

Unit 5

Fractions, decimals, percentages, ratio and proportion

Five daily lessons

National
Numeracy Strategy

Year 5
Autumn term

Unit Objectives Year 5

- **Use decimal notation for tenths and hundredths.** Know what each digit represents in numbers with up to two decimal places.
- **Relate fractions to their decimal representations:** that is recognise the equivalence between the decimal and fraction forms of one-half, one-quarter, three-quarters....and tenths and hundredths (e.g. $\frac{7}{10} = 0.7$, $\frac{27}{100} = 0.27$).
- Begin to understand percentage as the number of parts in every hundred and find simple percentages of small whole-number quantities (e.g. 25% of £8).
- Solve simple problems using ideas of ratio and proportion.
- Develop calculator skills and use a calculator effectively.

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Link Objectives

Year 4

Year 6

- Understand decimal notation and place value for tenths and hundredths, and use it in context. For example: order amounts of money; convert a sum of money such as £13.25 to pence, or a length such as 125 cm to metres; round a sum of money to the nearest pound.
- Recognise the equivalence between the decimal and fraction forms of one-half and one-quarter, and tenths such as 0.3.
- Begin to use ideas of simple proportion: for example, 'one for every...' and 'one in every...'.

(Key objectives in bold)

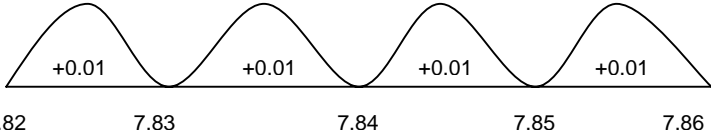
- Use decimal notation for tenths and hundredths in calculations, and tenths, hundredths and thousandths when recording measurements. Know what each digit represents in a number with up to three decimal places. Give a decimal fraction lying between two others (e.g. between 3.4 and 3.5). **Order a mixed set of numbers** or measurements **with up to three decimal places**.
- Recognise the equivalence between the decimal and fraction forms of one-half, one-quarter, three-quarters, one-eighth... and tenths, hundredths and thousandths (e.g. $\frac{700}{1000} = \frac{70}{100} = \frac{7}{10} = 0.7$). Begin to convert a fraction to a decimal using division.
- **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).
- **Solve simple problems involving ratio and proportion.**
- Develop calculator skills and use a calculator effectively.

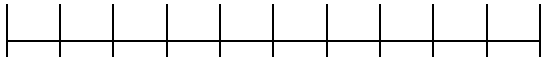
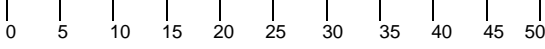
This Unit Plan is designed to guide your teaching. You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:


- Resource sheet 5.1
- Resource sheet 5.2
- Resource sheet 5.3
- Activity sheet 5.1
- Activity sheet 5.2
- OHT 5.1
- OHT 5.2
- Whiteboards
- OHP Calculator
- Calculator
- Counters
- 5 interlocking cubes, 2 black, 3 white (optional)

