

Mock Set A – Paper 3

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1)

Foundation tier • Paper 3 (Calculator)

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (1 mark)

Write the number sixty thousand four hundred and eight in figures.

Sixty thousand = 60 000

Four hundred and eight = 408

$60\,000 + 408 = 60\,408$

The thousands are 60, then 4 hundreds, 0 tens and 8 ones.

Answer: 60 408

Tip: Use a 0 to hold each empty place. 6408 and 600 408 are common wrong answers.

2 (1 mark)

Work out $\frac{1}{7}$ of 91

To find $\frac{1}{7}$ of a number, divide by 7.

$91 \div 7 = 13$

Answer: 13

3 (1 mark)

Write these fractions in order of size.
Start with the smallest fraction.

$$\frac{3}{5} \quad \frac{1}{4} \quad \frac{2}{3}$$

Change each fraction to a decimal (divide the top by the bottom).

$$\frac{3}{5} = 0.6, \quad \frac{1}{4} = 0.25, \quad \frac{2}{3} = 0.666 \dots$$

Smallest to largest: 0.25, 0.6, 0.666 ...

Answer: $\frac{1}{4}, \frac{3}{5}, \frac{2}{3}$

Tip: A bigger number on the bottom does not mean a bigger fraction. Compare the values, not the denominators.

4 (1 mark)

Simplify $8c - 3c + 2c$

All the terms are c terms, so collect them.

$$8 - 3 + 2 = 7$$

$$8c - 3c + 2c = 7c$$

Answer: $7c$

Tip: Work from left to right: $8c - 3c = 5c$, then $5c + 2c = 7c$. Do not do $3c + 2c$ first.

5 (1 mark)

Write down two factors of 45

A factor of 45 divides into 45 exactly.

Factor pairs: 1×45 , 3×15 , 5×9

The factors of 45 are 1, 3, 5, 9, 15, 45. Any two of these are correct.

Answer: Any two of 1, 3, 5, 9, 15, 45, e.g. 5 and 9

Tip: Factors go *into* the number. 90 is a multiple of 45, not a factor.

6 (2 marks)

(a) Solve $4m = 52$

$4m$ means $4 \times m$, so divide both sides by 4.

$$m = 52 \div 4 = 13$$

Answer: $m = 13$

Tip: Undo $\times 4$ by $\div 4$. Taking 4 away ($m = 48$) is the most common mistake.

(b) Solve $15 - k = 6$

15 take away something leaves 6.

$$15 - 9 = 6, \text{ so } k = 9.$$

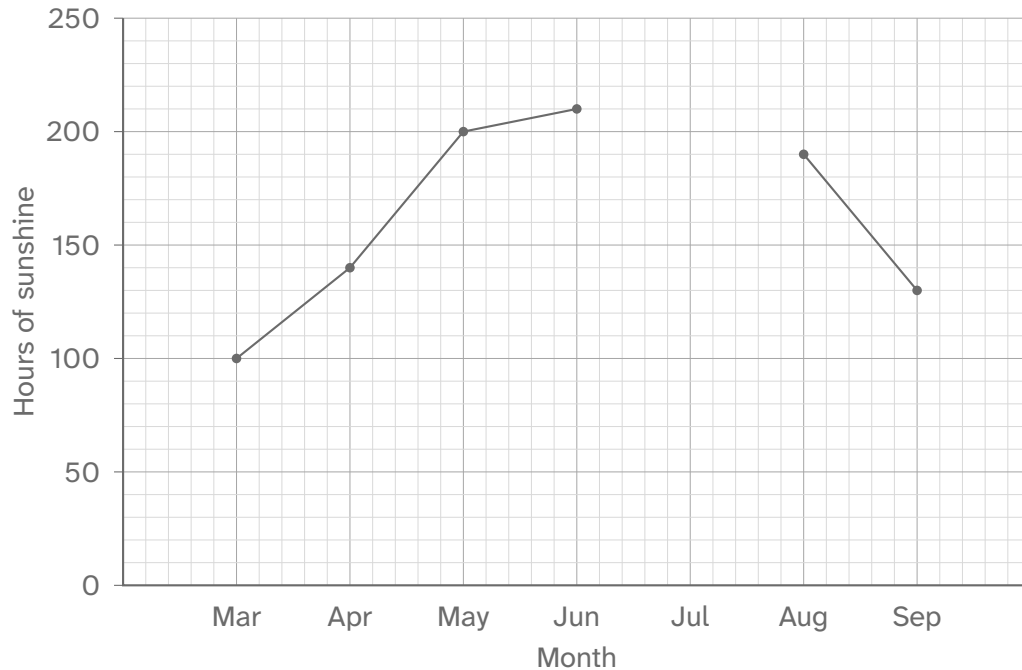
Or: add k to both sides: $15 = 6 + k$, so $k = 15 - 6 = 9$.

Answer: $k = 9$

Tip: Check by putting your answer back in: $15 - 9 = 6$. The answers 21 and -9 do not work.

7 (3 marks)

The time series graph shows the number of hours of sunshine in a town in some months of 2025.



- (a) How many hours of sunshine were there in August?

Each small square on the vertical axis is 10 hours.

