

Fix it 1 Percentage to decimal

Percentages · ANSWERS

Per cent means out of 100. Divide by 100 to write a percentage as a decimal.

EXAMPLE

Write 35%, 7% and 112% as decimals.

1. $35\% = 35 \div 100 = 0.35$
2. $7\% = 7 \div 100 = 0.07$
3. $112\% = 112 \div 100 = 1.12$
4. 7% is 7 hundredths: 0.07, not 0.7.

YOUR TURN

- 1 Write 4% as a decimal.

$$4\% = \underline{0.04}$$

- 2 Write 160% as a decimal.

$$160\% = \underline{1.6}$$

- 3 Write 2.5% as a decimal.

$$2.5\% = \underline{0.025}$$

Check: Multiply your decimal by 100: you get the percentage back. Under 10% gives a decimal under 0.1.

The Maths Habit

Fix it 2 The multiplier

Percentages · ANSWERS

Start at 100%. Add the percentage for an increase, take it away for a decrease, then write the result as a decimal.

EXAMPLE

Find the multiplier for an increase of 15%.

before	100%
after	115%

1. Before is 100%.
2. $100\% + 15\% = 115\%$
3. 115% as a decimal: 1.15
4. A decrease of 15%:
 $100\% - 15\% = 85\%$, so 0.85.

YOUR TURN

- 1 Write the multiplier for an increase of 6%.

$$\underline{1.06}$$

- 2 Write the multiplier for a decrease of 35%.

$$\underline{0.65}$$

- 3 Write the multiplier for a decrease of 3.5%.

$$\underline{0.965}$$

Check: An increase gives a multiplier more than 1. A decrease gives one less than 1.

The Maths Habit

Fix it 3 Use the multiplier

Percentages · ANSWERS

Multiply the amount by the multiplier. One calculation does the whole change.

EXAMPLE

Increase £240 by 15%.

1. The multiplier: 1.15
2. $240 \times 1.15 = 276$
3. £276

YOUR TURN

- 1 Decrease £85 by 20%.

£68

- 2 A 650 g bag of pasta has 12% extra free. How much pasta is in the bag now?

728 g

- 3 A £1250 laptop is reduced by 17.5% in a sale. Find the sale price.

£1031.25

Check: An increase: is your answer bigger than the start? A decrease: is it smaller?

The Maths Habit

Fix it 4 Percentage change

Percentages · ANSWERS

Percentage change = $\frac{\text{change}}{\text{original}} \times 100$. Always divide by the original, the amount before the change.

EXAMPLE

A bike's price falls from £240 to £204.
Find the percentage decrease.

1. The change: $240 - 204 = 36$
2. Divide by the original: $36 \div 240 = 0.15$
3. $\times 100$: a 15% decrease

YOUR TURN

- 1 Rent rises from £850 to £901 a month. Find the percentage increase.

6%

- 2 A car's value falls from £12 500 to £9750.
Find the percentage decrease.

22%

- 3 A ticket goes from £16 to £20. Kai says that is a 20% increase.
Find the right percentage.

25%, not 20%

Check: Use your answer as a multiplier on the original: you should get the new amount.

The Maths Habit

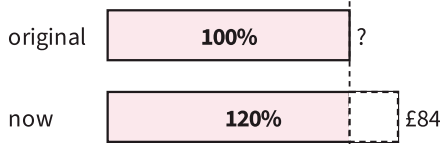
Fix it 5 Reverse percentages

Percentages · ANSWERS

Find the percentage now, divide by it to find 1%, then $\times 100$. Never take the % off the amount now.

EXAMPLE

After a 20% rise, a bill is £84.
Find the original bill.



1. £84 is 120% of the original.
2. $1\% = 84 \div 120 = 0.7$
3. $100\% = 0.7 \times 100 = £70$

YOUR TURN

- 1 In a 30% off sale, a jacket costs £56. Find the price before the sale.

£80

- 2 After a 4% pay rise, Ola earns £27 040 a year. What did she earn before the rise?

£26 000

- 3 After a 12.5% fall, a town's population is 7350. What was it before the fall?

8400

Check: Multiply your answer by the multiplier: you get the amount now back.

The Maths Habit

Fix it 6 Repeated change

Percentages · ANSWERS

The same change n times: the multiplier to the power n . Two different changes: multiply their multipliers.

EXAMPLE

£2400 earns 3% compound interest a year. Find its value after 5 years.

1. The multiplier: 1.03
2. 5 years: 2400×1.03^5
3. = 2782.257...
4. £2782.26

YOUR TURN

- 1 A car worth £18 000 loses 15% of its value each year. Find its value after 3 years.

£11 054.25

- 2 A colony of 500 bacteria grows by 8% each hour. How many are there after 6 hours, to the nearest whole number?

793

- 3 A price rises by 20%, then the new price falls by 20%. Write one multiplier that does both changes.

0.96

Check: Work it out year by year, $\times 1.03$ five times: you get the same answer as the power.

The Maths Habit

Fix it 7 Simple or compound?

Percentages · ANSWERS

Simple interest: the same amount every year, a percentage of the start. **Compound:** each year's interest is on the new amount, so use the power.

EXAMPLE

£600 for 3 years at 5% a year.
Find its value with simple interest, then
with compound interest.

1. Simple: $5\% \text{ of } 600 = 30$ a year
2. $600 + 3 \times 30 = £690$
3. Compound: $600 \times 1.05^3 = £694.58$

YOUR TURN

- 1 £400 earns 3% simple interest a year for 5 years. Find its value at the end.

£460

- 2 £1200 earns 2% compound interest a year for 4 years. Find its value at the end.

£1298.92

- 3 £900 is invested for 2 years at 6% a year. How much more does compound interest give than simple interest?

£3.24

Check: Over more than a year, compound interest always gives a little more than simple.

The Maths Habit

Fix it 8 Interest or total?

Percentages · ANSWERS

Read what the question asks for. The multiplier gives the total. The interest, or the value lost, is the change: subtract the start.

EXAMPLE

£3000 earns 2% compound interest a year for 4 years. How much interest does it earn?

1. Total: $3000 \times 1.02^4 = 3247.296...$
2. Subtract the start: $247.296...$
3. Interest: £247.30

YOUR TURN

- 1 £800 earns 5% compound interest a year for 2 years.
How much interest does it earn?

£82

- 2 A £15 000 van loses 20% of its value each year. How much value does it lose in 2 years?

£5400

- 3 £5000 earns 4% compound interest a year for 3 years. How much is in the account at the end?

£5624.32

Check: The start + the interest = the total. Add yours up to make sure.

The Maths Habit