

GCSE Mathematics

Calculator

Foundation Tier

Free Practice Set 1

1 hour 30 minutes



ANSWERS

Marks shown in brackets for each question (2)

Grade Boundaries

C	D	E	F	G
78	61	47	33	20

Legend used in answers

Green Box - Working out

5b means five times b
 $b = -3$ so $5 \times -3 = -15$

Red Box and ✓ - Answer

48 % ✓

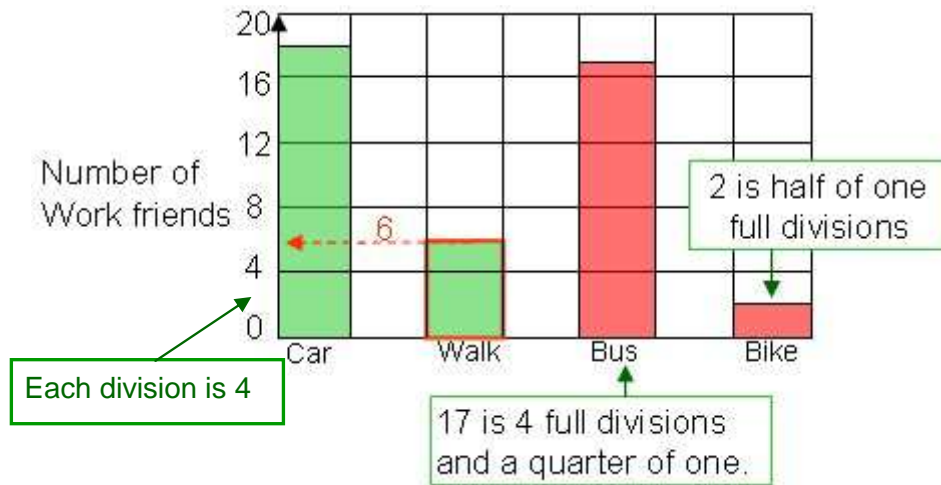
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1. Cyril asked his work friends how they travelled to the office.

The bar chart below shows how many travelled by car and how many walked.



17 work friends travelled by Bus

2 travelled by bike

a) How many work friends walked to work?

Those who walked are shown by one full division + $\frac{1}{2}$ division which is $4 + 2 = 6$

6 ✓

(1)

b) Complete the bar chart

Bus = 4 full divisions + $\frac{1}{4}$ division = $4 \times 4 + 1$
 Bike = $\frac{1}{2}$ division = $\frac{1}{2} \times 4 = 2$

(2)

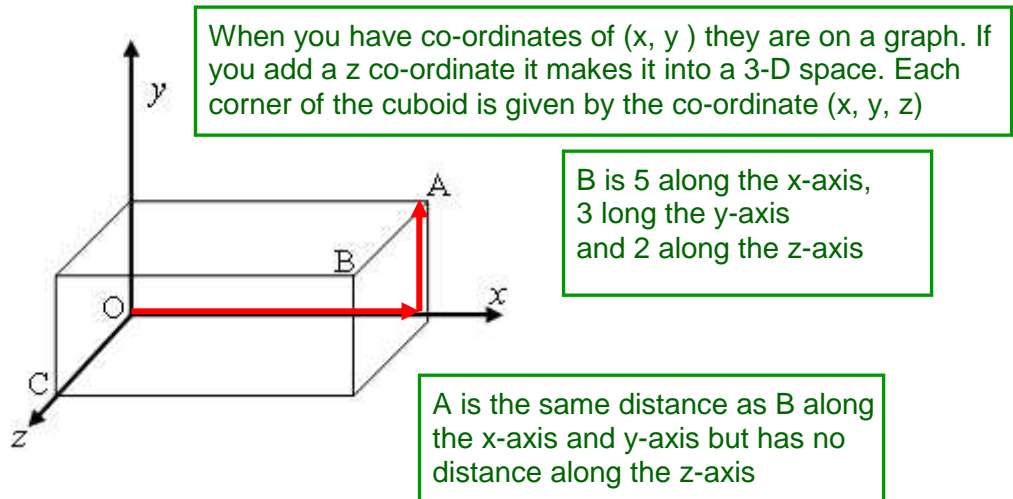
c) Work out the total number of Cyril's work friends

Cyril's work friends are :
 $18 \text{ car} + 6 \text{ walk} + 17 \text{ bus} + 2 \text{ bike} = 43$

43 ✓

(1)

2. A cuboid lies on the co-ordinate axes..



The point B has co-ordinates $(5, 3, 2)$

What are the co-ordinates of the point A

5, 3, 0 ✓
.....
(1)

3. Simplify

i) $9p - 4p$

Simplify means add or subtract anything that is the same type of thing
Here we have just p 's
Nine lots of p subtract four lots of p means we have five lots of p

5p ✓
.....
(1)

ii) $p \times q \times 7$

When we multiply different terms we just miss out the times sign.
We can have $pq7$ or $qp7$ but it is normal to write $7pq$.

7pq ✓
.....
(1)

i) $q \times q \times q$

In maths we use a small number at the top of a number or letter to show how many times we have multiplied something by itself. It saves us writing out all those times signs.
 $q \times q \times q = q^3$
 $q \times q \times q \times q \times q \times q = q^6$

q^3 ✓
.....
(1)

4. a) What is 0.257

i) correct to 1 decimal place

The first decimal place could be 0.2 or 0.3. Look at the numbers after the 1st decimal point to see if it is closer to 200 or 300. 257 is closer to 300 so to 1 decimal place it is 0.3

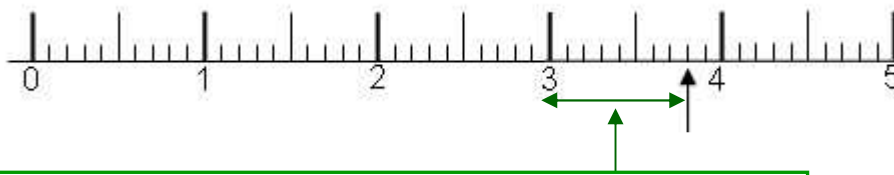
0.3 ✓
.....
(1)

ii) correct to 2 significant figures

2 significant figures – is it 0.250 or 0.260. 257 is closer to 260 so to 2 significant figures it is 0.26

0.26 ✓
.....
(1)

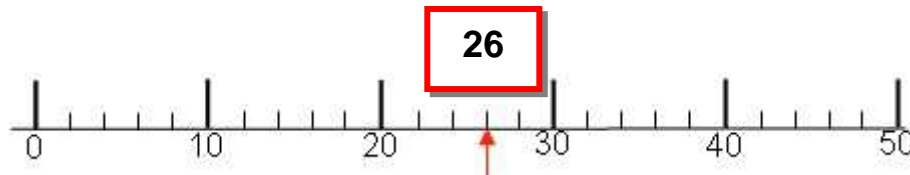
b) What is the number marked below



There are 10 small divisions between 3 and 4 so each one is 0.1. We have 8 small divisions which is 0.8.

3.8 ✓
.....
(1)

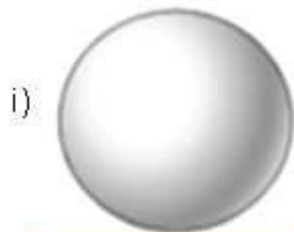
c) Mark the number 26 with an arrow on the line above



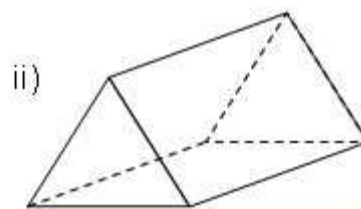
There are 5 small divisions between 20 and 30 so each one is 2. We need another 6 after the 20 which is 3 more small divisions

(1)

5. What is the mathematical name of these 3-D shapes.



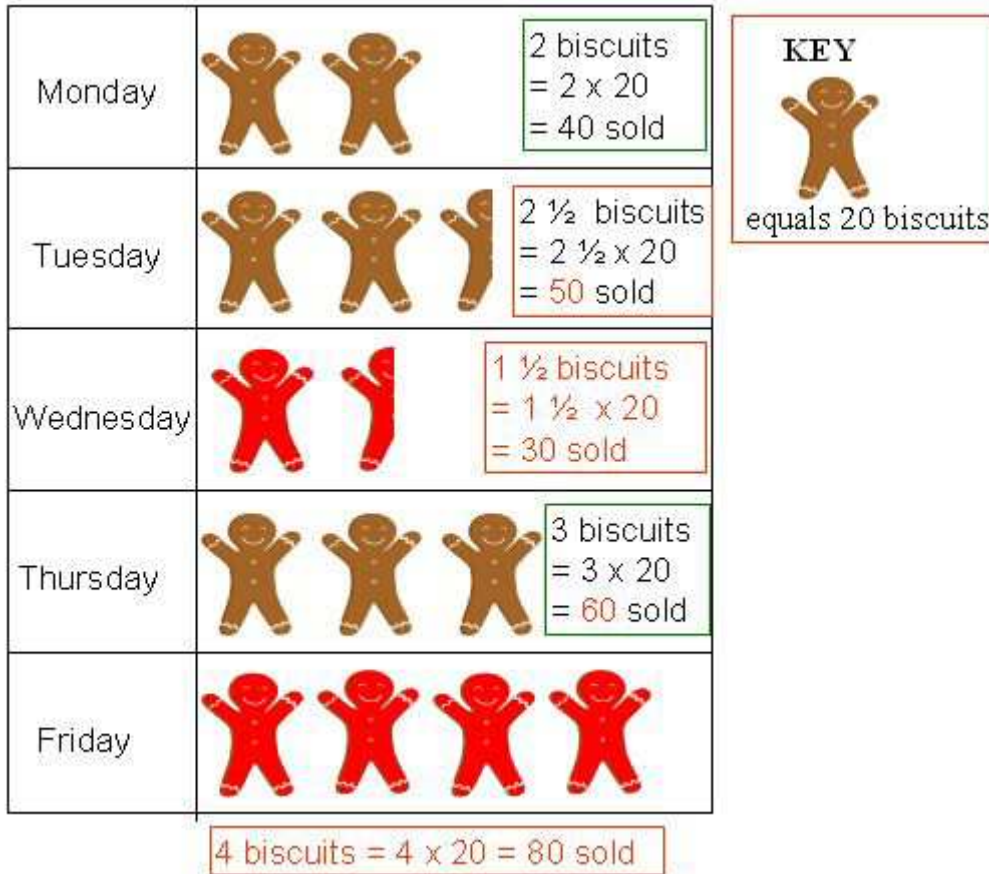
This shape is a sphere ✓
.....



This shape is a triangular prism ✓
.....

