

GCSE Mathematics

Calculator

Foundation Tier

Free Practice Set 6

1 hour 30 minutes



ANSWERS

Marks shown in brackets for each question (2)

Typical 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 $5 \times -3 = -15$

Red Box and ✓ - Answer

48 % ✓

Authors Note

Every possible effort has been made to ensure that everything in this answer paper is accurate and the author cannot accept responsibility for any errors.

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Question	Type of question	Marks
1	Metric units	3
2	Number operations	5
3	Reflection, translation	4
4	Tally, frequency	4
5	Bar chart, mean	4
6	Volume, plan	4
7	Index laws, area-finding side	4
8	Money conversion	4
9	Measure line, using protractor, construct bisector	4
10	Calculation, scale reading	4
11	Decimal places , significant figures	3
12	VAT percentage calculation	3
13	Calculator skills: πr^2 , $\sqrt{\quad}$, cubed numbers	4
14	Table and Rule	7
15	Algebra	7
16	Area, perimeter	8
17	Money calculation	3
18	Stem leaf, median, range	4
19	Reciprocal, fractions, ratio	4
20	Trial and improvement	4
21	Pythagoras theorem	4
22	Prime factor tree	2
23	Reciprocal, cm^2 to m^2 km to miles	3
24	Pie chart	4

1. Write a metric unit on each dotted line in the table below:
The first one has been done.

The length of a finger	9 centimetres
The volume of milk in a glass	300 . millilitre ✓
The length of a car	3.4 . metres ✓
The weight of a bag of potatoes	2 ... kilogram ✓

REMEMBER
1 litre = 1000 millilitres
1 metre = 100 centimetres
1 kilogram = 1000 grams

(3)

2. a) Use your calculator to work out

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

$$24.9 \times (2.5 - 1.4)$$

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

Brackets 1st

2 . 5 - 1 . 4 = 1.1

Multiplication 2nd

2 4 . 9 x 1 . 1 = 27.39

or

2 4 . 9 x (2 . 5 - 1 . 4) =

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

27.39 (2)

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

We have to decide whether the answer is 27.3 or 27.4
Look at the value of the 2nd decimal place (the 9)
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 3 to 4

27.4 (1)

c) Use your calculator to work out

$$45 \div (3.9 - 1.4)^2$$

Brackets 1st

3 . 9 - 1 . 4 = 2.5

Indices or powers 2nd

2 . 5 x² = 6.25

This button squares numbers

Division 3rd

4 5 ÷ 6 . 2 5 = 7.2

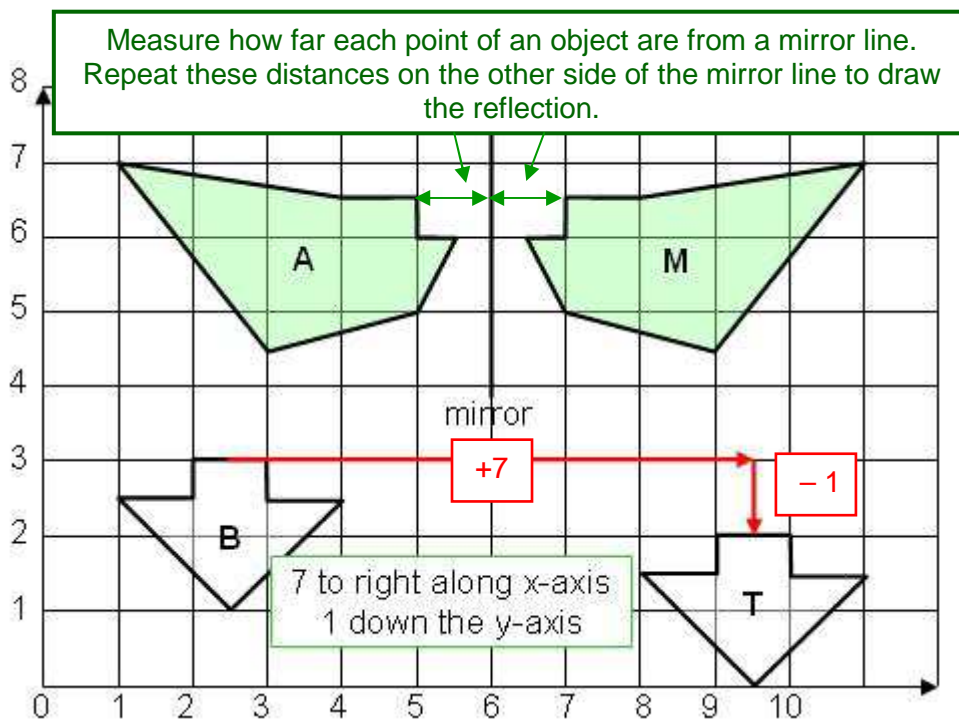
or

4 5 ÷ (3 . 9 - 1 . 4) x² =

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

7.2 (2)

3.



- a) Reflect the shape A in the mirror line. Label it M

Measure how far each point of an object are from a mirror line. Repeat these distances on the other side of the mirror line to draw the reflection.

(2)

- b) Translate triangle B by $\begin{pmatrix} +7 \\ -1 \end{pmatrix}$. Label it T.

(2)

The top number is how many steps to make along the horizontal axis
The bottom number is how many steps to make along the vertical axis

$\begin{pmatrix} +7 \\ -1 \end{pmatrix}$ means 7 steps to the right – the positive x –direction
means 1 step down – the negative y-direction

4. Riona carried out a survey of her friends' favourite website as below:

Facebook	Bebo	Twitter	Facebook	YouTube
Myspace	Facebook	YouTube	Facebook	Bebo
Twitter	Facebook	YouTube	Facebook	YouTube
YouTube	Myspace	Facebook	Facebook	Bebo

a) Complete the table to show Riona's results.

(2)

website	Tally	Frequency
Facebook		8
Myspace		2
Twitter		2
Bebo		3
YouTube		5

In the Tally column make a vertical mark for each colour you find. When you get to five put a line (||||) through it

In the frequency column just write the tally as a number

(3)

b) How many of Riona's friends liked Bebo?

3

(1)

c) What percentage of Riona's friends liked Bebo?

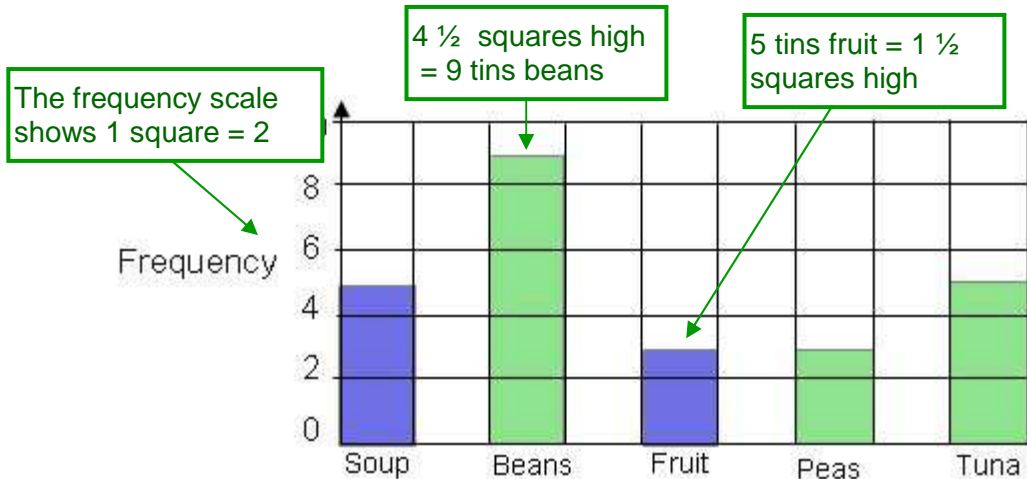
$$\frac{3}{20} = \frac{15}{100} = 15\%$$

At the base convert the 20 into 100 by x bottom by 5
Then do the same to the top

15%

(1)

5. Amy counted the tins of food in her kitchen.
She plotted the information on the bar chart below.



- a) How *many more* tins of beans than peas did she have?

There are 9 tins of beans and 3 tins of peas. $9 - 3 = 6$

6

(1)

- b) She counted five tins of soup and three tins of fruit.
Complete the bar chart

(2)

- c) Amy needed to make sandwiches. One tin of Tuna would make six sandwiches.
How many sandwiches could she make with the tins she had?

There are 5 tins of Tuna
Each Tin does 6 sandwiches
We can make 5×6 sandwiches = 30

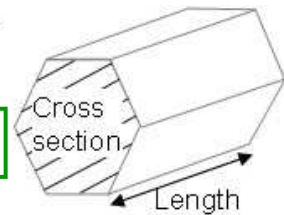
30

(1)

6. Nina measures her tent. Here are her measurements:

Height = 1.8 metres
 Width = 1.75 metres
 Length = 3.5 metres

a) Calculate the *volume* of her tent to 1 decimal place



The volume of a prism is given = area of cross section \times length

Area of cross section of Δ = $\frac{\text{width of } \Delta \times \text{height of } \Delta}{2} = \frac{1.9 \times 1.75}{2}$

1 . 9 \times 1 . 7 5 \div 2 = 1.6625

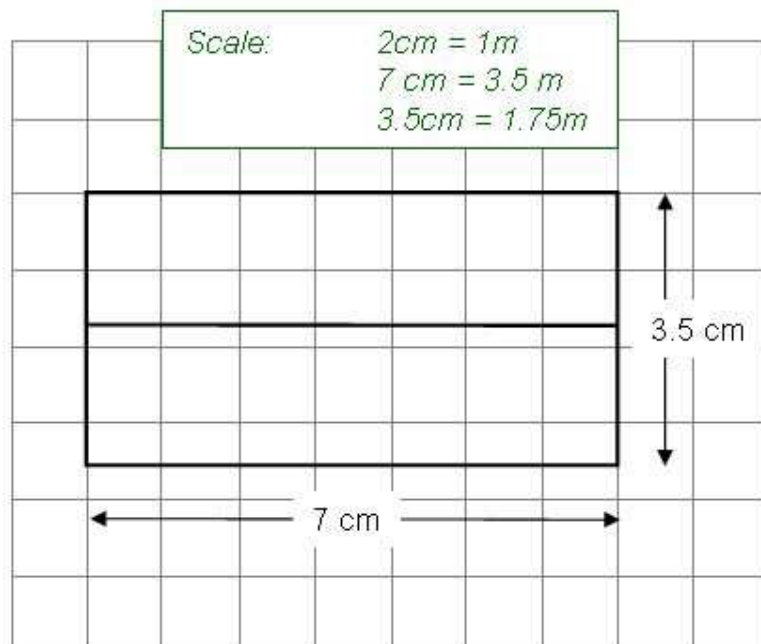
Volume of Δ = cross section \times length of Δ = 16.625×3.5

1 . 6 6 2 5 \times 3 . 5 = 5.81875

5.8 m³

(2)

b) On the centimetre grid below make an accurate drawing of a **plan** of her tent. Use the scale of **2 cm equal 1 metre**



(2)

7. As a power of y what is

a) $y^3 \times y^2$

Using powers is a short way of showing when you want to multiply a value by itself several times. Instead of writing it out long hand, we just put the power on the top right hand side of the value. 8^5 means eight to the power five. It means multiply 8 by itself five times $8 \times 8 \times 8 \times 8 \times 8$

When multiplying powers ADD the powers
So $y^3 \times y^2 = y \times y \times y \times y \times y = y^5$

y^5 ✓

(1)

b) $y^8 \div y^4$

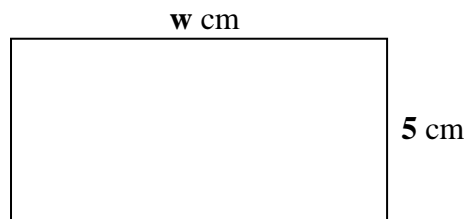
When dividing powers SUBTRACT the powers

$\frac{y^8}{y^4} = \frac{\cancel{y} \times \cancel{y} \times \cancel{y} \times \cancel{y} \times y \times y \times y \times y}{\cancel{y} \times \cancel{y} \times \cancel{y} \times \cancel{y}}$ cancel to get $= y^4$

y^4 ✓

(1)

c) The area of the rectangle below is 45 cm^2
Calculate the length of side w



In algebra we write $5 \times w$
as $5w$
missing out the times sign

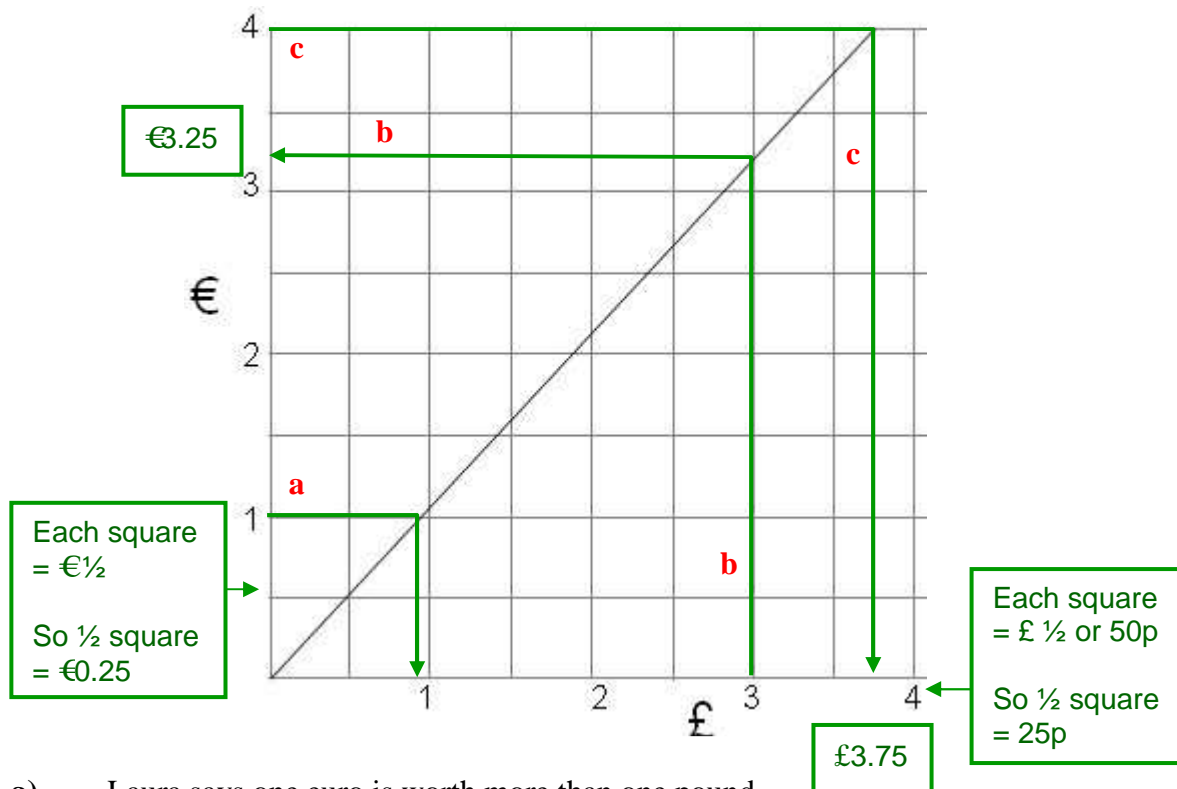
Area of rectangle = height \times width
= $5 \times w = 5w$

We know area = 45 so
 $5w = 45$
 $w = 45 \div 5 = 9$

$w = \dots \dots \dots 9$ ✓

(2)

8. The graph below can be used to convert between pounds and Euros.



- a) Laura says one euro is worth more than one pound.
 Laura is wrong
 Using the graph explain why

Find 1 euro on the vertical axis. Move across to the line. Drop down vertically – it crosses at less than 1 pound.

- b) What is £3 in Euros (€)?

