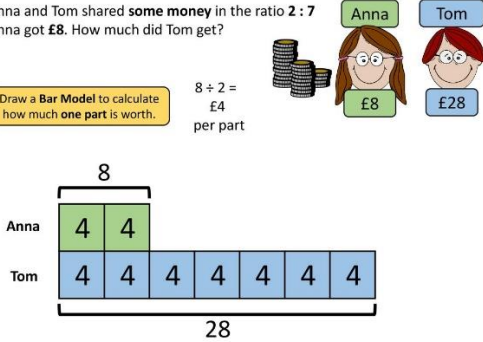
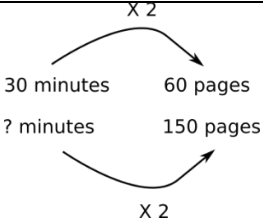
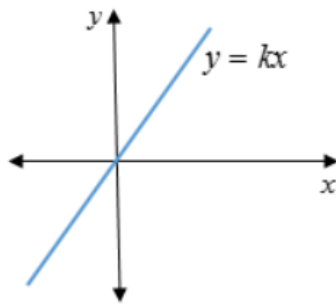
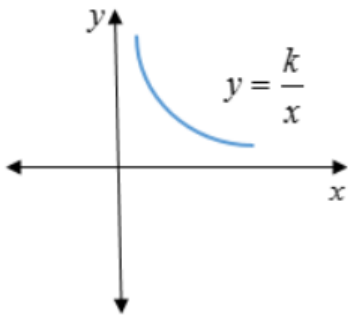
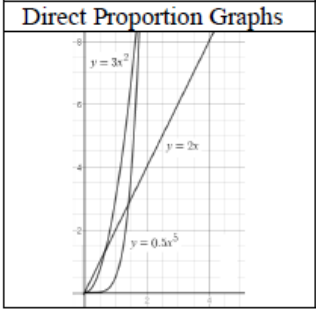
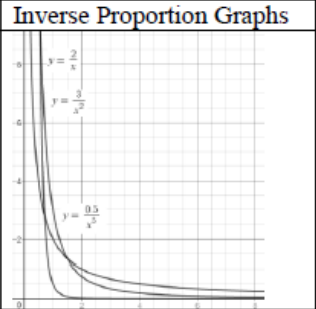


Topic: Ratio and Proportion Year 9

Topic/Skill	Definition/Tips	Example
Ratio	Ratio compares the size of one part to another part . Written using the ':' symbol.	$3 : 1$ 
Proportion	Proportion compares the size of one part to the size of the whole . Usually written as a fraction.	In a class with 13 boys and 9 girls, the proportion of boys is $\frac{13}{22}$ and the proportion of girls is $\frac{9}{22}$
Representing a ratio on a bar model	A bar model can be used to represent a ratio. Label each part, the total, differences and use it to find the value of one part.	Anna and Tom shared some money in the ratio 2 : 7 Anna got £8. How much did Tom get? Draw a Bar Model to calculate how much one part is worth. $8 \div 2 =$ £4 per part 
Simplifying Ratios	Divide all parts of the ratio by a common factor .	$5 : 10 = 1 : 2$ (divide both by 5) $14 : 21 = 2 : 3$ (divide both by 7)
Ratios in the form 1 : n or n : 1	Divide both parts of the ratio by one of the numbers to make one part equal 1 .	$5 : 7 = 1 : \frac{7}{5}$ in the form 1 : n $5 : 7 = \frac{5}{7} : 1$ in the form n : 1
Writing a ratio as a fraction	To write a part of a ratio as a fraction add the parts to get the total. That is the denominator. The ratio number is the numerator.	The ratio of cats to dogs is 3 : 7. What fraction are cats? Total = $3 + 7 = 10$ Fraction of cats = $\frac{3}{10}$
Sharing in a Ratio	Add the total parts of the ratio. Divide the amount to be shared by this value to find the value of one part. Multiply this value by each part of the ratio. Use only if you know the total.	Share £60 in the ratio 3 : 2 : 1. $3 + 2 + 1 = 6$ $60 \div 6 = 10$ $3 \times 10 = 30, 2 \times 10 = 20, 1 \times 10 = 10$ £30 : £20 : £10
Combining ratios	If the same quantity appears in multiple ratios you can combine the ratios. You need to match the ratio number by scaling up or down.	The ratio of red to green pens is 1 : 2 and the ratio of green : blue pens is 3 : 4. What is the ratio of red : green : blue? Match the green by scaling up to 6 R : G = 3 : 6 (multiplied by 3) G : B = 6 : 8 (multiplied by 2) Then the ratio of R: G: B = 3 : 6 : 8
Proportional Reasoning	Comparing two things using multiplicative reasoning and applying this to a new situation. Identify one multiplicative link and use this to find missing quantities.	

Unitary Method	Finding the value of a single unit and then finding the necessary value by multiplying the single unit value.	3 cakes require 450g of sugar to make. Find how much sugar is needed to make 5 cakes. 3 cakes = 450g So 1 cake = 150g ($\div$ by 3) So 5 cakes = 750 g ($\times$ by 5)
Ratio already shared	Find what one part of the ratio is worth using the unitary method .	Money was shared in the ratio 3:2:5 between Ann, Bob and Cat. Given that Bob had £16, found out the total amount of money shared. £16 = 2 parts So £8 = 1 part 3 + 2 + 5 = 10 parts, so $8 \times 10 = \text{£}80$
Best Buys	Find the unit cost by dividing the price by the quantity . The lowest number is the best value.	8 cakes for £1.28 $\rightarrow$ 16p each ($\div$ by 8) 13 cakes for £2.05 $\rightarrow$ 15.8p each ($\div$ by 13) Pack of 13 cakes is best value.
Direct Proportion	If two quantities are in direct proportion, as one increases, the other increases by the same percentage. 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.	
Inverse Proportion	If two quantities are inversely proportional, as one increases, the other decreases by the same percentage. 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.	
Using proportionality formulae	Direct: $y = kx$ or $y \propto x$ Inverse: $y = \frac{k}{x}$ or $y \propto \frac{1}{x}$ 1. Solve to find k using the pair of values in the question. 2. Rewrite the equation using the k you have just found. 3. Substitute the other given value from the question in to the equation to find the missing value.	p is directly proportional to q. When $p = 12$, $q = 4$. Find p when $q = 20$. 1. $p = kq$ $12 = k \times 4$ so $k = 3$ 2. $p = 3q$ 3. $p = 3 \times 20 = 60$, so $p = 60$

Direct Proportion with powers	Graphs showing direct proportion can be written in the form $y = kx^n$ Direct proportion graphs will always start at the origin.	
Inverse Proportion with powers	Graphs showing inverse proportion can be written in the form $y = \frac{k}{x^n}$ Inverse proportion graphs will never start at the origin.	
Map scales and scale diagrams	A scale can be written as a ratio, 1 : n. To find the distance in real life from the scale model you multiply by n. To find the distance needed in a scale diagram from a real life measurement you divide by n. You may need to convert units.	A map scale is 1:100 000. How far is a distance of 3cm on the map in real life in km? $3 \times 100000 = 300000cm$ $= 3000m = 3km$
Where else is the Ratio and Proportion topic used: Angles Measures Probability Fractions, decimals and percentages Algebra Data handling		Links to other subjects: