

# Unit 5

## Fractions, decimals, percentages, ratio and proportion

Five daily lessons

Year 5  
Summer term

### Unit Objectives

#### Year 5

- **Relate fractions to division**, and use division to find simple fractions, including tenths and hundredths of numbers and quantities.
- Find fractions and simple percentages of small whole-number quantities.
- Solve problems involving ratio and proportion.
- **Develop calculator skills and use a calculator effectively.**

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### Link Objectives

#### Year 4

- Begin to relate fractions to division and find simple fractions such as  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ ,  $\frac{1}{10}$  of numbers or quantities. Find fractions such as  $\frac{2}{3}$ ,  $\frac{3}{4}$ ,  $\frac{3}{5}$ ,  $\frac{7}{10}$ ... of shapes.
- Begin to use ideas of simple proportion; for example, 'one for every...' and 'one in every...'.

(Key objectives in bold)

#### Year 6


- **Use a fraction as an 'operator' to find fractions**, including tenths and hundredths, of numbers or quantities (e.g.  $\frac{5}{8}$  of 32,  $\frac{7}{10}$  of 40,  $\frac{9}{100}$  of 400 cm).
- **Solve simple problems involving ratio and proportion.**
- **Understand percentage as the number of parts in every 100.** Express simple fractions such as: one half, one quarter, three quarters, one third, two thirds, and tenths and hundredths, as percentages (e.g. know that  $\frac{1}{3} = 33\frac{1}{3}\%$ ).
- **Find simple percentages of small whole-number quantities** (e.g. find 10% of £500, then 20%, 40% and 80% by doubling).
- Develop calculator skills and use a calculator effectively.

This Unit Plan is designed to guide your teaching. You will need to adapt it to meet the needs of your class.

### Resources needed to teach this unit:

- Resource sheet 5.1
- Resource sheet 5.2
- OHT 5.1
- OHT 5.2
- OHT 5.3
- 1 m length of ribbon or string marked in tenths
- Fun size boxes of coloured sweets
- Counting stick
- OHP counters
- Counters
- Cubes
- Whiteboards
- OHP calculator
- Calculators
- Large interlocking cubes
- Selection of small boxes/bags

Planning sheet	Day One	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>	Term: Summer	Year Group: 5
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>Multiply and divide whole numbers up to 10 000 by 10 or 100.</p> <p>VOCABULARY multiply (by) product share divide quotient</p> <p>RESOURCES OHT 5.1</p>	<ul style="list-style-type: none"> <li>Write 6 on the board.</li> </ul> <p><b>Q</b> What is ten times 6?</p> <p>Record below the 6 in this way:</p> <p>6 60</p> <ul style="list-style-type: none"> <li>Continue questioning and recording.</li> </ul> <p><b>Q</b> What is ten times 60?</p> <p>6 60 600</p> <p><b>Q</b> What is ten times 600?</p> <p>6 60 600 6000</p> <p><b>Q</b> What happens to the 6 each time we multiply by 10?</p> <p>Establish that the digit moves a place to the left each time it is multiplied by 10.</p> <ul style="list-style-type: none"> <li>Invite the children to turn to a partner and discuss what might happen to the digits in a number when it is divided by 10.</li> </ul> <p>Take feedback and illustrate by referring to the pattern you've established:</p> <p>6 60 600 6000</p> <ul style="list-style-type: none"> <li>Display the place value chart OHT 5.1. Make sure that the children know how it works. Put a counter on 6 and show, by moving the counter, what happens when it is multiplied by 10, 100. Similarly put a counter on 6000 and show what happens when it is divided by 10, 100.</li> <li>Now put counters on any whole number, e.g. 60 and 5 to show 65.</li> </ul> <p><b>Q</b> What will 65 x 100 be?</p> <p>Move counters to check. Continue, showing any whole numbers and multiplying/dividing by 10 or 100.</p>	<p>Relate fractions to division, and use division to find simple fractions, including tenths and hundredths of numbers and quantities.</p> <p>Develop calculator skills and use a calculator effectively.</p> <p>VOCABULARY fraction names</p> <p>RESOURCES Calculators</p>	<ul style="list-style-type: none"> <li>Present this problem to the children:  'You have won a competition and you have been given a choice of prizes either: <math>\frac{1}{4}</math> of £200 or <math>\frac{1}{5}</math> of £220.'</li> </ul> <p><b>Q</b> Which would you choose and why?</p> <p>Allow the children to discuss this in pairs and then take feedback. Model some calculations on the board, stressing the links between division and fractions.</p> <ul style="list-style-type: none"> <li>Give the children this problem;  41 280 people entered the London marathon. <math>\frac{1}{5}</math> of them wore fancy dress. How many people wore fancy dress?</li> </ul> <p>Allow the children to work in pairs with calculators.</p> <p>Establish that the answer is 8256.</p> <p><b>Q</b> If 8256 is one fifth, what would two fifths be?</p> <p><b>Q</b> What would <math>\frac{4}{5}</math> be?</p> <ul style="list-style-type: none"> <li>Ask the children to investigate other fractions of 41 280 that give a whole number answer.</li> </ul>	<p><b>Q</b> What other fractions/ amounts did you find?</p> <p><b>Q</b> Which is the larger amount, <math>\frac{2}{3}</math> of a 330ml can of cola or <math>\frac{2}{5}</math> of a litre bottle of cola?</p> <ul style="list-style-type: none"> <li>Discuss with the children their methods and solutions.</li> <li>Draw attention to the fact that when quantities are involved, <math>\frac{2}{5}</math> can result in a larger amount than <math>\frac{2}{3}</math>. Illustrate by using number lines:</li> </ul> <p><math>\frac{1}{3}</math>      <math>\frac{2}{3}</math></p> <p>0      110      220      330 ml</p> <p><math>\frac{1}{5}</math>   <math>\frac{2}{5}</math>   <math>\frac{3}{5}</math>   <math>\frac{4}{5}</math></p> <p>0      200      400      600      800      1000 ml</p> <p><b>By the end of the lesson the children should be able to:</b></p> <ul style="list-style-type: none"> <li>Relate fractions to division;</li> <li>Find fractions of numbers and quantities;</li> <li>Use a calculator to respond to questions.</li> </ul> <p>(Refer to supplement of examples, section 6, page 25.)</p>