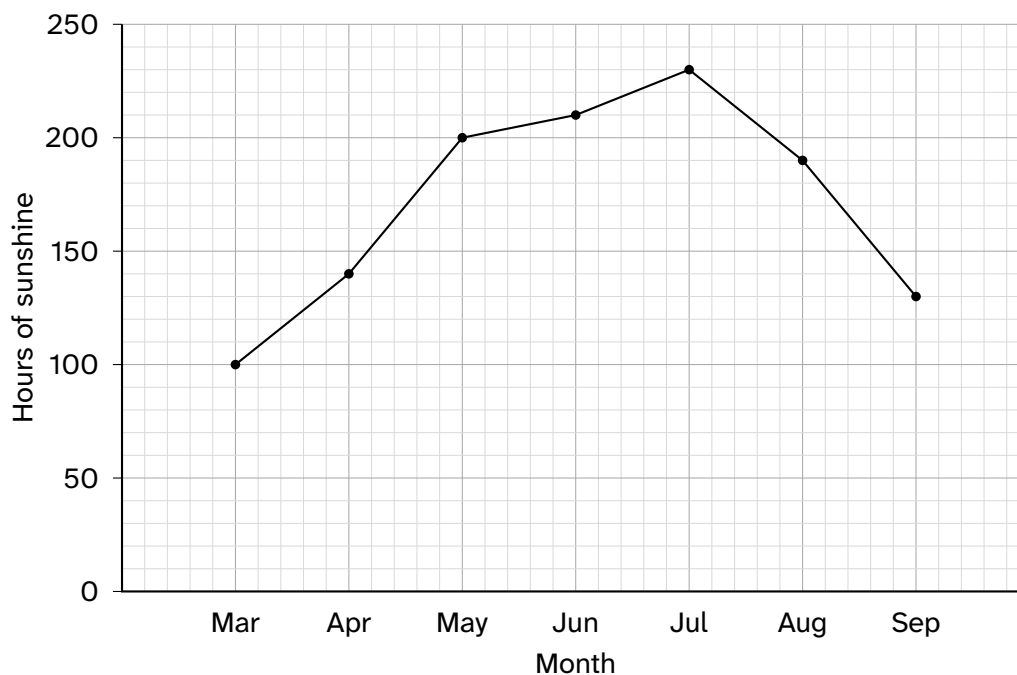
Read across from the August point: 190

Answer: 190 hours

- (b) In July there were 230 hours of sunshine.
Use this information to complete the time series graph.

Plot a point at July, 230 (three small squares above 200).

Join it to the June point and to the August point with straight lines.



Answer: Point at (July, 230), joined to June and August

- (c) Between which two months was the greatest increase in the number of hours of sunshine?

Look for the steepest line going up.

Mar to Apr: $140 - 100 = 40$

Apr to May: $200 - 140 = 60$

May to Jun: $210 - 200 = 10$

Jun to Jul: $230 - 210 = 20$

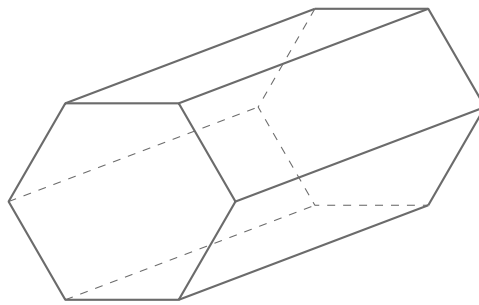
The greatest increase is 60 hours.

Answer: April and May

Tip: Give the two months. The month with the most sunshine (July) is not the answer.

8 (1 mark)

Here is a hexagonal prism.



Write down the number of edges of this hexagonal prism.

Front hexagon: 6 edges.

Back hexagon: 6 edges.

Edges joining the front to the back: 6

Total: $6 + 6 + 6 = 18$

Answer: 18

Tip: Edges are the lines where faces meet. 12 is the number of vertices (corners) and 8 is the number of faces.

9 (4 marks)

Here is part of a bus timetable from Ripon to Harrogate.

Ripon	06 50	07 25	08 00	08 30
Bishop Monkton	07 02	07 37	–	08 42
Ripley	07 14	07 49	08 15	08 54
Killinghall	07 21	07 56	08 22	09 01
Harrogate	07 35	08 12	08 36	09 16

(a) How many minutes should the 07 25 bus from Ripon take to get to Harrogate?

The 07 25 bus arrives in Harrogate at 08 12.

07 25 to 08 00 is 35 minutes.

08 00 to 08 12 is 12 minutes.

$35 + 12 = 47$ minutes

Answer: 47 minutes

Tip: Times are not ordinary numbers: $812 - 725 = 87$ is wrong because there are 60 minutes in an hour, not 100.

(b) Leah lives in Bishop Monkton.

She works in Harrogate.

Leah has to be at work by 08 50

It takes her 12 minutes to walk from the bus stop in Harrogate to work.

What is the latest bus Leah can catch from Bishop Monkton?

You must show how you get your answer.

Leah must get off the bus in Harrogate by $08\ 50 - 12\ \text{minutes} = 08\ 38$.

The 08 00 bus from Ripon arrives at 08 36, but it does **not** stop at Bishop Monkton (-).

The 08 30 bus arrives at 09 16, which is too late.

The 07 25 bus from Ripon leaves Bishop Monkton at 07 37 and arrives in Harrogate at 08 12, in time.

Answer: The 07 37 bus from Bishop Monkton

Tip: Check the bus actually stops where Leah gets on. A dash (-) in a timetable means the bus does not stop there.

Marks: 1 mark for working out 08 38 (or adding 12 minutes to arrival times). 1 mark for finding the bus that arrives at 08 12 or seeing that the 08 00 bus does not stop at Bishop Monkton. 1 mark for the 07 37 bus with working.

10 (2 marks)

Here is the menu for a meal deal at a cafe.

Wrap	Drink
Chicken (C)	Orange juice (O)
Falafel (F)	Smoothie (S)
Halloumi (H)	
Tuna (T)	

Danny buys one wrap and one drink.

Write down all the possible combinations of one wrap and one drink Danny can buy.

Take each wrap in turn and pair it with each drink.

CO, CS

FO, FS

HO, HS

TO, TS

$4 \times 2 = 8$ combinations.

Answer: CO, CS, FO, FS, HO, HS, TO, TS

Tip: Work in a system (all the C's, then all the F's, ...) so you do not miss one or write one twice.

Marks: 2 marks for all 8 combinations with no extras. 1 mark for at least 4 correct combinations.

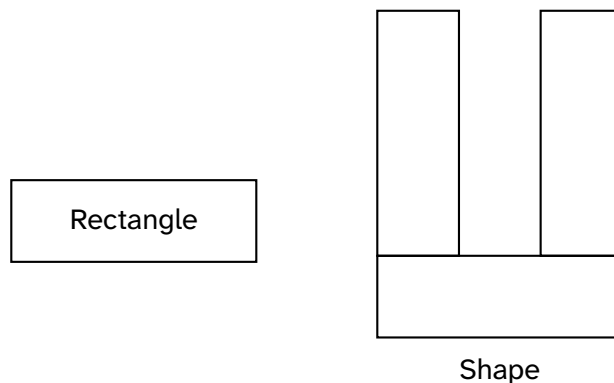
11 (3 marks)

Here is a rectangle and a shape.

The length of the rectangle is 3 times its width.

The perimeter of the rectangle is 32 cm.

