

Mock Set A – Paper 1

Solutions

For AQA GCSE Mathematics (8300)

Foundation tier • Paper 1 (Non-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 (2 marks)

- (a) Write down the value of the 8 in the number 52 816

52 816 = 5 ten thousands, 2 thousands, 8 hundreds, 1 ten, 6 ones.

The 8 is in the hundreds column.

Answer: 800

- (b) Write these numbers in order of size.
Start with the smallest.

6.38 6.083 6.308 6.03

Write them all with 3 decimal places so they are easy to compare:

6.380 6.083 6.308 6.030

Compare the tenths first, then the hundredths, then the thousandths.

$6.030 < 6.083 < 6.308 < 6.380$

Answer: 6.03, 6.083, 6.308, 6.38

Tip: A number with more digits is not always bigger: 6.38 is bigger than 6.083. Fill in zeros so every number has the same number of decimal places, then compare.

2 (3 marks)

- (a) Work out $924 \div 6$

Use short division: 6 into 9 is 1 remainder 3.

6 into 32 is 5 remainder 2.

6 into 24 is 4.

$$924 \div 6 = 154$$

Answer: 154

- (b) Work out $5003 - 1467$

Set it out in columns with 5003 on top.

Units: you cannot do $3 - 7$, and the tens and hundreds are 0, so exchange from the thousands.

5003 becomes 4 thousands, 9 hundreds, 9 tens and 13 units.

$$\text{Units: } 13 - 7 = 6 \quad \text{Tens: } 9 - 6 = 3$$

$$\text{Hundreds: } 9 - 4 = 5 \quad \text{Thousands: } 4 - 1 = 3$$

$$5003 - 1467 = 3536$$

$$\text{Check: } 3536 + 1467 = 5003$$

Answer: 3536

Tip: Do not take the smaller digit from the bigger one in each column (that gives 4464). When the top digit is 0, exchange from the next column that is not 0. Check by adding.

Marks: 2 marks for 3536. 1 mark for a correct column method with one slip.

3 (3 marks)

- (a) Complete the statement: 3.5 kilograms = _____ grams

$$1 \text{ kilogram} = 1000 \text{ grams}$$

$$3.5 \times 1000 = 3500$$

Answer: 3500 grams

- (b) Imran's sponsored cycle route is 35 miles long.

Use 5 miles = 8 kilometres

Convert 35 miles to kilometres.

How many lots of 5 miles are in 35 miles? $35 \div 5 = 7$

Each 5 miles is 8 km, so multiply by 7.

$$7 \times 8 = 56$$

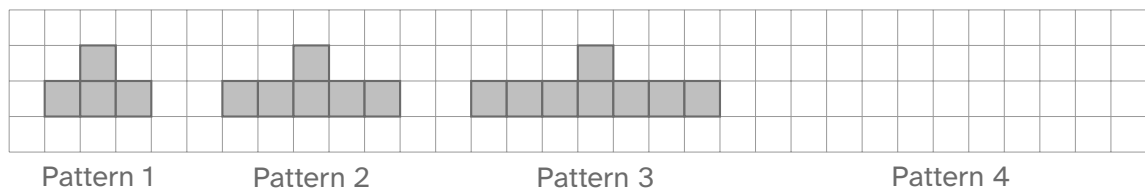
Answer: 56 km

Tip: Do not stop at $35 \div 5 = 7$. That tells you how many lots of 8 km there are, so you still need to multiply by 8.

Marks: 1 mark for $35 \div 5 = 7$ (or 1 mile = 1.6 km). 1 mark for 56.

4 (2 marks)

Here are the first three patterns in a sequence of patterns made from squares.



- (a) Draw Pattern 4 on the grid.

Each pattern has one more square at each end of the bottom row.

Pattern 4 has a bottom row of 9 squares with one square on top of the middle square.



Answer: A row of 9 squares with 1 square on top of the middle one

- (b) How many squares are in Pattern 8?

Count the squares: 4, 6, 8, 10, ...

Each pattern has 2 more squares than the one before.

Pattern 5: 12 Pattern 6: 14 Pattern 7: 16 Pattern 8: 18

Answer: 18

Tip: Pattern 8 is not double Pattern 4 ($2 \times 10 = 20$). Keep adding 2 until you reach Pattern 8.