Planning sheet	Day Two	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>	Term: Summer	Year Group: 5
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
<p>Use vocabulary to express simple ratios.</p> <p>VOCABULARY ratio for every</p> <p>RESOURCES 1m length of ribbon – marked in tenths</p>	<ul style="list-style-type: none"> <li>Show children a piece of ribbon and establish length as 1 metre and marked intervals as 10 cm.</li> </ul> <p>Fold the ribbon at the halfway point.</p>  <p><b>Q</b> What is the length of each part of the ribbon?</p> <p>Establish that if we compare these lengths they are 50 cm for every 50 cm.</p> <p><b>Q</b> Could this ratio be simplified?</p> <p>The ratio could be 1 cm for every 1 cm, 5 cm for every 5 cm, etc.</p> <ul style="list-style-type: none"> <li>Repeat the above folding the ribbon at different points e.g. 25 cm to 75 cm 10 cm to 90 cm</li> </ul> <p>Discuss simplifying the ratios.</p>	<p>Find simple percentages of whole number quantities.</p> <p>Develop calculator skills and use a calculator effectively.</p> <p>VOCABULARY percentage per cent % discount</p> <p>RESOURCES OHP calculator Class set of calculators</p>	<ul style="list-style-type: none"> <li>Write randomly on board: 50%, 25%, 10%, 1%, 480 ml, £360, 240 g, 4400 km.</li> <li>Invite the children to choose a percentage and an amount and make a statement about them, e.g. 50% of 240 g is 120 g.</li> </ul> <p><b>Q</b> How did you work it out?</p> <p>Draw out from the children's answers the relationship between percentages, fractions and division.</p> <ul style="list-style-type: none"> <li>Now write on the board 69% of £360.</li> </ul> <p><b>Q</b> Can you work out the answer in your head? (£248.40)</p> <p><b>Q</b> What makes this calculation more difficult?</p> <p>Establish that it is the percentage required.</p> <ul style="list-style-type: none"> <li>Using the overhead calculator, model the use of the percentage key.</li> <li>Write the original amounts (480 ml, £360, 240 g, 4400 km) randomly on the board but now write the percentages which are more difficult (e.g. 87%, 36%, 58%, 29%, 63%, 17.5%).</li> <li>Let the children work in pairs choosing percentages and amounts as previously but this time recording facts as mathematical sentences, e.g. 17.5% of £360 is £63.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss any difficulties which arose in the main part of the lesson.</li> <li>Give the children this problem:  You need a new pair of trainers, which shop gives the best value?  Shop A    Cost £30    discount 30% Shop B    Cost £21    discount 12% Shop C    Cost £24    discount 35%</li> </ul> <p>Allow the children to work in pairs, using a calculator to solve this problem.</p> <p><b>Q</b> Which shop has the cheapest trainers?</p> <p><b>By the end of the lesson the children should be able to:</b></p> <ul style="list-style-type: none"> <li>Calculate key percentages mentally;</li> <li>Use a calculator to find percentages.</li> </ul> <p>(Refer to supplement of examples, section 6, page 25.)</p>

