

SUBJECT: Maths

UNIT: Year 10 Ratio and Proportion



Key Concepts

Simplify Ratio:

Divide both sides of the ratio by a the highest common factor.

The form 1:n

Divide both sides of the ratio by the value left hand side of the original ratio.

*This is the same method for n:1, but divide by the value on the right hand side.

Examples

Share £120 into the ratio 3:5.

Step 1. Draw 3 boxes and 5 boxes

Step 2. Add up the total number of boxes (8)

Step 3. $£120 \div 8 = £15$

Step 4. Put £15 in each box

Step 5. Add up the totals in each stack of boxes.



Key Concepts

When sharing into a ratio, follow these steps:

Step 1. Add up the total parts in the ratio.

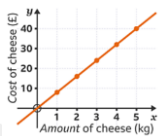
Step 2. Divide the original value by the total number of parts.

Step 3. Multiply each part of the ratio by the previous answer to find the new ratio.

Check! If you add the values in your answer, you should always get your original value!

Key Concept

A graph of two variables that are **directly proportional** will always have a **positive gradient** and start from the **origin**.



Directly Proportional:

When two variables are directly proportional, as one variable increases, the other also increases. Distance and Time are directly proportional; as the distance increases, the time taken to travel will increase.

Inversely Proportional:

When two variables are inversely proportional, as one variable increases, the other decreases. Speed and Time are inversely proportional; as your speed increases, the time taken to cover a distance will decrease.

Key Words

Examples – Direct Proportion

400g of Cheddar is £5.20. Work out the cost of 300g.

$$\begin{aligned} 400g &= £5.20 && (\div 4) \\ 100g &= £1.30 && (\times 3) \\ 300g &= £3.90 && (\times 3) \end{aligned}$$

Examples – Inverse Proportion

It takes 24 minutes for 4 people to paint a room. How long will it take 3 people at the same rate?

$$\begin{aligned} 4 &= 24 \text{ mins} && (\times 4) \\ 1 &= 96 \text{ mins} && (\div 3) \\ 3 &= 32 \text{ mins} && (\div 3) \end{aligned}$$

UNIT: Year 10 Algebra



Key Concept

<

Less Than

>

Greater than

≤

Less than or equal to

≥

Greater than or equal to

Examples

To factorise a quadratic, you need to identify the numbers that add to the coefficient of x and multiply to the number on the end.

$$x^2 + 11x + 28$$

List the factors of 28 to identify which pair also adds to 11:

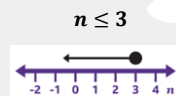
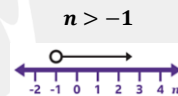
$$\begin{array}{l} \underline{28} \\ 1 \times 28 \\ 2 \times 14 \\ 4 \times 7 \end{array}$$

$$= (x + 7)(x + 4)$$

Key Concepts

When plotting inequalities, such as $x < 5$ on a number-line:

- Draw a circle above the number.
- Draw an arrow in the direction that the inequality is pointing (< to the left or > to the right).
- Shade in the circle if the inequality is \leq or \geq .



Key Words

Substitute: Replace a variable with the given value to calculate an answer.

Inequality: Similar to an equation, but one side is strictly greater than or less than the other side.

Factorise: Find a common factor of two or more terms and divide by this factor (put into brackets).

Solve: Find the solution to an inequality by doing the inverse operations.

Key Concept

$15x$ and 20 both have a common factor of 5. So if you were asked to **factorise**

$$15x + 20$$

then you would take the factor of 5 outside the brackets and divide both terms by 5 to get

$$5(3x + 4)$$

Examples

When solving an inequality, you must always perform inverse operations (the opposite) to eliminate terms.

$$\begin{array}{l} x + 5 < 12 \\ (-5) \quad | \quad (-5) \\ \hline x < 7 \end{array}$$

$$\begin{array}{l} x - 3 > 11 \\ (+3) \quad | \quad (+3) \\ \hline x > 14 \end{array}$$

$$\begin{array}{l} 9x \leq 36 \\ (\div 9) \quad | \quad (\div 9) \\ \hline x \leq 4 \end{array}$$

$$\begin{array}{l} \frac{x}{2} \geq 21 \\ (\times 2) \quad | \quad (\times 2) \\ \hline x \geq 42 \end{array}$$