

Compound growth, depreciation and reverse change

Topic cliff notes / objectives, key ideas and examples

Learning objectives

- Apply repeated percentage changes using multipliers.
- Reverse a percentage change when its multiplier is non-zero.

Key ideas

- Growth and depreciation use these multipliers.

$$m = 1 + \frac{r}{100} \quad \text{or} \quad m = 1 - \frac{r}{100}$$

- For depreciation, the percentage lies from zero to one hundred.

$$0 \leq r \leq 100$$

- After equal periods, raise the multiplier to the number of periods.

$$F = Pm^n$$

- To reverse the change, divide by the accumulated non-zero multiplier.

$$P = \frac{F}{m^n}, \quad m \neq 0$$

Worked example

An £800 device depreciates by 12% each year. Find its value after two years.

$$m = 1 - \frac{12}{100} = 0.88$$

$$F = 800(0.88)^2$$

$$800(0.88) = 704, \quad 704(0.88) = 619.52$$

Answer

$$£619.52$$

Quick example

A price is £540 after a 20% increase. Find its original value.

$$m = 1.20, \quad P = \frac{540}{1.20}$$

Answer

$$£450$$

Watch out

Apply each change to the current amount. A 100% decrease gives zero and cannot be reversed from the final amount alone.

