

Exercise walk-through

E1.17

Exponential growth and decay

IGCSE Mathematics

You must be able to

- write down the multiplier for a given percentage increase or decrease
- use the formula $\text{final} = \text{initial} \times (\text{multiplier})^n$
- work backwards to find the initial amount, or find how many years a change takes

1

The method

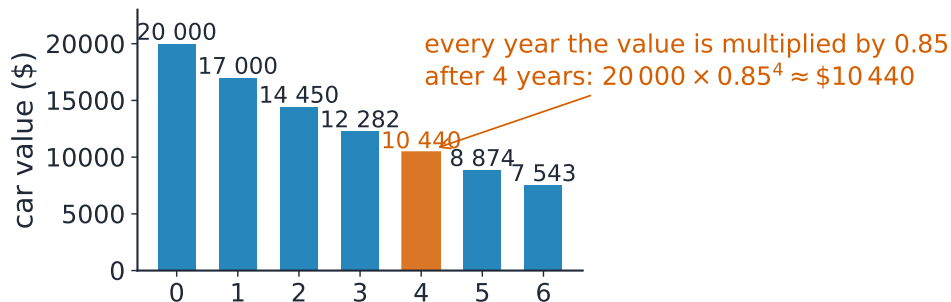
Method — One multiplier, raised to the number of years

- **The multiplier:** an increase of 4% is $\times 1.04$; a decrease of 15% is $\times 0.85$. An increase of 7.5% is $\times 1.075$.
- **Formula:** $\text{final} = \text{initial} \times (\text{multiplier})^n$, where n is the number of years.
- **Worked:** \$2000 at 4% compound interest for 3 years $= 2000 \times 1.04^3 = \$2249.73$.
- **Backwards:** divide instead of multiplying — $\text{initial} = \text{final} \div (\text{multiplier})^n$.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): writing the multiplier raised to the correct power is the method mark, so show it even if the calculator does the rest.

Method — One multiplier, raised to the number of years

Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): writing the...

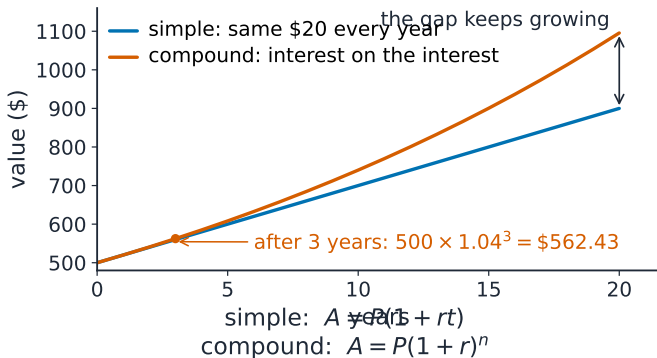


$V = V_0 r^t$ with $0 < r < 1$ for decay · here $r = 0.85$ each year

A decay curve falling by the same percentage each year

Method — One multiplier, raised to the number of years

Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): writing the...



Simple and compound interest compared over several years

2

Practice

Practice 2.1 ■ 1 mark

Write down the multiplier for an increase of 7.5%.

Solution 2.1

Method: One multiplier, raised to the number of years — p.4

Worked steps

- an increase of 7.5% multiplies by $1 + 0.075$

1.075

B1