

Unit 10

Fractions, proportion, ratio and problem solving

Five daily lessons

National
Numeracy Strategy

Year 6
Summer term

Unit Objectives Year 6

- Reduce a fraction to its simplest form by cancelling common factors. **Page 23**
- Use a fraction as an 'operator' to find fractions of numbers or quantities, e.g. $\frac{5}{8}$ of 32, $\frac{7}{10}$ of 40, $\frac{9}{100}$ of 400 centimetres. **Page 25**
- Solve simple problems involving ratio and proportion. **Page 27**

Year 5

Link Objectives

Year 7

- Recognise when two simple fractions are equivalent, including relating hundredths to tenths, e.g. $\frac{70}{100} = \frac{7}{10}$.
- **Relate fractions to division** and use division to find simple fractions, including tenths and hundredths of numbers and quantities, e.g. $\frac{3}{4}$ of 12, $\frac{1}{10}$ of 50, $\frac{1}{100}$ of £3.
- Solve simple problems using ideas of ratio and proportion ('one for every...' and 'one in every...').

- Simplify fractions by cancelling all common factors and identify equivalent fractions.
- Consolidate and extend mental methods of calculation to include decimals, fractions and percentages.
- Calculate simple fractions of quantities and measurements (whole-number answers).
- Solve simple problems about ratio and proportion using informal strategies.

(Key objectives in bold)

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:

- Activity sheet 10.1
- OHT 10.1
- OHT 10.2
- Self-assessment sheet 10.1
- Self-assessment sheet 10.2
- Whiteboards
- OHP calculator
- Calculators

Planning sheet	Day One	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: Summer	Year Group: 6		
Oral and Mental			Main Teaching	Plenary		
Objectives and Vocabulary	Teaching Activities		Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions	
<ul style="list-style-type: none">Identify patterns and use these to sum consecutive numbers.	<div><ul style="list-style-type: none">Draw on the board:<div><div><div>3</div><div>1</div><div>2</div><div>4</div></div></div><div><div>Q</div><div>What do you notice about this diagram?</div></div><div>Agree that the numbers 1 to 4 are used and the opposite numbers sum to 5.</div><div><div>Q</div><div>What do the four numbers sum to?</div></div><div>Establish they sum to 10.</div>Draw on the board:<div><div><div></div></div></div><div><div>Q</div><div>Can you put the numbers 1 to 8 on this diagram so the opposite numbers have the same total?</div></div><div>The children use whiteboards. Collect answers and record on the board.</div><div><div>Q</div><div>What do the opposite numbers sum to?</div></div><div>Agree they total 9.</div><div><div>Q</div><div>What do the 8 numbers sum to?</div></div><div>Establish they sum to 36.</div></div>		<div><div><div>Q</div><div>How did the arrangement of the eight numbers help us to find their sum?</div></div><div>Collect answers and get the children to identify that there are four pairs that sum to 9 and $4 \times 9 = 36$.</div><div><div>Q</div><div>How could we use this approach to sum numbers 1 to 12, and 1 to 20?</div></div><div>Collect answers and discuss the children's strategies. Encourage the children to identify the patterns $6 \times 13 = 78$ and $10 \times 21 = 210$ for the two sums. Establish that we have summed an even number of consecutive numbers that start at 1.</div><div>Ask:<div><div>Q</div><div>How can you adapt the strategy to find the sum of 1 to 15?</div></div></div><div>Discuss strategies for summing 1 to 14 and adding 15 or summing 1 to 16 and subtracting 16.</div><div>Record as:<div>$7 \times (1 + 14) + 15$$8 \times (1 + 16) - 16$</div></div><div><div>Q</div><div>Do these calculations give the same value?</div></div><div>Collect answers and confirm they both sum to 120.</div></div>	<ul style="list-style-type: none">Use a fraction as an 'operator' to find fractions of numbers or quantities.	<div><ul style="list-style-type: none">Show OHT 10.1. Explain that someone has asked you to help them. They want to put these sums of money in order of size, smallest first. Ask the children to scan the table quickly.<div><div>Q</div><div>Which calculation do you estimate will give the smallest and the largest sum of money?</div></div><div>Collect responses and note the most popular answers for the smallest and largest sums.</div>Point to the first calculation.<div><div>Q</div><div>How do we do this calculation?</div></div><div>Collect answers and discuss the children's methods. Establish that we can find $\frac{1}{4}$ first, by dividing by 4, then find $\frac{3}{4}$ by multiplying the answer by 3. Use the OHP calculator to work through the calculation. Discuss the other calculations with the children and ask them to work in pairs and carry out each calculation using their calculators.</div>Discuss the calculations with the children and use their answers to place the sums in order, recording these on the board. Compare the smallest and largest sums with the children's estimations.<div><div>Q</div><div>Did you expect $\frac{2}{3}$ of £969 to be less than $\frac{9}{10}$ of £725?</div></div>Give out Activity sheet 10.1. Ask the children to make an estimate for each calculation.<div><div>Q</div><div>Which fractions were the easiest to estimate? Why?</div></div><div><div>Q</div><div>Were any estimates similar?</div></div><div>Emphasise how helpful estimates are for giving a rough answer, but when answers are close together estimates can be misleading.</div>Ask the children to find the answers using their calculators. Collect answers and discuss their estimates and methods of calculation.</div>	<div><ul style="list-style-type: none">Write on the board:<div>$\frac{5}{\%}$ of £600.</div><div><div>Q</div><div>Can you work this out in your heads?</div></div><div>Agree that the numbers allow a quick division and multiplication to get to £500.</div><div>Write on the board:<div>$\frac{9}{10}$ of £A = £90</div><div><div>Q</div><div>What does this sentence mean?</div></div><div><div>Q</div><div>How would we work out what $\frac{10}{10}$ (the whole amount) is?</div></div><div>Discuss and record feedback on the board. Repeat with:<div>$\frac{6}{\%}$ of £B = £600</div></div></div></div> <div>ASSESSMENT – Explain to the children that during the week they will be completing 'My Mathematics' Self-assessment sheets that they will take to their secondary school.</div>
VOCABULARY sum consecutive RESOURCES Whiteboards			VOCABULARY estimate rounding nearest pound RESOURCES Activity sheet 10.1 OHT 10.1 OHP calculator Calculators			


