Y10 Maths Knowledge Organiser Foundation Tier: Percentages and Variation

What must I be able to do?

New content:

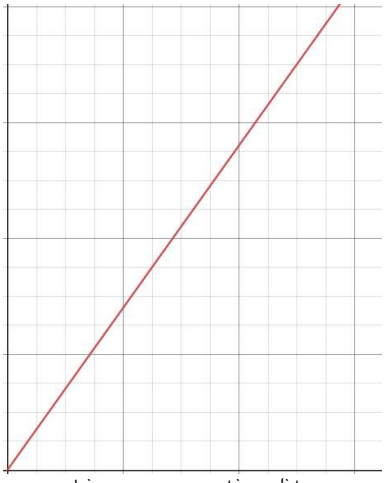
- ☐ Solve problems where two variables have a direct proportional relationship
  - ➢ Sparx U721
- ☐ Solve problems where two variables have an inversely proportional relationship
  - ➢ Sparx U357
- ☐ Calculate simple interest and compound interest
  - ➢ Sparx U533, U332

Key vocabulary

Constant of proportionality	The constant ratio between two proportional variables. Often represented with the letter k.
Direct proportion	As one variable increases, the other increases at the same rate
Inverse proportion	As one variable increases, the other decreases.
Simple interest	Interest is calculated once and remains the same amount for each period (e.g. year) and then added on.
Compound interest	Interest is re-calculated each period (e.g. year) from the new total amount and added on.

Direct Proportion

Example of direct proportionality and its graph



Linear proportionality

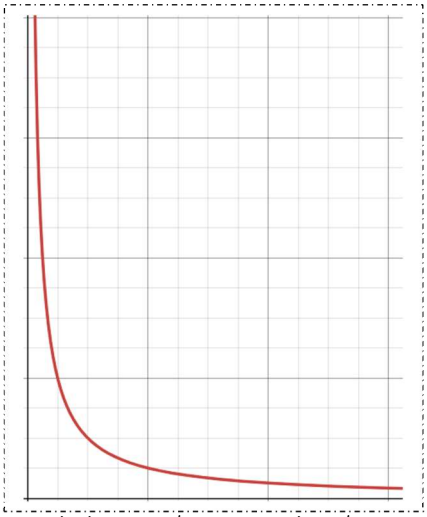
All direct proportion graphs start at (0, 0)

y is directly proportional to x

$y \propto x$

Inverse Proportion

Example of inverse proportionality and its graph



y is inversely proportional to x

$y \propto \frac{1}{x}$

Examples of direct and inverse proportion

Direct:

Two bananas cost £1.20. How much would 5 bananas cost?

Each banana has a fixed cost, you can scale down to the cost of 1 banana and then scale up to the cost of 5.

The more bananas you buy, the more it costs in total (both increase together)

Inverse:

It takes 2 men 3 days to build a wall. How long does it take 5 men?

This is inverse as 1 man will take **longer** not less time. 1 man would need 6 days (3 x 2).

From there you can find how long it takes 5 men (6 days divided by 5).

The more people working on the task, the less time it will take. (one increases, one decreases)

Increasing and decreasing by a percentage using multipliers

The starting value is always 100%. An increase takes it over 100% and a decrease takes it below 100%. Change the new percentage to a decimal to find the multiplier.

e.g. Increase £210 by 15%. 100% + 15% = 115%. 115% as a decimal is 1.15. So £210 x 1.15 = £241.50

e.g. Decrease £210 by 15% 100% - 15% = 85% 85% as a decimal is 0.85. So £210 x 0.85 = £178.50

Simple and compound interest

Viv wants to invest £2000 for 4 years in the same bank. At the end of 4 years, Viv wants to have as much money as possible. Which bank should she invest her £2000 in?

Option A
The International Bank
Compound Interest
6% for the first year
2% interest for each extra year

Option B
The Friendly Bank
Simple interest
3% each year

Option A

6% interest is 106% so 1.06 as a multiplier

2% interest is 102% so 1.02 as a multiplier

$2000 \times 1.06 \times 1.02^3 = £2249.76$

Power of 3 as it is 3 years at 2%
$1.02 \times 1.02 \times 1.02 = 1.02^3$

Option B

Simple interest so 3% of 2000 = 0.03 x 2000 = £60

£60 x 4 years = £240

£2000 + £240 = £2240

The International Bank will give more money after 4 years

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