5 (2 marks)

In a quiz game, six numbered balls are taken from a bag.



- (a) Write down the number that is a factor of 96

$96 \div 48 = 2$ exactly, so 48 is a factor of 96.

None of the other numbers divide into 96 exactly.

Answer: 48

- (b) Write down the number that is a prime number.

A prime number has exactly two factors: 1 and itself.

$14 = 2 \times 7$, $27 = 3 \times 9$, $35 = 5 \times 7$, $48 = 6 \times 8$, $51 = 3 \times 17$

23 has only the factors 1 and 23.

Answer: 23

Tip: 51 looks prime but it is 3×17 . Its digits add up to 6, so it divides by 3.

6 (3 marks)

The pictogram shows the number of books borrowed from a school library on four days.

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Key:  represents 4 books

60 books were borrowed altogether from Monday to Friday.

Complete the pictogram for Friday.

Each circle is 4 books, so a half circle is 2 books and a quarter circle is 1 book.

Monday: $3 \times 4 = 12$ Tuesday: $4 + 4 + 2 = 10$

Wednesday: $4 \times 4 + 1 = 17$ Thursday: $4 + 3 = 7$

Monday to Thursday: $12 + 10 + 17 + 7 = 46$

Friday: $60 - 46 = 14$

$14 \div 4 = 3.5$, so draw 3 whole circles and a half circle.

Monday	● ● ●
Tuesday	● ● ◐
Wednesday	● ● ● ● ◐
Thursday	● ◐
Friday	● ● ● ◐

Key: ● represents 4 books

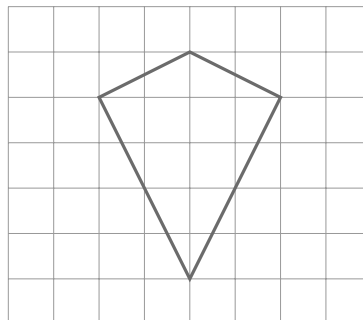
Answer: 3 whole circles and a half circle for Friday

Tip: A quarter circle is 1 book, so Wednesday is 17, not 16.5. Write the number of books next to each day before you add them up and subtract from 60.

Marks: 1 mark for reading at least two of the days correctly (12, 10, 17, 7). 1 mark for working out 14 books on Friday. 1 mark for drawing $3\frac{1}{2}$ circles.

7 (1 mark)

Here is a shape drawn on a square grid.



How many lines of symmetry does the shape have?

The shape is a kite: two pairs of equal sides next to each other.

The only line of symmetry is the vertical line through the top and bottom corners.

A line across the middle does not work: the top part is smaller than the bottom part.

Answer: 1

Tip: Imagine folding along the line: the two halves must match exactly. A kite has one line of symmetry.

8 (4 marks)

Here are the prices at a climbing centre.

Peak Wall Climbing Centre	
Adult ticket	£12.80
Child ticket	£8.50

VOUCHER
£5 off the total cost when you spend £40 or more

A family of 2 adults and 3 children go climbing.

They use the voucher and pay with a £50 note.

How much change should they get?

Adults: $2 \times £12.80 = £25.60$

Children: $3 \times £8.50 = £25.50$

Total: $£25.60 + £25.50 = £51.10$

This is more than £40, so they can use the voucher.

With the voucher: $£51.10 - £5 = £46.10$

Change: $£50 - £46.10 = £3.90$

Answer: £3.90

Tip: Write money answers with two decimal places: £3.90, not £3.9. Check you have used both the voucher and the £50 note.

Marks: 1 mark for the cost of the adults or the children. 1 mark for the total of £51.10. 1 mark for taking off £5 and subtracting from £50. 1 mark for £3.90.

9 (3 marks)

- (a) What percentage of the grid is shaded?

9 of the 20 squares are shaded: $\frac{9}{20}$

Multiply top and bottom by 5 to make the bottom 100:

$$\frac{9}{20} = \frac{45}{100} = 45\%$$

Answer: 45%

- (b) Work out 15% of 340

$$10\% \text{ of } 340 = 340 \div 10 = 34$$

$$5\% \text{ of } 340 = 34 \div 2 = 17$$

$$15\% = 10\% + 5\% = 34 + 17 = 51$$

Answer: 51

Tip: Build up from 10%: halve it to get 5%, then add. 15% is not $340 \div 15$.