Planning sheet	Day One	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>	Term: <i>Autumn</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>Convert pounds to pence and metres to centimetres and vice versa.</p> <p>VOCABULARY equivalent</p> <p>RESOURCES Resource sheet 5.1 Resource sheet 5.2 Whiteboards</p>	<ul style="list-style-type: none"> Using Resource Sheet 5.1, ask the children a range of questions, both open and closed. <p>Children record responses on whiteboards.</p> <div>Q Which measurement is equivalent to 310 cm?</div> <div>Q Write down a measurement that is greater than 2.5 m.</div> <div>Q Write down any measurements that are less than 200 cm.</div> <ul style="list-style-type: none"> Using the Resource Sheet 5.2, ask the children a range of questions, both open and closed. <div>Q What is the equivalent to £10.69?</div> <div>Q Write down an amount greater than £5.00.</div> <div>Q Write down an amount less than 400 p.</div>	<p>Use decimal notation for tenths and hundredths.</p> <p>Know what each digit represents in numbers with up to two decimal places.</p> <p>Relate fractions to their decimal representation.</p> <p>Develop calculator skills and use a calculator effectively.</p> <p>VOCABULARY tenths hundredths decimal place</p> <p>RESOURCES Activity sheet 5.1 OHT 5.1 OHP calculator Class set of calculators Pupil whiteboards</p>	<ul style="list-style-type: none"> Remind the class how the place value in numbers works reading from left to right, (i.e. each place is worth ten times less than the previous place). Reinforce by recording hundreds tens, ones. Tenths on the board relate to numbers such as 7.3, 25.4 and 236.7. Explain that some numbers have more than 1 decimal place, e.g. 6.51 <div>Q What fraction is ten times smaller than $\frac{1}{10}$? So what is the 1 worth in 6.51?</div> <p>Establish that its value is one hundredth. Record $0.01 = \frac{1}{100}$ on the board. Write 3.47, 2.05, 0.36 on the board and ask children to give the place value of each digit.</p> <ul style="list-style-type: none"> Using the OHT calculator, enter 358. Ask: What is the value of the 5 digit? etc. How could we remove the 5 from this number? What would we enter into the calculator? What would the new number be? Discuss, then ask children to try it on their calculators. Establish that subtracting 50 changes the number to 308. Now enter a number with 1 decimal place, e.g. 7.3 on the calculator. <div>Q What is this number and what is the value of the 3?</div> <ul style="list-style-type: none"> Read out other numbers to one decimal place and invite children to enter them on the OHP calculator. Discuss why a decimal is read 'seven point two six' NOT 'seven point twenty six'. Enter a number like 7.26 into the calculator. <div>Q What is this number and what is the value of the 6?</div> <p>Read out other numbers to two decimal places and invite children to enter them on the OHP calculator.</p> <p>Enter 12.59 into the calculator.</p> <div>Q How could we change the 5 in this number to a 0 by subtraction?</div> <p>Invite children to do this on the OHP calculator.</p> <div>Q How could we change the 9 to a 0 by subtraction?</div> <p>Invite children to do this on the OHP calculator.</p> <ul style="list-style-type: none"> Using OHT 5.1, cover up with counters a number with 2 decimal places e.g. 7.42 – cover $7, \frac{4}{10}, \frac{2}{100}$. Pupils record the number on whiteboards. Repeat – e.g. $9.03 - 9, \frac{3}{100}$. Reinforce how a decimal is read e.g. 'seven point four two' NOT 'seven point forty two'. <div>Q Where do the counters go to make the number 43.71?</div> <p>Ask children to discuss this in pairs, then collect responses. Set the following paired tasks using Activity Sheet 5.1.</p> <p>Task 1 Take turns to : 1. Write a number with 2 decimal places. 2. Partner cover number on place value chart. 3. Both children say decimal out loud. Repeat several times.</p> <p>Task 2 Take turns to : 1. Cover a number using 3 or 4 counters. 2. Partner records number in decimal form. 3. Both children say decimal out loud. Repeat several times</p> <ul style="list-style-type: none"> Repeat 	<ul style="list-style-type: none"> Write a range of decimals on the board, such as 0.9, 0.21 etc. Ask the children to put them in order from smallest to largest. <div>Q Who can tell me a decimal between 4.1 and 4.2?</div> <ul style="list-style-type: none"> Ask the children to discuss this question in pairs, then take responses. <div>Q Why is 0.7 larger than 0.17?</div> <p>Repeat for other pairs of decimals e.g. 0.6 and 0.57.</p> <p>Pose questions such as:</p> <div>Q Is 0.6 smaller than 0.57?</div> <p>Take thumbs up/thumbs down response from class. Discuss misconceptions.</p> <p>By the end of the lesson, children should be able to :</p> <ul style="list-style-type: none"> Respond to questions such as: What does the digit 6 in 3.64 represent? Relate decimal notation to fraction notation for tenths and hundredths. <p>(Refer to supplement of examples, section 6, page 29.)</p>

Planning sheet	Day Two	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>	Term: <i>Autumn</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>Recall pairs of numbers that total 100.</p> <p>Recognise and extend number sequences formed by counting from any number in steps of constant size.</p> <p>RESOURCES Resource sheet 5.3</p>	<ul style="list-style-type: none"> Ask the class to count in 20s from a non-zero starting point (say 3, 14) and back; count in 25s from 0 and back to –100 ('minus 100'). count in quarters from 0 to 5 and back. Show Resource Sheet 5.3 Collect suggestions for pairs of numbers that total 100. Discuss strategies. 	<p>Use decimal notation for tenths and hundredths.</p> <p>Know what each digit represents in numbers with up to two decimal places.</p> <p>Relate simple fractions to their decimal representations.</p> <p>Develop calculator skills and use a calculator effectively.</p> <p>VOCABULARY tenths hundredths decimal place value</p> <p>RESOURCES OHP calculator Class set of calculators Activity sheet 5.2</p>	<ul style="list-style-type: none"> Write on the board: 7.82.....7.86. Reinforce 'seven point eight two' not 'seven point eighty two'. <p>Q What could we put between these two numbers?</p> <p>Take feedback from the children.</p> <ul style="list-style-type: none"> Write on the board: $7.82 + ? = 7.86$. <p>Q Which digit has changed and by how much?</p> <p>Use a number line to demonstrate a difference of 0.04.</p>  <p>7.82 7.83 7.84 7.85 7.86</p> <p>Q How could we check the answer on a calculator?</p> <ul style="list-style-type: none"> Repeat with $7.52 + \square = 7.82$ Give the children a range of similar problems. <p>After a set time, go through the problems and ask how they solved them.</p> <ul style="list-style-type: none"> Use the OHP calculator. <p>Q How should I enter 5 tenths into this calculator?</p> <p>Repeat with other questions relating to tenths and hundredths.</p> <p>Ask the children to work in pairs with one calculator between them.</p> <p>Give them similar questions about tenths and hundredths. The children take turns to enter the answer, the other child checks to see if the answer is correct.</p>	<ul style="list-style-type: none"> Give out Activity Sheet 5.2, cut into horizontal strips, and distribute to groups of 6. Explain that each strip shows the length of a long jump. Ask the groups to order them according to length jumped. Take feedback and then ask: <p>Q How much longer is the 2nd in your list than the 1st?</p> <p>Q How much more is the longest jump than the shortest?</p> <p>Q How many metres and centimetres is 2.06 m?</p> <p>Collect responses and strategies. Model on the number line or tape measure.</p> <p>Q How many metres and centimetres would 2.06 m be?</p> <p>HOMEWORK</p> <ul style="list-style-type: none"> Ask the children to look for examples of the % sign in papers at home and bring them in tomorrow or look for the % sign on TV and write down what it was for. <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> Use a calculator in one step (operation) to change; 7.82 to 7.86; Write the decimal equivalent to: two-tenths and five-hundredths; Order numbers with two decimal places. <p>(Refer to supplement of examples, section 6, pages 29 and 71.)</p>