Planning sheet	Day Three	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>		Term: <i>Summer</i>	Year Group: 5
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities		Teaching Activities/Focus Questions
<p>Know simple fractions as percentages and decimals.</p> <p>VOCABULARY equivalent</p> <p>RESOURCES OHT 5.2 Counting stick Whiteboards</p>	<ul style="list-style-type: none"> <li>Use a counting stick divided into tenths. Tell the class that the stick represents 0–1. Point to <math>\frac{2}{10}</math>.</li> </ul> <p><b>Q</b> What is the value of this point?</p> <p><b>Q</b> Can anyone describe this in a different way?</p> <p>Draw out that this point could be described as <math>\frac{2}{10}</math>, 0.2 or 20%. Repeat at a variety of intervals.</p> <ul style="list-style-type: none"> <li>Show OHT 5.2. Point to <math>\frac{7}{10}</math> and ask for equivalent values.</li> <li>Ask the children to select six different values from OHT 5.2, at least one from each row, and record on whiteboards. Point to an interval on the counting stick. If the children have the equivalent value they cross it out. The first child to cross out all four numbers wins.</li> </ul>	<p>Relate fractions to division, and use division to find simple fractions, including tenths and hundredths, of numbers and quantities.</p> <p>Find simple percentages of small whole-number quantities.</p> <p>RESOURCES OHT 5.3 Resource sheet 5.1 Calculator</p>	<ul style="list-style-type: none"> <li>Display OHT 5.3 together with the label 'Now <math>\frac{3}{4}</math> of original price!' (cover up 'You pay 75%!').</li> </ul> <p><b>Q</b> If the original price was £6, what will you now pay?</p> <p>Discuss methods. Draw out the relationship between fractions and division. Emphasise that halving is the process of dividing by 2.</p> <p>Model, with the help of the children, some of the strategies used and address any errors or misconceptions.</p> <ul style="list-style-type: none"> <li>Change the label for 'You pay 75%' and repeat the question. Draw out the link between 75% and <math>\frac{3}{4}</math>.</li> <li>Ask the children in pairs to consider other linked pairs, (e.g. <math>\frac{1}{5}</math> of original price and you pay 20%)</li> </ul> <p><b>Q</b> If you pay 15% what would the linked fraction be in its simplest form?</p> <ul style="list-style-type: none"> <li>Hand out Resource sheet 5.1 and ask the children to calculate and record the new price of each item.</li> </ul>		<p><b>Q</b> Which item was the cheapest?</p> <p><b>Q</b> Which offer saved you the most money?</p> <p>Refer the children to the last question on the sheet.</p> <p>Discuss approaches and strategies used.</p> <p><b>By the end of the lesson the children should be able to:</b></p> <ul style="list-style-type: none"> <li><b>Relate fractions to division;</b></li> <li><b>Find simple fractions and percentages of whole numbers.</b></li> </ul> <p>(Refer to supplement of examples, section 6, pages 25, 33.)</p>

[illegible]

