

## Ratio, proportion and rates of change

KS3 R&P (a)	Change freely between related standard units [for example time, length, area, volume/capacity, mass]
KS4 R&P (1)	Change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, <u>density</u> , <u>pressure</u> ) in numerical and <u>algebraic</u> contexts
KS3 R&P (b)	Use scale factors, scale diagrams and maps
KS4 R&P (2)	Use scale factors, scale diagrams and maps
KS3 R&P (c)	Express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1
KS4 R&P (3)	Express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1
KS3 R&P (d)	Use ratio notation, including reduction to simplest form
KS4 R&P (4)	Use ratio notation, including reduction to simplest form
KS3 R&P (e)	Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio
KS4 R&P (5)	Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)
KS3 R&P (f)	Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction
KS4 R&P (6)	Express a multiplicative relationship between two quantities as a ratio or a fraction
KS3 R&P (g)	Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions
KS4 R&P (7)	Understand and use proportion as equality of ratios
KS4 R&P (8)	Relate ratios to fractions and to linear functions
KS3 R&P (h)	Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics
KS4 R&P (9)	Define percentage as 'number of parts per hundred'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics
KS3 R&P (i)	Solve problems involving direct and inverse proportion, including graphical and algebraic representations
KS4 R&P (10)	Solve problems involving direct and inverse proportion, including graphical and algebraic representations
KS3 R&P (j)	Use compound units such as speed, unit pricing and density to solve problems.
KS4 R&P (11)	Use compound units such as speed, rates of pay, unit pricing, <u>density</u> and <u>pressure</u>
KS4 R&P (12)	Compare lengths, areas and volumes using ratio notation; <u>make links to similarity (including trigonometric ratios)</u> and scale factors
KS4 R&P (13)	<u>Understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y ; construct and interpret equations that describe direct and inverse proportion</u>
KS4 R&P (14)	<u>Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion</u>
KS4 R&P (15)	<b>Interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts</b>
KS4 R&P (16)	<u>Set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes.</u>