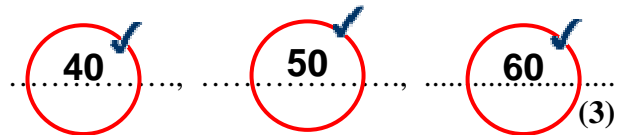
(2)

6. The pictogram below shows the number of biscuits sold by a bakery last week.



a) How many biscuits were sold on:

i) Monday, Tuesday and Thursday



Monday has 2 symbols = $2 \times 20 = 40$
Tuesday has $2 \frac{1}{2}$ symbols = $2 \frac{1}{2} \times 20 = 50$
Thursday has 3 symbols = $3 \times 20 = 60$

30 biscuits were sold on Wednesday and 80 were sold on Friday.

b) Use this information to complete the pictogram.

For 30 biscuits on Wednesday use $1 \frac{1}{2}$ symbols For 80 biscuits on Friday use 4 symbols

(2)

7. Dileep bought some supplies from the Cash and Carry. Complete his bill:

Cash and Carry store			
Description	Number	Cost of each item	Total
Bottles of orange juice	4	£1.20	£4.80
Packets of crisps	3	£0.27	£. 0.81
Pair of Jeans	3	£. 7	£21
Pair of socks	3	£2.54	£. 7.62
Total cost			£. 34.23

$$0 \cdot 27 \times 3 =$$

$$3 \times 0.27 = 0.81$$

(4)

$$21 \div 3 =$$

To get the cost of each item divide the total cost by the number of items

$$21 \div 3 = 7$$

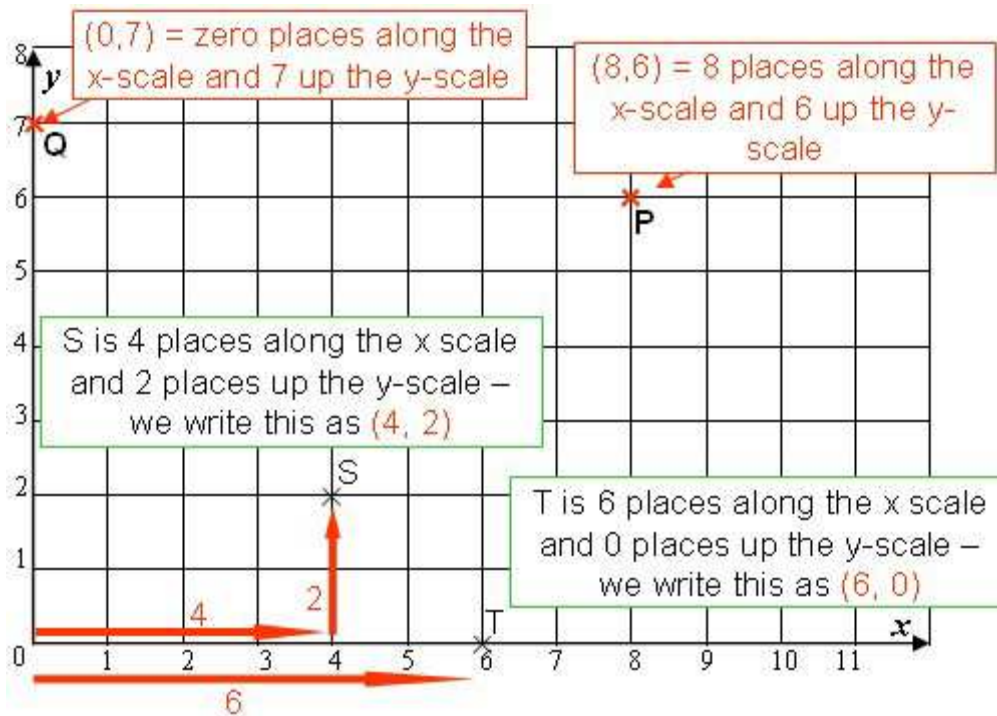
$$3 \times 2.54 =$$

$$3 \times 2.54 = 7.62$$

$$4.80 + 0.81 + 21 + 7.62 =$$

Add up all the amounts in the right hand column = £34.23

8.



a) Write down the co-ordinates of the point S

(.. **4, 2** ..)

(.. **6, 0** ..)

(2)

