

# Percentage Increase and Decrease

## Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

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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.

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**1** (2 marks)

Increase 360 by 15%

Find 15% of 360:

$$10\% \text{ of } 360 = 360 \div 10 = 36$$

$$5\% \text{ is half of } 10\%: 36 \div 2 = 18$$

$$15\% = 36 + 18 = 54$$

$$\text{It is an increase, so add: } 360 + 54 = 414$$

**Answer:** 414

**Tip:** 54 is only the increase. Remember to add it on to 360.

*Marks:* 1 mark for 54 or  $360 \times 1.15$ . 1 mark for 414.

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**2** (2 marks)

Write down the decimal multiplier for

(a) an increase of 4%

$$\text{After a 4\% increase you have } 100\% + 4\% = 104\%$$

$$104\% = 104 \div 100 = 1.04$$

**Answer:** 1.04

- (b) a decrease of 30%

After a 30% decrease you have  $100\% - 30\% = 70\%$

$$70\% = 70 \div 100 = 0.7$$

**Answer:** 0.7

**Tip:** The multiplier is what is **left** (70%), not the decrease (30%). So it is 0.7, not 0.3

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**3** (2 marks)

The price of a coat is £240

The price is decreased by 5%

Dev works out the new price.

He writes

$$240 \times 0.5 = 120$$

Dev's answer is wrong.

- (a) Explain what Dev has done wrong.

A 5% decrease leaves  $100\% - 5\% = 95\%$  of the price.

$$95\% = 0.95$$

So Dev should multiply by 0.95

Multiplying by 0.5 halves the price. That is a 50% decrease, not 5%.

**Answer:** He should multiply by 0.95, not 0.5 (0.5 is a 50% decrease)

- (b) Work out the correct price of the coat after the decrease.

$$240 \times 0.95 = 228$$

(Or 5% of 240 = 12, and  $240 - 12 = 228$ )

**Answer:** £228

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**4** (2 marks)

An annual rail pass costs £2400

Next year, the cost of the rail pass will increase by 3.5%

Work out the cost of the rail pass next year.

An increase of 3.5% gives  $100\% + 3.5\% = 103.5\%$

The multiplier is 1.035

$$2400 \times 1.035 = 2484$$

(Or  $1\%$  of 2400 = 24, so  $3.5\% = 84$ , and  $2400 + 84 = 2484$ )

**Answer:** £2484

**Tip:** The multiplier for a 3.5% increase is 1.035, not 1.35 (that would be a 35% increase).

*Marks:* 1 mark for 84 or  $2400 \times 1.035$ . 1 mark for 2484.

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**5** (2 marks)

Decrease 85 kg by 12%

After a 12% decrease you have  $100\% - 12\% = 88\%$  left.

The multiplier is 0.88

$$85 \times 0.88 = 74.8$$

**Answer:** 74.8 kg

**Tip:** On a calculator paper, use a multiplier. Building up 12% from 10%, 1% and 1% takes longer and leads to slips.

*Marks:* 1 mark for  $85 \times 0.88$  or  $85 - 10.2$ . 1 mark for 74.8

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**6** (2 marks)

A garden centre has 35% off all plants.

A lemon tree usually costs £68

Work out the price of the lemon tree with 35% off.

With 35% off you pay  $100\% - 35\% = 65\%$

The multiplier is 0.65

$$68 \times 0.65 = 44.2$$

Write money with 2 decimal places: £44.20

**Answer:** £44.20

**Tip:** £23.80 is the amount taken off, not the new price. Remember to subtract it from £68.

*Marks:* 1 mark for  $68 \times 0.65$  or  $68 - 23.80$ . 1 mark for 44.20

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**7** (2 marks)

Jan buys a bike for £320

She sells the bike for 15% less than she paid for it.

How much does she sell the bike for?

$$10\% \text{ of } 320 = 32$$

$$5\% = 32 \div 2 = 16$$

$$15\% = 32 + 16 = 48$$

She sells it for 15% less, so subtract:  $320 - 48 = 272$

**Answer:** £272

*Marks:* 1 mark for 48 or  $320 \times 0.85$ . 1 mark for 272.

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**8** (3 marks)

Two shops sell the same washing machine.

| Shop A                             | Shop B                                        |
|------------------------------------|-----------------------------------------------|
| Normal price £640<br>Sale: 15% off | Normal price £600<br>Sale: $\frac{1}{10}$ off |

Which shop sells the washing machine for less?

You must show how you get your answer.

Shop A: 15% of 640

10% = 64 and 5% = 32, so 15% = 96

Shop A price:  $640 - 96 = 544$  pounds

Shop B:  $\frac{1}{10}$  of 600 = 60

Shop B price:  $600 - 60 = 540$  pounds

£540 is less than £544

**Answer:** Shop B (£540 compared with £544)

**Tip:** Shop A takes off the bigger fraction of the price, but its starting price is higher. Work out both final prices before you decide.

*Marks:* 1 mark for 544 or 96. 1 mark for 540 or 60. 1 mark for Shop B, with both prices.

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**9** (3 marks)

At the start of 2024, the population of a town was 12 000

During 2024 the population increased by 8%

During 2025 the population increased by 5%

Work out the population at the end of 2025

2024: an 8% increase, so multiply by 1.08

$12\,000 \times 1.08 = 12\,960$

2025: a 5% increase of the **new** population, so multiply by 1.05

$$12\,960 \times 1.05 = 13\,608$$

**Answer:** 13 608

**Tip:** You cannot just add 13% to 12 000 (that gives 13 560). The 5% is of the population at the end of 2024.

*Marks:* 1 mark for  $\times 1.08$  (12 960). 1 mark for  $\times 1.05$ . 1 mark for 13 608.

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**10** (4 marks)

In January, two shops were selling the same model of bike.

In Shop P the price was £420

In Shop Q the price was £390

In March, Shop P increased its price by 10%

In June, Shop P decreased its new price by 20%

In June, Shop Q decreased its price by 5%

In June, in which shop is the bike cheaper?

You must show how you get your answer.

Shop P, March: an increase of 10%, so multiply by 1.1

$$420 \times 1.1 = 462 \text{ pounds}$$

Shop P, June: a decrease of 20% of the **new** price, so multiply by 0.8

$$462 \times 0.8 = 369.60 \text{ pounds}$$

Shop Q, June: a decrease of 5%, so multiply by 0.95

$$390 \times 0.95 = 370.50 \text{ pounds}$$

£369.60 is less than £370.50

**Answer:** Shop P (£369.60 compared with £370.50)

**Tip:** For Shop P, do not just take 10% off £420 (+10% then –20% is not the same as –10%). The 20% is taken off the March price, £462.

*Marks:* 1 mark for 462. 1 mark for  $462 \times 0.8$  (369.60). 1 mark for 370.50. 1 mark for Shop P, with both prices.

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