

Percentage Change

Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

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 farmer has 48 sheep and 12 goats.

What percentage of the animals are goats?

Total number of animals: $48 + 12 = 60$

Goats as a fraction of all the animals: $\frac{12}{60}$

Change to a percentage: $\frac{12}{60} \times 100 = 20$

Answer: 20%

Tip: Divide by the **total** number of animals (60), not by the number of sheep (48).

Marks: 1 mark for $\frac{12}{60}$. 1 mark for 20.

2 (1 mark)

Which percentage is closest in value to $\frac{1}{6}$?

Circle your answer.

Options: 6%, 16%, 17%, 60%

$\frac{1}{6} = 1 \div 6 = 0.1666 \dots$

$0.1666 \dots \times 100 = 16.66 \dots \%$

16.66 ... % is closer to 17% than to 16%.

Answer: 17%

Tip: $\frac{1}{6}$ is not 6% or 16%. Divide the top by the bottom, then multiply by 100.

3 (1 mark)

From 2023 to 2024, the number of members of a running club **trebled**.
Write down the percentage increase in the number of members.

Try a number. Suppose there were 100 members in 2023.

Trebled: $3 \times 100 = 300$ members in 2024.

Increase: $300 - 100 = 200$ members

$$\frac{200}{100} \times 100 = 200\%$$

Answer: 200%

Tip: Trebling is a 200% increase, not 300%. The new amount is 300% **of** the old amount, but the increase is only 200%.

4 (3 marks)

Work out the percentage increase from 60 to 195

$$\text{Percentage increase} = \frac{\text{increase}}{\text{original}} \times 100$$

Increase: $195 - 60 = 135$

$$\frac{135}{60} \times 100 = 225$$

Answer: 225%

Tip: Divide the **increase** by the original. $\frac{195}{60} \times 100 = 325\%$ gives 195 as a percentage of 60, which is not the increase.

Marks: 1 mark for 135. 1 mark for $\frac{135}{60}$. 1 mark for 225.

5 (3 marks)

The price of a phone falls from £450 to £378
Work out the percentage decrease.

$$\text{Percentage decrease} = \frac{\text{decrease}}{\text{original}} \times 100$$

$$\text{Decrease: } 450 - 378 = 72$$

$$\frac{72}{450} \times 100 = 16$$

Answer: 16%

Tip: The decrease is £72, but that does not mean 72%. You must divide by the original price, £450.

Marks: 1 mark for 72. 1 mark for $\frac{72}{450}$. 1 mark for 16.

6 (3 marks)

A furniture shop buys a sofa for £350
The shop sells the sofa for £469

Work out the percentage profit.

$$\text{Profit: } 469 - 350 = 119 \text{ pounds}$$

$$\text{Percentage profit} = \frac{\text{profit}}{\text{amount paid}} \times 100$$

$$\frac{119}{350} \times 100 = 34$$

Answer: 34%

Tip: Divide the profit by what the shop **paid** (£350), not by the selling price.

Marks: 1 mark for 119. 1 mark for $\frac{119}{350}$. 1 mark for 34.

7 (1 mark)

a is 40% less than b .

Which statement is correct?

Tick one box.

Try numbers. Let $b = 100$

40% less than 100 is $100 - 40 = 60$, so $a = 60$

a is 60% of b ✓

Check another: b is $\frac{100}{60} \times 100 = 166.7\%$ of a , not 140%.

Answer: a is 60% of b

Tip: Choosing a value such as 100 for b makes percentage statements easy to test.

8 (4 marks)

A car dealer has 200 cars for sale.

45% of the cars are electric.

The dealer sells 30 of the electric cars and 10 of the other cars.

What percentage of the cars left are electric?

Electric cars at first: $45\% \text{ of } 200 = 0.45 \times 200 = 90$

Electric cars left: $90 - 30 = 60$

Total cars left: $200 - 30 - 10 = 160$

Electric as a fraction of the cars left: $\frac{60}{160}$

$\frac{60}{160} \times 100 = 37.5\%$

Answer: 37.5%

Tip: Use the **new** total (160), not the old total (200). Both kinds of car were sold, so the total has changed.

Marks: 1 mark for 90. 1 mark for 60. 1 mark for 160. 1 mark for 37.5.

9 (4 marks)

A café has a target that at least 60% of its customers each day buy a drink.
On one day

150 customers came in the morning and 52% of them bought a drink

90 customers came in the afternoon and 70% of them bought a drink.

Does the café meet its target on this day?

You must show your working.

Morning: 52% of 150 = $0.52 \times 150 = 78$ customers bought a drink

Afternoon: 70% of 90 = $0.7 \times 90 = 63$ customers bought a drink

Total: $78 + 63 = 141$ out of $150 + 90 = 240$ customers

$$\frac{141}{240} \times 100 = 58.75\%$$

58.75% is less than 60%, so the café does not meet its target.

(Or: the target is 60% of 240 = 144 customers, and 141 is less than 144.)

Answer: No, only 58.75% (141 out of 240) bought a drink

Tip: You cannot just average 52% and 70% (that gives 61%). There were more customers in the morning, so work out the actual numbers first.

Marks: 1 mark for 78. 1 mark for 63. 1 mark for $\frac{141}{240}$ or 144. 1 mark for No, with 58.75% (or 141 and 144).

10 (3 marks)

A gym had 1250 members in January.

By June, it had 1080 members.

The manager says,

“The number of members has fallen by more than 15%.”

Is the manager correct?

You must show your working.

Decrease: $1250 - 1080 = 170$ members

$$\frac{170}{1250} \times 100 = 13.6\%$$

13.6% is less than 15%, so the manager is not correct.

(Or: 15% of 1250 = 187.5, and the decrease of 170 is less than 187.5.)

Answer: No, it is a 13.6% decrease

Tip: Finish with a clear conclusion, e.g. “13.6% is less than 15%, so no”. Answers with no conclusion lose the last mark.

Marks: 1 mark for 170. 1 mark for $\frac{170}{1250}$ (or 15% of 1250 = 187.5). 1 mark for No, with 13.6% (or 170 and 187.5).

11 (4 marks)

A bakery sells bread in its shop and online.

	Sales in March	Change from March to April
In the shop	£8000	10% decrease
Online	£2000	35% increase

Work out the percentage change in the total sales from March to April.
State whether it is an increase or a decrease.

Total sales in March: $8000 + 2000 = 10\,000$ pounds

Shop sales in April (10% decrease): $8000 \times 0.9 = 7200$

Online sales in April (35% increase): $2000 \times 1.35 = 2700$

Total sales in April: $7200 + 2700 = 9900$ pounds

Change: $10\,000 - 9900 = 100$ (a decrease)

Percentage change: $\frac{100}{10\,000} \times 100 = 1\%$

Answer: 1% decrease

Tip: You cannot just work out $35 - 10 = 25\%$. The two percentages are of different amounts, so work out the actual sales first.

Marks: 1 mark for 7200 or 2700. 1 mark for 9900. 1 mark for $\frac{100}{10\,000}$ or equivalent. 1 mark for 1% decrease.