Find £3 on the bottom axis. Draw a line vertically up to the graph line and go across to read the left axis

€..... 3.25 ✓
 (1)

- c) What is €4 Euros in pounds (£)

Find €4 on the left axis. Draw a line horizontally across to the graph line and go down to read the bottom axis

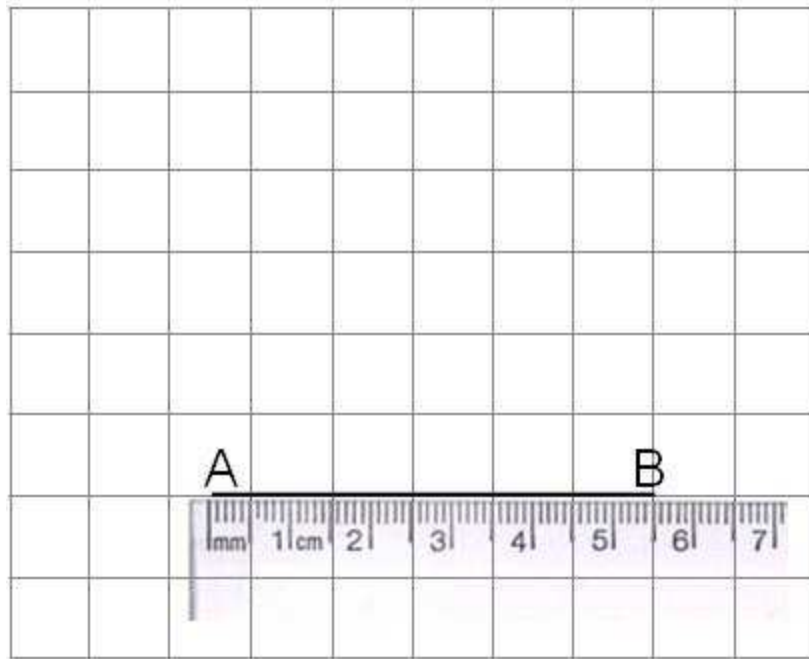
£..... 3.75 ✓
 (1)

- d) What is £300 in Euros?

From b) £3 = €3.25
 £300 = €3.25 x 100 = €325

€..... 325 ✓
 (1)

