertising spaces and calculate how much they would cost.



4. A medicine bottle holds 300mls. The instructions read ‘take one 5ml spoonful 4 times a day’ Patricia has to take the medicine for 14 days.

How many millilitres of medicine will left over after the 14 days?

5. 1 ml of water weighs 1gram.

A 1cm^3 piece of material is put into water and it floats.

What can you say about 1cm^3 of this material?