

Percentage change

There are two methods that can be used to increase or decrease an amount by a percentage.

Method 1

Work out 26% of £280:

$$\frac{26}{100} \times £280 = £72.80$$

Subtract the decrease:

$$£280 - £72.80 = £207.20$$

£280

26% OFF

Method 2

Use a multiplier:

$$100\% + 30\% = 130\%$$

$$\frac{130}{100} = 1.3$$

So the multiplier for a 30% increase is 1.3:

$$400 \text{ g} \times 1.3 = 520 \text{ g}$$

400 g

PLUS
30%
EXTRA

Worked example

Target grade 4

For the 2014/2015 season a football club charged £550 for a top-price season ticket.

For the 2015/2016 season the club increased its season ticket prices by 6.2%.

It offered supporters a 10% discount on the new price if they bought their season tickets before the end of June.

Calculate the price of a season ticket bought before the end of June. (3 marks)

$$550 \times 1.062 = 584.1$$

$$584.1 \times 0.9 = 525.69$$

The discounted price is £525.69

Examiners' report

Read the question carefully – there are two steps in the working:

6.2% increase

$$\text{The multiplier is } \frac{100 + 6.2}{100} = 1.062$$

10% decrease

$$\text{The multiplier is } \frac{100 - 10}{100} = 0.9$$

This is a calculator question. Don't attempt complex calculations on Papers 2 and 3 without using your calculator!

Real students have struggled with questions like this in recent exams – **be prepared!**



Calculating a percentage increase or decrease

Work out the amount of the increase or decrease



Write this as a percentage of the original amount

Was £60
Now £39

$$60 - 39 = 21$$

$$\frac{21}{60} \times 100 = 35\%$$

This is a 35% decrease.

For a reminder about writing one quantity as a percentage of another, have a look at page 59.

A question might ask you to calculate a percentage profit or loss rather than an increase or decrease.

Now try this

Target grade 4

- 1 A TV originally cost £520. In a sale it was priced at £340. What was the percentage reduction in the price? Give your answer to 1 decimal place. (3 marks)

Reduction means decrease. Work out the decrease as a percentage of the original price.

Target grade 5

- 2 Johan publishes a monthly poetry magazine. In March he printed 1400 copies of his magazine. In April he increased his print run by 15%. It costs Johan £800 plus 75p per copy to print his magazine. He sells each issue for £1.99. Assuming Johan sells every copy that he prints, calculate his percentage profit in April. (4 marks)

Reverse percentages

In some questions you are given an amount **after** a percentage change, and you have to find the **original amount**. To answer questions like this you need to be really confident with **percentage change**. Revise it on page 62.

Using a multiplier

You can use a multiplier to calculate a percentage increase or decrease. If you are given the **final amount** and you need to find the **original amount**, you can **divide by the multiplier**. Here are two examples:

1 A sweater is **reduced** in price by 20% in a sale.

Original price: £50
Sale price: £40

Multiplier: $\times 0.8$
Reverse multiplier: $\div 0.8$

2 The average temperature **increases** by 5%.

Original temperature: 22°C
Temperature after increase: 23.1°C

Multiplier: $\times 1.05$
Reverse multiplier: $\div 1.05$

Worked example

Target grade **5**

In a sale, normal prices are reduced by 15%.
The sale price of a pair of trainers is £75.65.
Work out the normal price of the trainers.

(3 marks)

$$100\% - 15\% = 85\%$$

$$\frac{85}{100} = 0.85$$

$$75.65 \div 0.85 = 89$$

The original price was £89

Read percentages questions carefully so you know what information you have been given. This question tells you the price **after** the percentage decrease, so you need to use **reverse percentages**. To find the multiplier for a 15% decrease:

1. Subtract 15% from 100%

2. Divide by 100 to convert to a multiplier.

You need to **divide** by the multiplier to find the original price.

Check it!

Reduce £89 by 15%: $\pounds 89 \times 0.15 = \pounds 13.35$
 $\pounds 89 - \pounds 13.35 = \pounds 75.65$ ✓



Problem solved!

Plan your answer before you start. You will need to do **two separate calculations** to find both original heights. Then you need to compare the original heights and **write a conclusion**.

Examiners' report

Always carry out a **common sense check** on your calculations. The heights in 2013 should be **less** than the heights in 2014.

Real students have struggled with questions like this in recent exams – **be prepared!**



Worked example

Target grade **5**

Amy and Paul measure their heights each year. This table shows their heights in 2014.

	Height in 2014 (cm)	Percentage increase since 2013
Paul	154	10%
Amy	150.8	4%

Who was taller in 2013? Give reasons for your answer.

(4 marks)

Paul's original height = $154 \div 1.1 = 140$ cm

Amy's original height = $150.8 \div 1.04 = 145$ cm

In 2013 Amy was taller than Paul by 5 cm.

Now try this

Target grade **5**

- 1** Hannah buys a pair of shoes in a sale where all the items are marked '40% off'.
She pays £27 for the shoes.
What price were the shoes originally? (3 marks)

- 2** Jared bought a house in 2010.
By 2012 his house had increased in value by 8%. The new value of Jared's house was £237 600. How much did Jared pay for his house? (3 marks)

Worked solution video