9. On the 1 cm grid below, line AB has been drawn.

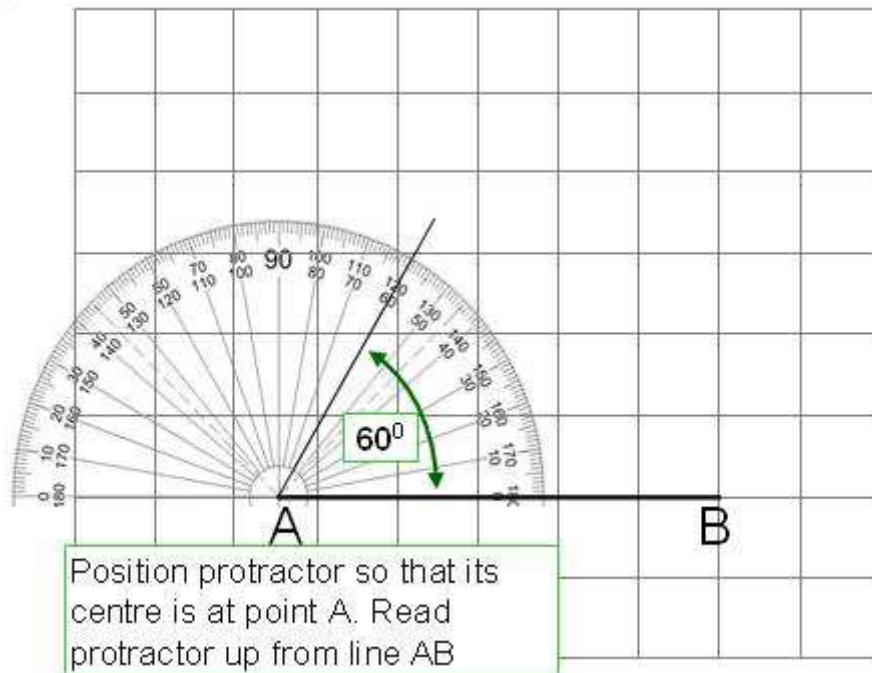


a) Measure the length of the line AB

5.5 ± 0.1 cm ✓

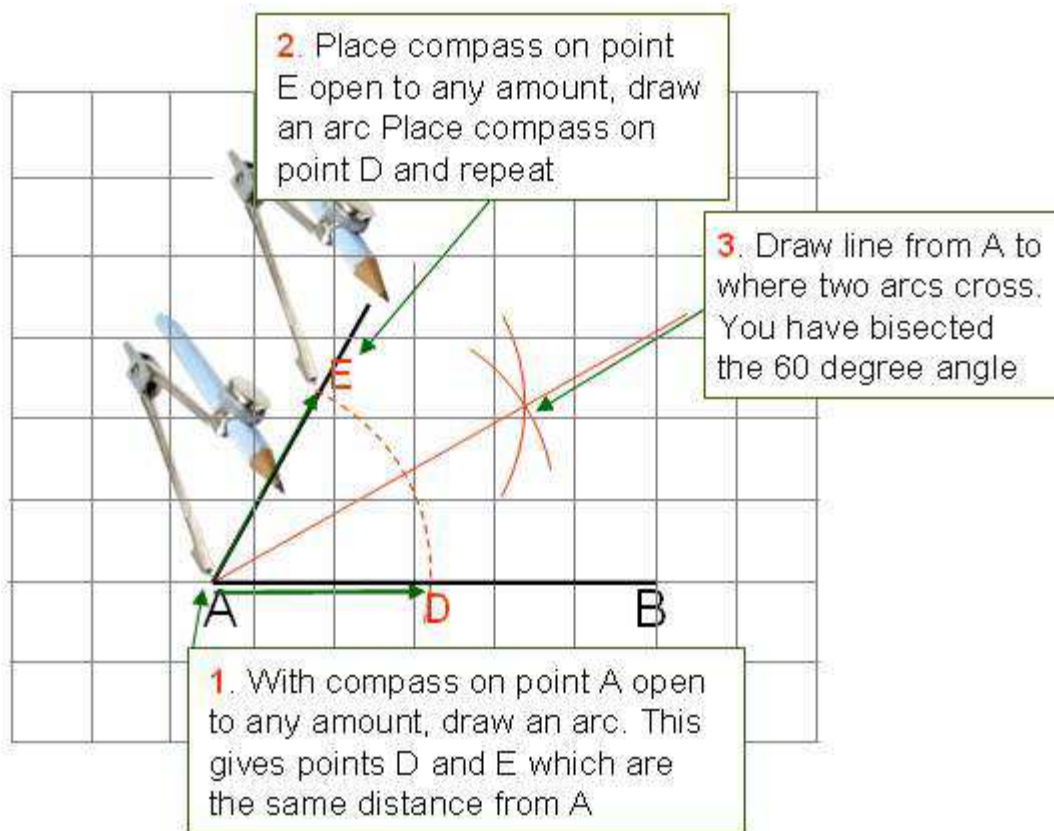
.....
(1)

b) Using a protractor draw an angle of 60° at point A.



(1)

- c) Using a compass **bisect** the 60° angle from b)
You must show your construction lines.



(2)

10. Matthew put 30 litres of petrol in his car. It cost £31.80.

a) How much was the cost of petrol per litre?

30 litres cost £31.80
1 litre costs £31.80 ÷ 30

$$31.80 \div 30 = 1.06$$

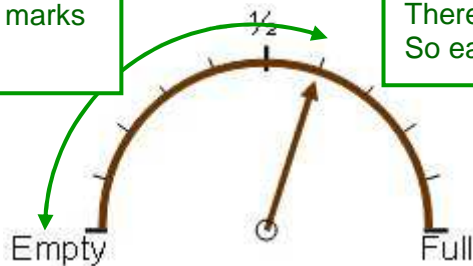
1.06 ✓

£.....
(2)

When Matthew's petrol tank was full it contained 45 litres of petrol.

b) After using his car for a week, Matthew's petrol gauge showed the reading below. How much petrol was left in the petrol tank?

The scale reads 6 small marks
= 6/10 full which is 0.6



There are 10 small marks
So each is 1/10 of the full mark

$$45 \times 0.6 = 27$$

27 ✓

.....
(2)

11. What is 1.469

a) correct to 1 decimal place

The 1st decimal place could be 4 or 5.
Look at the 2nd decimal value. If it is 5 or more round up. Otherwise round down.
We have 6 so we round up to 1.5

1.5 ✓

(1)

b) correct to 2 decimal place

The 2nd decimal place could be 6 or 7.
Look at the 3rd decimal value. If it is 5 or more round up. Otherwise round down.
We have 9 so we round up to 1.47

1.47 ✓

(1)

c) correct to 2 significant figures

The first significant figure is 1
The 2nd significant figure could be 4 or 5
Look at the 3rd significant figure. If it is 5 or more round up. Otherwise round down.
We have 6 so we round up.

1.5 ✓

(1)

12. Logan bought a webcam for £26.40. In the sale it was reduced by 45%.
How much did Logan pay for the webcam?

1. Find 45% of £26.40
You can do it 3 ways:

Change 45% to a decimal → 0.45

2 6 . 4 0 × 0 . 4 5 = 11.88

x 45 and ÷ 100

2 6 . 4 0 × 4 5 ÷ 1 0 0 =

Use the % button

2 6 . 4 0 × 4 5 shift % =

Find the % button on your calculator to make it simpler

2. Subtract it from £26.40

2 6 . 4 0 - 1 1 . 8 8 =

14.52 ✓

(3)

13. Using your calculator work out

a) πr^2 when $r = 2.5$ cm . Give your answer to 1 decimal place

$$\pi r^2 = \pi \times 2.5^2$$

get π with shift π or whatever it is on your calculator

The x^2 button squares 2.5

or **shift** π **x** **2** **.** **5** **x²** **=**

shift π **x** **2** **.** **5** **x** **2** **.** **5** **=** 19.635

To 1 decimal place 19.635 is 19.6

..... **19.6** ✓ .cm²
(2)

b) the square root of 96.04

√ **9** **6** **.** **0** **4** **=**

This is the square root button on your calculator

9.8 ✓
(1)

c) 2.4 cubed. Write all the numbers on your calculator display

Cubed means that number times itself three times
Use the x^y button

2 **.** **4** **x** **2** **.** **4** **x** **2** **.** **4** **=**

or **2** **.** **4** **x^y** **3** **=**

The x^y button multiplies the number any number of times.
Enter the number, press this button then enter the number of times you want to multiply it by itself

..... **13.824** ✓
(1)

14. Sylvia hired some tableware for a tea party
The prices for each item are shown in the table below

a) Complete Sylvia's bill for hiring the tea set.