Write down the co-ordinates of the point T

b) On the grid mark the point $(8, 6)$ with a cross and label it point P

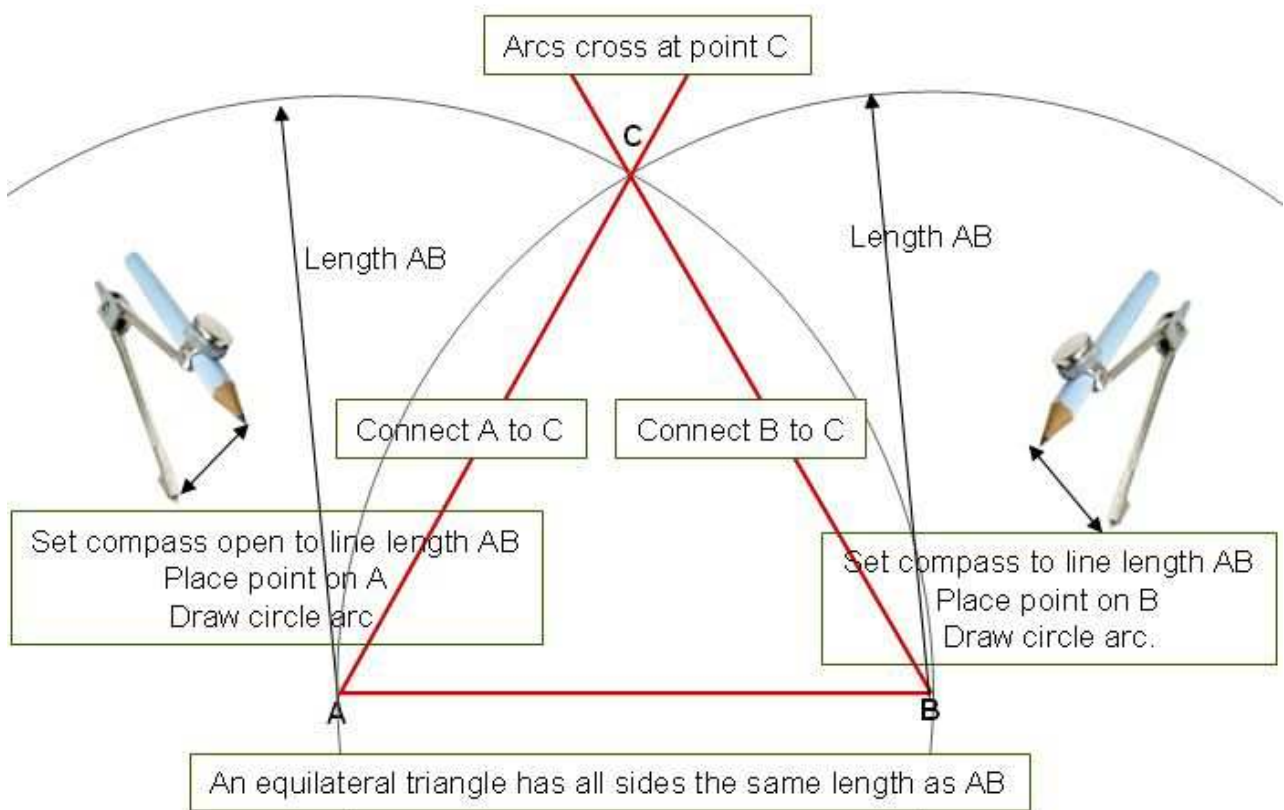
P is 8 along the horizontal x scale and 6 up the vertical y scale

On the grid mark the point $(0, 7)$ with a cross and label it point Q

Q is 0 along the horizontal x scale and 7 up the vertical y scale

(2)

9. A horizontal line AB is drawn below



- a) Using a compass and pencil construct an equilateral triangle with the line AB as the base

(3)

To construct an equilateral triangle which has three sides of the same length we open our compass so it is the same length as the base AB.

Then place the compass on A and draw an arc of a circle.

Then we place the compass on B keeping it opened by the same amount and draw another arc.

We join A and B to the point C where the two arcs cross to make an equilateral triangle.

10. Mrs Dew went to a museum with three teenagers. It was £6.50 for an adult and £3.50 for each teenager. How much did it cost her altogether to get in?

Add up how much Mrs Dew has spent = $£3.50 \times 3 + £6.50 = £17$

3 . 5 x 3 + 6 . 5 =

£ 17 ✓
.....
(2)

11. a) Write $\frac{6}{10}$

i) as a decimal

$\frac{1}{10}$ is 0.1 as a decimal so $\frac{6}{10}$ is 0.6

6 ÷ 1 0 =

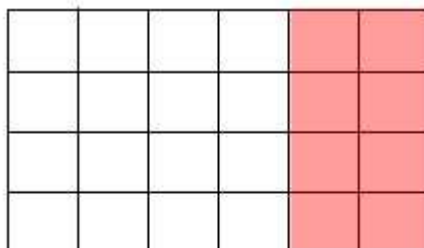
..... 0.6 ✓ (1)

ii) as a percentage

To change a decimal to a percentage just move the decimal point two places to the right – like multiplying by 100
 $0.6 \times 100 = 60$

60% ✓ (1)

- b) Shade $\frac{2}{6}$ of this shape



(1)



The rectangle is divided into 6 vertical columns – so shade just two of them

Don't shade 2 lots of 6 boxes as shown here because this is a half.

12. Complete the missing units below:

	Metric	Imperial
The width of your hand	centimetres	inches
The weight of a bag of sugar	kilogram	pounds
The amount of water in a jug	litre	pints

(3)

13. The table below shows how far it is in miles between four towns.

Toddington	London	Leeds	Bradford
41			
156	195		
163	202	10	

The shows how far it is between Toddington and London
 The shows how far it is between London and Leeds
 The shows how far it is between Leeds and Bradford
 Biggest mileage - so farthest apart are London and Bradford

a) Work out the distance between Toddington and London

..... **41** miles
(1)

b) Which two towns are the farthest apart?

London and **Bradford**

(1)

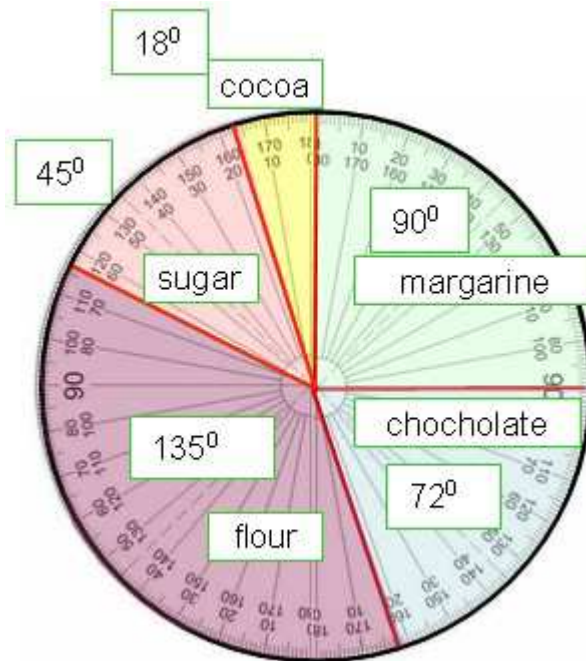
Martin drives from Toddington to Leeds.
 He then drives from Leeds to Bradford.
 Finally he drives back from Bradford to Toddington.

c) What is the total distance that Martin has driven?

Add up all the distances:
 Toddington-Leeds = 156 miles
 Leeds – Bradford = 10 miles
 Bradford – Toddington = 163 miles
 Total **329** miles

..... **329** miles
(3)

14.



Matty is making chocolate drops.
He uses margarine, sugar, flour, cocoa and chocolate.

The pie chart shows some of the proportions by weight of ingredients in the chocolate drops.

a) Calculate the weight of chocolate in 800 grams of Matty's chocolate drops.

Looking at the pie chart we can see that as a *fraction* the chocolate is 72 degrees out of 360 degrees = $\frac{72}{360}$

The chocolate is $\frac{72}{360}$ th of the 800 grams

$$72 \div 360 \times 800 =$$

$$70 \div 360 \times 800 = 160$$

160

...grams
(2)

12.5 % of the weight of the chocolate drops is sugar.

b) Complete the pie chart

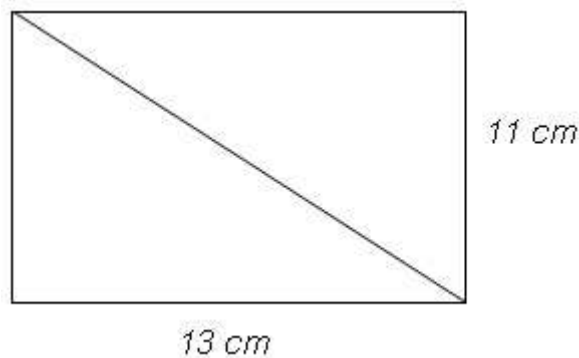
We need to change 12.5% to an angle: $360 \times 12.5\% = 45^\circ$

(2)

$$360 \times 12.5\% =$$

Use your protractor to measure 45° for sugar.
The Cocoa will be what is left

15. A rectangular is shown below with a diagonal across the middle.



Not to Scale

- a) Work out the total length of the sides of the rectangle including the diagonal.
Give your answer to 2 significant figures.

To work out the length of the diagonal we can use **Pythagoras's theorem** because we have a right angled triangle.

$$\begin{aligned} (\text{Length diagonal})^2 &= (\text{length Side 1})^2 + (\text{length side 2})^2 \\ D^2 &= 11^2 + 13^2 = 121 + 169 = 290 \\ D &= \sqrt{290} = 17.029 \text{ cm} \end{aligned}$$

Add in other sides : $11\text{cm} + 11\text{cm} + 13\text{cm} + 13\text{cm} + 17.029\text{cm} = 65.029\text{cm}$
To 2 sig figs this is 65

65

.cm
(4)

- b) 11 and 13 are both prime numbers. What are the next two prime numbers?

17

. and ..

19

Prime numbers don't divide by anything except 1 and themselves and end in 1, 3, 7 or 9
2 3 5 7 11 17 19

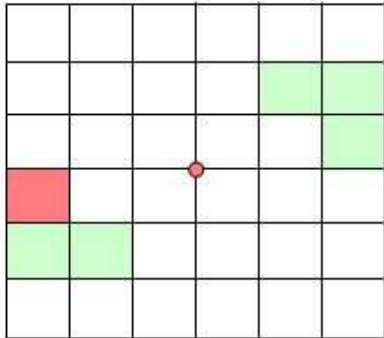
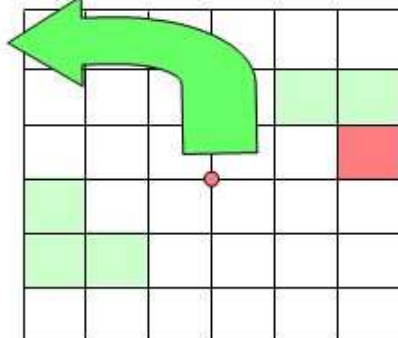
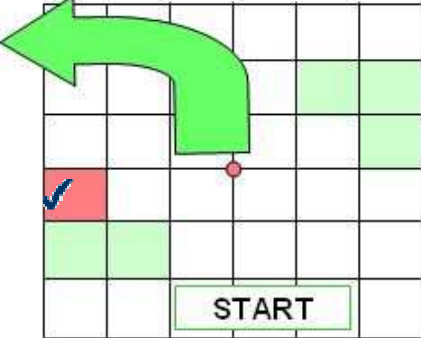
(2)

16. a) Shade one square to give this pattern a rotational symmetry of order 2. (1)

Overall we have order two rotational symmetry.

Rotate by another $\frac{1}{2}$ turn and another order of rotational symmetry.