Planning sheet	Day Five	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>		Term: <i>Summer</i>	Year Group: 5
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions	
<p>Recognise when two simple fractions are equivalent.</p>	<ul style="list-style-type: none"> <li>Ask four children to come out and match equivalent fractions.</li> </ul> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <math>\frac{3}{4}</math>  <math>\frac{20}{10}</math>  <math>\frac{4}{5}</math>  <math>\frac{10}{12}</math> </div> <div style="text-align: center;"> <math>\frac{5}{6}</math>  <math>\frac{10}{120}</math>  <math>\frac{4}{10}</math>  <math>\frac{1}{5}</math>  <math>\frac{50}{100}</math>  <math>\frac{75}{100}</math>  <math>\frac{8}{10}</math> </div> </div> <p>In pairs, the children complete the spider using fractions, decimals and percentages.</p> <div style="text-align: center;"> </div> <p>Discuss strategies used and deal with any misconceptions that arise.</p>	<p>Solve simple problems involving ratio and proportion.</p>	<ul style="list-style-type: none"> <li>Give the children this problem:  At the gym club there are two boys for every three girls. There are 15 girls at the club. How many boys are there at the club?  Allow the children time to solve this problem.</li> </ul> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">Q How did you solve this problem?</div> <p>Model the children's methods on the board.</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">Q There are 12 boys at the club, how many girls are there?</div> <p>Model the children's methods on the board.</p> <ul style="list-style-type: none"> <li>Give the children these problems to work through:               <ol style="list-style-type: none"> <li>Chicken must be cooked for 50 minutes for every kg. How long does it take to cook a 3 kg chicken?</li> <li>A mother seal is fed five fish for every two fish for its baby. Alice fed the mother seal 15 fish. How many fish did the baby get? Alice fed the baby seal eight fish. How many did its mother get?</li> <li>For every 50p coin Mum gives Dad, he gives her five 10p coins. Dad gave Mum 25 10p coins. How many 50p coins did Mum give him?</li> <li>Kate wanted to make some lilac paint. She used one tin of purple paint to every three tins of white paint. If she used 16 tins altogether, how many purple tins did she use?</li> <li>Zara uses three tomatoes for every <math>\frac{1}{2}</math> litre of sauce. How much sauce can she make from 15 tomatoes? How many tomatoes does she need for 1 litre of sauce?</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Discuss any issues that have arisen during the lesson.</li> <li>Show the children a box containing a 'mystery' amount of cubes. Explain that you will give the children clues they need to work out how many cubes are in the box and the number of cubes of each colour.</li> <li>Read out the clues on Resource sheet 5.2. Encourage the children to make informal jottings to help them solve the clues. For box 4, extend by only reading the first two clues and asking the children to give a statement to identify the final number.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>By the end of the lesson the children should be able to:</b></p> <ul style="list-style-type: none"> <li>Use, read and write, spelling correctly, vocabulary to express simple ratios and proportions;</li> <li>Discuss statements such as: John has one stamp for every two that Mark has;</li> <li>Solve simple problems involving ratio and proportion.</li> </ul> <p>(Refer to supplement of examples, section 6, page 27.)</p> </div>	
<p>VOCABULARY fraction names equivalent</p>		<p>VOCABULARY proportion ratio 'in every...' 'four every...'</p> <p>RESOURCES Boxes Coloured cubes Resource sheet 5.2</p>			

<p>You get a quarter off!</p> <p>£40</p> 	<p>10% discount!</p> <p>£54</p> 	<p>Less 50%</p> <p>£17</p> 
<p>25% off!</p> <p>£16</p> 	<p>Now half price!</p> <p>£22</p> 	<p>Cut price <math>\frac{1}{3}</math> off</p> <p>£9.99</p> 
<p>Sale bonanza 20% discount</p> <p>£13</p> 	<p>The Teacher A horror film Not suitable for children</p> <p>You pay 15% less</p> <p>£19</p> 	<p>We refund <math>12\frac{1}{2}\%</math></p> <p>£26</p> <p>SALE</p> 

**Box 1**

There are between 10 and 20 cubes in the box.

There is one yellow cube for every four green cubes.

There is an odd number of cubes.

**Box 2**

There is an even number of cubes.

There is one red cube for every two blue cubes.

There are between 20 and 30 cubes in the box.

**Box 3**

There are two green cubes for every three pink cubes.

There is an odd number of cubes.

There are between 16 and 34 cubes in the box.

**Box 4**

There are between 15 and 40 cubes in the box.

There is an even number of cubes.

There are three yellow cubes for every four black cubes.

For information:

Box 1 contains 15 cubes – 3 yellow, 12 green

Box 2 contains 24 cubes – 8 red, 16 blue

Box 3 contains 25 cubes – 10 green, 15 pink

Box 4 contains 28 cubes – 12 yellow, 16 black



1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

