MathsMadeEasy

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
76	60	47	33	20

Legend used in answers

Green Box - Working out

5b means five times b
b = – 3 so 5 × – 3 = –15

Red Box and ✓ - Answer

48 % ✓

1. The dial below shows how fast a car is travelling.

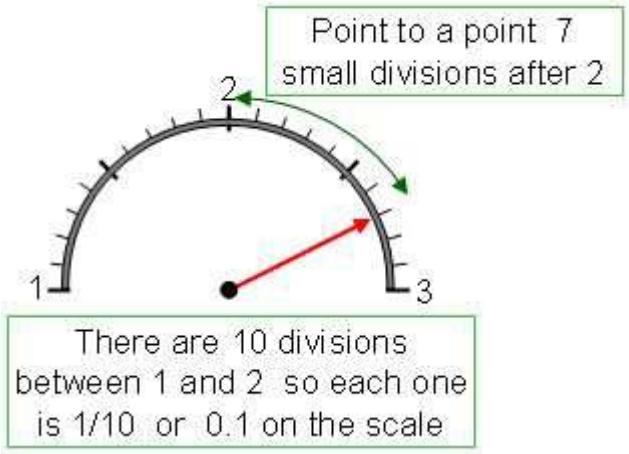
a) If the speed limit is 70 mph, ***how much below*** the speed limit is the car travelling?

Since each small division is 5 mph., the dial shows a reading of 55 mph
70 – 55 = 15. So it is 15 mph below the speed limit

15 ✓

……mph

(1)



b) Find the value 2.7 on the scale above and mark it with an arrow

(1)

2. **a)** Use your calculator to work out

$$14.8 \times (3.6 - 1.5)$$

Follow the rules of BODMAS or BIDMAS
This tell you the order which you do calculate

Brackets Order Divide Multiply Add Subtract
Brackets Indices Divide Multiply Add Subtract

3 . 6 - 1 . 5 = → 2.1

1 4 . 8 x 2 . 1 = → 31.08

or

1 4 . 8 x (3 . 6 - 1 . 5) =

If your calculator has brackets do it in one go as shown

31.08 ✓

(2)

b) Write your answer to a) correct to 1 decimal place

We have to decide whether the answer is 31.0 or 31.1
Look at the value of the 2nd decimal place (the 8)
If it is 5 or more we increase the 1st decimal place by one
If it is less than 5 we leave the 1st decimal place as it is
Here we increase the 1st decimal place by 1 from 0 to 1

31.1 ✓

(1)

c) Use your calculator to work out

$$35 \div (3.7 - 1.2)^2$$

3 . 7 - 1 . 2 = → 2.5

2 . 5 x^2 = → 6.25

This button squares numbers

3 5 ÷ 6 . 2 5 = → 5.6

or

3 5 ÷ (3 . 7 - 1 . 2) x^2 =

If your calculator has brackets do it in one go as shown

5.6 ✓

(2)

d) Write your answer to c) correct to 1 significant figure

The 1st digit is the 1st significant number. Is 5.6 closer to 5 or 6?

6 ✓

(1)

3. From this list of numbers : **11** **17** **22** **28** **36** **88** write:

a) A multiple of 7

A multiple of a number is its Times Table.
So a multiple of 7 is 2×7=14; 3×7 =21 ; 4×7 = 28

28 ✓

(1)

b) A factor of 44

A factor is a number that divides into another number.
11 goes into 44 four times; 22 will go into 42 twice

11 or 22 ✓

(1)

c) A square number

Square numbers are: 1×1 = 1; 2×2 = 4; 3×3 = 9.
In this case 6 × 6=36

36 ✓

(1)

d) What is the highest common factor of 11 and 88

The highest Common Factor is the largest number that will divide into these two numbers. 11 is the highest dividing once into 11 and 8 times into 88

11 ✓

(1)

4 Matthew has £50 birthday money to spend on Itunes. Each music track costs £0.79.

a) How many tracks can he buy for £50?

Since £0.79 is less than £1 he will get more than 50 tracks.
Work this out by 50 ÷ 0.79

5 0 ÷ 0 . 7 9 = 63.29

You can't buy 0.29 of a track so he must be able to buy 63 tracks

63 ✓

(2)

b) How much money in pence does he have left?

He spends 63 × £0.79 = £49.77. So he has £0.23 or 23 pence left

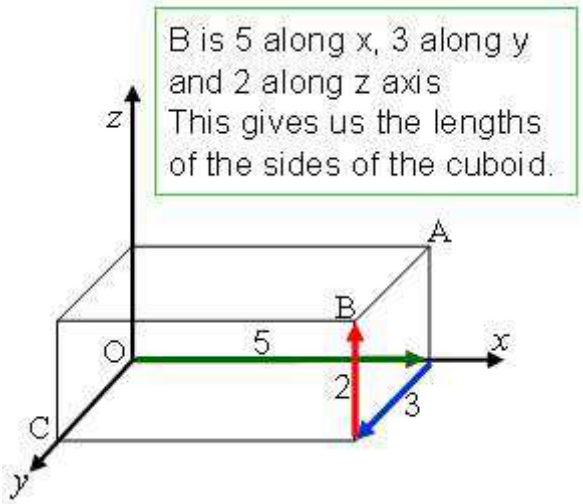
6 3 x 0 . 7 9 = 49.77

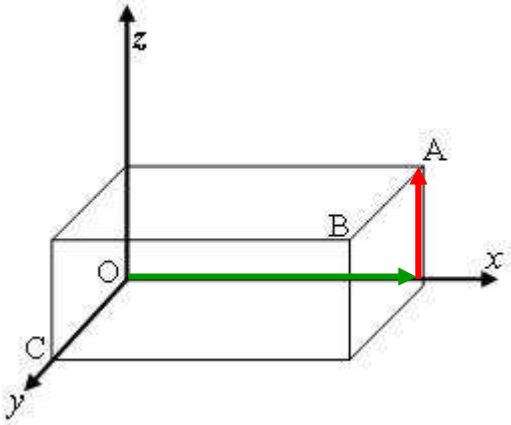
23 ✓ .pence

(1)