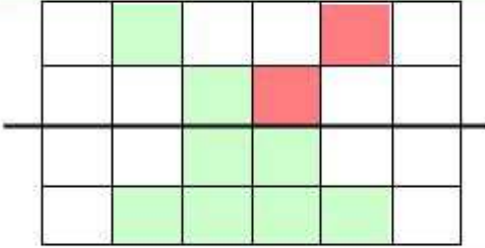
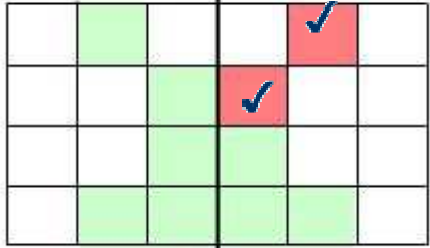
Rotate by $\frac{1}{2}$ turn we have the same pattern so one order of rotational symmetry.

- b) Shade two squares to give this pattern one line of symmetry. (1)

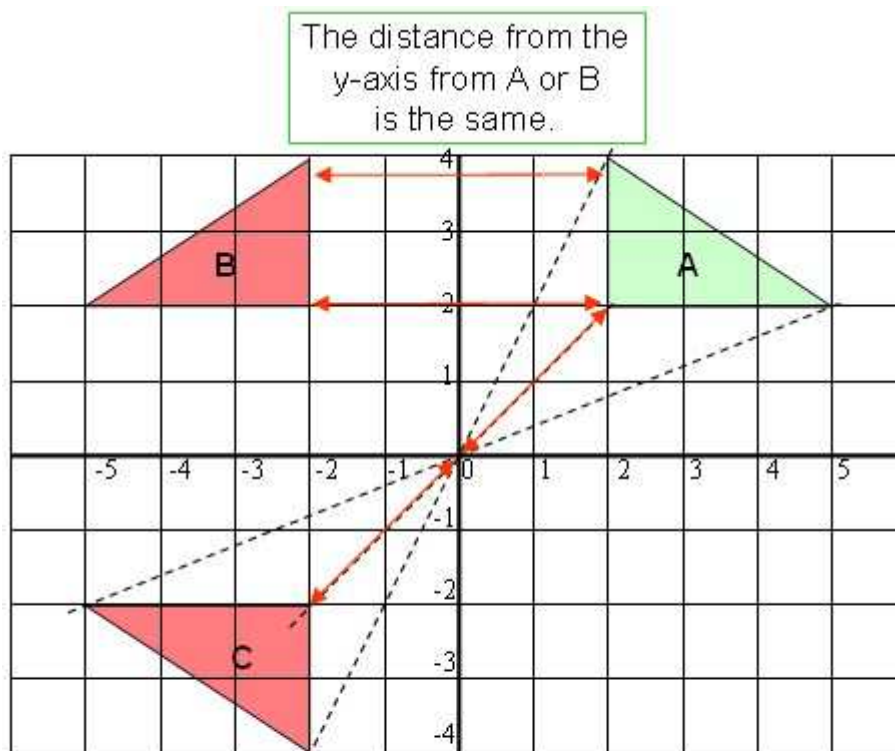
Pattern above and below line is different so not a line of symmetry.

Pattern on left and right of line is the same so is a line of symmetry.

Only one line of symmetry.

- c) Reflect triangle A in the y-axis. Label it B (2)
- d) Rotate triangle A by 180° about (0,0). Label it C. (2)



To rotate A about the point (0,0) draw lines from A through (0,0). The distance from C to (0,0) is the same as the distance from A

17. Below are the first 4 terms of a number sequence

3 7 11 15

a) What is the next term

The sequence goes up by 4 each time so the next term will be $15 + 4 = 19$

19

(1)

b) What is the 10th term

3 7 11 15 19 23 27 31 35 **39**

This sequence is like the 4 times table – which you can write as $4 \times n$ or just $4n$

But it starts at 3 instead of 4.

So if we take 1 away from $4n$ we get a sort of formula that helps us work out different terms in the sequence : This is called an expression for the n th term: $4n - 1$

So the 10th term is $4 \times 10 - 1 = 40 - 1 = 39$

39

(1)

c) Is 254 in this number sequence.

The sequence only has odd numbers and since 254 is an even number it cannot belong to this sequence

(1)

18. Laura went to Australia.

She changed £200 into Australian dollars (Aus\$)
The exchange rate was £1 = Aus\$2.45

a) How many Australian dollars will she get?

You get more Australian dollars than pounds.
So you multiply by 2.45 to convert pounds into dollars:
 $200 \times 2.45 = 490$

2 0 0 × 2 . 4 5 =

When she came home she changed Aus\$42.35 back to pounds
The exchange rate was now £1 = Aus\$2.42

b) How many pounds did she get?

You get fewer pounds than Australian dollars.
So you divide by 2.42 to convert dollars into pounds
 $42.35 \div 2.42 = 17.5$

4 2 . 3 5 ÷ 2 . 4 2 =

Aus\$ 490 ✓
.....
(2)

£ 17.50 ✓
.....
(2)

19. $Y = 6a$

a) Find the value of Y when $a = 5$

$Y = 6a$ means $6 \times a$
 Replace the 'a' with 5 so $Y = 6 \times 5 = 30$

$Y = \dots\dots\dots$ 30 (1)

$B = c + d - 6e$

Remember to do the multiplication before the addition

$c = 15$
 $d = 20$
 $e = 3$

$B = c + d - 6e$ means $c + d - 6 \times e$
 Replace c with 15, d with 20 and e with 3
 $B = 15 + 20 - 6 \times 3 = 15 + 20 - 18 = 35 - 18 = 17$

b) Find the value of B

$B = \dots\dots\dots$ 17 (2)

20. What is

a) $\sqrt{(4.5 + 7.8)}$

Make sure you add 4.5 and 7.8 before doing the square root

√ (4 . 5 + 7 . 8) =

3.507 (3)

or

4 . 5 + 7 . 8 = √ =

b) πr^2 when $r = 3.25$

$3.25^2 \pi r^2 = \pi \times 3.25^2$

get π using shift π

The x^2 button squares 3.25

or shift π × 3 . 2 5 x² =

shift π × 3 . 2 5 × 3 . 2 5 =

33.187 (4)

c) $\frac{1}{0.25^2}$

Work out 0.25² first = $0.25 \times 0.25 = 0.0625$
 Then use the $1/x$ button

0 . 2 5 × 0 . 2 5 = 1/x =

$\dots\dots\dots$ 16 (3)

or

0 . 2 5 x² 1/x =

The x^2 button squares 0.25

21. Eva has a bag of 25 coloured buttons

8 buttons are blue
12 buttons are green
5 buttons are red.

$$\text{Total number buttons is } 8 + 12 + 5 = 25$$

Eva takes a button at random from the bag

What is the probability that Eva

a) takes a red button

$$\frac{5}{25}$$

(1)

$$\text{Probability (red)} = \text{number of red buttons} \div \text{total number buttons} \\ = 5 / 25$$

b) does not take a blue button

$$\frac{17}{25}$$

(1)

$$\text{Probability (blue)} = \text{number of blue buttons} \div \text{total} = 8/25 \\ \text{So probability (NOT blue)} = 1 - 8/25 = 17/25$$

c) takes a yellow button

$$0$$

(1)

There are no yellow buttons so the probability is zero

22. The total cost for 5 kg of pears and 2kg of oranges is £10.56.

6 kg of pears cost £7.68

What is the cost of 1kg of oranges

$$\text{£}2.08$$

(3)

Work out the cost of 1 kg of pears : $7.68 \div 6 = \text{£}1.28$
So 5 Kg of pears costs: £6.40

$$7 \quad . \quad 6 \quad 8 \quad \div \quad 6 \quad \times \quad 5 \quad =$$

If we subtract £6.40 from £10.56 it will give the cost of 2 Kg of oranges
 $\text{£}10.56 - \text{£}6.40 = \text{£}4.16$

$$1 \quad 0 \quad . \quad 5 \quad 6 \quad - \quad 6 \quad . \quad 4 \quad =$$

Dividing by 2 gives the cost of 1 kg oranges: = £2.08

23. a) Simplify $f + 3g + 4f - g$

Simplify means add or subtract anything that is the same type of thing
Here we have f's and g's
One lot of f plus another 4 lots of f gives 5 lots of f.
Three lots of g subtract one lot of g gives two lots of g

$5f + 2g$

(2)

$y = 3x + 6$

- b) What is the value of x when $y = 24$

Replace the y with 24 $\rightarrow 24 = 3x + 6$
Solve $24 = 3x + 6$
Take 6 from both sides of the equation
 $24 - 6 = 3x + 6 - 6$
 $18 = 3x$
Divide both sides by 3 $\rightarrow 18 \div 3 = x = 6$

6

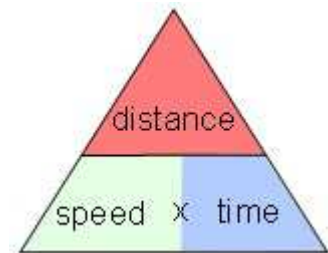
(2)

24. David drove at a steady speed of 65 miles per hour for 4 hours.

How far did he travel?

In the triangle cover up the distance to give the formula that you need:
Distance = speed x time = $65 \times 4 = 260$ miles

If you travelled 65 miles in 1 hour, double it to get how far you travelled in 2 hours then double it again to get the distance in 4 hours.



260

.....miles

(2)

25. What is

Look for the % button.
Sometimes you need to use shift

a) 43% of 150

1 5 0 x 4 3 shift % =

64.5

(1)

b) the cube root of 216

The cube root of a number is a value that when multiplied by itself 3 times equals that number. Try a few numbers first to see if the answer can be guessed: $5^3 = 5 \times 5 \times 5 = 225$; $6^3 = 6 \times 6 \times 6 = 216$. We have guessed correctly that the cubed root is 6.

Using a calculator we use a special button shown below.

3 shift $\sqrt[3]{}$ 2 1 6 =

6

Look for the root button – we have entered 3 because we want the cube root

c) 7.4 cubed to 1 decimal place

Cubed means we multiply the number by itself three times

7 . 4 x 7 . 4 x 7 . 4 =

Or do this short cut using a special button as below

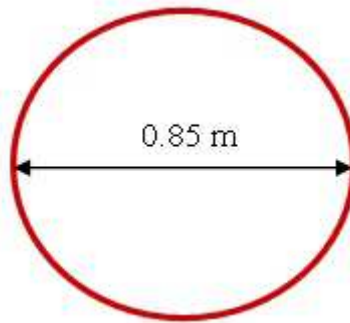
7 . 4 x x^y 3 =

This combination of buttons cubes 7.4

405.2

(1)

26.