Planning sheet	Day Two	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
<ul style="list-style-type: none"> Find factors of given numbers and common factors of pairs of given numbers. <p>VOCABULARY factor common factor highest common factor</p>	<ul style="list-style-type: none"> Write 15 on the board. <div>Q What are the factors of 15?</div> <p>Agree that 1, 3, 5, 15 are factors and record these.</p> <div>Q What are the factors of 21?</div> <p>Agree that 1, 3, 7 and 21 are factors and record these.</p> <div>Q Do 15 and 21 share a common factor?</div> <p>Identify that 1 and 3 are common factors. Explain that 1 is always a common factor and we will ignore 1. Establish that 3 is the largest or highest common factor.</p> Write 18 and 24 on the board. <div>Q What common factors do 18 and 24 share?</div> <p>Collect answers and record 2, 3 and 6. Establish that 6 is the largest or highest common factor.</p> Give children pairs of numbers to find their common factors and to identify their highest common factor. 	<ul style="list-style-type: none"> Use a fraction as an 'operator' to find fractions of numbers of quantities. <p>RESOURCES OHP calculator Calculators Self-assessment sheet 10.1</p>	<ul style="list-style-type: none"> Recap plenary from day 1 by writing on the board: $1\frac{1}{12}$ of £A = £1000 <div>Q What does this sentence tell us?</div> <div>Q What do we know about $1\frac{1}{12}$ of £A?</div> <p>Agree that $1\frac{1}{12}$ is all or the whole of A, and $1\frac{1}{12}$ is bigger than $1\frac{1}{12}$ by $\frac{1}{12}$.</p> Write on the board: $1\frac{2}{13}$ of £B = £1000 <div>Q What do we know about $1\frac{2}{13}$ of £B?</div> <div>Q Will amount A be more or less than amount B? By much?</div> <p>Collect suggestions and explain that to decide you want the children to tell you how to work out the answers.</p> <div>Q How can I work out amounts A and B?</div> <p>Establish that as you know $1\frac{1}{12}$ of £A = £1000 then dividing the amount by 11 would give you $\frac{1}{12}$.</p> <p>Discuss how finding $\frac{1}{12}$ helps to find $1\frac{2}{12}$: the full amount. Discuss and record the calculation needed.</p> <div>Q Can we do these calculations easily in our heads?</div> <p>Establish a calculator is needed. Use an OHP calculator to work out $1\frac{2}{12}$ of £A.</p> Ask the children to use their calculators to find amount B. Discuss why amount A is greater than amount B. Write on the board: $1\frac{3}{14}$ of £C = £1000. Encourage the children to think about the examples they have just done to explain how to work out amount C. Collect answers and reasoning. <div>Q How would we use the calculator to find out the total amount?</div> <p>With the class, find the total amount C. Set the children to work on similar examples.</p> 	<ul style="list-style-type: none"> Write on the board: $\frac{2}{3}$ of £N = £40 $\frac{2}{6}$ of £A = £14 $\frac{7}{8}$ of £L = £16 $\frac{3}{4}$ of £P = £3000 $\frac{8}{9}$ of £C = £4 $1\frac{2}{13}$ of £X = £36 <p>Ask the children to work out the calculations. Collect in the calculators.</p> <div>Q Which calculations did you solve mentally?</div> <p>Invite children out to record their method.</p> <div>Q For which calculation would you use a calculator?</div> <p>Agree that finding amount L is the only one that requires a calculator.</p> <p>ASSESSMENT –</p> <ul style="list-style-type: none"> Give out Self-assessment sheet 10.1. Explain that the sheet is to help children to identify what mathematics they have been able to do during the week. There will be some time each lesson for them to complete the sheet. Ask the children to work out in their heads the first two cloud questions on the sheet. Say that you want them to write their calculations and solutions in the middle loop. When they have done this they should show their work to a friend. Some of the children may need help. Tell the children that they should tick the box to say if they required any help. Give the children a few minutes to complete this task and ask them to put this sheet away ready for their next mathematics lesson.