5. A cuboid is shown below on.

The cuboid is on three axis: x, y and z.
We can find a position on a 2-D graph using co-ordinates of (x, y)
If you add a z co-ordinate we can find a point in a 3-D space as shown





A is 5 along the x-axis.
It is zero along the y-axis
It is 2 along the z-axis
So its co-ordinates are (5, 0, 2)

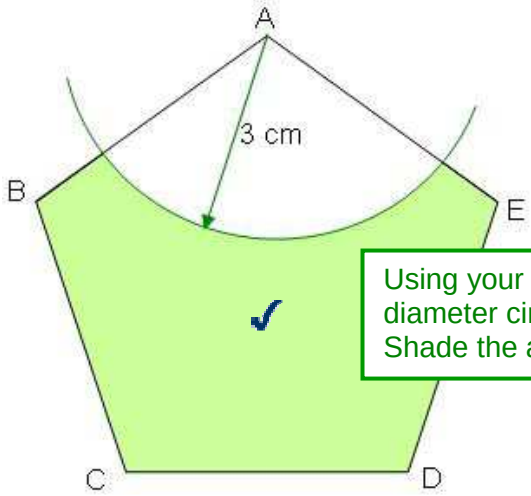
Not drawn accurately

The point B has co-ordinates (5, 3, 2)
What are the co-ordinates of the point A

5, 0, 2 ✓

(1)

b) ABCDE is a pentagon



Using your compass draw a 3 cm diameter circle with centre at A
Shade the area shown

Shade the area inside the pentagon which is more than 3 centimetres from A.

(2)

6. 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

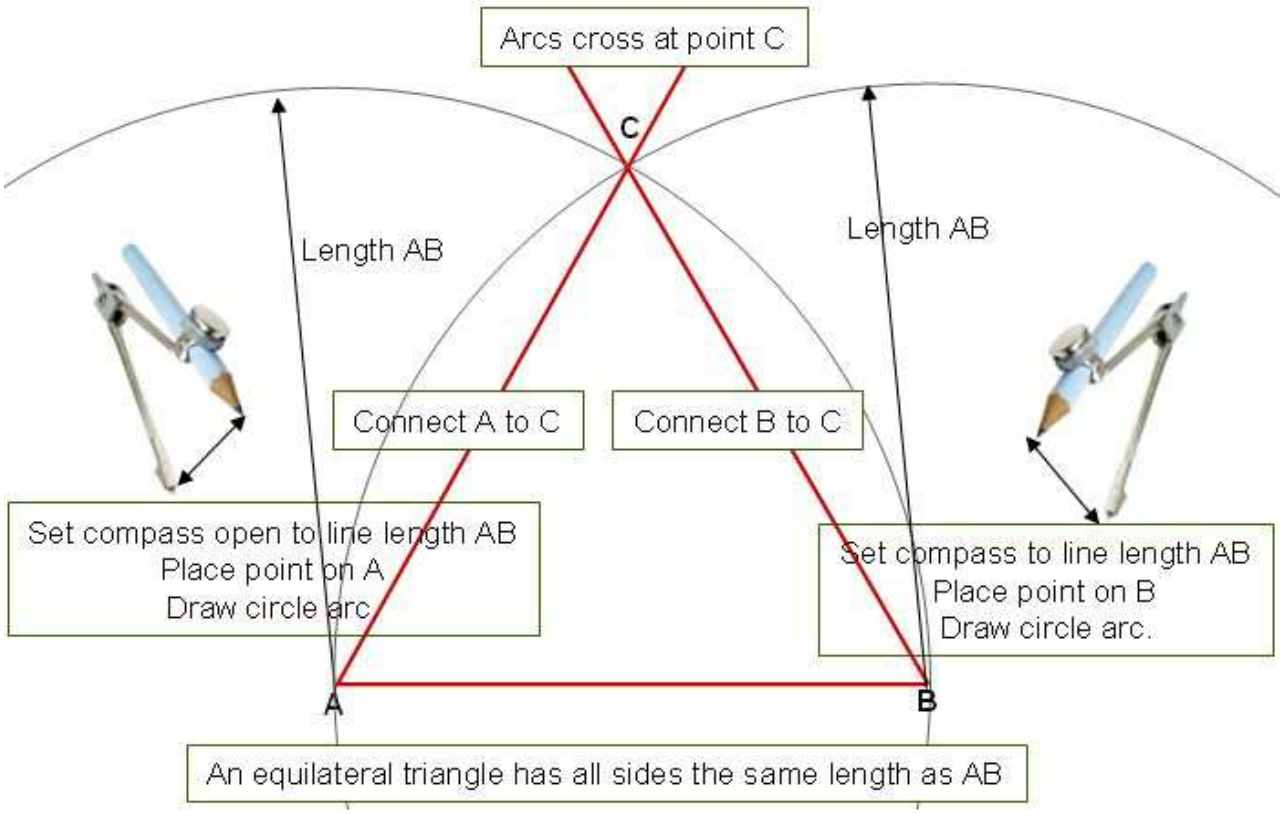
.....**0.3**✓..... **(1)**

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)**

7. 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.

8. At the supermarket the total cost for one DVD and three CDs was £17.25
The DVD cost £6.75. What was the price for **one** CD?

1 DVD	£6.75
3 CDs	
Total	£17.25

To get the cost of 3CDs subtract £6.75 from £17.25

1 7 . 2 5 - 6 . 7 5 = 10.5

To get the cost of one CDs divide 10.5 this by 3

1 0 . 5 ÷ 3 = 3.5

or

(1 7 . 2 5 - 6 . 7 5) ÷ 3 =

If your calculator has brackets do it in one go as shown

1 CD costs £ **3.50** ✓

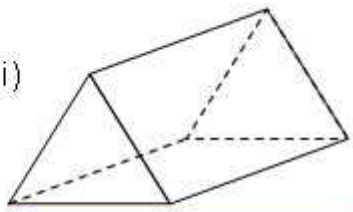
(2)

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

i)

This shape is a sphere ✓

ii)



This shape is a triangular prism ✓

…….. …….. **(2)**

10. **a)** What is the Highest Common Factor (HCF) of 24 and 60

A FACTOR is a number that goes into (divides into) another number.
So 2 goes into 24 and 2 also goes into 60. But we have to find the biggest or highest factor that goes into both.

List the factors for each number: Find the biggest one on both lists

24 : 2 3 4 6 8 10 12 24
60 : 2 3 4 6 8 10 12 15 30 60

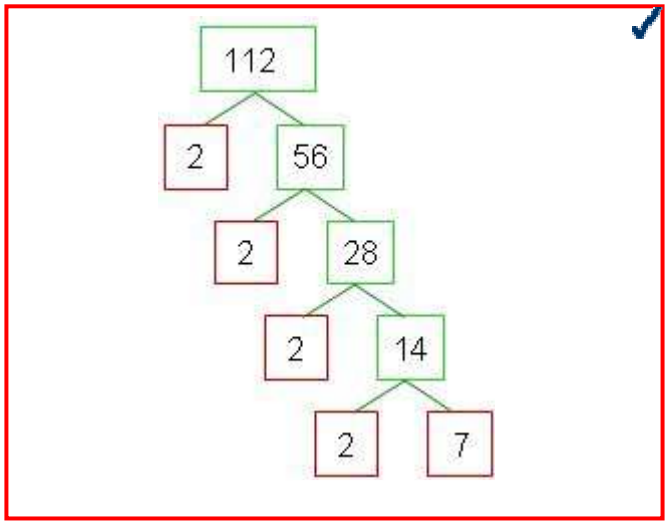
12 ✓

(2)

b) Draw a prime number tree for 112.

Prime numbers are those numbers (greater than 1) that cannot be divided by any number except themselves and one.
Every number is made by multiplying prime numbers together!

A prime number tree shows all the prime numbers that multiply to make a number.
Start with 112. The first prime number is 2. Divide 112 by 2 and write out 2 and 56
As 2 still divides into 56 continue until we end with the prime number 7.



✓

(2)

c) Hence express 112 as a product of its prime factors.

Product of prime numbers just means which ones multiply together to make 112.
Select all the boxes in red: $2 \times 2 \times 2 \times 2 \times 7 = 112$ or $2^4 \times 7$

2 x 2 x 2 x 2 x 7 or 2^4 x 7 ✓

(1)

d) 11 and 13 are both prime numbers. What is the next prime number?

After 13, 14 is not prime as it divides by 2 or 7, 15 divides by 3 or 5,
16 divides by 2 or 4 or 8. 17 only divides by 1 or 17 so it is a prime.

17 ✓

(1)

e) What is the reciprocal of 100?

Reciprocal means 1 over the number.

$\frac{1}{100}$ ✓

(1)

11. Using your calculator work out

Per centage % is out of 100. 43% is 43 ÷ 100
OF means **X** on your calculator

a) 43% of £150

4 3 ÷ 1 0 0 x 1 5 0 =

Or use your percentage % sign on your calculator as shown below

1 5 0 x 4 3 shift % =

You may need shift depending on how your calculator works

£ 64.50 ✓

(1)

b) the square root of 306.25

√

Square root means what number times itself gives …

√ 3 0 6 . 2 5 =

17.5 ✓

(1)

c) 7.4 cubed. Write all the numbers on your calculator display

Cubed means a number times itself three time

7 . 4 x 7 . 4 x 7 . 4 x = 405.224 ✓

(1)

If your calculator has this button x^y type

7 . 4 x^y 3 =

12) David buys a mobile phone for £90. VAT is 17.5%.
What is the total cost for the phone *including* VAT?

You can work out 17.5% in different ways on your calculator

Method 1 - using 17.5% = 17.5 ÷ 100

1 7 . 5 ÷ 1 0 0 x 9 0 = 15.75

Method 2 - use the percentage % button on your calculator as shown

shift

9 0 x 1 7 . 5 % = 15.75

You may need shift depending on how your calculator works

Method 3 convert % to a decimal and use that as shown below: 17.55 = 0.175

9 0 x 0 . 1 7 5 = 15.75

Vat @ 17.5% = 10% + 5% + 2½%

You can do this without a calculator:

£90 × 10% = £ 9. 00
£90 × 5% = £ 4. 50
£90 × 2½% = £ 2. 25
£15.75 =VAT

Now add the VAT to the £90

9 0 + 1 5 . 7 5 =

105.75 ✓

(3)

13. Calculate:

a) How many kilograms (kg) is 2500g

1000 g = 1 kg = To convert 2500 g to kg divide by 1000
Move the decimal point (which is after the last zero) three places to the left.

2500 ÷ 1000 is 2 . 5 0 0

2.5 kg ✓

(1)

b) How many millimetres (mm) is 6.6cm

1 cm = 10mm. To convert 6.6 cm to mm multiply by 10
Move the decimal point one place to the right.

6. 6 × 10 is 6 6.0

66mm ✓

(1)

c) 1 mile = 1.6 km. How many miles is 28 km?

A mile is further than a km,
So we divide (NOT multiply) the 28 km by 1.6 to change it to miles.

2 8 ÷ 1 . 6 =

17.5 miles ✓

(2)

d) How many hours and minutes is it from 9.40am to 1.25pm?

From 9.40am to 10.00am we have 20 minutes.
From 10.00am to 1.00pm we have 3 hours
From 1.00pm to 1.25pm we have 25 minutes
In total we have 20min + 3 hr + 25min = 3 hr 45 min

3 hour 45 mins ✓

(2)

e) What is 5.25 hours in minutes?

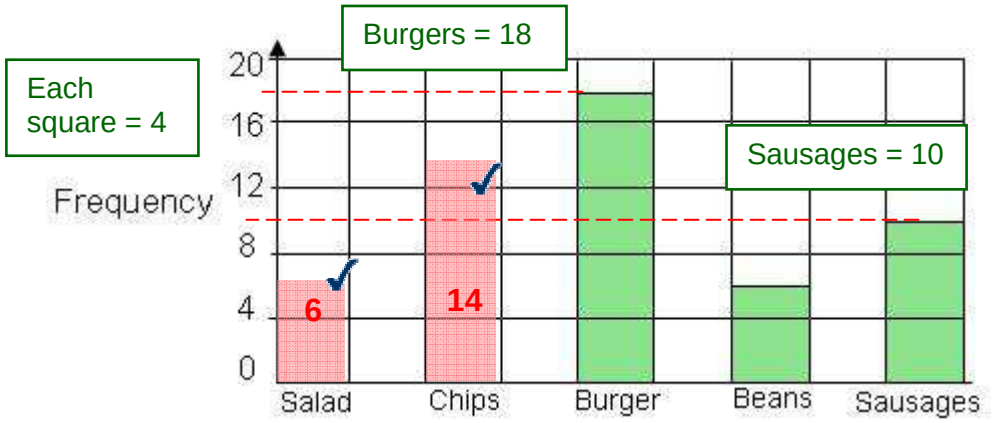
1 hour = 60 minutes

5 hours = 60 × 5 = 300 minutes
0.25 hour = ¼ hour = 15 minutes
Total 315 minutes

315 mins ✓

(1)

14. Cyril carried out a survey of choices for school meals. He plotted the information on the bar chart below



a) How ***many more*** students chose burgers than sausages?

18 – 10 = 6

8

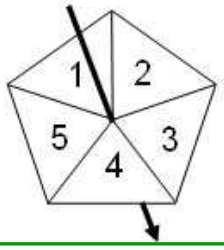
.....

(1)

b) 6 students chose salad and 14 chose chips.
Complete the bar chart

(2)

15. **a)** What is the probability of getting 3 or more on a 5-sided spinner?

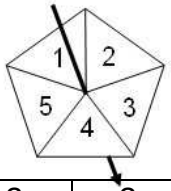


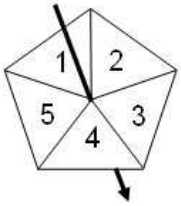
In total there are 5 values on the spinner.
To get 3 or more we could have 3 or 4 or 5 or 3 possible values.
Probability (3 or more) =number of values possible ÷ total number of values

$\frac{3}{5}$ ✓

(1)

b) Nadine used two spinners for a game.
He added the scores on both spinners to get a total score
Complete the table showing all the total score combinations.
The first one has been done for you.





	1	2	3	4	5
1	**2**	**3**	**4**	**5**	**6**
2	**3**	**4**	**5**	**6**	**7**
3	**4**	**5**	**6**	**7**	**8**
4	**5**	**6**	**7**	**8**	**9**
5	**6**	**7**	**8**	**9**	**10**

✓

(1)

c) What is the probability of getting a total score of 7 or more from the spinners?

In total there are 25 possible scores 5 × 5

	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	**7**
3	4	5	6	**7**	**8**
4	5	6	**7**	**8**	**9**
5	6	**7**	**8**	**9**	**10**

A total score of 7 or more can happen 10 times.
Probability (7 or more) = 10 ÷ 25 = 2/5

$\frac{2}{5}$ ✓

(2)

d) From a bag of 8 blue buttons, 12 green buttons and 5 red buttons what is the probability of taking a red button?

Total buttons = 8 + 12 + 5 = 25
Probability (red) = number of red buttons ÷ total number buttons
= 5 / 25

5/25 or 1/5 ✓

.....

(1)

16. **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 ✓

.....

(1)

y = 3x + 6

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

Replace the y with 24 → 24 = 3x + 6
Take 6 from both sides of the equation
24 – 6 = 3x + 6 – 6
18 = 3x
Divide both sides by 3 18 ÷ 3 = x = 6

..... **6** ✓ .....

(2)

c) Factorise 3*t* – 12

Find a factor that goes into 3t and 12
3 will go into both. Place outside the bracket: 3 (t – 4)

3 (t – 4) ✓

.....

(1)

4z × z = **4z²**

d) Expand 4 z (z – 3)

4z × – 3 = **–12z**

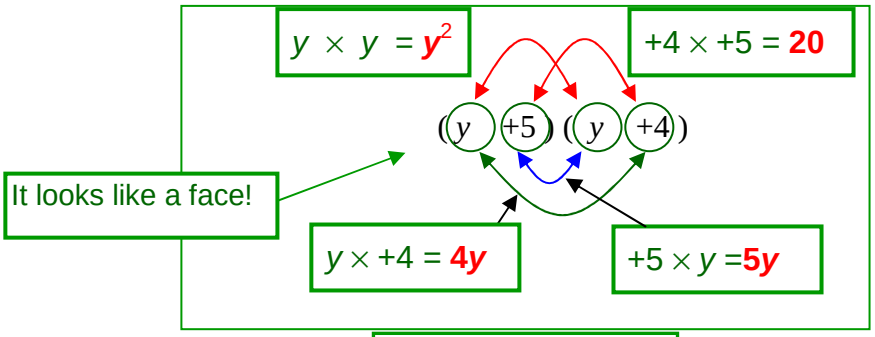
Expanding is the opposite of factorise.
Use the value outside the brackets and multiply it by the two values inside. Don't forget the minus sign

4z² – 12z ✓

.....