Planning sheet	Day Three	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>	Term: <i>Autumn</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>Count in steps of equal size forward and back from 0.</p>	<ul style="list-style-type: none"> Use counting stick. Ask the class to count in 2s from 0 to 20 as you point to the marks on the stick. Repeat counting in 5s. Now ask them to count in both 2s and 5s, e.g. (0,0) (2,5) (4,10) etc. <div style="text-align: center;"> <p>0 2 4 6 8 10 12 14 16 18 20</p>  <p>0 5 10 15 20 25 30 35 40 45 50</p>  </div> <p>Repeat with 3 and 10</p>	<p>Begin to understand percentage as the number of parts in every hundred.</p>	<ul style="list-style-type: none"> Talk to the children about the % sign and their homework. Display any cuttings the children have brought in. <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Q Where else would we see this sign? </div> <ul style="list-style-type: none"> Define the term 'percent'. Per 'in every' and 'cent' meaning hundred. Explain that 1% means 1 in every hundred, so it is equivalent to $\frac{1}{100}$ or 0.01. Write: $1\% = \frac{1}{100} = 0.01$ on the board. <p>Define the term 'cent' meaning hundred.</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Q What other words can you think of that have cent in them? </div> <p>Discuss the meaning of suggested words in relation to one hundred.</p> <ul style="list-style-type: none"> Use OHT 5.2. Explain that each square is 1%. Cover up squares with either cubes or counters and ask the children how many percent is covered up. <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Q How could you record what is covered? </div> <p>Show the children how to record the percentages e.g. 30 out of 100 or $\frac{30}{100}$ or 0.3 or 30%.</p> <p>Give the children lots of examples on OHT 5.2 to record as a fraction, a decimal and a percentage. Reinforce that 10% is equivalent to $\frac{10}{100}$, $\frac{1}{10}$ and 0.1.</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Q What is 20% in tenths and as a decimal? </div> <p>Repeat for 30%, 60% and 90%. Give out copies of OHT 5.2 and counters if appropriate.</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Q If I cover 50% of grid, how many squares are covered? </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Q If I cover $\frac{1}{4}$ of grid, how could you express this? </div> <ul style="list-style-type: none"> Give the children percentage problems like: I have 100 counters, 21% are yellow, 13% are red, the rest are blue. What percentage is blue? <p>Encourage children to visualise the percentages on the 100 grid.</p>	<ul style="list-style-type: none"> Extend children's understanding of percentages by explaining that percentage can refer to a total or whole e.g. <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Q What is 100% of our class? Q 50% of our class have a cold, how many is that? Q A clothes shop is closing down, so they are reducing their prices by 50%. A shirt originally cost £10.00 but what is its price now? </div> <ul style="list-style-type: none"> Ask more questions like those above. The children can respond either orally or with whiteboards. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Recognise the % sign on clothes labels, in sales, on food packets; Know that: one whole = 100%, one-half = 50%, one-quarter = 25%, one-tenth = 10%; Know that $10\% = 0.1 = \frac{1}{10}$, $20\% = 0.2 = \frac{2}{10} = \frac{1}{5}$. <p>(Refer to supplement of examples, section 6, page 33.)</p> </div>
<p>RESOURCES</p> <p>Counting stick</p>		<p>VOCABULARY</p> <p>percent</p> <p>percentages</p> <p>% sign</p> <p>RESOURCES</p> <p>Whiteboards</p> <p>OHT 5.2</p>		

