

**Unit 5**  
**Fractions, decimals and percentages, ratio and proportion**

Five daily lessons

*National*  
**Numeracy Strategy**

**Year 6**  
**Autumn term**

**Unit Objectives**  
**Year 6**

- **Round a number with two decimal places to the nearest tenth or to the nearest whole number.**
- Recognise the equivalence between decimal and fractions, forms.
- **Solve simple problems involving ratio and proportion.**

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**Link Objectives**

**Year 5**

- Round a number with one or two decimal places to the nearest integer.
- Relate fractions to their decimal representations.

**Year 7**

- Recognise the equivalence of percentages, fractions and decimals.

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:**

- OHT 5.1
- OHT 5.2
- Counting stick
- Calculators
- OHP calculator
- Yellow area linking cubes
- Whiteboards

(Key objectives in bold)

Planning sheet	Day One	Unit 5	Fractions, decimals and percentages, ratio and proportion	Term: Autumn	Year Group: 6
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.</p> <p>Find simple percentages.</p> <p>VOCABULARY equivalent percentage decimal fraction</p>	<ul style="list-style-type: none"><li>Write a selection of fractions and percentages on the board e.g. <div><div>26%</div><div><math>\frac{3}{5}</math></div></div><div><div>70%</div><div>0.8%</div></div><div><div>0.26%</div><div><math>\frac{1}{4}</math></div></div><div><div>0.6%</div><div>74%</div></div><div><div>25%</div><div><math>\frac{3}{4}</math></div></div><div><div>0.25%</div><div>0.75%</div></div></li></ul> <div><p>Q Find a fraction greater than... Between... Less than... Which fraction is equivalent to... Which two fractions total a whole? A half?</p></div> <p>Ask questions like:</p> <div><p>Q If I have £100 how much is <math>\frac{3}{4}</math>? 0.25? three fifths?</p></div>	<p>Find pairs with sum of 100, multiples of 50 with sum of 1000, decimals with sum of 1, 10.</p> <p>VOCABULARY number pairs complements explain your reasoning</p> <p>RESOURCES OHT 5.1 OHT 5.2 Counting stick</p>	<ul style="list-style-type: none"><li>Explain that today's work will focus on complements. Discuss the meaning of this. Use OHT 5.1. Cover up 33.</li></ul> <div><p>Q What is the complement to 100?</p></div> <ul style="list-style-type: none"><li>Show/discuss how they can use the grid to help their calculations of completion. Repeat with different numbers. Repeat process with 0.1 – 1 grid, OHT 5.2, recording examples.</li><li>Demonstrate, using the counting stick with questions like: Range from 0 – 100.</li></ul> <div><p>Q My finger marks 37, how much is left?</p></div> <ul style="list-style-type: none"><li>Range 0 – 1.</li></ul> <div><p>Q My finger marks 0.6, how much is left?</p></div> <p>Increase speed to improve speed of pupils' oral responses. e.g.</p> <div><div><div>36</div><div>92</div><div>0.1</div></div><div><div>64</div><div>8</div><div>0.9</div></div></div> <ul style="list-style-type: none"><li>Without the counting stick, practise multiples of 50 to give totals of 1000 e.g. 350 and 650 150 and 850 Discuss strategies used.</li></ul> <div><p>Q 60% of the class were girls, what percentage were boys?</p><p>Q A garment was 30%wool, 20% mohair and the rest acrylic. What percentage was acrylic?</p></div> <ul style="list-style-type: none"><li>Ask children to work on similar word problems in pairs (use both fractions and percentages).</li></ul>	<ul style="list-style-type: none"><li>Repeat chanting exercise with individuals/pairs of children for decimal complements to ten e.g.: <div><div>4.6</div><div>5.4</div></div><div><div>4.7</div><div>5.3</div></div><div><div>0.3</div><div>9.7</div></div></li><li>Now try some complements in money, to £10.</li></ul> <div><p>Q What is the complement of £5.60? etc.</p></div> <div><p>Q Why might this be useful?</p></div> <div><p>By the end of the lesson children should be able to:</p><ul style="list-style-type: none"><li>Mentally convert fractions to decimals and percentages to solve simple problems;</li><li>Find complements using decimals and percentages</li></ul><p>(Refer to supplement of examples section 6, page 27.)</p></div>	

Planning sheet	Day Two	Unit 5 <i>Fractions, decimals and percentages, ratio and proportion</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Round decimals to the nearest whole number or nearest tenth.</p> <p>VOCABULARY rounding up rounding down to the nearest whole number</p>	<ul style="list-style-type: none"> <li>Explain to the children that we often round numbers to help mental calculation, for example when working out the area of carpet for a room. Show an example e.g. <math>3.8\text{m} \times 4.1\text{m}</math> will give an area roughly 16 square metres.</li> <li>Discuss why we round one number up and the other down.</li> <li>Explain that 0.5 is rounded up to the next whole number.</li> <li>Practise some examples from the line board.</li> </ul> <div>Q Round to the nearest whole number: 9.7, 25.6, 148.3</div> <div>Q Round to the nearest metre: 1.5m, 6.7m, 4.1m, 8.9m</div>	<p>Round a number with two decimal places to the nearest tenth or the nearest whole number.</p> <p>Give a decimal fraction lying between two others.</p>	<ul style="list-style-type: none"> <li>Tell the children we are going to work on rounding decimal numbers with more than one decimal place.</li> </ul> <p>Write 0.78 on the board.</p> <p>Establish that the number lies between 0.7 and 0.8. Which number is it nearest to? We can record:</p> <div>Q Round to the nearest whole number 9.7, 25.6, 148.5</div> <div>Q Round to the nearest metre 1.5m, 6.7m, 4.1m, 8.5m</div> <ul style="list-style-type: none"> <li>Explain to children that we write <math>0.78 \approx 0.8</math> (to the nearest tenth)</li> </ul> <p>We can also write this as <math>0.78 \approx 0.8</math> (to one decimal place)</p> <p>We call this rounding to one decimal place.</p> <p>Repeat for other examples.</p> <p>Consolidate with examples using both terms for the children to work on.</p> <ul style="list-style-type: none"> <li>Extend to numbers with whole numbers and decimals e.g.:</li> </ul> <div>Q Round 365.49 to <ul style="list-style-type: none"> <li>the nearest tenth</li> <li>the nearest whole number</li> <li>nearest ten</li> <li>nearest hundred</li> </ul> </div> <div>Q Round 42.847 to <ul style="list-style-type: none"> <li>the nearest hundredth</li> <li>the nearest tenth</li> <li>the nearest whole number</li> </ul> </div>	<p>Write a set of statements on the board where some are incorrect e.g.</p> <p><math>0.45 \approx 0.4</math> (to one decimal place)</p> <p><math>6.9 \approx 7</math> (to nearest whole number)</p> <p><math>3.49 \approx 3</math> (to nearest whole number)</p> <p><math>32.01 \approx 32.1</math> (to one decimal place)</p> <p><math>166.6 \approx 16</math> (to nearest whole number)</p> <p><math>644 \approx 650</math> (to nearest 50)</p> <div>Q Which are incorrect and why?</div> <p>Invite children to add more to the list – some correct and some incorrect.</p> <p>Ask the class for comments.</p> <div> <p><b>By the end of the lesson children should understand:</b></p> <ul style="list-style-type: none"> <li><b>How to round numbers with two or more decimal places to the nearest tenth.</b></li> </ul> <p>(Refer to supplement of examples section 6, page 31)</p> </div>