Planning sheet	Day Three (page 1 of 2)	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
<ul style="list-style-type: none"> Find complement to 1 of a given fraction. Simplify fractions by cancelling. <p>VOCABULARY complement to 1 simplify cancel</p>	<ul style="list-style-type: none"> Write $\frac{4}{7}$ on the board. <div>Q What fraction do we add to $\frac{4}{7}$ to make a total of 1, its complement to 1?</div> <p>Collect answers and record: $\frac{4}{7} + \frac{3}{7} = \frac{7}{7} = 1$</p> Write $\frac{12}{16}$ on the board. <div>Q What is the complement of $\frac{12}{16}$ to 1?</div> <p>Collect answers and record: $\frac{12}{16} + \frac{4}{16} = \frac{16}{16} = 1$</p> Ask: <div>Q Can we simplify $\frac{4}{16}$?</div> <p>Establish that $\frac{4}{16} = \frac{1}{4}$. <div>Q What is the complement of $\frac{1}{4}$ to 1?</div> <p>Collect answers and below the previous statement record: $\frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$. <div>Q Are these two statements equivalent?</div> <p>Agree they are and $\frac{12}{16} = \frac{3}{4}$.</p> </p></p> Write $\frac{54}{60}$ on the board. <div>Q How can we use the complement to 1 to simplify $\frac{54}{60}$?</div> <p>Collect answers and record: $\frac{54}{60} + \frac{6}{60} = \frac{60}{60} = 1$. <div>Q What is $\frac{6}{60}$ simplified?</div> <p>Collect answers and record: $\frac{1}{10} + \frac{9}{10} = \frac{10}{10} = 1$. <div>Q Does this mean $\frac{54}{60} = \frac{9}{10}$?</div> <p>Confirm by cancelling that this is the case. <p>Give the children other fractions to simplify this way, such as $\frac{72}{80}$, $\frac{63}{70}$, $\frac{360}{400}$, $\frac{486}{540}$, $\frac{900}{960}$.</p> </p></p></p> 	<ul style="list-style-type: none"> Reduce a fraction to its simplest form by cancelling common factors. <p>VOCABULARY common factors divisibility recurring in every</p> <p>RESOURCES OHP calculator Calculators Self-assessment sheet 10.1</p>	<ul style="list-style-type: none"> Write on the board: $\frac{252}{294}$ <div>Q How can we simplify this fraction?</div> <p>Discuss the children's suggestions. Record the complement of 1, $\frac{42}{294}$. Say that to cancel $\frac{252}{294}$, we need to look for common factors of 252 and 294. <div>Q What tests of divisibility can we use?</div> <p>Collect answers and remind the children of the tests for 2, 3, 4, 5, 6, 8, 9 and 10.</p> </p> Establish that the two numbers have a common factor of 2 and 3. <div>Q Is 6 a common factor?</div> <p>Agree it is because 2 and 3 are. With the class, divide each number by 6. If necessary, record on the board:</p> $\begin{array}{r} 252 \\ - 240 \quad (40 \times 6) \\ \hline 12 \\ - 12 \quad (2 \times 6) \\ \hline 0 \end{array} \qquad \begin{array}{r} 294 \\ - 240 \quad (40 \times 6) \\ \hline 54 \\ - 54 \quad (9 \times 6) \\ \hline 0 \end{array}$ $252 = 42 \times 6 \qquad 294 = 49 \times 6$ $\frac{252}{294} = \frac{42 \times 6}{49 \times 6} = \frac{42}{49}$ <p>Emphasise that we have cancelled the 6 to simplify the fraction. <div>Q Do 42 and 49 share a common factor?</div> <p>Collect answers and agree 7 is a common factor. Write:</p> $\frac{42}{49} = \frac{6 \times 7}{7 \times 7} = \frac{6}{7}$ <div>Q Can $\frac{6}{7}$ be simplified?</div> </p> 	<p>ASSESSMENT</p> <ul style="list-style-type: none"> Ask the children to complete the last two cloud questions on Self-assessment sheet 10.1. They should discuss it with a friend as before and tick the appropriate box. Help those children who need it. Give the children a few minutes to complete the task. Ask them to put the sheet away carefully for the next lesson.