Three of these rectangles are put together, without overlapping, to make the shape.



*Diagram **NOT** accurately drawn*

Work out the perimeter of the shape.

Let the width of the rectangle be w . The length is $3w$.

Perimeter of the rectangle: $w + 3w + w + 3w = 8w = 32$

$w = 32 \div 8 = 4$, so the rectangle is 4 cm by 12 cm.

The shape is 12 cm wide and $4 + 12 = 16$ cm tall.

Outside edges: $16 + 12 + 16 = 44$ cm (left, bottom, right).

Tops of the two upright rectangles: $4 + 4 = 8$ cm.

Inside the gap: $12 + 4 + 12 = 28$ cm (down, across, up). The gap is $12 - 4 - 4 = 4$ cm wide.

Perimeter = $44 + 8 + 28 = 80$ cm

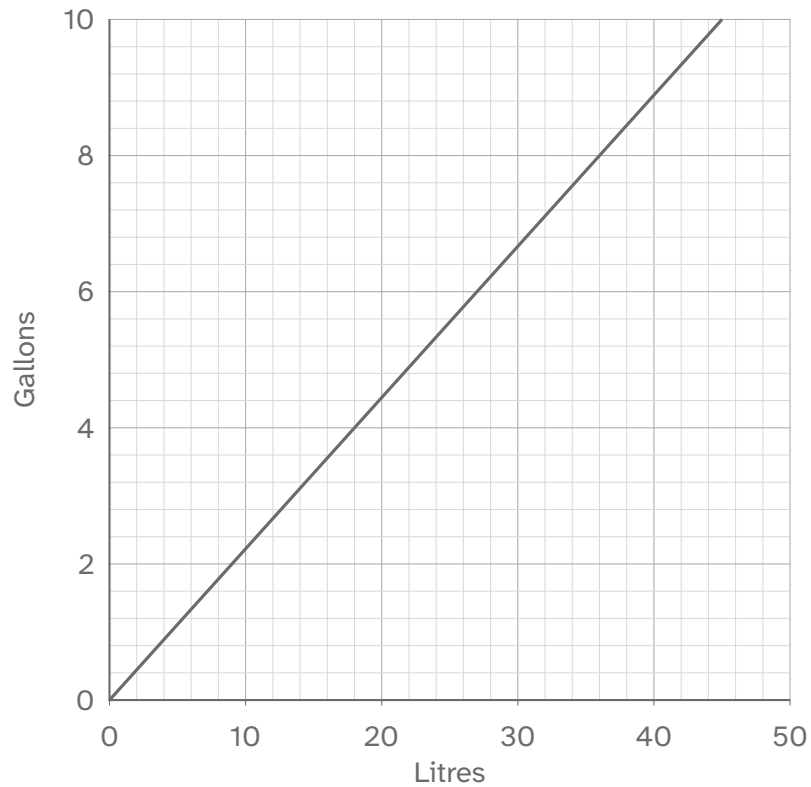
Answer: 80 cm

Tip: Only count the edges on the outside of the shape. Edges where two rectangles touch are not part of the perimeter.

Marks: 1 mark for the width 4 cm or the length 12 cm. 1 mark for a complete method for the perimeter. 1 mark for 80 cm.

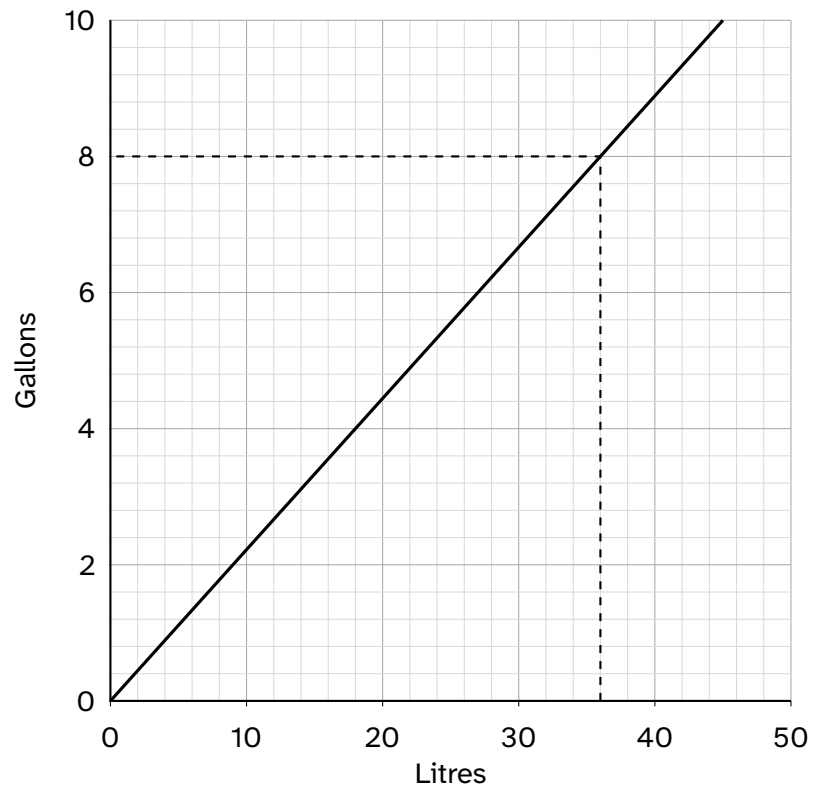
12 (3 marks)

You can use this graph to change between litres and gallons.



- (a) Change 36 litres to gallons.

Go up from 36 litres to the line, then across to the gallons axis.