(1)

e) Expand and simplify $(y + 5)(y + 4)$



Double Brackets mean FOUR multiplications

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

Simplify – collect like terms together

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

OR use a 2×2 grid
Then simplify

×	y	+4
y	y^2	+4y
+5	+5y	+20

$y^2 + 9y + 20$ ✓ **(2)**

f) Solve $5(4x – 4) = 5(2x + 9)$

Expand both sides first

$5 \times 4x = 20x$ $\quad$ $5 \times 2x = 10x$

Solve $5(4x – 4) = 5(2x + 9)$

$5 \times -4 = -20$ $\quad$ $5 \times +9 = 45$

Then collect terms and simplify to get:

$20x – 20 = 10x + 45$

Now solve $20x – 20 = 10x + 45$

Add 20 to both sides

$20x – 20 + 20 = 10x + 45 + 20$

Subtract 10x from both sides

$20x – 10x = 10x + 65 – 10x$

$10x = 65$

Divide both sides by 10

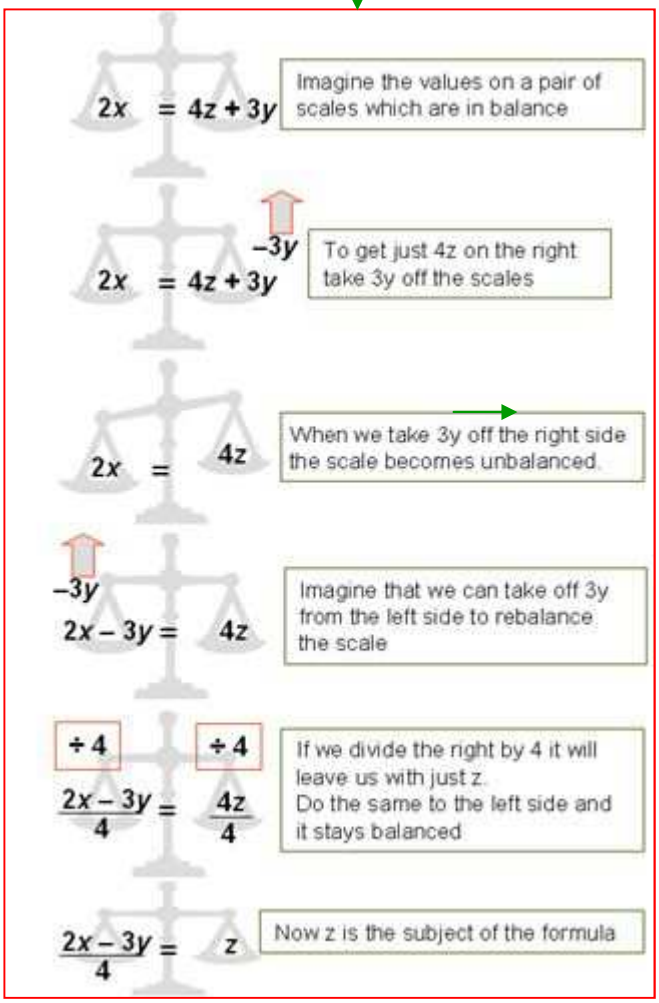
$x = 6.5$

6.5 ✓ **(2)**

g) Make *z* the subject of the formula

$2x = 4z + 3y$

We have to get z on one side of the equation and everything else on the other side.
Imagine that each side is different sides of a balance separated by the = sign.
To keep it balanced if we change one side we have to change the other side in exact in the same way.



Subtract 3*y* from both sides

$2x - 3y = 4z + 3y - 3y$
$2x - 3y = 4z$

Divide both sides by 4

$\frac{2x - 3y}{4}$

$z = \frac{2x - 3y}{4}$ ✓

(2)

h) Simplify $\frac{y^9}{y^3}$

$\frac{y^9}{y^3} = \frac{y \times y \times y \times y \times y \times y \times y \times y \times y}{y \times y \times y} = y^6$

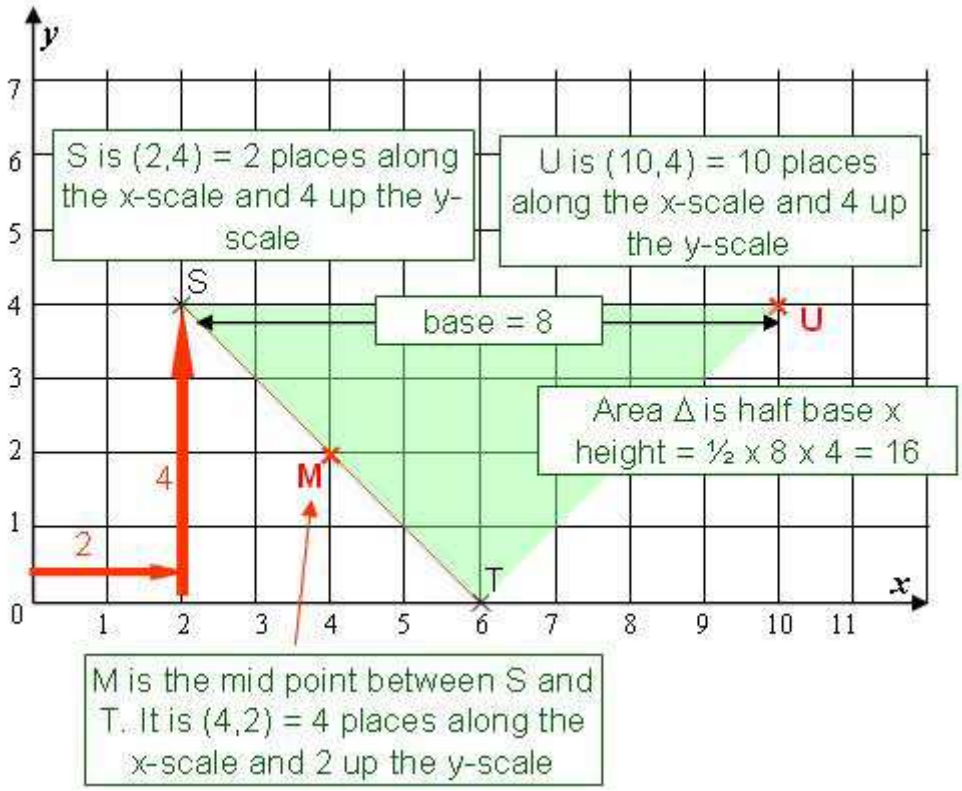
Cancelling is when you divide the top and bottom of a fraction by a factor (number or letter) . It makes fractions simpler. e.g. 4/6 = 2/3
Here we CANCEL the y's at the top and bottom to make it simpler

y^6 ✓

(1)

When you divide powers they SUBTRACT 9 – 3= 6

17. Points S and P are shown on the on the centimetre square grid below



a) What are the co-ordinates of point S

(2, 4)

S is 2 along the horizontal *x* scale and 4 up the vertical *y* scale

(1)

b) Draw a line between S and T. Find the mid-point between S and T and label it M. What are the co-ordinates of the point M?