Planning sheet	Day Three (page 2 of 2)	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: <i>Summer</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>Establish it cannot and that:</p> $\frac{252}{294} = \frac{6}{7}$ <div>Q Can we simplify $\frac{42}{294}$?</div> <p>Establish that as $\frac{42}{294}$ is the complement to 1 of $\frac{252}{294}$ it is also the complement to 1 of $\frac{6}{7}$ so $\frac{42}{294} = \frac{1}{7}$</p> <ul style="list-style-type: none"> Write on the board: $\frac{300}{540} \quad \frac{99}{231} \quad \frac{720}{900} \quad \frac{315}{1155}$ <div>Q Which fractions can we begin to simplify quickly?</div> <p>Agree that two fractions can be simplified using the common factor of 10.</p> <div>Q What other common factors can you see?</div> <p>Collect answers, confirm the factors are 3, 5 and 9 by using tests of divisibility. Ask children to work in pairs and simplify the fractions and their complements to 1.</p> <ul style="list-style-type: none"> Collect answers and confirm the children are sure their answers cannot be simplified any further. Say that in an election 27 720 people voted. Of these, 2 520 were first-time voters. <div>Q What fraction were first-time voters?</div> <p>Discuss how the children might answer this. Give out calculators and ask them to find the answer. Remind them the answer is to be as a fraction. Collect answers and discuss strategies.</p> <ul style="list-style-type: none"> Using the OHP calculator, work out $2\,520 \div 27\,720$. <div>Q What kind of decimal is this?</div> <p>Remind them it is a recurring decimal.</p> <div>Q What answer do you get if you work out $1 \div 11$ on your calculator?</div> <p>Collect answers and confirm it is the same as that on the OHP calculator. Establish that one eleventh of the voters were first-time voters. Remind children that another way of saying this is that 1 voter in every 11 was a first-time voter.</p>	

Planning sheet	Day Four (page 1 of 2)	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: <i>Summer</i>	Year Group: 6																																								
Oral and Mental		Main Teaching		Plenary																																								
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions																																								
<ul style="list-style-type: none">Use a fraction as an operator.	<ul style="list-style-type: none">Write on the board: $\frac{3}{5}$ of A = B.<div>Q Will A or B be the smaller?</div><p>Establish that B will be the smaller.</p><div>Q If A = 40, what is B?</div><p>Collect answers. Confirm $\frac{1}{5}$ of 40 is 8 so $\frac{3}{5}$ is 24.</p>Write on the board:<table><thead><tr><th>A</th><th>B</th></tr></thead><tbody><tr><td>40</td><td>24</td></tr><tr><td>50</td><td></td></tr><tr><td>35</td><td></td></tr><tr><td>750</td><td></td></tr><tr><td>1200</td><td></td></tr><tr><td>12.5</td><td></td></tr></tbody></table><p>Ask the children to find the corresponding values of B. Collect and discuss the children's answers and methods.</p>Remind the children that A was always bigger than B. Ask:<div>Q If B = 12, what is A?</div><p>Collect answers. Establish that B represents $\frac{3}{5}$ of A so $\frac{1}{5}$ of A is $12 \div 3 = 4$ and $\frac{5}{5}$ of A is $4 \times 5 = 20$.</p>Write on the board:<table><thead><tr><th>A</th><th>B</th></tr></thead><tbody><tr><td>20</td><td>12</td></tr><tr><td></td><td>21</td></tr><tr><td></td><td>360</td></tr><tr><td></td><td>45</td></tr><tr><td></td><td>1.2</td></tr><tr><td></td><td>0.9</td></tr></tbody></table><p>Ask the children to find the corresponding values of A. Collect and discuss the children's answers and methods.</p>	A	B	40	24	50		35		750		1200		12.5		A	B	20	12		21		360		45		1.2		0.9	<ul style="list-style-type: none">Solve simple problems involving ratio and proportion. <div>VOCABULARY in every ratio proportion simplest form 1 to 2 2 to 3</div>	<ul style="list-style-type: none">Explain that in a library three in every ten books returned are overdue. In a day 250 books are returned.<div>Q How many of the books are overdue?</div><p>Collect answers. Remind children that three in every ten is equivalent to three tenths.</p><div>Q What is one tenth of 250, what is three tenths?</div><p>Establish $\frac{3}{10}$ of 250 books is 75 books.</p>Remind the children that proportion compares part to whole in this example, the overdue books (the part) with all the books that were returned (the whole). Set the children similar questions involving proportions that they can answer mentally.Draw on the board:<table><tr><td>10 cm</td><td>30 cm</td></tr></table><p>Say that this time we want to compare the two lengths.</p><div>Q What is the ratio of these lengths?</div><p>Collect answers. Emphasise that a ratio is used to compare measures and quantities. In this case, the ratio is 10 to 30 or 1 to 3. Explain that the ratio 1 to 3 is the simplest possible and we have divided 10 and 30 by their common factor 10. Discuss other ratios and ask the children to express them in their simplest form, e.g. 10 to 90, 3 to 60, 4 to 48.</p>Write on the board: Ratio of two weights is 2 to 5.<div>Q If the lighter weight is 12 g, what is the heavier weight?</div><p>Collect answers and discuss strategies. Establish that the 12 g corresponds to the 2 in the ratio and to get to 12 we must multiply 2 by 6. So 6 is the common multiplier. The other weight is $6 \times 5 = 30$ g.</p>Set the children similar questions and discuss their methods and solutions.Draw on the board:<table><tr><td>24 cm</td><td>33 cm</td></tr></table><p>Say these represent two pieces of wood. You want two pieces that are in the ratio 2 to 3.</p>	10 cm	30 cm	24 cm	33 cm	<ul style="list-style-type: none">Write on the board:<table><tr><td>A</td><td>40 g</td><td>49 g</td><td>B</td></tr></table><p>Say A and B are two chemicals. A and B are to be mixed in the ratio 3 to 4.</p><div>Q What is the greatest possible mix we can have?</div><p>Collect answers and methods. Compare methods involving scaling up, writing 3 to 4, 6 to 8, 9 to 12, etc. and finding the largest multiples of 3 and 4 and adjusting, writing largest multiple of 3 in 40 is 39. $3 \times 13 = 39$ but $4 \times 13 = 52$ which is bigger than 49.</p><p>Establish the greatest possible mix is:</p><p>36 g of A and 48 g of B, a total of 84 g of chemicals.</p>Repeat using capacity:<table><tr><td>X</td><td>33 cl</td><td>87 cl</td><td>Y</td></tr></table><p>Say X and Y are to be mixed in the ratio 2 to 5.</p>	A	40 g	49 g	B	X	33 cl	87 cl	Y
A	B																																											
40	24																																											
50																																												
35																																												
750																																												
1200																																												
12.5																																												
A	B																																											
20	12																																											
	21																																											
	360																																											
	45																																											
	1.2																																											
	0.9																																											
10 cm	30 cm																																											
24 cm	33 cm																																											
A	40 g	49 g	B																																									
X	33 cl	87 cl	Y																																									

