


YEAR 10, FOUNDATION 3 YEAR GCSE, RATIO, PROPORTION AND RATES OF CHANGE, MATHS

| Rationale and Context of Unit: | Core curriculum content: | Tier 2 & Tier 3 vocabulary explicitly taught: |
|---|---|--|
| <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><u>CALCULATING WITH PERCENTAGES</u></p> <ul style="list-style-type: none"> Solve problems involving percentage change, including: <ul style="list-style-type: none"> percentage increase / decrease problems original value problems simple interest, including in financial mathematics | <p>Percentage, out of 100, increase, decrease, original value, simple interest</p> <p>Highlighted words <u>MUST</u> 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> |

| Challenge and Support: | World wide learning/ links to 21 st century: | Cultural capital/ Industry/ Enrichment: |
|--|--|---|
| <p>Ratio, proportion and rates of change</p> <ol style="list-style-type: none"> 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, density, pressure) in numerical and algebraic contexts 2. use scale factors, scale diagrams and maps 3. express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 4. use ratio notation, including reduction to simplest form 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) 6. express a multiplicative relationship between two quantities as a ratio or a fraction 7. understand and use proportion as equality of ratios 8. relate ratios to fractions and to linear functions 9. define percentage as 'number of parts per hundred'; interpret percentages and | <p>Businesses use percentage change to compare profits in different years. When you save or borrow money the interest is calculated using repeated percentage changes.</p> | <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. • Challenge problems. • Extension work. • Assessment sections in texts |

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

10. solve problems involving direct and inverse proportion, including graphical and algebraic representations

11. use compound units such as speed, rates of pay, unit pricing, density and pressure

12. compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors

9

13. understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$;

construct and interpret equations that describe direct and inverse proportion

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

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: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |