



- 1** In a sale, all prices are reduced by 15%.
The sale price of a jumper is £68.
Work out the normal price of the jumper.

(2 marks)

The sale price is $100\% - 15\% = 85\%$ of the normal price

The original price was multiplied by 0.85 to obtain the sale price. Undo that multiplication by dividing by 0.85; adding 15% of the sale price would use the wrong starting amount

$$\text{Normal price} = 68 \div 0.85 = £80$$

Check

$$80 \times 0.85 = £68$$

£80

- 2** The price of a rail ticket increased by 20%.
The ticket now costs £54.
Work out the price of the ticket before the increase.

(2 marks)

The new price is 120% of the old price

$$\text{Old price} = 54 \div 1.2 = £45$$

Check

$$45 \times 1.2 = £54$$

£45

- 3** The price of a jacket is reduced by 10%.
The reduced price is £63.
Work out the price of the jacket before the reduction.

(2 marks)

The reduced price is 90% of the original price

$$\text{Original price} = 63 \div 0.9 = £70$$

Check

$$70 \times 0.9 = £63$$

£70

- 4 The price of a printer, including VAT at 20%, is £90.
Work out the price of the printer before VAT was added.

(2 marks)

$$\text{Price with VAT} = 120\% = 1.2 \times \text{original}$$

$$\text{original} = 90 \div 1.2$$

$$\boxed{\text{£75}}$$

$$\text{Check: } 75 \times 1.2 = 90$$

- 5 The population of a town increased by 12% between 2015 and 2025.
The population in 2025 was 26 880.
Work out the population in 2015.

(2 marks)

$$\text{The 2025 population is } 112\% \text{ of the 2015 population}$$

$$\text{2015 population} = 26\,880 \div 1.12 = 24\,000$$

Check

$$24\,000 \times 1.12 = 26\,880$$

$$\boxed{24000}$$

- 6 In a sale there is 30% off all prices.
Kofi pays £59.36 for a coat in the sale.
Work out the price of the coat before the sale.

(2 marks)

$$\text{The sale price is } 70\% \text{ of the original price}$$

$$\text{Original price} = 59.36 \div 0.7 = \text{£}84.80$$

Check

$$84.80 \times 0.7 = \text{£}59.36$$

$$\boxed{\text{£}84.80}$$

- 7 Sunita's salary was increased by 4%.
Her new salary is £31 200 a year.
Work out her salary before the increase.

(3 marks)

$$\text{New salary} = 104\% = 1.04 \times \text{old}$$

$$\text{old} = 31\,200 \div 1.04$$

$$\boxed{\text{£}30\,000}$$

$$\text{Check: } 30\,000 \times 1.04 = 31\,200$$

8

Dana gets a 5% pay rise.

Her new rate of pay is £13.65 per hour.

Work out her rate of pay before the rise.

(2 marks)

The new rate is 105% of the old rate

$$\text{Old rate} = 13.65 \div 1.05 = \text{£}13 \text{ per hour}$$

Check

$$13 \times 1.05 = \text{£}13.65$$

£13

9

In 2024 the population of a town decreased by 8% to 46 000.

a. Work out the population of the town before the decrease.

b. In 2025 the population increased by 3%. Work out the population of the town after this increase.

(4 marks)

$$\text{a) } 100\% - 8\% = 92\% = 0.92$$

$$\text{original} = 46\,000 \div 0.92$$

50 000

$$\text{b) increase of } 3\% = \times 1.03$$

$$= 46\,000 \times 1.03$$

47 380

10

The value of a car depreciates by 20% each year.

At the end of 2 years the car is worth £10 368.

Work out the value of the car 2 years ago.

(3 marks)

The 2-year multiplier is $0.8 \times 0.8 = 0.64$

$$\text{Original value} = 10\,368 \div 0.64 = \text{£}16\,200$$

Check

$$16\,200 \times 0.8 = 12\,960, \text{ then } 12\,960 \times 0.8 = \text{£}10\,368$$

£16200

11

Aisha puts £1500 into a savings account for one year.

At the end of the year the interest is taxed at 20%. After tax is taken off, Aisha receives £36 interest.

Work out the annual interest rate of the account before tax.

(4 marks)

She keeps 80% = 0.8 of the interest

$$\text{interest} = 36 \div 0.8 = £45$$

$$\text{rate} = \frac{45}{1500} \times 100$$

3%

12

The value of a house increased by 8% in 2024 and then by 5% in 2025.

At the end of 2025 the house was worth £226 800.

Work out the value of the house at the start of 2024.

(3 marks)

The overall multiplier is $1.08 \times 1.05 = 1.134$

$$\text{Value at the start of 2024} = 226\,800 \div 1.134 = £200\,000$$

Check

$$200\,000 \times 1.08 = 216\,000, \text{ then } 216\,000 \times 1.05 = £226\,800$$

£200000

13

A delivery van lost 12% of its value in the first year and then 25% of its remaining value in the second year.

After two years the van is worth £5940.

Work out the value of the van when it was new.

(3 marks)

Year 1: $\times 0.88$

Year 2: $\times 0.75$

$$0.88 \times 0.75 = 0.66$$

$$\text{original} = 5940 \div 0.66$$

£9000

- 14 The price of a television was reduced by 20% in a sale.

In a final clearance, the sale price was reduced by a further 10%.

The clearance price is £216.

- Work out the original price of the television.
- Show that the two reductions together are equivalent to a single reduction of 28%.

(4 marks)

$$a) \text{ Overall multiplier} = 0.8 \times 0.9 = 0.72$$

$$\text{Original price} = 216 \div 0.72 = £300$$

Check

$$300 \times 0.8 = 240, \text{ then } 240 \times 0.9 = £216$$

b) A multiplier of 0.72 means the final price is 72% of the original, which is a reduction of $100\% - 72\% = 28\%$

- 15 In a sale, the price of a coat is reduced by $\frac{2}{7}$ of its original price.

The sale price of the coat is £45

Work out the original price of the coat.

(3 marks)

A reduction of $\frac{2}{7}$ leaves $\frac{5}{7}$ of the original price

So $\frac{5}{7}$ of the original price is 45, which means $\frac{1}{7}$ is $45 \div 5 = 9$

The original price is $7 \times 9 = 63$, so the coat originally cost 63 pounds

£63

- 16 VAT at 20% is added to the price of a laptop.

The shop then takes 10% off the price including VAT.

Sam pays £648 for the laptop.

Work out the price of the laptop before VAT was added.

(4 marks)

Undo the discount first ($\div 0.9$)

$$648 \div 0.9 = 720$$

Now undo the VAT ($\div 1.2$)

$$= 720 \div 1.2$$

£600

Check: $600 \times 1.2 \times 0.9 = 648$

17

Ines put a sum of money into a savings account for 3 years.

The account paid 4% compound interest in the first year, then 2.5% compound interest in each of the next 2 years.

At the end of the 3 years the account held £8741.20.

- Work out the sum of money Ines put into the account.
- Work out the total interest she earned.

(5 marks)

$$a) \text{ Overall multiplier} = 1.04 \times 1.025 \times 1.025 = 1.09265$$

$$\text{Original sum} = 8741.20 \div (1.04 \times 1.025^2) = £8000$$

Check forwards

$$8000 \times 1.04 = 8320, \text{ then } 8320 \times 1.025 = 8528, \text{ then}$$

$$8528 \times 1.025 = £8741.20$$

$$b) \text{ Total interest} = 8741.20 - 8000 = £741.20$$