Planning sheet	Day Four (page 2 of 2)	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: Summer	Year Group: 6																																	
Oral and Mental		Main Teaching			Plenary																																
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities		Teaching Activities/Focus Questions																																
			<div>Q What lengths can you cut off the pieces of wood so they are in the ratio 2 to 3?</div> <p>Collect answers and discuss the children’s methods. Establish cutting 2 cm off the 24 cm length is one solution.</p> <div>Q Is it possible to cut the same length off each piece to get this ratio?</div> <p>Discuss the children’s strategies. Make a list of the lengths and the ratios of the two bits of wood formed by gradually cutting 1 cm pieces off each piece. In each case, try to simplify the ratio.</p> <table><thead><tr><th>Length 1</th><th>Length 2</th><th>Ratio</th><th>Simplest Form</th></tr></thead><tbody><tr><td>24</td><td>33</td><td>24 to 33</td><td>8 to 11</td></tr><tr><td>23</td><td>32</td><td>23 to 32</td><td>23 to 32</td></tr><tr><td>22</td><td>31</td><td>22 to 31</td><td>22 to 31</td></tr><tr><td>21</td><td>30</td><td>21 to 30</td><td>7 to 10</td></tr><tr><td>20</td><td>29</td><td>20 to 29</td><td>20 to 29</td></tr><tr><td>19</td><td>28</td><td>19 to 28</td><td>19 to 28</td></tr><tr><td>18</td><td>27</td><td>18 to 27</td><td>2 to 3</td></tr></tbody></table> <p>Establish that the two lengths 18 cm and 27 cm are in the ratio 2 to 3 and the size of the cut needed is 6 cm.</p> <ul style="list-style-type: none">Set similar questions and discuss the children’s methods and answers.		Length 1	Length 2	Ratio	Simplest Form	24	33	24 to 33	8 to 11	23	32	23 to 32	23 to 32	22	31	22 to 31	22 to 31	21	30	21 to 30	7 to 10	20	29	20 to 29	20 to 29	19	28	19 to 28	19 to 28	18	27	18 to 27	2 to 3	
Length 1	Length 2	Ratio	Simplest Form																																		
24	33	24 to 33	8 to 11																																		
23	32	23 to 32	23 to 32																																		
22	31	22 to 31	22 to 31																																		
21	30	21 to 30	7 to 10																																		
20	29	20 to 29	20 to 29																																		
19	28	19 to 28	19 to 28																																		
18	27	18 to 27	2 to 3																																		

Planning sheet	Day Five (page 1 of 2)	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
<ul style="list-style-type: none"> Identify equivalent ratios between given lengths and numbers. 	<ul style="list-style-type: none"> Hold up a piece of string. Say the string represents a length of 16 units. Fold the string in half and hold the string as shown:  <div>Q How long is each piece of string?</div> <p>Agree each is 8 units.</p> <div>Q What is the ratio of these two parts of the string?</div> <p>Establish they are 8 to 8 or 1 to 1.</p> <ul style="list-style-type: none"> This time fold one half of the string in half. Hold the shorter piece horizontally. <div>Q How long is each part of the string now?</div> <p>Agree they are 4 units and 16 units.</p> <div>Q What is the ratio of these two parts of the string?</div> <p>Establish it is 4 to 12 or 1 to 3.</p>	<ul style="list-style-type: none"> Solve simple problems involving ratio and proportion. 	<ul style="list-style-type: none"> Draw on the board: <div> <div>24 cm</div> <div>33 cm</div> </div> <p>Say you want them to divide each length in a given ratio. Write 1 to 2.</p> <div>Q If the 24 cm length is divided into ratio 1 to 2, what will the two new lengths be?</div> <div>Q If the 33 cm length is divided into ratio 1 to 2, what will the two new lengths be?</div> <p>Collect answers and discuss methods. Establish that with a ratio 1 to 2, it helps to think of the length we are dividing as being 3 units long – 1 unit and the other 2 units.</p> <div>Q What is the length of each unit?</div> <p>For 24 cm a unit is 8 cm so the lengths are 8 cm and 16 cm. For 33 cm a unit is 11 cm so the lengths are 11 cm and 22 cm.</p> <ul style="list-style-type: none"> Write on the board the ratio 1 to 5. Say that this time the two lengths 24 cm and 33 cm are to be cut into this ratio. <div>Q What are the new lengths?</div> <p>Collect answers and discuss methods. Remind the children that this time there are 6 units: a 1 unit and a 5 units. Confirm the lengths are 4 cm and 20 cm, and 5.5 cm and 27.5 cm.</p> <ul style="list-style-type: none"> Repeat with other lengths e.g. 25 cm and 40 cm and other ratios, e.g. 1 to 4 and 2 to 3. Return to the two original lengths: <div> <div>24 cm</div> <div>33 cm</div> </div> <p>and say that when we combine them we get 1 length of 57 cm.</p> <p>Explain that the original 57 cm was cut into two pieces. When each piece was cut into the ratio 1 to 2 we had the four lengths; 8 cm, 16 cm, 11 cm and 22 cm. Say that we will cut the original 57 cm into two other lengths, e.g. 10 cm and 47 cm. When we divide these two lengths in the ratio 1 to 2 we do not get whole cm lengths.</p> <div>Q Can we cut the 57 cm in two lengths so the four pieces are whole cm lengths?</div> <p>Set the children to work in small groups on solving the problem.</p> <ul style="list-style-type: none"> Collect answers and discuss strategies. Establish that each of the two lengths must be a multiple of 3. Collect possible lengths and the corresponding pieces, and record on the board: 	<ul style="list-style-type: none"> Discuss with the children the work they have been engaged in during the week. Emphasise that when we describe part of something we use a fraction and say that a part is a proportion of the whole. When we compare two quantities or numbers, we use ratios. <p>ASSESSMENT –</p> <ul style="list-style-type: none"> Give out Self-assessment sheet 10.2. Allow time for the children to read and complete the problem on the sheet and describe their strategies. Discuss the solutions to the problems with the class. Explain that the table on the bottom half of the sheet is for the children to summarise how well they have been able to answer each question. Ask the children to look at the statements in the left-hand column. The questions alongside each statement are intended to remind the children what each statement means. Ask the children to look back on their work to help them fill in the table. Ask the children to complete each statement by putting a tick in one box. Ask the children to complete the target statement by choosing one of the three areas of mathematics where they think they need to improve. For those children who were able to answer all the questions without help, discuss the learning objectives for Year 7 shown on the front page of the unit.
<p>RESOURCES</p> <p>Piece of string (80 cm approx)</p>		<p>VOCABULARY</p> <p>ratio</p> <p>1 to 2</p> <p>2 to 3</p> <p>RESOURCES</p> <p>OHT 10.2</p> <p>Self-assessment sheet 10.2</p>		

