

YEAR 10 — PROPORTION...

Percentages and Interest

What do I need to be able to do?

By the end of this unit you should be able to:

- Convert and compare FDP
- Work out percentages of amounts
- Increase/ decrease by a given percentage
- Express one number as a percentage
- Calculate simple and compound interest
- Calculate repeated percentage change
- Find the original value
- Solve problems with growth and decay

Keywords

Exponent: how many times we use a number in multiplication. It is written as a power

Compound interest: calculating interest on both the amount plus previous interest

Depreciation: a decrease in the value of something over time.

Growth: where a value increases in proportion to its current value such as doubling

Decay: the process of reducing an amount by a consistent percentage rate over time.

Multiplier: the number you are multiplying by

Equivalent: of equal value.

Compare FDP

Comparisons are easier in the same format

70/100 → This also means 70 ÷ 100 → 70 out of 100 squares → 70 hundredths = 7 'tenths' 0.7

Using a calculator → $\frac{70}{100} = 0.7$ → Convert to a decimal → × 100 converts to a percentage

Be careful of recurring decimals
e.g. $\frac{1}{3} = 0.333333$
 $\frac{1}{3} = 0.\dot{3}$
The dot above the 3

Fraction/ Percentage of amount

Find $\frac{3}{5}$ of £60

Remember $\frac{3}{5} = 60\% = 0.6$

10% of £60 = £6
50% of £60 = £30
60% of £60 = £36

Remember $\frac{3}{5} = 60\% = 0.6$
60% of £60 = 0.6 × 60 = £36

Percentage increase/decrease

100% → 42% → Decrease by 58%

100% - 58% = 42%

100 - 0.58 = 0.42

Multiplier Less than 1

100% → 100% + 12% → Increase by 12%

100% + 12% = 112%

100 + 0.12 = 112

Multiplier More than 1

Express as a percentage

27 per every 50 shaded → $\frac{27}{50}$ → 54 per every 100 shaded → $\frac{54}{100}$ → 54%

$\frac{13}{30} \rightarrow \frac{13}{30} \times 100 = 43.333... \%$

Can't use equivalence easily to find 'per hundred'

Decimal percentages are still a percentage

Simple and compound interest

Simple Interest

James invests £2000 at 5% simple interest

100% → 5% → £2000 → £100

The original value increases by this amount every year

Compound Interest

Tess invests £100 at 10% compound interest for 3 years

Original amount: £100

Y1: £110 (10% increase)

Y2: £121 (10% increase)

Y3: £132.10 (10% increase)

The multiplier 1.10 repeats each year

Repeated percentage change

Compound Interest

Tess invests £100 at 10% compound interest for 3 years

£100 × 1.10 × 1.10 × 1.10

Original amount: £100

Repeated multiplier: 1.10

Number of occurrences: 3

Depreciation

Depreciation calculations use multipliers less than 1

Multipliers are commutative — an overall multiplier effect can be calculated by combining the multipliers separately

e.g. Increase of 10% then a reduction of 10% → $1.10 \times 0.90 = 0.99$ The multiplier

Growth and decay

Compound growth

Compound decay

Compound growth and compound decay are exponential graphs

Growth — the values increase exponentially. The constant multiplier is more than one

Decay — the values get closer to 0. The constant multiplier is less than one

Find the original value

Percentage calculations

Original amount × Multiplier = Final Value

In a test Lucy scored 60% of her questions correctly. Her score was 24. How many questions were on the test?

Original × 0.6 = 24

24 ÷ 0.6 = 40 marks

10% = 6
100% = 40

Total questions on test

A car sold for a profit £3000 with a profit of 20%. How much was the car originally?

Original × 1.2 = 3000

120% = £3000
10% = £250
100% = £2500