To get this column multiply the two columns together.
Cost each x quantity = total for item
e.g. 0.15 x 10 = £1.50

Item	Cost each	Quantity	Total cost (£)
Cups	£0.29	9 ✓	£ 2.61 ✓
Saucers	£0.16	9 ✓	£1.44
Tea pot	£2.65	3	£7.95
Sugar bowl	£0.75	2	£1.50
Milk jug	£0.86	3	£ 2.58 ✓
Total			£16.08

(3)

$$0.86 \times 3 =$$

2.58

To get the quantity of each item ÷ the total cost by the cost each

$$1.44 \div 0.16 = 9$$

Subtract the amounts in the right hand column from £16.08

$$16.08 - 2.58 - 1.5 - 7.95 =$$

$$- 1.44 = 2.61$$

$$2.61 \div 0.29 = 9$$

The cost of delivery for these items is worked out using the formula:

$$\text{Cost of delivery} = \text{Distance to customer (miles)} \times \text{£}0.40 + \text{£}5$$

The distance to a customer is 27 miles.

b) Work out how much the delivery cost is in pounds

$$27 \times 0.4 + 5$$

$$27 \times 0.4 + 5 = 15.8$$

£..... **15.8** ✓
(2)

A customer paid £17.80 for the delivery cost.

c) Work out the distance to the customer

$$\text{Work it out backwards} \rightarrow 17.80 - 5 \div 0.4$$

$$17.80 - 5 \div 0.4 = 32$$

32 ✓
.....miles
(2)

15. a) Simplify $5b + 7a + 3b - 9a + b$

Simplify means add or subtract anything that is the same type of thing
 5 lots of b plus another 3 lots of b and another b gives 9 lots of b.
 7 lots of a subtract 9 lots of a gives minus 2 lots of a

$9b - 2a$ ✓

(1)

b) Simplify $a + a \times a$

Do the $a \times a$ first = a^2
 We can't mix a and a^2 so we have to leave it as $a + a^2$

$a + a^2$ ✓

(1)

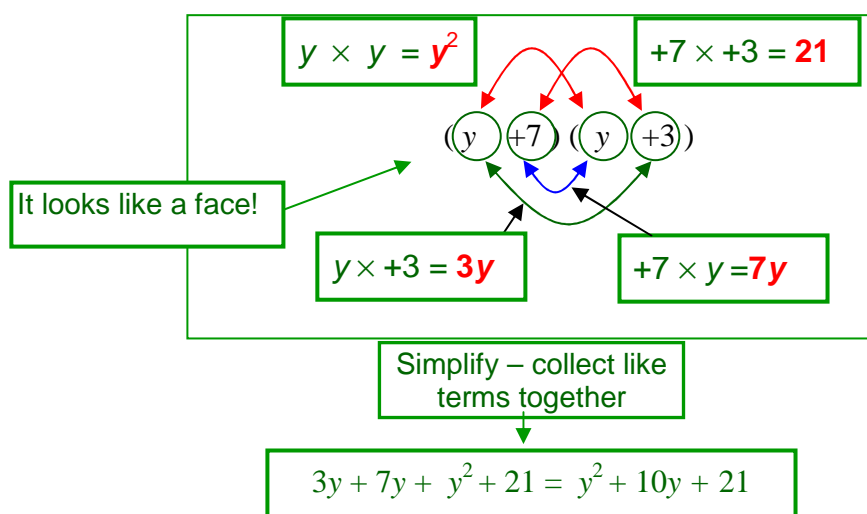
c) $c = 5a - 6b$ What is the value of c when $a = 6$ and $b = 3$

Replace the letters with numbers
 $c = 5a - 6b$
 $c = 5 \times 6 - 6 \times 3 = 30 - 18 = 12$

12 ✓

(2)

d) Expand and Simplify $(y + 7)(y + 3)$



Double Brackets mean FOUR multiplications

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	+3
y	y^2	$+3y$
+7	$+7y$	$+21$

$y^2 + 10y + 21$ ✓

(2)

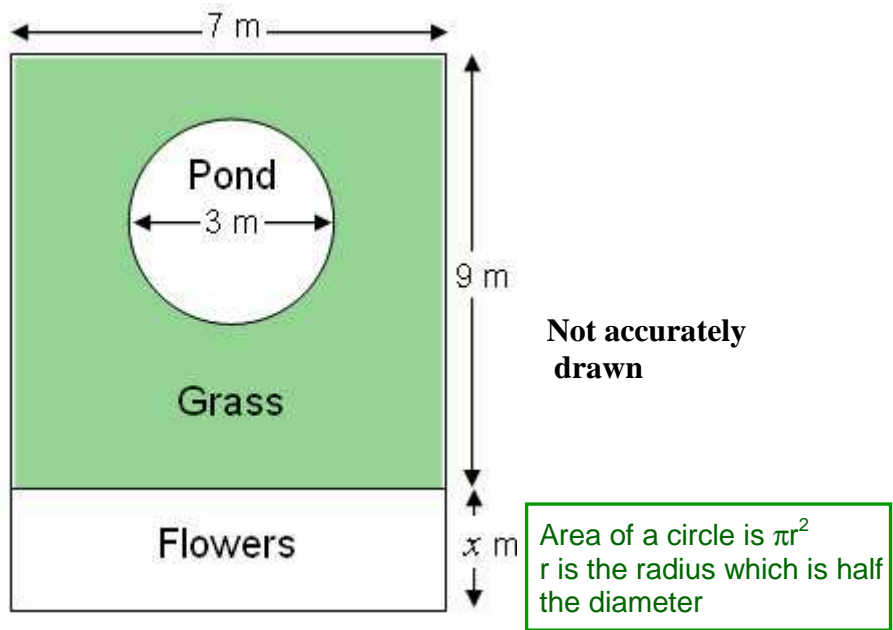
e) Simplify $2a^2 \times a$

$a^2 \times a = a^3$

$2a^3$ ✓

(1)

16. The diagram below shows a plan of a rectangular garden with measurements in metres. There is a circular pond and an area for flowers.