Planning sheet	Day Five (page 2 of 2)	Unit 10 <i>Fractions, proportion, ratio and problem solving</i>	Term: <i>Summer</i>	Year Group: 6																									
Oral and Mental		Main Teaching			Plenary																								
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities		Teaching Activities/Focus Questions																								
	<ul style="list-style-type: none"> Let the string represent 20, 40 and other multiples of 4, each time recording the ratios. Halve the string and ask for the ratios of the two pieces. <div>Q Will the two parts of the string always be in the ratio 1 to 1?</div> <p>Collect answers and discuss the children's explanations.</p> <ul style="list-style-type: none"> Now halve and halve again and collect the ratios. <div>Q Will the two parts of the string always be in the ratio 1 to 3? Why?</div> <p>Collect answers and discuss the children's explanations.</p> <ul style="list-style-type: none"> Let the string represent 18, 30 and other even numbers that are not multiples of 4 to include fractions in the ratios, such as: $4\frac{1}{2}$ to $13\frac{1}{2}$ and $7\frac{1}{2}$ to $22\frac{1}{2}$. Record these on the board. Establish that no matter what length the string represents the ratios will always be 1 to 1 and 1 to 3. 		<table border="1"> <tr> <td></td><td></td><td>Length 1</td><td></td><td></td><td>Length 2</td></tr> <tr> <td>Unit A</td><td>Unit B</td><td></td><td>Unit A</td><td>Unit B</td><td></td></tr> <tr> <td>1 cm</td><td>2 cm</td><td>3 cm</td><td>18 cm</td><td>36 cm</td><td>54 cm</td></tr> <tr> <td>2 cm</td><td>4 cm</td><td>6 cm</td><td>17 cm</td><td>34 cm</td><td>51 cm</td></tr> </table> <ul style="list-style-type: none"> Show OHT 10.2. Tell the children to read the problem and discuss it in pairs. <div>Q Will Ben's and Jill's groups be the same or not?</div> <p>Discuss the children's views and let them work on the problem.</p> <p>Collect answers and agree the solution. Establish that Ben and Jill do end up with the same four groups of counters but in a different order.</p> <p>Ben: 20 – 8 and 12 40 – 16 and 24</p> <p>Jill: 24 – 8 and 16 36 – 12 and 24</p>				Length 1			Length 2	Unit A	Unit B		Unit A	Unit B		1 cm	2 cm	3 cm	18 cm	36 cm	54 cm	2 cm	4 cm	6 cm	17 cm	34 cm	51 cm	
		Length 1			Length 2																								
Unit A	Unit B		Unit A	Unit B																									
1 cm	2 cm	3 cm	18 cm	36 cm	54 cm																								
2 cm	4 cm	6 cm	17 cm	34 cm	51 cm																								