Marks: 1 mark for finding 10% (34) and 5% (17), or another correct method. 1 mark for 51.

10 (3 marks)

- (a) Leon simplifies $5p \times 2q$

Here is his answer.

$$5p \times 2q = 7pq$$

What mistake has Leon made?

$5p \times 2q$ means $5 \times p \times 2 \times q$.

Multiply the numbers: $5 \times 2 = 10$, then the letters: $p \times q = pq$

So $5p \times 2q = 10pq$.

Leon **added** the 5 and the 2 instead of multiplying them.

Answer: He added 5 and 2 instead of multiplying them (the answer should be $10pq$)

Tip: In a “what mistake” question, say exactly what was done wrong. Here: the numbers were added, not multiplied. Giving the correct answer $10pq$ helps.

(b) Expand and simplify $3(2x + 5) - 4x$

Multiply both terms in the bracket by 3:

$$3(2x + 5) = 6x + 15$$

$$6x + 15 - 4x$$

Collect the x terms: $6x - 4x = 2x$

$$2x + 15$$

Answer: $2x + 15$

Tip: Multiply the 5 by 3 as well. $3(2x + 5) = 6x + 5$ is a common mistake.

Marks: 1 mark for expanding the bracket to $6x + 15$. 1 mark for $2x + 15$.

11 (2 marks)

Two youth clubs record how their members travel to the club.

At Northfield Youth Club, $\frac{5}{8}$ of the members walk there.

At Riverside Youth Club, $\frac{3}{5}$ of the members walk there.

Which club has the greater proportion of members who walk there?

You must show your working.

Tick a box.

Write both fractions with the same denominator. The LCM of 8 and 5 is 40.

$$\frac{5}{8} = \frac{25}{40} \quad \frac{3}{5} = \frac{24}{40}$$

$\frac{25}{40}$ is bigger than $\frac{24}{40}$

Or as decimals: $\frac{5}{8} = 0.625$ and $\frac{3}{5} = 0.6$

Answer: Northfield, because $\frac{5}{8} = \frac{25}{40}$ and $\frac{3}{5} = \frac{24}{40}$

Tip: Do not just compare the denominators. A bigger denominator means smaller pieces, so you must change to a common denominator, decimals or percentages.

Marks: 1 mark for writing both fractions in a form you can compare (e.g. $\frac{25}{40}$ and $\frac{24}{40}$, or 0.625 and 0.6). 1 mark for Northfield.

12 (3 marks)

In a board game, a bag contains only red, blue and yellow counters. The table shows the number of counters of each colour.

Colour	Red	Blue	Yellow
Number of counters	9	6	5

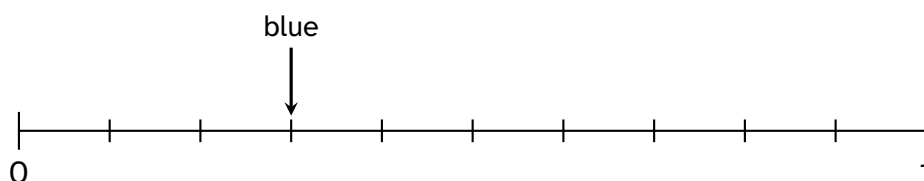
A counter is taken at random from the bag.

- (a) On the probability scale, mark with an arrow the probability that the counter is blue.

Total number of counters: $9 + 6 + 5 = 20$

$$P(\text{blue}) = \frac{6}{20} = \frac{3}{10} = 0.3$$

Each small mark on the scale is 0.1, so the arrow goes at the third mark.



Answer: Arrow at 0.3

- (b) Some of the red counters are taken out of the bag and the same number of yellow counters are put in. A red counter and a yellow counter are now equally likely to be taken. How many red counters were taken out?

The probabilities are the same, so there must now be the same number of red and yellow counters.

Swapping a red counter for a yellow one does not change the total of red and yellow counters: $9 + 5 = 14$

So there are now $14 \div 2 = 7$ red counters and 7 yellow counters.

There were 9 red counters, so $9 - 7 = 2$ were taken out.

