

Simple and Compound Interest

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • 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 (3 marks)

Priya puts £1850 into a savings account that pays 2.4% simple interest per year.

She leaves the money there for 3 years.

How much money will be in the account after 3 years?

Simple interest is the same amount every year.

2.4% as a decimal is 0.024

Interest for one year: $0.024 \times 1850 = 44.40$

Interest for 3 years: $3 \times 44.40 = 133.20$

Total in the account: $1850 + 133.20 = 1983.20$

Answer: £1983.20

Tip: This question asks for the total in the account, so add the interest to the £1850. Also, 2.4% is 0.024, not 0.24

Marks: 1 mark for 44.40. 1 mark for 133.20. 1 mark for 1983.20.

2 (3 marks)

Marcus invests £1200 at 3.5% simple interest per year.

He receives a total of £210 in interest.

For how many years did Marcus invest the money?

Simple interest is the same each year.

Interest each year: $0.035 \times 1200 = 42$ pounds

Number of years: $210 \div 42 = 5$

Answer: 5 years

Tip: Work out one year's interest first, then see how many of those make £210.

Marks: 1 mark for 0.035×1200 . 1 mark for 42. 1 mark for 5.

3 (3 marks)

The value of a rare coin increases by 7% each year.

The coin is worth £640 today.

Work out the value of the coin in 2 years' time.

A 7% increase each year means multiply by 1.07 each year.

For 2 years: 640×1.07^2

$= 640 \times 1.1449 = 732.736$

Round to the nearest penny: £732.74

Answer: £732.74

Tip: Adding 14% of £640 gives £729.60, which is wrong: the second year's 7% is of the new value.

Marks: 1 mark for using 1.07. 1 mark for 640×1.07^2 . 1 mark for 732.74

4 (3 marks)

Hana invests £2750 in a savings bond for 4 years.

The bond pays 3.6% compound interest per year.

Work out the total amount of interest Hana earns.

Multiply by 1.036 for each of the 4 years:

$2750 \times 1.036^4 = 3167.90$ (to the nearest penny)

This is the total value of the bond.

Interest: $3167.90 - 2750 = 417.90$

Answer: £417.90

Tip: The question asks for the **interest**. Remember to subtract the £2750 she put in.

Marks: 1 mark for 2750×1.036^4 . 1 mark for subtracting 2750. 1 mark for 417.90.

5 (3 marks)

A machine costs £12 000

Its value depreciates by 10% each year.

Work out the value of the machine after 3 years.

Depreciates means the value goes down.

A 10% decrease each year means multiply by 0.9 each year.

For 3 years: $12\,000 \times 0.9^3$

$12\,000 \times 0.729 = 8748$

Answer: £8748

Marks: 1 mark for using 0.9. 1 mark for $\times 0.9^3$ (or three correct years). 1 mark for 8748.

6 (3 marks)

A beekeeper has 8000 bees in a hive.

The number of bees increases by 5% each week for 3 weeks.

Work out the number of bees in the hive at the end of the 3 weeks.

This works like compound interest: multiply by 1.05 each week.

For 3 weeks: 8000×1.05^3

$$= 8000 \times 1.157625 = 9261$$

Answer: 9261

Tip: Do not work out 5% of 8000 and multiply by 3 (that gives 9200). Each week's increase is 5% of the new, bigger number.

Marks: 1 mark for using 1.05. 1 mark for $\times 1.05^3$. 1 mark for 9261.

7 (3 marks)

A painting was valued at £3500

In the first year, the value of the painting went up by 12%

In the second year, the value of the painting went down by 5%

Work out the value of the painting at the end of the second year.

Year 1: a 12% increase, so multiply by 1.12

$$3500 \times 1.12 = 3920$$

Year 2: a 5% decrease on the **new** value, so multiply by 0.95

$$3920 \times 0.95 = 3724$$

Answer: £3724

Tip: Apply the 5% decrease to the value at the end of year 1 (£3920), not to the £3500. Using $12 - 5 = 7\%$ gives £3745, which is wrong.

Marks: 1 mark for 3500×1.12 . 1 mark for your 3920×0.95 . 1 mark for 3724.

8 (4 marks)

Nia wants to save £4000 for 3 years.

Fixed account 3% per year simple interest	Saver account 2.9% per year compound interest
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Which account will give Nia more money at the end of 3 years?

You must show how you get your answer.

Fixed account (simple interest):

One year: 3% of 4000 = 120

Three years: $3 \times 120 = 360$

Total: $4000 + 360 = 4360$ pounds

Saver account (compound interest):

Multiplier for 2.9% interest: 1.029

$4000 \times 1.029^3 = 4358.189 \dots = 4358.19$ pounds

£4360 is more than £4358.19

So the Fixed account gives more money (by £1.81).

Answer: The Fixed account

Tip: Compound interest does not always give more. Over a few years, a slightly higher simple interest rate can beat it, so work out both amounts. Do not just use $3 \times 2.9\%$ for the Saver account.

Marks: 1 mark for 360 or 4360. 1 mark for 4000×1.029^3 (or working out the interest year by year). 1 mark for both values. 1 mark for the Fixed account, with both values.