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| **UNIT 11: Ratio and Proportion**  |

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**SPECIFICATION REFERENCES**

N11 identify and work with fractions in ratio problems

N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate

R1 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

R2 use scale factors, scale diagrams and maps

R3 express one quantity as a fraction of another

R4 use ratio notation, including reduction to simplest form

R5 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)

R6 express a multiplicative relationship between two quantities as a ratio or a fraction

R7 understand and use proportion as equality of ratios

R8 relate ratios to fractions and to linear functions

R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations

R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors

R13 understand that *X* is inversely proportional to *Y* is equivalent to *X* is proportional to ; interpret equations that describe direct and inverse proportion

R14 interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion

**PRIOR KNOWLEDGE**

Students should know the four operations of number.

Students should have a basic understanding of fractions as being ‘parts of a whole’.

**KEYWORDS**

Ratio, proportion, share, parts, fraction, function, direct proportion, inverse proportion, graphical, linear, compare

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| **11b. Proportion** (N13, R1, R5, R7, R10, R13, R14) | **Teaching time**4-6 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* Understand and use proportion as equality of ratios;
* Solve word problems involving direct and inverse proportion;
* Work out which product is the better buy;
* Scale up recipes;
* Convert between currencies;
* Find amounts for 3 people when amount for 1 given;
* Solve proportion problems using the unitary method;
* Recognise when values are in direct proportion by reference to the graph form;
* Understand inverse proportion: as *x* increases, *y* decreases (inverse graphs done in later unit);
* Understand direct proportion ---> relationship *y* = *kx*.

**POSSIBLE SUCCESS CRITERIA**

Recognise that two paints mixed red to yellow 5 : 4 and 20 : 16 are the same colour.

If it takes 2 builders 10 days to build a wall, how long will it take 3 builders?

Scale up recipes and decide if there is enough of each ingredient.

Given two sets of data in a table, are they in direct proportion?

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Problems in context, such as scaling a recipe, or diluting lemonade or chemical solutions, will show how proportional reasoning is used in real-life contexts.

**NOTES**

Find out/prove whether two variables are in direct proportion by plotting the graph and using it as a model to read off other values.

Possible link with scatter graphs.