A circle has a diameter of 0.85 metres.

- a) Work out the circumference of the circle.
Give your answer *in centimetres* to 3 significant figures.

Circumference = $\pi \times D = 3.143 \times 0.85 \times 100 = 267.07\text{cm}$
To 3 sig figs it is 267cm
The first sig. fig is the first number which is not zero i.e. 2.

get π using shift π

shift π x 0 . 8 5 x 1 0 0 =

267

cm
(2)

A wheel has a diameter of 0.85metres.
The wheel rolls without slipping for 40 metres.

- b) Calculate the number of times the wheel turns.
Give your answer to the nearest whole number.

shift π x 0 . 8 5 =

Leave circumference in metres
= 2.67 metres

For each revolution the wheel travels 2.67m.
To work out the number of turns divide 40 metres by 2.67 m $40 \div 2.67 = 14.97$

15

(2)

4 0 0 0 ÷ 2 6 7 =

27. Bill invests £6000 in an account paying 5.6% **simple** interest each year. Calculate the amount he has after 2 years.

Simple interest means we pay the same interest every year.
The interest is : $6000 \times 5.6\% = \text{£}336$.

6 0 0 0 x 5 . 6 shift % =

After two years we have $\text{£}6000 + \text{£}336 + \text{£}336 = \text{£}6672$

£. **6672.00**
(3)

28. a) Simplify $y^6 \times y^4$

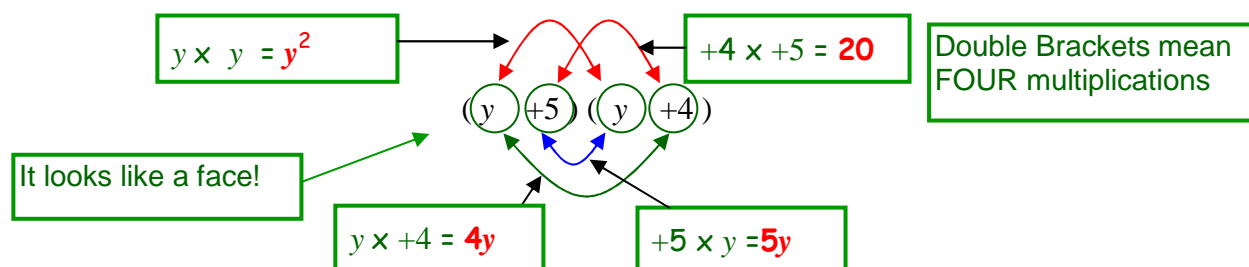
When you **multiply** powers they **ADD** $6 + 4 = 10$

y^{10}

y^6 means y times itself 6 times and y^4 means y times itself 4 times

So $y^6 \times y^4 = y \times y \times y \times y \times y \times y \times y \times y \times y \times y$
 $= y \times y \times y \times y \times y \times y \times y \times y \times y \times y$ or y times itself 10 times $= y^{10}$

- b) Expand and simplify $(y + 5)(y + 4)$



Simplify – collect like terms together

$$4y + 5y + y^2 + 20 = y^2 + 9y + 20$$

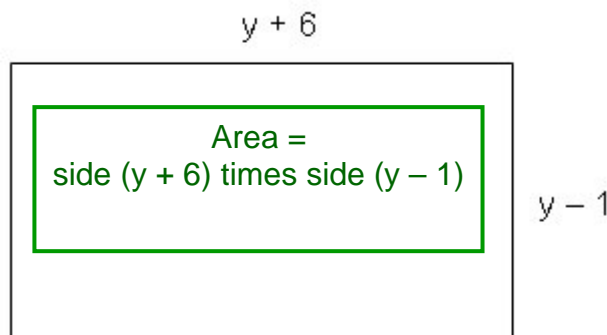
Use **FOIL** to help you remember the 4 multiplications:
First terms
Outer terms
Inner terms
Last terms

OR use a 2x2 grid
Then simplify

x	y	+4
y	y^2	$+4y$
+5	$+5y$	$+20$

$y^2 + 9y + 20$..(2)

29.



a) Show that the area A of the rectangle above is $A = y^2 + 5y - 6$

$y \times y = y^2$ $+6 \times -1 = -6$ Double Brackets mean FOUR multiplications
 It looks like a face! $y \times -1 = -1y$ $+6 \times y = 6y$
 Simplify – collect like terms together So $6y - 1y + y^2 - 6 = y^2 + 5y - 6$ ✓
 OR use a 2x2 grid Then simplify

x	y	+6
y	y^2	$+6y$
-1	$-1y$	-6

Use **FOIL** to help you remember the 4 multiplications:
First terms
Outer terms
Inner terms
Last terms

(2)

b) Express the perimeter of the rectangle in terms of y

Perimeter is the distance around the rectangle so we just need to add the sides
 $y + 6 + y - 1 + y + 6 + y - 1$
 We have 4 lots of y or 4y and $12 - 2 = 10$
 Perimeter = $4y + 10$

$4y + 10$ ✓

(1)

c) If the perimeter = 38 what is the value of y

Perimeter = $4y + 10 = 38$. We need to solve the equation.
 Subtract 10 from both sides of the equation $4y + 10 - 10 = 38 - 10$
 So $4y = 28$. Divide both sides by 4 gives $y = 28 \div 4 = 7$

7 ✓

(1)

**TOTAL FOR PAPER: 100 MARKS
 END**