(4, 2)

(1)

c) Mark with a cross and label the point U at the co-ordinates (10, 4)

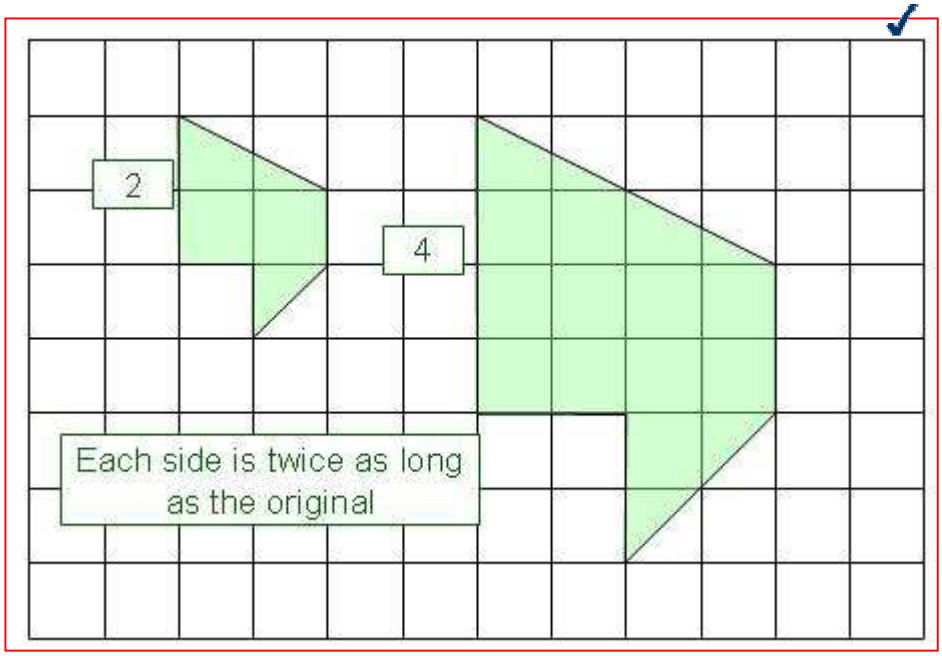
(1)

d) What is the area of the triangle made by connecting the points S, T and U?

16

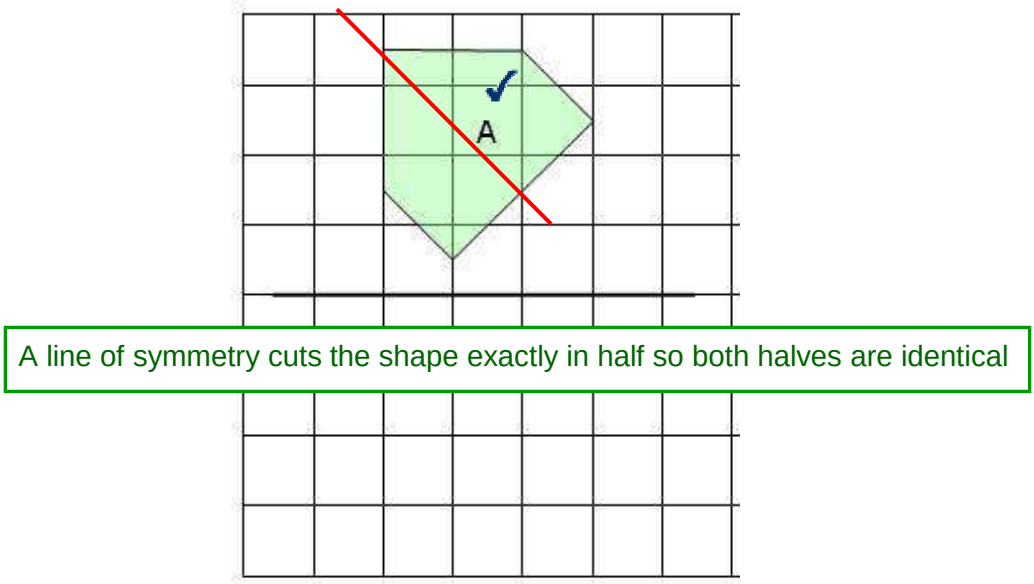
(2)

18.



a) Enlarge the shape shown above by a factor of two

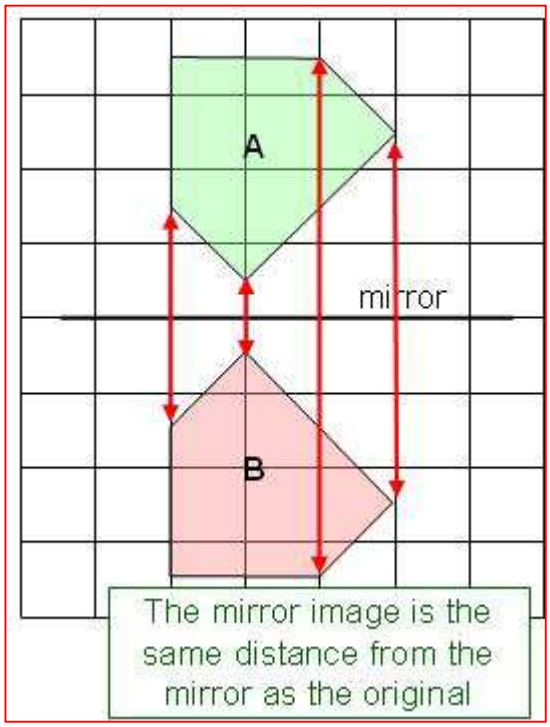
(1)



