

Reverse Percentages

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 (1 mark)

After a 20% increase, a price is £60

Which calculation gives the price before the increase?

Circle your answer.

Options: 60×0.8 , $60 \div 1.2$, $60 \div 0.8$, 60×1.2

After a 20% increase, the price is $100\% + 20\% = 120\%$ of the old price.

So old price $\times 1.2 = 60$

To go backwards, divide by 1.2

Answer: $60 \div 1.2$

2 (3 marks)

125% of a number is 450

Work out 80% of the number.

125% is 5 lots of 25%.

So $25\% = 450 \div 5 = 90$

$100\% = 4 \times 90 = 360$

10% = 36, so 80% = $8 \times 36 = 288$

Answer: 288

Tip: 450 is 125% of the number, so the number itself is **less** than 450. Do not work out 80% of 450.

Marks: 1 mark for 90 (25%) or 360 (100%). 1 mark for a correct method for 80% of your number. 1 mark for 288.

3 (3 marks)

At the end of the summer, a garden centre takes 35% off the price of every plant.
A rose bush now costs £7.80

Work out the price of the rose bush before the reduction.

The new price is $100\% - 35\% = 65\%$ of the price before.

So $65\% = 7.80$ pounds

65% is 13 lots of 5%.

$5\% = 7.80 \div 13 = 0.60$

$100\% = 20 \times 0.60 = 12$

(Or with a multiplier: $7.80 \div 0.65 = 12$)

Answer: £12

Tip: Do not add 35% of £7.80 to £7.80. The 35% was taken off the price **before** the reduction, not the new price.

Marks: 1 mark for 65%. 1 mark for $7.80 \div 0.65$ or $7.80 \div 13$. 1 mark for 12.

4 (3 marks)

After a 15% increase, the price of a game is £92

Work out the price before the increase.

After a 15% increase, £92 is 115% of the old price.

The multiplier is 1.15

To go backwards, divide: $92 \div 1.15 = 80$

Check: $80 \times 1.15 = 92$ ✓

Answer: £80

Marks: 1 mark for 115%. 1 mark for $92 \div 1.15$. 1 mark for 80.

5 (2 marks)

The price of a lamp, including VAT at 20%, is £54

Work out the price of the lamp before VAT is added.

Adding 20% VAT makes the price 120% of the price before VAT.

So 120% = 54

$54 \div 1.2 = 45$

Answer: £45

Marks: 1 mark for $54 \div 1.2$ (or $54 \div 12 \times 10$). 1 mark for 45.

6 (2 marks)

The population of a village increased by 4%

The population is now 12 480

Work out the population before the increase.

The population now is 104% of the population before.

The multiplier is 1.04

$12\,480 \div 1.04 = 12\,000$

Answer: 12 000

Marks: 1 mark for $12\,480 \div 1.04$. 1 mark for 12 000.

7 (2 marks)

The price of a coat is reduced by 25%

The price is now £45

Max says,

‘The original price was $£45 + 25\% \text{ of } £45 = £56.25$ ’

Is Max correct? Tick a box.

Show working to support your answer.

The 25% was taken off the **original** price, not off £45.

So £45 is $100\% - 25\% = 75\%$ of the original price.

$$45 \div 0.75 = 60$$

The original price was £60, not £56.25

Check: 25% of 60 is 15, and $60 - 15 = 45$ ✓

Answer: No, it was £60

Tip: Max’s mistake is very common: adding 25% back on to the new price does not undo a 25% decrease.

Marks: 1 mark for $45 \div 0.75$. 1 mark for No, with 60.

8 (3 marks)

After a 3% pay rise, Kay’s salary is £25 750 per year.

How much was the pay rise?

After a 3% rise, £25 750 is 103% of the old salary.

Old salary: $25\,750 \div 1.03 = 25\,000$

Pay rise: $25\,750 - 25\,000 = 750$

Answer: £750

Tip: The rise is 3% of the **old** salary. Working out 3% of £25 750 (£772.50) is wrong.

Marks: 1 mark for dividing by 1.03. 1 mark for 25 000. 1 mark for 750.

9 (3 marks)

672 000 electric bikes were sold this year.

This is 12% more than last year.

How many were sold last year?

This year is 12% more, so this year is 112% of last year.

The multiplier is 1.12

$$672\,000 \div 1.12 = 600\,000$$

$$\text{Check: } 600\,000 \times 1.12 = 672\,000 \quad \checkmark$$

Answer: 600 000

Marks: 1 mark for 112%. 1 mark for $672\,000 \div 1.12$ or equivalent. 1 mark for 600 000.

10 (3 marks)

The mass of a block of ice is 4 950 000 kg

This value is a 10% reduction from the original mass of the block of ice.

Work out the original mass of the block of ice.

Give your answer in standard form.

After a 10% reduction, 4 950 000 is $100\% - 10\% = 90\%$ of the original mass.

The multiplier is 0.9

$$4\,950\,000 \div 0.9 = 5\,500\,000$$

$$\text{In standard form: } 5\,500\,000 = 5.5 \times 10^6$$

Answer: 5.5×10^6 kg

Tip: Divide by 0.9. Do not add 10% of 4 950 000, and do not multiply by 1.1. Then remember to write your answer in standard form.

Marks: 1 mark for 90%. 1 mark for $4\,950\,000 \div 0.9$ or equivalent. 1 mark for 5.5×10^6 .