- a) Work out the area of the circular pond to 2 decimal places

$$\text{Area of a circular pond is } \pi r^2 = \pi \times 1.5^2$$

get π using shift π

The x^2 button squares 1.5

or

$$\text{shift } \pi \times 1.5 x^2 =$$

$$\text{shift } \pi \times 1.5 \times 1.5 = 7.07$$

To 2 decimal places 7.0695 is 7.07

7.07

.....m²
(1)

- b) Work out the area of the rectangle covered by grass to 1 decimal place

$$\begin{aligned} \text{Area of rectangle covered by grass} &= \text{area of rectangle} - \text{pond area} \\ &= 7 \times 9 & - 7.07 \\ &= 63 & - 7.07 = 55.9 \end{aligned}$$

55.9

.....m²
(2)

- c) Express the longest side of the garden in terms of x .

9 + x

.....m
(1)

- d) Express the perimeter of the garden in terms of x .
Give your answer in its simplest form.

$$\begin{aligned} \text{The perimeter is the total distance around the garden} \\ = 7 + 9 + x + 7 + 9 + x \\ = 32 + 2x \end{aligned}$$

$$32 + 2x$$

(2)

- e) The perimeter of the garden is 40 metres.
Find the value of x .

$$\begin{aligned} \text{Perimeter} \quad 32 + 2x &= 40 \\ \text{(Subtract 32)} \quad 32 - 32 + 2x &= 40 - 32 \\ &2x = 8 \quad \text{so } x = 4 \end{aligned}$$

$$4$$

$x =$

(2)

17. Laura bought 25 cups and 8 plates.
The total cost was £35.07.
Each plate cost £1.79.
Find the cost of each cup.



8 plates cost $8 \times £1.79$

$$8 \times 1.79 =$$

14.32

Find the cost of 25 cups by subtracting this from the total cost

$$35.07 - 14.32 =$$

20.75

Find the cost of each cup by dividing this by 25

$$20.75 \div 25 =$$

0.83

0.83 ✓

£.....

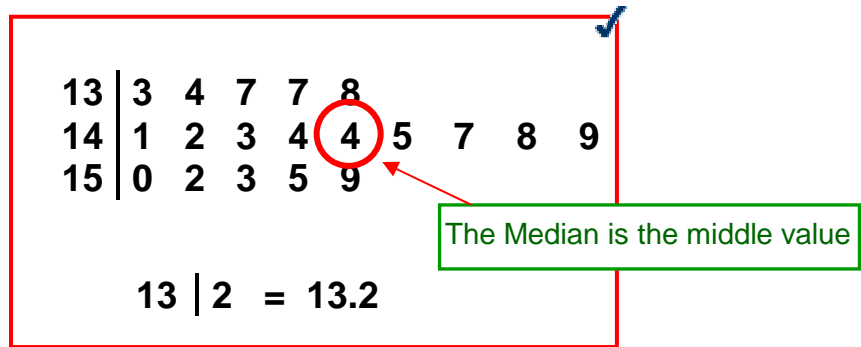
(3)

18. A pupil recorded the length of **19 pencils** in centimetres.

The stem-and-leaf diagram shows the results.

13.3 13.4 15.5 15.9 15.0 13.8 14.4 14.1
 14.2 14.3 13.7 14.4 14.5 15.3 14.8 15.2
 14.9 13.7 14.7

a) In the space below, draw a stem and leaf diagram to show these times.
 Show the key.



(2)

b) What is the median pencil length?

The Median is the middle value
 There are 19 values so the middle one is the 10th value

..... 4 .cm
 (1)

c) What is the range of pencil lengths?

Range = difference between largest and smallest
 15.9 – 13.3 = 2.6

..... 2.6 .cm
 (1)

19. a) What is the reciprocal of 5?

The reciprocal is 1 over the number

$$\frac{1}{5}$$

(1)

- b) Work out

$$\frac{2}{7} - \frac{5}{21}$$

We can convert 7th into 21st because 7 goes into 21

$$\frac{2}{7} = \frac{6}{21} \quad \text{subtract} \quad \frac{6}{21} - \frac{5}{21} = \frac{1}{21}$$

x 3 to get 21

$$\frac{1}{21}$$

(2)

- c) Share 21 in the ratio 1:2

Add up the ratios $1 + 2 = 3$. We have 10 parts

Divide 21 by $3 = 7$.

One part = 7 Two parts = 14

7 and 14

(1)

20. The equation

$$x^3 - 4x = 9$$

Trial and improvement means trying out different values for the letters in an equation to see how close you get to the given answer

has a solution between 2 and 3

Use a trial and improvement method to find this solution correct to 1 decimal place

You must show **all** your working.