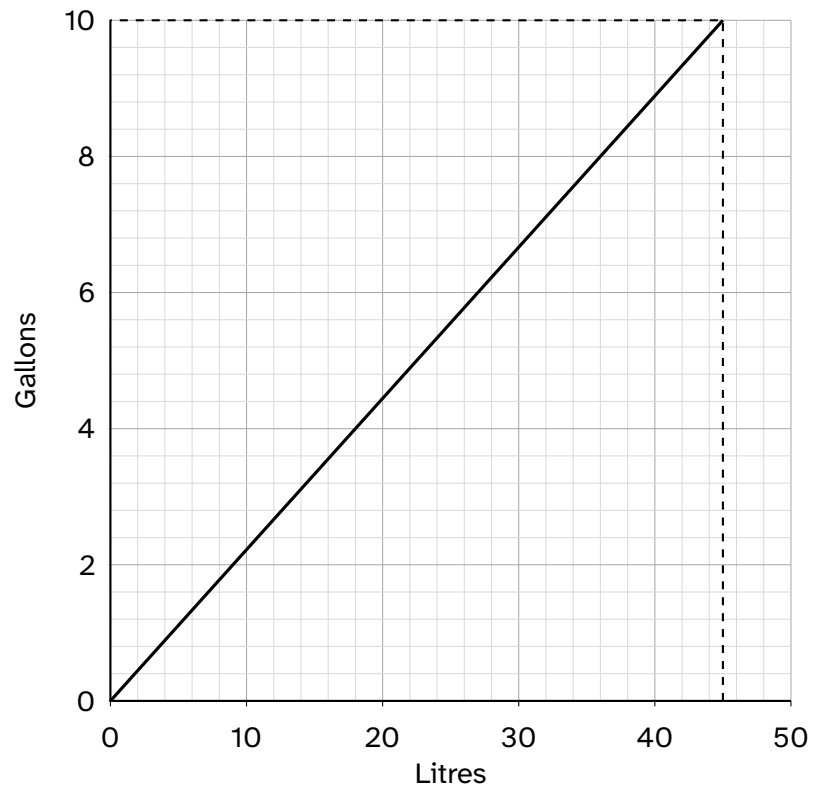
36 litres = 8 gallons

Answer: 8 gallons

- (b) The milk tank on Hannah's farm holds 630 litres of milk when it is full.
How many gallons of milk does the tank hold when it is full?

630 litres is off the graph, so use a pair of values you can read accurately.

From the graph: 45 litres = 10 gallons.



$$630 \div 45 = 14$$

$$14 \times 10 = 140 \text{ gallons}$$

Answer: 140 gallons

Tip: Choose a reading that is exactly on a grid line, like 45 litres = 10 gallons, then scale it up.

Marks: 1 mark for using a pair of values from the graph and scaling up. 1 mark for an answer from 136 to 144.

13 (3 marks)

Freya, Kwame and Imran win some money in a quiz.

They share the money in the ratio 4:3:8

Imran gets £390 more than Kwame.

How much money does Freya get?

Imran has 8 parts and Kwame has 3 parts.

Difference: $8 - 3 = 5$ parts, and 5 parts = £390

One part: $\pounds 390 \div 5 = \pounds 78$

Freya has 4 parts: $4 \times 78 = \pounds 312$

Check: Imran $8 \times 78 = \pounds 624$, Kwame $3 \times 78 = \pounds 234$, and $624 - 234 = 390$.

Answer: $\pounds 312$

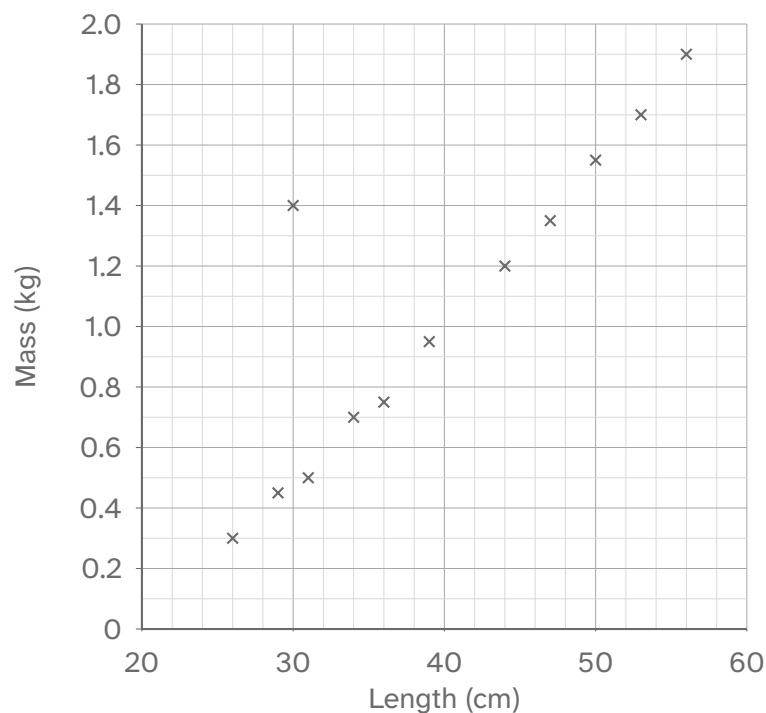
Tip: The $\pounds 390$ is the *difference* between two shares, not the total. Dividing 390 by 15 (all the parts) is the most common mistake.

Marks: 1 mark for $8 - 3 = 5$ parts (or $390 \div 5$). 1 mark for finding one part, $\pounds 78$, and multiplying by 4. 1 mark for $\pounds 312$.

14 (4 marks)

Mike went fishing.

The scatter graph shows information about the length and the mass of each of 12 fish he caught.



(a) Write down the type of correlation.

As the length increases, the mass increases.

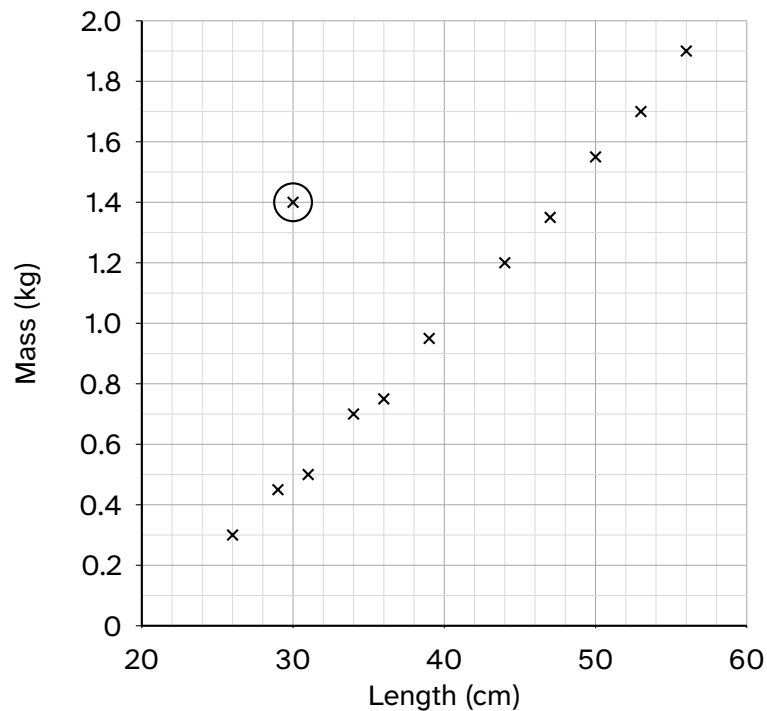
The points go upwards from left to right.