Planning sheet	Day Three	Unit 5 <i>Fractions, decimals and percentages, ratio and proportion</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Begin to convert a fraction to a decimal using division.</p> <p>VOCABULARY divide</p> <p>RESOURCES calculators OHP calculator</p>	<ul style="list-style-type: none"> <li>Write a range of equivalent fractions on the board such as:  <math>\frac{3}{15}, \frac{4}{20}, \frac{1}{5}, \frac{5}{25}, \frac{6}{30}, \frac{7}{35}, \frac{10}{50}, \frac{100}{500}</math> </li> </ul> <div> <b>Q</b> Use a calculator to find the decimal equivalents of these fractions. What do you notice?         </div> <ul style="list-style-type: none"> <li>Move on to use an OHP calculator to find the decimal equivalents of:  <math>\frac{1}{4}, \frac{3}{4}, \frac{5}{8}, \frac{7}{10}, \frac{3}{5}, \frac{1}{3}, \frac{2}{3}</math> </li> </ul> <p>Discuss results.</p> <ul style="list-style-type: none"> <li>Some of these decimal fractions never end so we often need to round them off.</li> </ul> <p>Remind children of work on rounding in the previous lesson.</p> <p>e.g. <math>\frac{1}{3} \approx 0.33</math>  <math>\frac{2}{3} \approx 0.67</math></p> <p>to 2 decimal places.</p>	<p>Recognise the equivalence between decimals and fractions.</p> <p>Develop calculator skills and use a calculator effectively.</p>	<ul style="list-style-type: none"> <li>Similarly <math>\frac{1}{8} \approx 0.13</math> to 2 decimal places.</li> </ul> <p>Ask the children in pairs to use a calculator to key in a set of fractions and record the results to 2 decimal places.</p> <p>Such as <math>\frac{5}{6}, \frac{1}{7}, \frac{5}{8}, \frac{7}{24}, \frac{5}{24}</math></p> <p>Ask children to invent some more.</p> <ul style="list-style-type: none"> <li>Gather results from the class. Record on the board.</li> </ul> <div> <b>Q</b> Which of these decimal fractions never end?         </div> <p>Choose 3 numbers and ask the children to order them from smallest to largest.</p> <p>Extend to fractions with 3 decimal places.</p> <ul style="list-style-type: none"> <li>Ask the children to work in pairs to find and order decimals.</li> </ul> <p>Challenge some children by including <math>\frac{1}{3}, \frac{1}{6}, \frac{2}{3}</math> in sets of numbers.</p>	<div> <b>Q</b> Which of these decimals is equivalent to <math>\frac{193}{100}</math>?            1.93, 10.193, 0.193, 19.13         </div> <p>Discuss without using a calculator and then use the calculator to check result.</p> <p>Repeat using other examples with denominations of 100 and 1000.</p> <div> <b>By the end of the lesson the children should be able to:</b> <ul style="list-style-type: none"> <li>Enter fractions into a calculator;</li> <li>Use a calculator to compare fractions.</li> </ul> <p>(Refer to supplement of examples, section 6, page 33.)</p> </div>

Planning sheet	Day Four	Unit 5 <i>Fractions, decimals and percentages, ratio and proportion</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Understand the language associated with ratio and proportion.</p> <p>VOCABULARY for every to every in every as many as</p>	<ul style="list-style-type: none"> <li>Assess (or recap) children's previous knowledge by asking questions like:               <div>Q John has one stamp for every two that Mark has. Ask children what this means, recording results on the board.</div> <div>Q If John has half as many stamps as Mark, how many could they each have?</div> <div>Q If Mark has twice as many stamps as Mark, how many could they ach have?</div> <div>Q If Mark has 4 stamps, John has 2 stamps, what ratio is this?</div> </li> <li>Now extend the work by posing questions like:               <div>Q If Mark has 400 stamps and John has 200 stamps, what ratio is this?</div> </li> </ul> <p>Try further examples with different simple ratios.</p>	<p>Solve simple problems involving ratio and proportion.</p> <p>RESOURCES yellow and red linking cubes</p> <p>VOCABULARY ratio proportion</p>	<ul style="list-style-type: none"> <li>Use questions from supplement of examples, section 6, page 27 to assess children's confidence in solving problems of the kind:               <div>Q A mother seal is fed 5 fish for every 2 fish given to the baby seal. Alice fed the mother seal 15 fish. How many fish did the baby seal get?</div> </li> <li>Show the children a tower with 8 red and 2 yellow linking cubes:               <div>R R R Y R R R R R Y</div> <div>Q Ask how many yellow cubes there are to each red.</div> <p>Write on board '1 to every 4'. So what proportion of the strip is yellow? '1 in every 5'.</p> </li> <li>Explain that the first statement describes the ratio. Emphasise the language 'to every'. The second statement describes the proportion or fraction.</li> <li>Set children another problem.               <div>Q Julie has 20 sweets. She gives Jim one sweet for every 3 sweets she eats. How many sweets does Jim get?</div> <p>Reinforce stages of problem solving and go through solution on board. Check using real sweets.</p> </li> <li>If children appear confident let them try two more questions in pairs.</li> </ul>	<ul style="list-style-type: none"> <li>Say there are 20 boys and 10 girls in Class 6.               <div>Q Give me a sentence using the word 'ratio' (or proportion). Ask for alternatives.</div> </li> <li>Repeat for other numbers. Take feedback and record results.</li> <li>Encourage children to use appropriate vocabulary.</li> </ul> <div> <p><b>By the end of the lesson children should understand:</b></p> <ul style="list-style-type: none"> <li>How to solve simple ratio and proportion problems such as, at a gym club there are 2 boys for every 3 girls. There are 30 children at the club. How many boys are there?</li> </ul> <p>(Refer to supplement of examples section 6, page 27.)</p> </div>