Check: red $9 - 2 = 7$, yellow $5 + 2 = 7$ ✓

Answer: 2

Tip: Do not just find the difference $9 - 5 = 4$: taking out 4 red and adding 4 yellow gives 5 red and 9 yellow, which is the wrong way round. Each swap changes both colours by 1.

Marks: 1 mark for seeing there must now be 7 red and 7 yellow counters. 1 mark for 2.

13 (3 marks)

n is a positive whole number.

For each statement, tick **one** box.

	Always true	Sometimes true	Never true
$2n + 1$ is an odd number	✓		
$5n$ ends in the digit 5		✓	
$4n + 2$ is a multiple of 4			✓

Try some values of n : $n = 1, 2, 3, \dots$

$2n$ is always even, so $2n + 1$ is always odd. **Always true**

$n = 1$: $5n = 5$ (ends in 5). $n = 2$: $5n = 10$ (ends in 0). **Sometimes true**

$4n$ is a multiple of 4, so $4n + 2$ is always 2 more than a multiple of 4. e.g. 6, 10, 14, ...

Never true

Answer: Always true; Sometimes true; Never true

Tip: Test several values of n , including odd and even ones. One example is not enough to say “always”.

Marks: 1 mark for each correct row.

14 (3 marks)

Grace and Owen share a raffle prize in the ratio Grace : Owen = 2:7

Owen gets £75 more than Grace.

How much was the raffle prize?

Owen has 7 parts and Grace has 2 parts, so Owen has $7 - 2 = 5$ more parts.

These 5 parts are worth £75.

One part: $£75 \div 5 = £15$

The prize is $2 + 7 = 9$ parts: $9 \times £15 = £135$

Check: Grace $2 \times 15 = £30$, Owen $7 \times 15 = £105$, and $105 - 30 = 75$ ✓

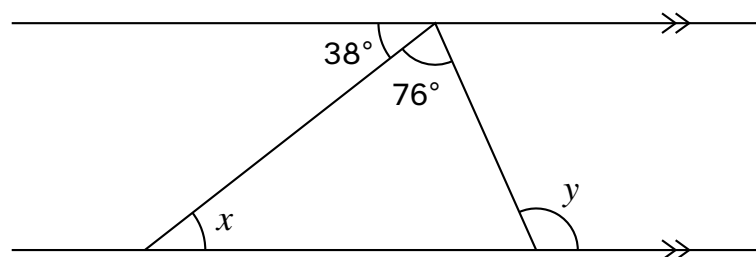
Answer: £135

Tip: The £75 is the **difference**, so it matches the difference in parts ($7 - 2 = 5$), not the 9 parts in total. Check that your two shares really are £75 apart.

Marks: 1 mark for $75 \div 5 = 15$ (the value of one part). 1 mark for 9×15 (or both shares, 30 and 105). 1 mark for £135.

15 (3 marks)

The diagram shows two parallel lines and a triangle.



Not drawn accurately

Is y three times x ?

Tick a box.

Show working to support your answer.

x and the 38° angle are alternate angles, so $x = 38^\circ$.

Angles in a triangle add up to 180° :

angle inside the triangle at the bottom right = $180 - 38 - 76 = 66^\circ$

Angles on a straight line add up to 180° : $y = 180 - 66 = 114^\circ$

$$3 \times 38 = 114$$

So y is three times x .

Answer: Yes: $x = 38^\circ$ and $y = 114^\circ = 3 \times 38^\circ$

Tip: Look for a Z shape to spot alternate angles. You do not need to measure: the diagram is not drawn accurately.

Marks: 1 mark for $x = 38^\circ$. 1 mark for $y = 114^\circ$. 1 mark for Yes with both angles found.

16 (3 marks)

Solve $5(x - 4) = 2x + 13$

Expand the bracket: $5x - 20 = 2x + 13$

Subtract $2x$ from both sides: $3x - 20 = 13$

Add 20 to both sides: $3x = 33$

Divide both sides by 3: $x = 11$

Check: $5(11 - 4) = 35$ and $2 \times 11 + 13 = 35$ ✓

Answer: $x = 11$

Tip: When you move a term to the other side, do the opposite operation: -20 becomes $+20$.
Check by putting your answer back into both sides.

Marks: 1 mark for expanding to $5x - 20$. 1 mark for collecting terms, e.g. $3x = 33$. 1 mark for $x = 11$.

17 (2 marks)

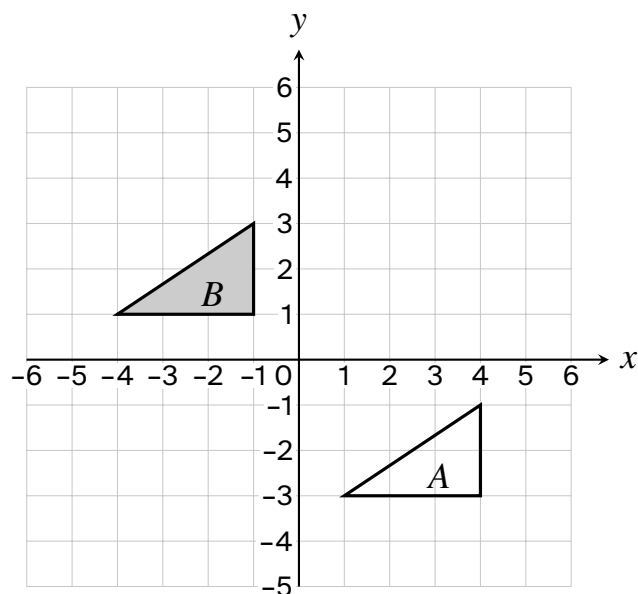
Triangle A is drawn on the grid.

Translate triangle A by the vector $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$

The top number is the move across: -5 means 5 squares to the **left**.

The bottom number is the move up or down: 4 means 4 squares **up**.

Move each corner: $(1, -3) \rightarrow (-4, 1)$, $(4, -3) \rightarrow (-1, 1)$, $(4, -1) \rightarrow (-1, 3)$



Answer: Triangle with vertices $(-4, 1)$, $(-1, 1)$ and $(-1, 3)$

Tip: Move each corner separately and count squares carefully. Keep the shape the same size and the same way round.

Marks: 2 marks for the triangle in the correct place. 1 mark for the correct move left or the correct move up.

18 (4 marks)

- (a) Round each number to 1 significant figure to work out an estimate for $\frac{83 \times 4.12}{0.37}$

$$83 \approx 80, \quad 4.12 \approx 4, \quad 0.37 \approx 0.4$$

$$\text{Top: } 80 \times 4 = 320$$

$$320 \div 0.4: \text{ multiply both by 10 to get } 3200 \div 4$$

$$3200 \div 4 = 800$$

Answer: 800

Tip: To divide by a decimal, multiply both numbers by 10 first: $320 \div 0.4 = 3200 \div 4$.
Dividing by a number less than 1 makes the answer bigger.

Marks: 1 mark for 80, 4 and 0.4. 1 mark for $320 \div 0.4$ (or $3200 \div 4$). 1 mark for 800.

(b) Is your answer to part (a) an underestimate or an overestimate?

Tick a box.

Give a reason for your answer.

83 and 4.12 were both rounded **down**, so the top of the fraction is smaller than it should be.

0.37 was rounded **up**, so we divided by a bigger number, which gives a smaller answer.

Both changes make the answer smaller: it is an underestimate.

Answer: Underestimate: the numbers on the top were rounded down and the number on the bottom was rounded up

Tip: Rounding the bottom of a fraction **up** makes the answer **smaller**. Mention the top and the bottom in your reason.

19 (3 marks)

Here are five number cards.



Dev takes away one of the cards.

He puts a card with the number 22 in its place.

The mean of the five numbers increases by 2

Which card did Dev take away?

You must show your working.

Total of the five numbers at the start: $7 + 12 + 9 + 3 + 14 = 45$

Mean at the start: $45 \div 5 = 9$

New mean: $9 + 2 = 11$

New total: $5 \times 11 = 55$

The total has gone up by $55 - 45 = 10$

The 22 card is 10 more than the card taken away: $22 - 10 = 12$

Check: $7 + 22 + 9 + 3 + 14 = 55$ and $55 \div 5 = 11$ ✓

Answer: 12

Tip: Work with totals: total = mean $\times$ how many numbers. There are still five cards, so a mean that is 2 more means a total that is $5 \times 2 = 10$ more.

Marks: 1 mark for the total (45) or the mean (9) at the start. 1 mark for the new total (55), or for seeing that the total goes up by 10. 1 mark for 12.