Answer: Positive (correlation)

Tip: Write “positive”, not “increasing”.

- (b) One of the points is an outlier.
Write down the length and the mass of this fish.

The outlier is the point that does not fit the pattern.



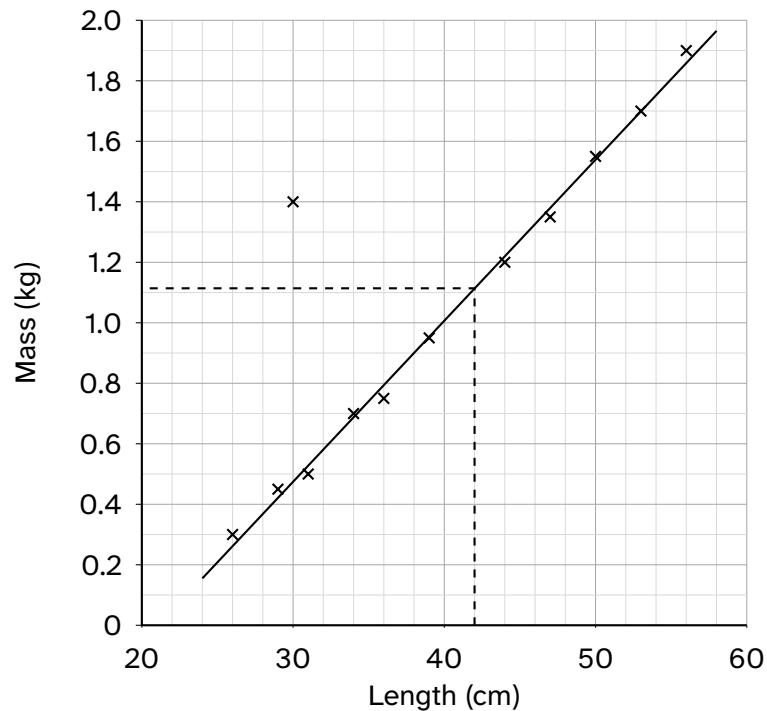
Length 30 cm, mass 1.4 kg: much heavier than other fish of about the same length.

Answer: 30 cm and 1.4 kg

- (c) Mike catches another fish.
The length of this fish is 42 cm.
Estimate the mass of this fish.

Draw a line of best fit through the middle of the points. Ignore the outlier.

Go up from 42 cm to the line, then across to the mass axis.



Mass $\approx$ 1.1 kg

Answer: About 1.1 kg (from 1.0 to 1.2)

Tip: A line of best fit is one straight ruled line through the middle of the points. Do not join the dots or start at the origin.

Marks: 1 mark for a sensible line of best fit (or a reading from one). 1 mark for an answer from 1.0 to 1.2 kg.

15 (3 marks)

The scale of a map is 1:50 000

- (a) On the map, the length of a walking route is 13.6 cm.
Work out the real length of the walking route.
Give your answer in kilometres.

1 : 50 000 means 1 cm on the map is 50 000 cm in real life.

$$13.6 \times 50\,000 = 680\,000 \text{ cm}$$

$$680\,000 \div 100 = 6800 \text{ m}$$

$$6800 \div 1000 = 6.8 \text{ km}$$

Answer: 6.8 km

Tip: 1 km = 100 000 cm. A common mistake is to divide 680 000 by 1000 only, giving 680.

Marks: 1 mark for $13.6 \times 50\,000$. 1 mark for 6.8 km.

- (b) The real distance between two car parks is 3.8 km.
Work out the distance between the car parks on the map.

$$3.8 \text{ km} = 3.8 \times 100\,000 = 380\,000 \text{ cm}$$

$$380\,000 \div 50\,000 = 7.6 \text{ cm}$$

Or: 1 cm on the map is 0.5 km, so $3.8 \div 0.5 = 7.6 \text{ cm}$.

Answer: 7.6 cm

16 (1 mark)

At 6 am, the temperature in a mountain village was -7°C .

At 2 pm, the temperature in the village was 5°C .

Work out the rise in temperature from 6 am to 2 pm.

From -7 up to 0 is 7 degrees.

From 0 up to 5 is 5 degrees.

$$\text{Rise} = 7 + 5 = 12^{\circ}\text{C}$$

Answer: 12°C

Tip: $5 - (-7) = 12$. Doing $7 - 5 = 2$ ignores the minus sign.

17 (4 marks)

Ollie wants to buy an electric bike.
The cash price of the bike is £1450
Ollie can also buy the bike on credit.

Credit terms

deposit: 15% of the cash price
then 12 monthly payments of £115

Ollie says,
“Buying the bike on credit costs more than 10% extra.”

Is Ollie correct?
You must show how you get your answer.

Deposit: 15% of £1450 = $0.15 \times 1450 = £217.50$

Monthly payments: $12 \times £115 = £1380$

Total cost on credit: $217.50 + 1380 = £1597.50$

Extra cost: $1597.50 - 1450 = £147.50$

As a percentage of the cash price: $\frac{147.50}{1450} \times 100 = 10.17 \dots \%$

10.17% is more than 10%, so Ollie is correct.

Or: 10% extra would be $1450 \times 1.1 = £1595$, and £1597.50 is more than £1595.

Answer: Yes. Credit costs £1597.50, which is 10.17% more than £1450

Tip: The deposit is part of what Ollie pays on credit. Leaving it out gives £1380, which looks cheaper than the cash price.

Marks: 1 mark for the deposit £217.50. 1 mark for the total credit price £1597.50. 1 mark for a method to compare with 10% (e.g. $147.50 \div 1450 \times 100$, or $1450 \times 1.1 = 1595$). 1 mark for Yes with correct figures.

18 (2 marks)

Write these numbers in order of size.
Start with the smallest number.