Planning sheet	Day Five	Unit 5 <i>Fractions, decimals and percentages, ratio and proportion</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Give a decimal lying between two others.</p> <p>VOCABULARY thousandths</p> <p>RESOURCES Whiteboards</p>	<p>Draw a number line on the board from 5 to 6. Ask questions such as:</p> <p><b>Q</b> Give me a number that lies between 5 and 6.</p> <p>Take feedback and extend the problem to 'zoom in' on the tenths divisions.</p> <p><b>Q</b> Now give me a number between 5 and 5.5.</p> <p>Children respond using whiteboards.</p> <ul style="list-style-type: none"> <li>Repeat for different numbers 'zooming in' each time to reach 2 decimal places. For example:  Find me a number between 5.1 and 5.3 5.2 and 5.3 5.2 and 5.25 5.25 and 5.26 etc.</li> </ul> <p><b>Q</b> Can I squeeze in another number? How do you know?</p> <ul style="list-style-type: none"> <li>Emphasise the language of fractions when describing decimal parts of a number. (i.e. 3-528 is three and five tenths, two hundredths and eight thousandths.)</li> </ul>	<p>Extend knowledge of decimals to several decimal places.</p> <p>Develop calculator skills and use a calculator effectively.</p> <p>Explain methods and reasoning, orally and in writing.</p> <p>VOCABULARY ten thousandths hundred thousandths recurring decimal places</p> <p>RESOURCES Calculators</p>	<ul style="list-style-type: none"> <li>Write the number 16 on the board and <div style="border: 1px solid black; width: 150px; height: 30px; margin: 10px auto; text-align: center;">Target 100</div>at the side.</li> </ul> <p><b>Q</b> Can you estimate what we must multiply 16 by to produce exactly 100?</p> <p>Discuss suggestions.</p> <p>Now children can try the suggestions on their own calculators.</p> <p>Write children's suggestions on the board e.g.</p> <p style="text-align: center;"><math>8 \times 16 = 128</math> (too large) <math>6 \times 16 = 96</math> (almost there) <math>7 \times 16 = 112</math> (too large)</p> <p><b>Q</b> What numbers come between 6 and 7?</p> <p style="text-align: center;"><math>6.4 \times 16 = 102.4</math> (too big) <math>6.3 \times 16 = 100.8</math> (still too big)</p> <p>By trial and improvement reach the conclusion that the number lies between 6.2 and 6.3. Try 6.25.</p> <ul style="list-style-type: none"> <li>Repeat with a different start number, say 23. Explain that we cannot always reach 100 exactly but we can get nearer and nearer.</li> <li>Stress the importance of recording each estimate to guide us to the next move.  Discuss what each stage means using the language of tenths and hundredths and questions like 'how far off a hundred is this?' Continue until you reach an agreed level of accuracy, perhaps <math>4.349 \times 23 = 100.027</math>.</li> <li>Children work in pairs using start numbers like 32, 48. Some could be challenged with starting numbers like 11, 22, 45 which lead to recurring decimals. Others should be given numbers which only need to go to 1 or 2 decimal places, like 40, 80.</li> </ul>	<ul style="list-style-type: none"> <li>Ask a pair of children to record all their stages on the board, explaining their reasons for choosing each number.  Comment on strategies used.</li> <li>HOMEWORK – Play target 100 starting with 96, 36, 55.</li> <li>Ask children to record anything they notice.</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>Give a decimal lying between 2 others;</li> <li>Explain their reasoning to others;</li> <li>Use a calculator and read the display in decimal notation.</li> </ul> <p>(Refer to supplement of examples section 6, page 33.)</p> </div>

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

0.1	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.70
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.80
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00