20 (5 marks)

Martha hires a canal boat. She travels from the marina to a village 14 km along the canal and back. The boat travels at an average speed of 6 km/h. She leaves at 10:15 am and stops at the village for 1 hour 20 minutes. The boat must be back by 4 pm. Will she get back in time?

Total distance: there and back is $2 \times 14 = 28$ km.

Time travelling: $28 \div 6 = 4$ remainder 4, so $4\frac{4}{6} = 4\frac{2}{3}$ hours.

$\frac{2}{3}$ of an hour = $\frac{2}{3} \times 60 = 40$ minutes, so the travelling takes 4 hours 40 minutes.

Add the stop: 4 hours 40 minutes + 1 hour 20 minutes = 6 hours.

She gets back at 10:15 am + 6 hours = 4:15 pm.

This is 15 minutes after 4 pm, so the answer is **No**.

Another way: from 10:15 am to 4 pm is 5 hours 45 minutes. Take off the 1 hour 20 minute stop: 4 hours 25 minutes = 265 minutes for travelling. In 265 minutes the boat goes $6 \times 265 \div 60 = 26.5$ km, which is less than 28 km.

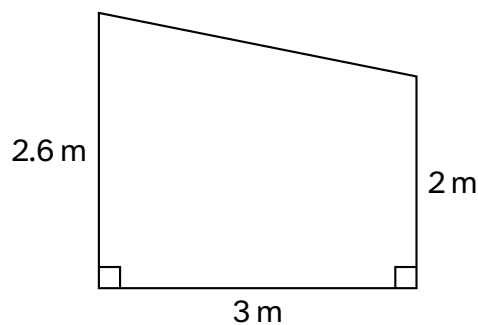
Answer: No: she gets back at 4:15 pm (travelling takes 4 hours 40 minutes, plus the 1 hour 20 minute stop)

Tip: Read the question again before you finish: the boat goes there **and back**, so the distance is 28 km, not 14 km. $4\frac{2}{3}$ hours is 4 hours 40 minutes, not 4 hours 67 minutes or 4.6 hours.

Marks: 1 mark for the total distance of 28 km (or the time for one way, 2 hours 20 minutes). 1 mark for the travelling time, 4 hours 40 minutes (280 minutes). 1 mark for adding the stop (6 hours). 1 mark for working out the time she gets back (4:15 pm) or comparing with the 5 hours 45 minutes available. 1 mark for No with correct values.

21 (3 marks)

The diagram shows the end wall of a shed.



Not drawn accurately

Work out the area of the wall.

Split the wall into a rectangle and a right-angled triangle on top.

Rectangle: $3 \times 2 = 6 \text{ m}^2$

Height of the triangle: $2.6 - 2 = 0.6 \text{ m}$

Triangle: $\frac{1}{2} \times 3 \times 0.6 = 0.9 \text{ m}^2$

Total area: $6 + 0.9 = 6.9 \text{ m}^2$

Answer: 6.9 m^2

Tip: The height of the triangle is $2.6 - 2 = 0.6 \text{ m}$, not 2.6 m . Remember the $\frac{1}{2}$ in the triangle area. You could also use the trapezium formula.

Marks: 1 mark for the rectangle area (6). 1 mark for the triangle area (0.9). 1 mark for 6.9.

22 (3 marks)

Work out $3\frac{5}{6} + 1\frac{3}{4}$

Give your answer as a mixed number.

Add the whole numbers: $3 + 1 = 4$

Add the fractions using a common denominator of 12:

$$\frac{5}{6} = \frac{10}{12} \quad \frac{3}{4} = \frac{9}{12}$$

$$\frac{10}{12} + \frac{9}{12} = \frac{19}{12} = 1\frac{7}{12}$$

$$4 + 1\frac{7}{12} = 5\frac{7}{12}$$

Answer: $5\frac{7}{12}$

Tip: $\frac{19}{12}$ is more than 1, so carry 1 into the whole numbers. Do not add the denominators.

Marks: 1 mark for changing to a common denominator (12). 1 mark for $\frac{67}{12}$ or $4 + \frac{19}{12}$. 1 mark for $5\frac{7}{12}$.