$\frac{5}{7}$ of 770 m	Estimate:	
$\frac{6}{8}$ of 832 m	Estimate:	
$\frac{6}{10}$ of 950 m	Estimate:	
$\frac{2}{3}$ of 918 m	Estimate:	
$\frac{3}{5}$ of 1050 m	Estimate:	
$\frac{5}{6}$ of 900 m	Estimate:	

$\frac{3}{4}$ of £868	$\frac{6}{7}$ of £763
$\frac{7}{8}$ of £744	$\frac{9}{10}$ of £725
$\frac{4}{5}$ of £815	$\frac{2}{3}$ of £969
$\frac{5}{6}$ of £786	$\frac{8}{9}$ of £729

Ben is sorting 60 counters in four groups. He first divides the counters into two groups in the ratio of 1 to 2. Each of these groups he then divides into two smaller groups in the ratio 2 to 3.

Jill is also sorting 60 counters in four groups. She first divides the groups into two groups in the ratio 2 to 3. Each of her groups she then divides into two smaller groups in the ratio of 1 to 2.

Will Ben's and Jill's four groups of counters be identical?

My Mathematics by

Find, without using a calculator:

$\frac{2}{3}$ of £72;
 $\frac{3}{4}$ of £70;
 $\frac{5}{6}$ of £15.60

My calculations

Show or discuss with a friend

I found the fractions of these quantities:

on my own

with some help

Find, without using a calculator, £A and £B if:

$\frac{4}{5}$ of £A = £120;
 $\frac{5}{8}$ of £B = £2.50

My calculations

Show or discuss with a friend

I found the fractions of these quantities:

on my own

with some help

Find, using a calculator:

$\frac{7}{8}$ of £450;
 $\frac{8}{9}$ of 32.4 kg;
 $\frac{10}{11}$ of 57.2 m

My calculations

Show or discuss with a friend

I found £A and £B:

on my own

with some help

Reduce these fractions to their simplest forms:

$\frac{540}{810}$, $\frac{144}{360}$, $\frac{168}{210}$

My calculations

Show or discuss with a friend

I simplified these fractions:

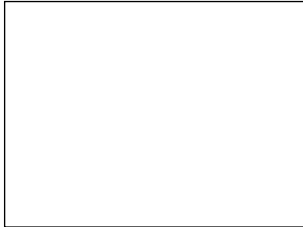
on my own

with some help

My Mathematics by

Dilip's and Seema's Card

120 cm



80 cm

Dilip's sheet of card is 120 cm long and 80 cm wide. What is the ratio of these measurements?

Seema asks Dilip to cut out a sheet of card whose sides are in the ratio 3 to 5. What is the biggest sheet of card Dilip can cut for Seema from his sheet?

My strategy for solving this problem is:

I explained my strategy:

on my own

with some help

Name:	School:
What I can do	
I can find fractions of numbers or quantities: on my own <input type="checkbox"/> with some help <input type="checkbox"/>	Find, without using a calculator: $\frac{2}{3}$ of £72; $\frac{3}{4}$ of £70; $\frac{5}{6}$ of £15.60
	Find, without using a calculator, £A and £B if: $\frac{4}{5}$ of £A = £120; $\frac{5}{8}$ of £B = £2.50
	Find, using a calculator: $\frac{7}{8}$ of £450; $\frac{8}{9}$ of 32.4 kg; $\frac{10}{11}$ of 57.2 m.
I can reduce a fraction to its simplest form by cancelling: on my own <input type="checkbox"/> with some help <input type="checkbox"/>	Reduce these fractions to their simplest form: $\frac{540}{810}$; $\frac{144}{360}$; $\frac{168}{210}$.
I can solve problems involving ratio and proportion: on my own <input type="checkbox"/> with some help <input type="checkbox"/>	Dilip's and Seema's card.

My next target:

I want to get better at _____