b) Draw a line of symmetry on the shape labelled A above

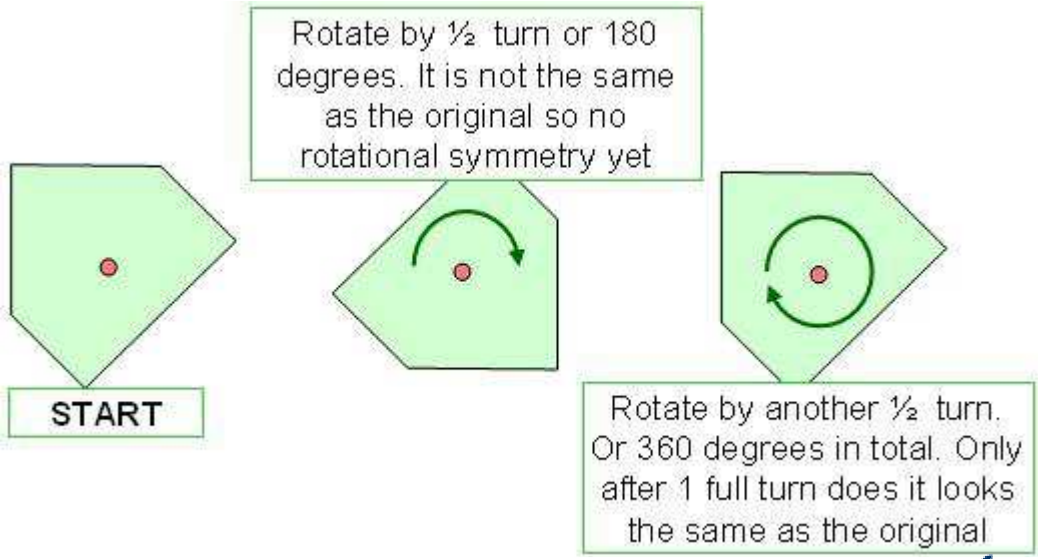
(1)

c) Reflect shape A in the mirror line shown. Label it B



(1)

d) What is the order of rotational symmetry for shape A?



It only looks like the original after a complete rotation so it is order 1

. 1 .....

(1)

19. Jenny 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 × 2.45 = 490

2 0 0 x 2 . 4 5 =

Aus$..... 490 ✓

(2)

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 2.45 to convert dollars into pounds
42.35 ÷ 2.42 = 17.5

4 2 . 3 5 ÷ 2 . 4 2 =

£..... 17.50 ✓

(2)

20. For her wedding, Laura bought 8 birdcages and 6 metres of material.
The total cost was £109.98.
Each birdcage cost £8.79.
Find the cost of <u>each metre</u> of material.

8 birdcages cost 8 × £8.79

8 x 8 . 7 9 = 70.32

Find the cost of 6 metres of material by subtracting this from the total cost

1 0 9 . 9 8 - 7 0 . 3 2 = 39.66

Find the cost of 1 metres of material by dividing this by 6

3 9 . 6 6 ÷ 6 = 6.61

6.61 ✓

.....

(3)

21. A bank pays 5.6% **simple** interest per year on £6000.
How much interest would you get after two years.

Simple interest means we pay the same interest every year.
The interest per year is : 6000 × 5.6% = £336.

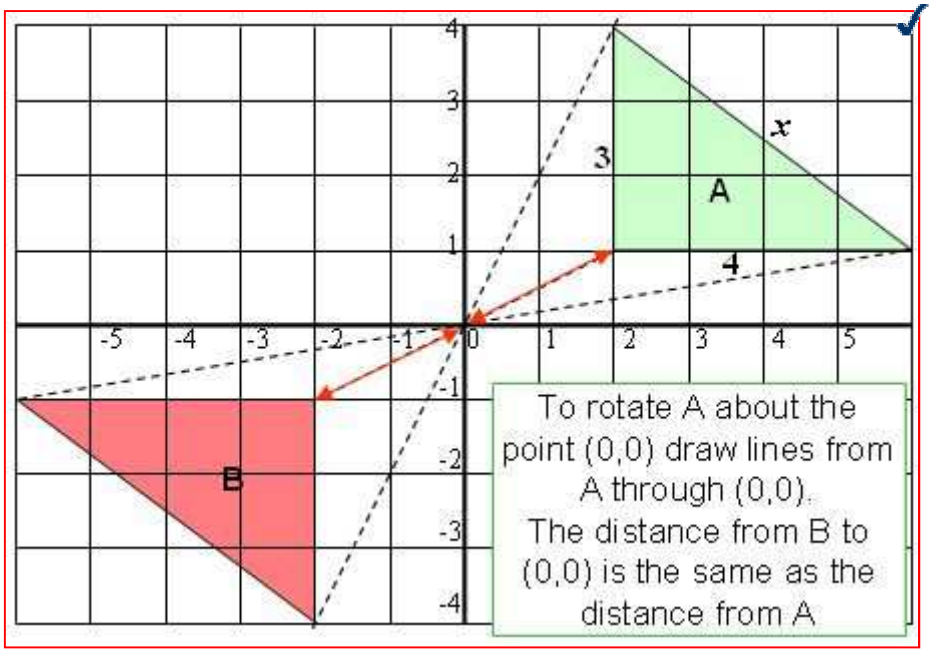
6	0	0	0	x	5	.	6	shift	%	=	336

After two years we have interest of £336 + £336 = £672

£ 672 ✓

(3)

22. The triangle A is shown on a centimetre square grid below.



✓

a) Rotate triangle A by 180^0 about (0, 0). Label it B.

(2)

b) Calculate the length of the side *x* of the triangle.

