The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Prime – Ratio and Proportion

Lesson Objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to share an amount into a ratio.	• Students will know how to represent a ratio using boxes or bars. • Students will know how to share a quantity into a two-part given ratio. • Students will know how to share a quantity into a three-part given ratio. • Students will know how to find quantities within a ratio when the value of one part is given. • Students will know how to find quantities within a ratio when the difference between two parts is given.	**Ratio** - a way of representing the relationship between two amounts **Simplify –** make something simpler or easier to manage	• Students should already know how to write and simplify ratios including writing them in the form 1 : n or n : 1. • Students should already know how to convert fractions into ratios and vice versa.	**Steps to Success - How do we share in a given ratio?** **Step 1:** Firstly, represent the ratio in the form of boxes – remember to assign the ratio in the order of the question. **Step 2:** Count the number of the parts within the question. Divide the total amount by the number of parts. This will give you the amount that each part is worth. **Step 3:** Write the value of each part within the box and calculate the totals for each section of the ratio. **Step 4:** Check if the question is asking to share between a ratio or for a specific value within the ratio. **Steps to Success: Ratio - Given one value** Step 1: Firstly, represent the ratio in the form of boxes – remember to assign the ratio in the order of the question. Step 2: If you are given one value divide the amount by the number of parts for the person it is referring to. Step 3: Write the value of each part within the box and calculate the totals for each section of the ratio. Step 4: Check if the question is asking for one value or for the total amount. **Steps to Success Ratio – Given the difference** Step 1: Firstly, represent the ratio in the form of boxes – remember to assign the ratio in the order of the question. Step 2: Count the difference in the number of the parts within the question. Divide the difference by the difference in the number of parts. This will give you the amount that each part is worth. Step 3: Write the value of each part within the box and calculate the totals for each section of the ratio. Step 4: Check if the question is asking for one value or for the total amount.	
To learn how to solve ratio problems.	• Students will know how to combine two ratios in the form a:b, b:c etc. and use them for comparison between three parts. • Students will know how to solve more complex, worded problems including those involving fractions, percentages, money etc. **Opportunities for Challenge:** • Students will know how to solve more complex ratio problems including those where they need to write a ratio as a fraction.		• Students need to know how to share an amount using a ratio. • Students need to know how to simplify ratios.	**Steps to success - How do we combine ratios?** **Step 1:** Check whether you have been given two ratios where you have been given a common element between the two ratios. **Step 2:** Find the LCM of the two parts that are in common. **Step 3:** Multiply both ratios in order to make the parts in common equal. **Step 4:** Combine the two ratios, simplify if possible. **Step 5:** Check if the question is asking to share between the combined ratio, the simplified combined ratio or a different ratio.	

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To learn how to solve problems involving recipes.	• Students will know how to solve more complex problems involving recipes.	**Proportion –** a part, share, or number considered in comparative relation to a whole **Direct Proportion –** If two things are directly proportional then if one increases, so does the other, if one decreases, then so does the other	• Students need to know how to scale up simple recipes.	**Steps to Success – How do you scale up/down recipes?** To begin you need to **Identify** whether the ingredients in the recipe are being scaled up or down, if the new amount is bigger it is scaling up, if it is smaller you are scaling down. There are **multiple** methods that can be carried out to find the ingredients for the new recipe: **Method 1**: Find the ingredients **required** if the recipe was for one person, to do this divide the ingredients by the amount the recipe is made for. E.g. If the recipes was for 6 people, divide by 6. Once you have achieved this multiply it by the amount the recipe is now for. **Method 2**: **Express** the ingredient you are trying to find as a ratio with the amount the recipe shows. **Simplify** to find the amount required for one. Then multiply by the amount needed. **Method 3**: Find the recipe for a **common factor** of people, and then scale up.	
To learn how to identify best buys.	• Students will know how to find the best buy by either finding the value of one item for each option or finding the value of a common multiple of each item. • Students will know how to find the best buy in more complex scenarios where percentage discounts or fractions are also involved.	**Value** – how much money something is worth	• Students need to know how to find the LCM of two numbers.	**Steps to Success – Comparing prices to find the best buy** **Method 1 – Finding the price of one item and comparing.** **Step one: Identify** if you are being asked to **compare** prices or find the **cheapest** option, if so do the following. **Step two:** You need to compare the price, this can be done by dividing the price by the **quantity** you have of each item. This will give you the cost for 1 unit of that item. **Step three:** Compare the prices for each **unit**, the lowest price is the best buy. **Step four:** Identify what the question is asking you for, is it asking for the cheapest item? Remember to write the name of the cheapest item and give your **reasoning**. Do not circle which is cheapest. **Method 2 – Finding the LCM of each item and comparing.** **Step one:** Identify if you are being asked to compare prices or find the cheapest option, if so do the following. **Step two:** You need to find the lowest common multiple (LCM) of the quantities of each item. **Step three:** Multiply the cost of each item in order to get the LCM quantity of each item, this is so you can compare. **Step four:** Compare the prices for each item, the lowest price is the best buy. **Step five:** Identify what the question is asking you for, is it asking for the cheapest item? Remember to write the name of the cheapest item and give your reasoning. Do not circle which is cheapest.	