0.425 $\frac{3}{7}$ 43% 0.42

Change them all to decimals.

$$\frac{3}{7} = 3 \div 7 = 0.4285 \dots$$

$$43\% = 0.43$$

Compare: 0.42, 0.425, 0.4285 ..., 0.43

Answer: 0.42, 0.425, $\frac{3}{7}$, 43%

Tip: Write each decimal to the same number of places (0.420, 0.425, 0.429, 0.430) to compare them. 0.425 is not bigger than 0.43.

Marks: 2 marks for the correct order. 1 mark for changing them to the same form or for one error in the order.

19 (4 marks)

Amir, Bea, Cal and Dan are the 4 swimmers in a relay team.
Each swimmer swims one length of the pool.
The table shows the times, in seconds, for three of the swimmers.

Swimmer	Amir	Bea	Cal
Time (seconds)	31.6	33.1	32.9

The mean time for the 4 swimmers is 32.45 seconds.

(a) Work out Dan's time.

$$\text{Total time} = \text{mean} \times \text{number of swimmers}$$

$$\text{Total} = 32.45 \times 4 = 129.8 \text{ seconds}$$

$$\text{Amir} + \text{Bea} + \text{Cal} = 31.6 + 33.1 + 32.9 = 97.6 \text{ seconds}$$

$$\text{Dan} = 129.8 - 97.6 = 32.2 \text{ seconds}$$

Answer: 32.2 seconds

Tip: Work out the total first. Adding the three times and dividing by 4 does not use the mean.

Marks: 1 mark for 32.45×4 . 1 mark for subtracting the other three times. 1 mark for 32.2.

- (b) The coach then finds that Bea's time was written down wrongly.

Bea's correct time is 33.5 seconds.

Dan's time does not change.

What effect does this have on the mean time of the 4 swimmers?

Bea's time goes up by $33.5 - 33.1 = 0.4$ seconds, so the total goes up by 0.4.

The mean goes up by $0.4 \div 4 = 0.1$ seconds.

The new mean is 32.55 seconds.

Answer: The mean increases (by 0.1 seconds, to 32.55 seconds)

20 (3 marks)

A doorstep is a solid cuboid made of brass.

Brass has a density of 8.4 g/cm^3

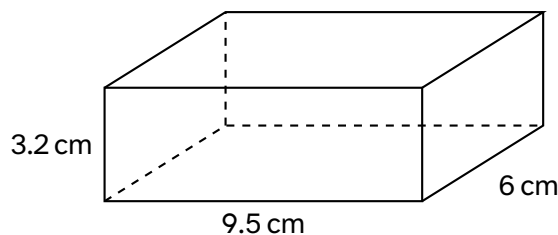


Diagram **NOT** accurately drawn

Petra says,

"The doorstep weighs less than 1.5 kg."

Is Petra correct?

You must show how you get your answer.

$$\text{Volume} = 9.5 \times 6 \times 3.2 = 182.4 \text{ cm}^3$$

$$\text{Mass} = \text{density} \times \text{volume}$$

$$\text{Mass} = 8.4 \times 182.4 = 1532.16 \text{ g}$$

$$1000 \text{ g} = 1 \text{ kg, so } 1532.16 \text{ g} = 1.53216 \text{ kg}$$

1.53216 kg is more than 1.5 kg, so Petra is **not** correct.

Answer: No. The mass is $1532.16 \text{ g} = 1.53 \text{ kg}$, which is more than 1.5 kg

Tip: Density is mass per cm^3 , so multiply. Then compare in the same units: $1.5 \text{ kg} = 1500 \text{ g}$.

Marks: 1 mark for the volume, 182.4. 1 mark for multiplying the volume by 8.4. 1 mark for No with 1.53 kg (or 1532.16 g and 1500 g).

21 (4 marks)

Here are the first five terms of an arithmetic sequence.

$$-9 \quad -5 \quad -1 \quad 3 \quad 7$$

(a) Find an expression, in terms of n , for the n th term of this sequence.

The terms go up by 4 each time, so the n th term starts $4n$.

When $n = 1$, $4n = 4$. The first term is -9 .

$$-9 - 4 = -13, \text{ so subtract } 13.$$

$$n\text{th term} = 4n - 13$$

Check: $n = 2$ gives $8 - 13 = -5$, which is the second term.

Answer: $4n - 13$

Tip: The term before the first term is $-9 - 4 = -13$, which gives the number to add.

$4n - 9$ and $4n + 13$ are common errors.

Marks: 1 mark for $4n$. 1 mark for $4n - 13$.

(b) Is 81 a term in this sequence?

You must give a reason for your answer.

$$\text{Solve } 4n - 13 = 81$$

$$4n = 94$$

$$n = 23.5$$

n must be a whole number, so 81 is not a term.

Or: the 23rd term is 79 and the 24th term is 83, so the sequence jumps over 81.

Answer: No. $4n - 13 = 81$ gives $n = 23.5$, which is not a whole number

Tip: “Odd numbers” is not a reason here: 81 is odd and so are all the terms. You need to show it is missed.

Marks: 1 mark for $4n - 13 = 81$ or finding the terms 79 and 83. 1 mark for No with a correct reason.

22 (5 marks)

$\mathcal{C} = \{\text{whole numbers from 1 to 18}\}$

$A = \{\text{multiples of 3}\}$

$B = \{\text{factors of 24}\}$

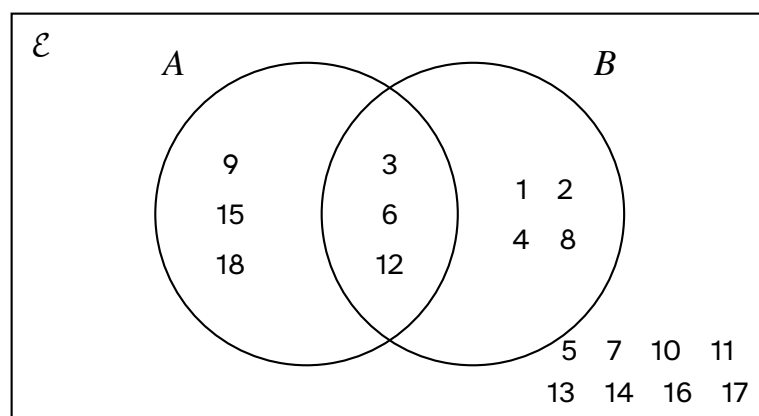
(a) Complete the Venn diagram for this information.