The triangle has sides of 3 and 4. We need to find the hypotenuse *x*

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

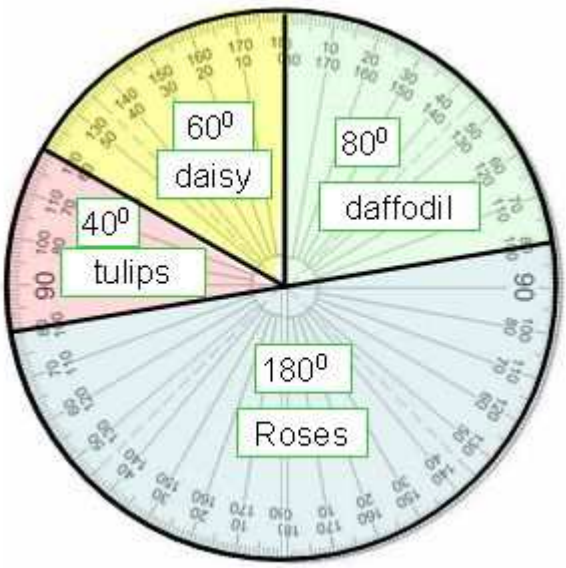
(Length hypotenuse)^2 = (length side 1)^2 + (length side 2)^2
$D^2 = 3^2 + 4^2 = 9 + 16 = 25$
$D = \sqrt{25} = 5$ cm

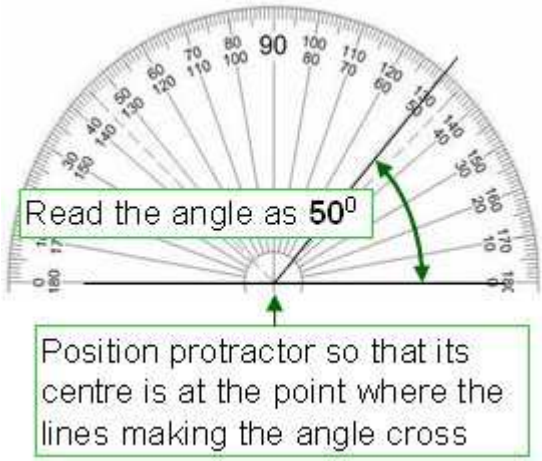
..... 5 ✓ ..cm

(2)

23. A survey of 90 people's favourite flowers for Valentine's day is shown in the accurate pie chart

Diagram **accurately** drawn





Use the pie chart to complete the table.

Favourite flower	Frequency	Angle
Roses	45	180°
Tulip	**10** ✓	**40** ✓
Daffodil	20	**80** ✓
Daisy	**15** ✓	**60** ✓
Total	90	**360** ✓

(2)

The roses are 180 degrees and equal a frequency of 45.
So a frequency of 1 is 180 ÷ 45 = 4 degrees.

Daffodils have a frequency of 20 peoples so in degrees they are:
20 × 4 degrees = 80 degrees.

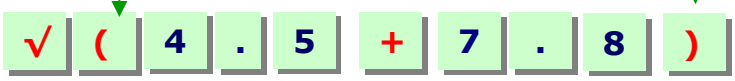
Now measure using a protractor.
Tulips measures 40°. To convert this to a frequency do 40 ÷ 4 = 10
Daisies measure 60°. To convert this to a frequency do 60 ÷ 4 = 15

Check by adding up frequencies = 45 + 10 + 20 + 15 = 90
Angles 180 + 40 + 80 + 60 = 360

24. What is

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

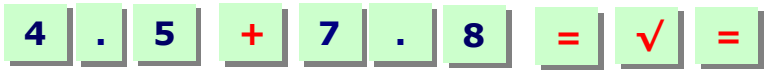
Make sure you add 4.5 and 7.8 before doing the square root
Using brackets tells your calculator to do this



√12.3 ... **3.51** ✓ **(1)**

√12.3 = 3.507 . To 2 decimal places this is 3.51

or



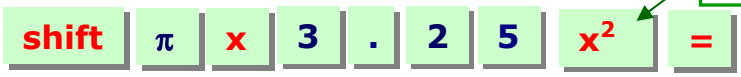
b) πr^2 when r = 3.25

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

get π using shift π

The x^2 button squares 3.25

or



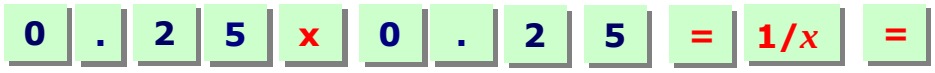
33.187

To 1 decimal place 33.187 is 33.2

..... **33.2** ✓ **(1)**

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

Work out 0.25^2 first = 0.25 × 0.25 = 0.0625
Then use the **1/*x*** button



..... **16** ✓ ..... **(1)**

or

The x^2 button squares 0.25

d) What is 7×10^4 as an *ordinary number*

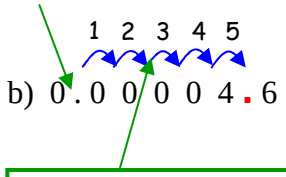
10^4 means 10 times itself 4 times or 10000.
$7 \times 10^4 = 7 \times 10000 =$ 70,000

70 000 ✓ ... **(1)**

e) What is 0.000046 in *standard form*

To convert a number to standard form count the jumps needed to get the decimal point between the first two numbers.

Start at the decimal point



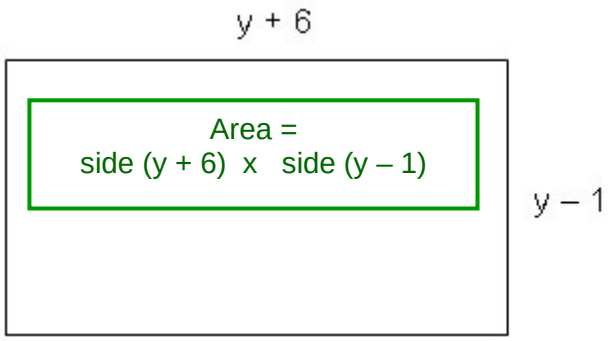
Jump over digits going Right until you are just before last digit

We made 5jumps Right so we get 10^{-5}

4.6×10^{-5} ✓

(1)

25.



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

Expand and simplify (y + 6) (y – 1)

$y \times y = y^2$

$+6 \times -1 = -6$

(y +6) (y –1)

$y \times -1 = -y$

$+6 \times y = 6y$

Double Brackets mean FOUR multiplications

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

Simplify and collect like terms together

$6y - y + y^2 - 6 = y^2 + 5y - 6$

Since area A= side (y + 6) × side (y – 1) then

$A = y^2 + 5y - 6$ ✓

(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 ✓

(2)

TOTAL FOR PAPER: 100 MARKS
END