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To learn how to convert currencies.	• Students will know how to convert between different currencies. • Students will know how to solve problems involving the conversions of different currencies. • Students will know how to convert currencies using a conversion graph. • Students will know how to convert currencies using a conversion graph for currencies that are not necessarily marked on the axes of the graph.	**Currency** – a system of money in general use in a particular country. **Convert** – change/ swap to	• Students need to know how to plot coordinates and draw straight line graphs.	**Steps to Success – Currency Conversion** Step one – Write out the conversions and label with arrows. Step two – Decide which direction involves multiplication and label this arrow. Step three – Decide which direction involves division and label this. Step four – Use the diagrams to convert appropriately. (When multiple conversions are needed work through those one at a time.)	
To learn how to solve real life problems involving direct and inverse proportion.	• Students will know the difference between direct and inverse proportion. • Students will know how to solve real life problems involving direct proportion without using algebra. • Students will know how to solve real life problems involving inverse proportion without using algebra (e.g. number of worker problems etc.).	**Inverse** – Opposite **Inverse Proportion** – If two things are inversely proportional then as one increases the other decreases or vice versa	• Students need to know how scale up a recipe or convert currencies.	**Direct Proportion – Steps to Success** **Step 1**: Express the proportions as a **ratio** and decide if you are increasing or decreasing the proportion. If you are finding a greater amount than the value in the question you are increasing, if you are finding a smaller amount you are decreasing. **Step 2**: Dependant on the question you may need to find the unitary value for one of the proportions, to do this you would divide both parts of the ratio by the original proportion. **Step 3:** If you then needed to find a greater amount, you would multiply both parts of the ratio to find the required proportion. **Inverse Proportion – Steps to Success** **Step 1**: Express the proportions as a **ratio.** **Step 2:** Decide which proportion is being changed and how, remembering if one side of the proportion increases, then the other would have to decrease. **Step 3:** If you then needed to find a greater amount, you would multiply both parts of the ratio to find the required proportion. **Double check that your answer makes sense for what is being asked.**	
To learn how to solve algebraic direct proportion problems	• Students will know how to solve algebraic direct proportion problems by writing an algebraic statement in the form y = kx • Students will know that k is known as the constant of proportionality. **Opportunities for Challenge:** • Students will know how to solve algebraic direct proportion problems involving powers and roots.	**Direct Proportion –** If two things are directly proportional then if one increases, so does the other, if one decreases, then so does the other **Constant** – a quantity or parameter that does not change its value whatever the value of the variables	• Students need to know how to substitute numbers into formulae. • Students need to know how to solve simple one step equations in the form a = bx.	**Steps to Success – Algebraic Direct Proportion** If y is directly proportional to x, this can be written as $y \propto x$ An equation of the form $y = kx$ represents direct proportion, where k is the **constant of proportionality**. **Step 1:** Write out the equation y = kx, attaching the appropriate power to the 'x' and using the **variables** given in the question. **Step 2: Substitute** in the given values. **Step 3: Solve** the resulting **equation** to find k. **Step 4:** Rewrite the equation with the value for k. **Step 5:** Substitute in the given value to find the missing variable the question asks for.	

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To learn how to solve algebraic inverse proportion problems	• Students will know how to solve algebraic inverse proportion problems using y = k/x before **Opportunities for Challenge:** •Students will know how to solve algebraic inverse proportion problems involving powers and roots.	**Inverse Proportion** – If two things are inversely proportional then as one increases the other decreases or vice versa	• Students need to know how to substitute numbers into formulae. • Students need to know how to solve one step equations involving fractions.	**Steps to Success – Algebraic Inverse Proportion** If y is inversely proportional to x, this can be written as $y \propto \frac{1}{x}$. An equation of the form $y = \frac{k}{x}$ represents inverse proportion. **Step 1:** Write out the equation $y = \frac{k}{x}$ with the **variables** given in the question **Step 2: Substitute** in the given values **Step 3: Solve** the resulting **equation** to find k **Step 4:** Rewrite the equation with the value for k **Step 5:** Substitute in the given value to find the missing variable the question asks for	
Mini-Assessment 5					