23 (4 marks)

(a) On the grid, draw the graph of $y = 4 - 3x$ for values of x from -1 to 3

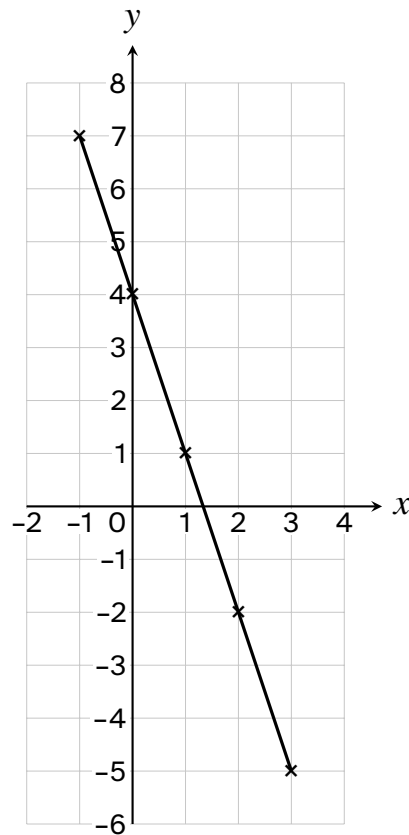
Make a table of values:

$$x = -1: y = 4 - 3 \times (-1) = 4 + 3 = 7$$

$$x = 0: y = 4 \quad x = 1: y = 1$$

$$x = 2: y = -2 \quad x = 3: y = -5$$

Plot $(-1, 7)$, $(0, 4)$, $(1, 1)$, $(2, -2)$, $(3, -5)$ and join them with a ruler.



Answer: Straight line from $(-1, 7)$ to $(3, -5)$

Tip: Take care with $x = -1$: $-3 \times -1 = +3$, so $y = 7$. If your points are not in a straight line, check them again.

Marks: 3 marks for a correct straight line from $x = -1$ to $x = 3$. 2 marks for at least 3 correct points. 1 mark for 2 correct points (or 2 correct values in a table).

- (b) The point $(k, -11)$ is on the line $y = 4 - 3x$
Work out the value of k .

Put $y = -11$ into the equation: $-11 = 4 - 3k$

Add $3k$ to both sides: $3k - 11 = 4$

Add 11: $3k = 15$

$k = 5$

Check: $4 - 3 \times 5 = 4 - 15 = -11$ ✓

Answer: $k = 5$

Tip: The point is off the grid, so use the equation, or carry on the pattern: y goes down by 3 each time x goes up by 1.

24 (2 marks)

Work out the value of $\frac{5^3 \times 5^4}{5^9}$. Give your answer as a fraction.

When multiplying powers of the same number, add the powers: $5^3 \times 5^4 = 5^7$

When dividing, subtract the powers: $5^7 \div 5^9 = 5^{-2}$

$$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$$

$$\text{Or: } \frac{5^7}{5^9} = \frac{5^7}{5^7 \times 5^2} = \frac{1}{5^2}$$

Answer: $\frac{1}{25}$

Tip: The top is a smaller power than the bottom, so the answer is less than 1. 5^{-2} means $\frac{1}{5^2}$; it is not -25 or -10 .

Marks: 1 mark for 5^7 or 5^{-2} (or $\frac{1}{5^2}$). 1 mark for $\frac{1}{25}$.

25 (1 mark)

Circle the value of $\tan 45^\circ$

Options: 0, $\frac{1}{2}$, 1, 45

In a right-angled triangle with a 45° angle, the opposite and adjacent sides are equal.

$$\tan 45^\circ = \frac{\text{opposite}}{\text{adjacent}} = 1$$

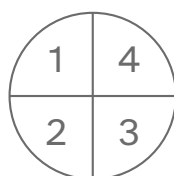
Answer: 1

Tip: Learn the exact values: $\tan 0^\circ = 0$, $\tan 30^\circ = \frac{\sqrt{3}}{3}$, $\tan 45^\circ = 1$, $\tan 60^\circ = \sqrt{3}$.

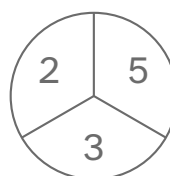
26 (4 marks)

Here are two fair spinners.

The number on Spinner A is multiplied by the number on Spinner B to get a score.



Spinner A



Spinner B

		Spinner A			
Spinner B	×	1	2	3	4
	2	2		6	
	3		6		12
	5	5			20

- (a) Complete the table to show all the possible scores.

Multiply the number on Spinner A by the number on Spinner B.

e.g. $2 \times 2 = 4$, $2 \times 4 = 8$, $3 \times 1 = 3$, $3 \times 3 = 9$, $5 \times 2 = 10$, $5 \times 3 = 15$

		Spinner A			
Spinner B	×	1	2	3	4
	2	2	4	6	8
	3	3	6	9	12
	5	5	10	15	20

Answer: Missing values: 4, 8, 3, 9, 10, 15

Marks: 2 marks for all six missing values correct. 1 mark for at least four correct.

- (b) Hana wins if the score is odd. Tom wins if the score is an even number greater than 6. Hana says she is more likely to win than Tom, because there are more odd numbers than even numbers on the spinners. Is Hana correct?

There are $4 \times 3 = 12$ equally likely scores in the table.

Odd scores (Hana wins): 3, 9, 5, 15 $\rightarrow$ 4 scores, so $P(\text{Hana}) = \frac{4}{12}$

Even scores greater than 6 (Tom wins): 8, 12, 10, 20 $\rightarrow$ 4 scores, so $P(\text{Tom}) = \frac{4}{12}$

They are equally likely to win, so Hana is **not** correct.

(The score is odd only when **both** numbers are odd, so having more odd numbers on the spinners does not give more odd scores.)

Answer: No: $P(\text{Hana wins}) = \frac{4}{12}$ and $P(\text{Tom wins}) = \frac{4}{12}$, so they are equally likely to win

Tip: Use the completed table, not the numbers on the spinners. Count both players' winning scores. "Greater than 6" does not include 6 itself.

Marks: 1 mark for counting the odd scores (4) or the even scores greater than 6 (4). 1 mark for No with both counts or both probabilities.

27 (3 marks)

- (a) Write 4.06×10^{-3} as an ordinary number.

10^{-3} means divide by 1000.

Move the digits 3 places to the right: $4.06 \rightarrow 0.00406$

Answer: 0.00406

- (b) Each bead has a mass of 8×10^{-2} grams. A tub contains 7×10^3 beads. Work out the total mass of the beads in a tub, in standard form.

Total mass = number of beads $\times$ mass of one bead

$$(7 \times 10^3) \times (8 \times 10^{-2})$$

Multiply the numbers: $7 \times 8 = 56$

Add the powers of 10: $10^3 \times 10^{-2} = 10^{3+(-2)} = 10^1$

56×10^1 is not in standard form because 56 is bigger than 10.

$56 = 5.6 \times 10$, so $56 \times 10^1 = 5.6 \times 10^2$ grams (560 grams)

Answer: 5.6×10^2 grams

Tip: Multiply, because every bead adds the same mass. When you multiply powers of 10, add the powers: $3 + (-2) = 1$. The first number in standard form must be at least 1 and less than 10.

Marks: 1 mark for 56×10^1 or 560 (or any answer of the form 5.6×10^k). 1 mark for 5.6×10^2 .

28 (3 marks)

- (a) Factorise $x^2 + 3x - 28$

Find two numbers that multiply to -28 and add to $+3$.

Factor pairs of 28: 1 and 28, 2 and 14, 4 and 7

$+7$ and -4 : $7 \times (-4) = -28$ and $7 + (-4) = 3$

$$(x + 7)(x - 4)$$

Answer: $(x + 7)(x - 4)$

Tip: Expand your brackets to check. $(x - 7)(x + 4)$ gives $-3x$, not $+3x$.

Marks: 2 marks for $(x + 7)(x - 4)$. 1 mark for brackets that give either the -28 or the $+3x$ correctly.

(b) Hence, solve $x^2 + 3x - 28 = 0$

$$(x + 7)(x - 4) = 0$$

One of the brackets must be zero:

$$x + 7 = 0 \text{ gives } x = -7$$

$$x - 4 = 0 \text{ gives } x = 4$$

Answer: $x = -7$ or $x = 4$

Tip: Change the signs: $(x + 7) = 0$ gives $x = -7$, not $x = 7$. Give both solutions.
