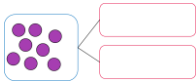




# Ratio and Proportion: Overview

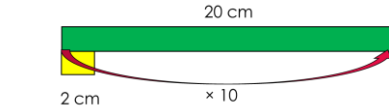
**Concepts:** Early correspondence, Solving problems that relate to scaling and ratio, Connecting fractions, decimals and percentages to proportion, Solve scaling problems in the context of measures or shape

Statements for Ratio and Proportion **only appear in the Year 6 National Curriculum** but should be connected to previous learning on multiplication and division, fractions, decimals and percentages and solving problems in context that involve scaling. These connections from the other curriculum strands have been mapped in Reception-Year 5 in this document.



"One for you, one for me"

Countries visited	
Each	● represents 10 people
France	● ● ● ● ●
Germany	● ● ● ● ● ● ● ● ● ● ●
America	● ●

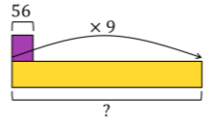


"Twenty is ten times the size as two".



"The mole is ten times the size. **For every one**, I need to use a ten."

A square of chocolate weighs 56 g. The packet weighs nine times as much as a square. How much does one packet weigh?

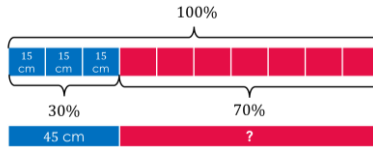


- Reception and Key Stage 1**
- Throughout EYFS and KS1 pupils gain confidence in using **one-to-one correspondence** e.g. when sharing equally into groups, "one for you, one for you"
  - By Year 2 pupils begin to explore **many-to-one correspondence** when using pictograms that use a symbol to represent 2, 5 or 10 objects.

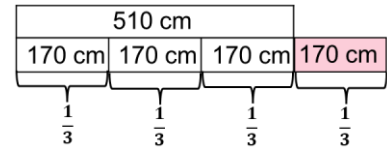
- Year 3**
- Solve problems involving multiplication and division, including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects
  - Understanding scaling by 10 as 'ten times as many'
  - Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts.
  - The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long or five times as high) and this connects to multiplication.

- Year 4**
- Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one digit, integer scaling problems and harder correspondence problems such as  $n$  objects are connected to  $m$  objects.
  - Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions.
  - Solve problems involving scaling by 10 and 100
  - Begin to understand that decimals and fractions are different ways of expressing numbers and proportions.

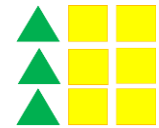
Fred cuts 30% from a length of wood. The length of wood he has cut is 25 cm. What was the original length of wood?



Iain jumped 5 m and 10 cm. The length of the sand pit is  $\frac{1}{3}$  of this distance again. How long is the sand pit?



"The ratio of triangles to squares is 1:2"



- Year 6**
- Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
  - Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
  - Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.
  - Solve problems involving similar shapes where the scale factor is known or can be found

- Year 5**
- Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.
  - Apply understanding of scaling to multiply and divide by 10, 100, and 1000
  - Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions  $> 1$ .
  - Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions
  - Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.



# Ratio and proportion: Concept breakdown

Note: Statutory Curriculum requirements are in **bold**

Statements for Ratio and Proportion **only appear in the Year 6 National Curriculum** but should be connected to previous learning on multiplication and division, fractions, decimals and percentages and solving problems in context that involve scaling. These connections from the other curriculum strands have been mapped in Reception-Year 5 in this document.

	Reception and KS1	→	Year 3	→	Year 4	→	Year 5	→	Year 6
<b>Early understanding of correspondence</b>									
Early Correspondence	<p>Throughout EYFS and KS1 pupils gain confidence in using <b>one-to-one correspondence</b> e.g. when sharing equally into groups, “one for you, one for me”. By Year 2, pupils should begin to explore <b>many-to-one correspondence</b> e.g. when using pictograms that use a symbol to represent 2, 5 or 10 objects as in <a href="#">Y2 Unit 5</a></p>								
<b>Solving multiplicative problems in context that relate to scaling and ratio</b>									
Scaling and ratio Problems	<p>Throughout Reception and KS1 pupils should explore early ideas around scaling when doubling, halving, sharing, grouping and multiplying. E.g. Jamie has twice as many as Rita.</p>								
	<p><b>Solve problems involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects</b> (from Multiplication and Division NC strand) <a href="#">Unit 7; Unit 12</a></p> <p>Solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts. <a href="#">Unit 12</a></p>		<p><b>Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects</b> (from Multiplication and Division NC strand) <a href="#">Unit 3; Unit 5</a></p> <p>Solve two-step problems in contexts choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children. <a href="#">Unit 10</a></p>		<p><b>Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates</b> (from Multiplication and Division NC strand) <a href="#">Unit 4, Unit 8</a></p>		<p><b>Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts</b> <a href="#">Unit 10</a></p> <p>Pupils begin to use the notation <math>a:b</math> to record their work <a href="#">Unit 10</a></p> <p>Pupils solve problems involving unequal quantities, for example, ‘for every egg you need three spoonfuls of flour’, <a href="#">Unit 10</a></p>		



# Ratio and proportion: Concept breakdown

Note: Statutory Curriculum requirements are in **bold**

Reception and KS1 → Year 3 → Year 4 → Year 5 → Year 6					
<b>Solving multiplicative problems in context that relate to scaling and ratio (continued)</b>					
Scaling by powers of 10		<p>Understanding scaling by 10 as 'ten times as many' <a href="#">Unit 7</a></p>	<p>Solve problems involving scaling by 10 and 100 <a href="#">Unit 3</a></p>	<p>Apply understanding of scaling to <b>multiply and divide whole numbers and decimals by 10, 100 and 1,000</b> <a href="#">Unit 4</a></p>	<p>Continue to practise multiplying and dividing by powers of ten through Maths Meetings and/or Arithmetic sessions.</p>
<b>Connecting fractions, decimals and percentages to proportion</b>					
Connecting fractions, decimals and percentages to proportion	<p>Throughout Reception – Year 3 pupils may begin to use simple fractions e.g. one half, in the context of proportion – showing how one amount relates to another. For example. "Half of the class are boys, half are girls." "Three quarters of the class have pets, One quarter does not have a pet."</p>	<p>Pupils begin to understand that decimals and fractions are different ways of expressing numbers and proportions. <a href="#">Unit 6</a></p>	<p>Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions &gt; 1. <a href="#">Unit 8</a> Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions <a href="#">Unit 6</a>, <a href="#">Unit 8</a></p>	<p><b>Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison</b> <a href="#">Unit 5</a>  Pupils solve problems involving unequal quantities, for example, <math>\frac{5}{3}</math> of the class are <b>boys</b>. <a href="#">Unit 10</a></p>	
<b>Solve scaling problems in the context of measures or shape</b>					
Scaling in the context of measure or shape		<p>Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts. <a href="#">Unit 12</a> The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long or five times as high) and this connects to multiplication <a href="#">Unit 11</a></p>	<p>Pupils continue to solve increasingly complex problems in contexts including measures and scaling. <a href="#">Unit 10</a></p>	<p><b>Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.</b> (from Measures NC strand) <a href="#">Unit 11</a></p>	<p><b>Solve problems involving similar shapes where the scale factor is known or can be found</b> <a href="#">Unit 10</a></p>