

YEAR 9, MASTERY, RATIO, PROPORTION AND RATES OF CHANGE, MATHS

Rationale and Context of Unit:	Core curriculum content:	Tier 2 & Tier 3 vocabulary explicitly taught:
<p>Prior key stage 3 content reviewed using pre-tests and whiteboard work at the start of each topic.</p> <p><u>PROPORTIONAL REASONING</u></p> <p><u>Ratio</u> You will explore the uses of ratio</p> <ul style="list-style-type: none"> • Identify ratio in a real-life context • Write a ratio to describe a situation <p><u>Proportion</u> You will investigate the connection between ratio and proportion and solve problems involving proportional reasoning and compound units</p> <ul style="list-style-type: none"> • Identify proportion in a situation • Find a relevant multiplier in a situation involving proportion • Use fractions fluently in situations involving ratio or proportion • Understand the connections between ratios and fractions • Understand the meaning of a compound unit • Know the connection between speed, distance and time • Solve problems involving speed 	<p><u>RATIO AND PROPORTION</u></p> <ul style="list-style-type: none"> • Identify and work with fractions in ratio problems • Express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 • Use ratio notation, including reduction to simplest form • 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 and concentrations) • Express a multiplicative relationship between two quantities as a ratio or a fraction • Understand and use proportion as equality of ratios • Relate ratios to fractions and to linear functions 	<p>Ratio, proportion, quantity, fraction, simplest form, conversion, comparison, scaling.</p> <p>Highlighted words MUST be explicitly taught, defined and recorded in student books as they are first met. Other listed words may be introduced verbally or written in a similar format.</p>

<ul style="list-style-type: none"> Identify when it is necessary to convert quantities in order to use a sensible unit of measure 		
<p>Challenge and Support:</p>	<p>World wide learning/ links to 21st century:</p>	<p>Cultural capital/ Industry/ Enrichment:</p>
<p>Ratio, proportion and rates of change</p> <ol style="list-style-type: none"> change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts use scale factors, scale diagrams and maps express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 use ratio notation, including reduction to simplest form 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) express a multiplicative relationship between two quantities as a ratio or a fraction 	<ul style="list-style-type: none"> Outside of the maths class, it is easy to recognize ratios in the real world. Common examples include comparing prices per ounce while grocery shopping, calculating the proper amounts for ingredients in recipes and determining how long car trip might take. Other essential ratios include pi and phi (the golden ratio). 	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Search Algebra for all ages</p> <p>NRICH website – access current articles and enrichment activities.</p> </div> </div> <ul style="list-style-type: none"> NRICH provides thousands of free online mathematics resources for ages 3 to 18 - completely free and available to all via their website (nrich.maths.org/). These resources aim to: <ul style="list-style-type: none"> Enrich and enhance the experience of the mathematics curriculum for all learners Develop mathematical thinking and problem-solving skills Offer challenging, inspiring and engaging activities Problem solving opportunities – Applied Mathematics.

<p>7. understand and use proportion as equality of ratios</p> <p>8. relate ratios to fractions and to linear functions</p> <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</p> <p>10. solve problems involving direct and inverse proportion, including graphical and algebraic representations</p> <p>11. use compound units such as speed, rates of pay, unit pricing, density and pressure</p> <p>12. compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors</p> <p>9</p> <p>13. understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$;</p>		<ul style="list-style-type: none"> • Challenge problems. • Extension work. • Assessment sections in texts
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<p>construct and interpret equations that describe direct and inverse proportion</p> <p>14. interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion</p> <p>15. 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</p> <p>16. set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes.</p>		
<p>Historical, Social, Moral, Spiritual, Cultural context:</p>	<p>Cross curricular links/ literacy/numeracy:</p>	<p>Common misconceptions:</p>
<ul style="list-style-type: none"> Ratio is used in many different real life situations. Converting between different currencies, working out which packet of crisps is the best value, mixing cement and scaling up a recipe all involve using ratios 	<ul style="list-style-type: none"> Science: science can provide the context for many basic ratio problems such as concentration of substances within a chemical compound. Geography: statistics on populations in different parts of the world at different periods, given as ratios and categorised according to the requirements/limitations of the data. Art: see proportion wheel for creating art cards of different sizes by reducing pictures in different proportions. 	<ul style="list-style-type: none"> Some pupils may think that a:b always means part:part Some pupils may try to simplify a ratio without first ensuring that the units of each part are the same Many pupils will want to identify an additive relationship between two quantities that are in proportion and apply this to other quantities in order to find missing amounts

- Literacy: Interpretation of written problems with conversion between these types of problems to pictorial and number representation.
- Correct use of specialised vocabulary.

Assessment timeline:

- Topic test assessments are conducted at the end of each topic. These are roughly after 2 weeks per topic, but this may vary.
- Pre-checks are conducted at the start of the topic to test student prior knowledge. This informs lesson planning and delivery.
- Tracking assessments are conducted once a term with end of year formal exams, for reporting and checking cumulative knowledge.
- Testing data leads to discussions about setting, intervention groups and individual in-class intervention.
- All students have access to a wide range of resources to develop their understanding.

Home learning

- Homework is set weekly for each group. This will often be via interactive websites with immediate feedback and support.
- Teachers have the autonomy to use whichever resource they wish within the criteria set for the topic.
- Students have access to lots of resources at home, including: Kerboodle, MyMaths, Mathswatch, PiXL Maths APP, PiXL Tmes Table App.

Feedback

- Feedback is given after each topic test, tracking assessment and end of year exams. After tracking and end of year exams, this will include “Formative Marking” sheets which give feedback question by question to help support the students with priorities for further work.

Length of unit (duration indicated in lessons)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Unit:																													