A (multiples of 3 up to 18): 3, 6, 9, 12, 15, 18

B (factors of 24 up to 18): 1, 2, 3, 4, 6, 8, 12

In both A and B : 3, 6, 12

Every other number from 1 to 18 goes outside the circles.



Answer: A only: 9, 15, 18; $A \cap B$: 3, 6, 12; B only: 1, 2, 4, 8; outside: 5, 7, 10, 11, 13, 14, 16, 17

Tip: Every number in $\mathcal{E}$ goes somewhere on the diagram, including the ones in neither set. Write each number only once.

Marks: 3 marks for all 18 numbers in the right places. 2 marks for at least 14 in the right places. 1 mark for 3, 6 and 12 in the overlap.

- (b) One of the numbers in $\mathcal{E}$ is chosen at random.
Find the probability that this number is in the set $A \cap B$

$A \cap B$ means in A **and** in B : the overlap.

$A \cap B = \{3, 6, 12\}$, so there are 3 numbers.

There are 18 numbers in $\mathcal{E}$.

$$P(A \cap B) = \frac{3}{18} = \frac{1}{6}$$

Answer: $\frac{3}{18} = \frac{1}{6}$

Tip: $\cap$ means “and” (the overlap). $\cup$ would mean “or”.

Marks: 1 mark for a fraction with 3 on top or 18 on the bottom. 1 mark for $3/18$ or $1/6$.

23 (5 marks)

Kofi runs a cafe.

He buys paper cups and lids for the cups.

Cups	Lids
pack of 40 cups £3.20 a pack	pack of 75 lids £4.50 a pack

Kofi has £200 to spend on cups and lids.

He wants to buy exactly the same number of cups and lids.

Work out the greatest number of cups Kofi can buy.

You must show all your working.

The number of cups must be a multiple of 40, and the number of lids a multiple of 75.

They must be equal, so look for common multiples of 40 and 75.

Multiples of 75: 75, 150, 225, 300, 375, 450, 525, 600, and $600 \div 40 = 15$, so the LCM is 600.

Or: $40 = 2^3 \times 5$, $75 = 3 \times 5^2$, so $\text{LCM} = 2^3 \times 3 \times 5^2 = 600$

600 cups and 600 lids: $600 \div 40 = 15$ packs of cups and $600 \div 75 = 8$ packs of lids.

Cost: $15 \times 3.20 + 8 \times 4.50 = 48 + 36 = \text{£}84$

The common multiples are 600, 1200, 1800, ..., costing £84, £168, £252, ...

£168 is less than £200, but £252 is more than £200.

So the greatest number is 1200 cups.

Answer: 1200 cups

Tip: The numbers of cups and lids must be equal, so they go up in steps of the LCM, 600.

Work out what each step costs, then see how many steps £200 pays for.

Marks: 1 mark for listing multiples of 40 and 75 (or prime factors). 1 mark for 600 as the LCM.

1 mark for the cost of 600 cups and 600 lids, £84. 1 mark for comparing with £200, e.g. $2 \times 84 = 168$ and $3 \times 84 = 252$. 1 mark for 1200 cups.

24 (2 marks)

Make x the subject of the formula $y = 7x - 4$

Add 4 to both sides: $y + 4 = 7x$

Divide both sides by 7: $\frac{y + 4}{7} = x$

$$x = \frac{y + 4}{7}$$

Answer: $x = \frac{y + 4}{7}$

Tip: Divide the *whole* of $y + 4$ by 7. $x = y + 4 \div 7$ is wrong unless you use a fraction line or brackets.

Marks: 1 mark for $y + 4 = 7x$. 1 mark for $x = (y + 4)/7$.

25 (4 marks)

Triangle ABC and triangle DEF are similar.

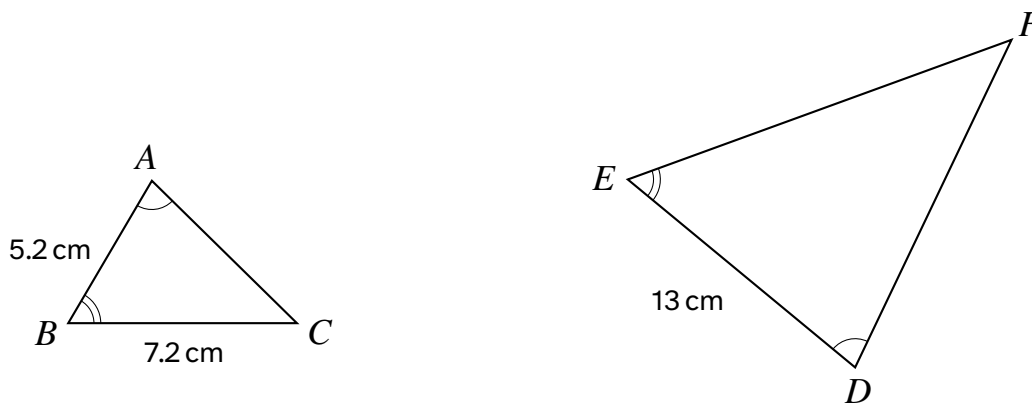


Diagram **NOT** accurately drawn

The perimeter of triangle DEF is 47 cm.

Work out the length of AC .

The angles show that A matches D and B matches E , so AB matches DE .

$$\text{Scale factor} = 13 \div 5.2 = 2.5$$

Every length in DEF is 2.5 times the matching length in ABC , so the perimeters are too.

$$\text{Perimeter of } ABC = 47 \div 2.5 = 18.8 \text{ cm}$$

$$AC = 18.8 - 5.2 - 7.2 = 6.4 \text{ cm}$$

$$\text{Or: } EF = 7.2 \times 2.5 = 18, DF = 47 - 13 - 18 = 16, AC = 16 \div 2.5 = 6.4 \text{ cm}$$

Answer: 6.4 cm

Tip: Find the scale factor from the pair of matching sides you know. The perimeters are in the same ratio, so $47 \div 2.5$ gives the perimeter of ABC .

Marks: 1 mark for the scale factor 2.5. 1 mark for $47 \div 2.5 = 18.8$ (or $EF = 18$). 1 mark for a complete method for AC . 1 mark for 6.4.

26 (3 marks)

Eleni puts £3200 into a savings account.

The account pays simple interest.

Eleni does not pay in or take out any money.

After 4 years, there is £3616 in the account.

Work out the rate of simple interest per year.

$$\text{Total interest: } £3616 - £3200 = £416$$

$$\text{Simple interest is the same each year: } £416 \div 4 = £104 \text{ per year}$$

$$\text{As a percentage of } £3200: \frac{104}{3200} \times 100 = 3.25$$

The rate is 3.25% per year.

Answer: 3.25%

Tip: Take away the starting amount first to get the interest. Then divide by the number of years, because simple interest is the same every year.

Marks: 1 mark for the interest £416 (or $3616 \div 3200$). 1 mark for a complete method. 1 mark for 3.25%.

27 (3 marks)

The diagram shows a shape.

The shape is a rectangle with a square cut out of one corner.

All measurements are in centimetres.

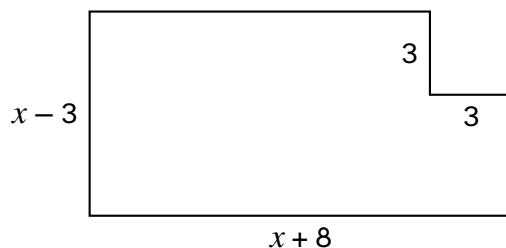


Diagram **NOT** accurately drawn

The area of the shape is $A \text{ cm}^2$

Show that $A = x^2 + 5x - 33$

Area of the whole rectangle: $(x + 8)(x - 3)$

$$(x + 8)(x - 3) = x^2 - 3x + 8x - 24 = x^2 + 5x - 24$$

Area of the square cut out: $3 \times 3 = 9$

$$A = x^2 + 5x - 24 - 9 = x^2 + 5x - 33$$

Or split the shape into two rectangles:

$$(x + 8)(x - 6) + 3(x + 5) = x^2 + 2x - 48 + 3x + 15 = x^2 + 5x - 33$$

Answer: $A = (x + 8)(x - 3) - 9 = x^2 + 5x - 24 - 9 = x^2 + 5x - 33$

Tip: In a “show that” question the answer is given, so the marks are for the working. Write the expansion out in full before you simplify.

Marks: 1 mark for $(x + 8)(x - 3)$ expanded with at least 3 of the 4 terms correct. 1 mark for taking away 9 (the square). 1 mark for showing every step to reach $x^2 + 5x - 33$.

28 (4 marks)

Josh plays a hoopla game at a fair.

He throws a ring at some prizes.

The probability that he wins a prize with a throw is 0.12

Josh has two throws.

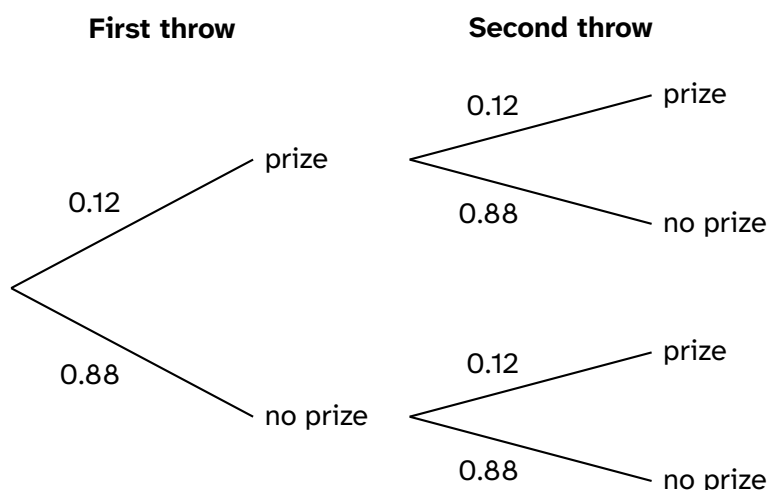
The result of his first throw does not affect the result of his second throw.

(a) Complete the probability tree diagram.

The probabilities on each pair of branches add up to 1.

$$P(\text{no prize}) = 1 - 0.12 = 0.88$$

Each throw is the same, so the second-throw branches are 0.12 and 0.88 too.



Answer: First throw: 0.88 (no prize). Second throw: 0.12 (prize), 0.88 (no prize) on both pairs

Marks: 1 mark for 0.88 on the first-throw branch. 1 mark for all four second-throw branches correct.

(b) Josh says,

“The probability that I win at least one prize with my two throws is 0.24”

Is Josh correct?

You must show how you get your answer.

“At least one prize” is every outcome except no prize with both throws.

$$P(\text{no prize, no prize}) = 0.88 \times 0.88 = 0.7744$$

$$P(\text{at least one prize}) = 1 - 0.7744 = 0.2256$$

Or add the three routes:

$$0.12 \times 0.12 + 0.12 \times 0.88 + 0.88 \times 0.12 = 0.0144 + 0.1056 + 0.1056 = 0.2256$$

0.2256 is not 0.24, so Josh is **not** correct. (He has added $0.12 + 0.12$.)

Answer: No. $P(\text{at least one prize}) = 1 - 0.88 \times 0.88 = 0.2256$, not 0.24

Tip: You cannot add the probabilities for the two throws: $0.12 + 0.12$ counts winning with both throws twice. Use $1 - P(\text{no prizes})$.

Marks: 1 mark for $1 - 0.88 \times 0.88$ (or adding the three routes with a prize). 1 mark for No with 0.2256.

29 (3 marks)

Solve the simultaneous equations

$$5x + 2y = 14$$

$$3x - 4y = 24$$

Multiply the first equation by 2: $10x + 4y = 28$

The y terms are $+4y$ and $-4y$, so add the equations.

$$(10x + 4y) + (3x - 4y) = 28 + 24$$

$$13x = 52, \text{ so } x = 4$$

Substitute into $5x + 2y = 14$: $20 + 2y = 14$

$$2y = -6, \text{ so } y = -3$$

Check: $3(4) - 4(-3) = 12 + 12 = 24$, which is correct.

Answer: $x = 4, y = -3$

Tip: Same signs subtract, different signs add. Always check your answers in the second equation.

Marks: 1 mark for a correct method to eliminate x or y . 1 mark for substituting to find the other value. 1 mark for both answers.