For this equation make a table with columns for the x , x^3 , $-4x$ and answer

Use the power button to get x^3

4×3^3 gives $4^3 = 64$

x^y

x	x^3	$-4x$	$=$	
2	8	-8	0	Too low

2 x^y 3
 - 4 \times 2
 =

3	27	-12	15	Too high
---	----	-----	-----------	----------

3 x^y 3
 - 4 \times 3
 =

15 is closer to 9 than 0 so x is nearer 3 than 2. Try $x = 2.7$ next

2.7	19.68	-10.8	8.88	Almost
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2 . 7 x^y 3
 - 4 \times 2 . 7
 =

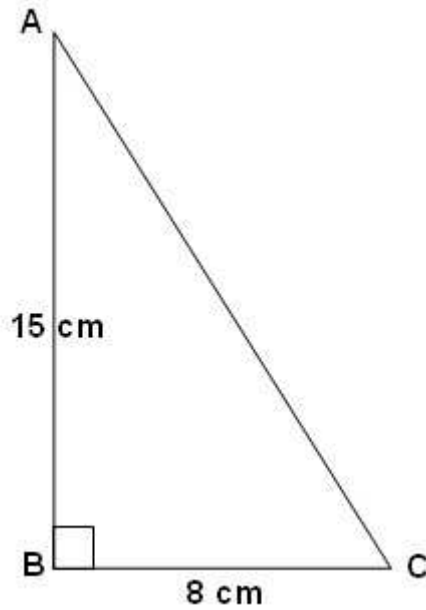
This is too low so try a higher value for x . Go up by one decimal point $x = 2.8$

2.8	21.95	-11.2	10.75	Too high
-----	-------	-------	--------------	----------

2 . 8 x^y 3
 - 4 \times 2 . 8
 =

$x =$
2.7
) (4)

21. ABC is a right angled triangle with side AB = 15 and side BC = 8 cm



a) Work out the length of side AC

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

$$\begin{aligned} (\text{Length diagonal})^2 &= (\text{length Side 1})^2 + (\text{length side 2})^2 \\ D^2 &= 15^2 + 8^2 = 225 + 64 = 289 \\ D &= \sqrt{289} = 17 \text{ cm} \end{aligned}$$

This button squares your number

17 cm
(2)

1 5 x² + 8 x² = 289 √ 2 8 9 =

b) Work out the area of the triangle.

$$\begin{aligned} \text{Area of } \Delta &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= 0.5 \times 8 \times 15 = 60 \end{aligned}$$

0 . 5 x 8 x 1 5 =

60 cm²
(2)

22. Draw a prime number tree for 112.

A prime factor tree breaks a number down into its prime number factors.

2 is the first prime number

Start with your number at the top. See if it can be halved. This halves into 2 and 56

56 can be halved again = 2 x 28

28 can be halved again = 2 x 14

14 = 2 x 7 both prime numbers

$112 = 2 \times 2 \times 2 \times 2 \times 7$
These are all prime numbers

(2)

23. Calculate:

a) Convert 3m^2 to cm^2

The answer is NOT 300!!

Look at a metre square with 100cm sides
 $1\text{ m}^2 = 100 \times 100\text{ cm square} = 10000\text{ cm}^2$
 $3\text{ m}^2 = 30000\text{ cm}^2$

30000 ✓

(2)

b) 1 mile = 1.6 km. How many miles is 48 km?

So $\frac{1.6\text{ kilometres}}{1\text{ kilometre}} = \frac{1\text{ mile}}{1.6\text{ miles}}$

So $48\text{ kilometres} = \frac{1 \times 48}{1.6} = \frac{48}{1.6}\text{ miles}$

30 ✓

(1)

4 8 ÷ 1 . 6 =

24. Laura recorded the types of tableware she had in her crockery business. She had 90 items.

To work out the number of degrees for one item, divide 140 by 35 = 4

Tableware	Frequency	Angle
Plates	35	140
Cups & saucers	30	120
Milk Jugs	11	44
Sugar bowls	14	56

- a) Complete the table above

This angle = 30 x 4 degrees

$$30 \times 4 =$$

This frequency = 44 ÷ 4

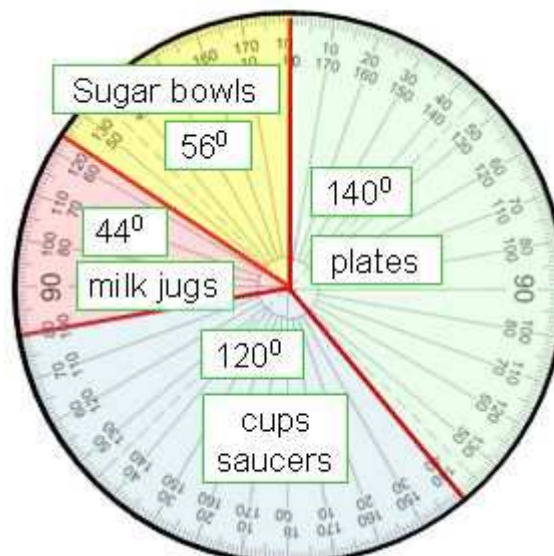
$$44 \div 4 =$$

This frequency = 14 x 4 = 56

$$14 \times 4 =$$

(2)

- b) Draw an accurate pie chart to show this information. The first one has been done for you.



(2)

TOTAL FOR PAPER: 100 MARKS
END