Planning sheet	Day Four	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>	Term: <i>Autumn</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>Begin to understand percentage as the number of parts in every hundred.</p> <p>VOCABULARY percent</p> <p>RESOURCES Whiteboards OHT 5.2</p>	<ul style="list-style-type: none"> On whiteboards children show answers to questions such as: <div> <p>Q What is 10% as a fraction, as a decimal?</p> <p>Q What is $\frac{1}{2}$ as a percentage?</p> <p>Q What is 0.4 in tenths? As a percentage?</p> </div> Discuss why for example 0.4 is 40% NOT 4%. Reinforce with OHT 5.2 if necessary. Ask the children problems involving percentages. The children can respond using whiteboards. Give problems such as: <div> <p>There were 40 children in a class.</p> <p>Q If 50% of them went on a trip, how many children would be left?</p> <p>Q If 25% of the class had school dinners, how many children would that be?</p> <p>Q If 75% of the class went out to play, how many children did not?</p> </div> 	<p>Solve simple problems using ideas of ratio (one for every).</p> <p>VOCABULARY ratio for every</p> <p>RESOURCES Beakers/cups 10p, 50p coins</p>	<ul style="list-style-type: none"> If we make a cake we use 1 cup of sugar for every 2 cups of flour. Use pupils with cups to model: <div>Record as 1 sugar for every 2 flour; 1 for every 2. If you wish, introduce the recording 1 : 2.</div> <div>Q If we made a bigger cake and used 2 cups of sugar, how many cups of flour do we need?</div> <div>Model with pupils and record: 1 for every 2 (1 : 2) 2 for every 4 (2 : 4) 3 for every 6 (3 : 6)</div> <div>Q If we use 10 cups of flour how much sugar do we need?</div> <div>Establish that 5 cups of sugar are needed. Use OHT to model this problem: For every 50p coin Mum gives to Dad, he gives her five 10p coins.</div> <div>Q If Dad gives Mum twenty-five 10p coins, how many 50p coins did Mum give to Dad?</div> <div>Model recording as: 1 for every 5 (1 : 5) 2 for every 10 (2 : 10) 3 for every 15 (3 : 15) 4 for every 20 (4 : 20) 5 for every 25 (5 : 25) Explain that this for every relationship is known as ratio.</div> Write on the board: Jasdeep has a total of 60 sweets that are either red or yellow. For every two red sweets there are three yellow sweets. <div>Q How many red and yellow sweets has Jasdeep got?</div> <div>Work this out in stages with the children, e.g.: 2 red : 3 yellow (5 sweets) 4 red : 6 yellow (10 sweets) 8 red : 12 yellow (20 sweets) 16 red : 24 yellow (40 sweets) Consider the patterns and establish that in each statement both numbers are the same multiple of the corresponding numbers in the first statement. Continue to show that for 60 sweets (40 + 20) there are 16 + 8 red and 24 + 12 yellow.</div> Ask the children to work out how many of each colour there will be for 100 sweets. Discuss and record strategies used by children on the board. <div>Q What if there were 4 red for every 1 yellow?</div> <div>Ask children to explore combinations for different sweet totals, recording their findings systematically.</div> 	<ul style="list-style-type: none"> Pupils sit in small groups. <div>Q What is the ratio of boys to girls in your group? long hair : short hair laced shoes : non-laced etc?</div> Discuss and establish 'for every' statements for each group. <div>Q Can you make up a ratio statement for your group?</div> Share and discuss. <div> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> Solve simple problems involving ratio; Make statements involving 'for every'. <p>(Refer to supplement of examples, section 6, page 27.)</p> </div>

Planning sheet	Day Five	Unit 5 <i>Fractions, decimals, percentages, ratio and proportion</i>		Term: <i>Autumn</i>	Year Group: 5
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities		Teaching Activities/Focus Questions
Double or halve any whole number to 100	<ul style="list-style-type: none"> Play a teacher-pupil response doubling game where a rhythm is set with the following dialogue: Teacher : Ping Pupils : Pong Teacher : Ping Pupils : Pong Teacher : 15 Pupils : 30 Teacher : 26 Pupils : 52 etc..... Change the rule to halving a number. 	<p>Solve simple problems using ideas of ratio and proportion.</p> <p>VOCABULARY ratio for every fraction percentage decimal</p> <p>RESOURCES Interlocking cubes (3 white, 2 black)</p>	<ul style="list-style-type: none"> Recap from yesterday, state: 'I can get five glasses of lemonade from every bottle'. <div>Q What can you tell me about this statement?</div> <ul style="list-style-type: none"> Collect responses, e.g. five glasses for every one bottle 5 : 1, I can get 10 glasses from 2 bottles; the ratio is 5 : 1 <div> Q How many bottles would I need for 25, 50, 100 glasses? Q What fraction of the bottle would fill one glass? What percentage would fill one glass? </div> <p>Ask children to work out these problems in pairs and record systematically.</p> <p>Discuss and address any misconceptions.</p> <ul style="list-style-type: none"> Draw a strip divided into five equal parts, three white, two black, or show them a tower similarly made from two black and three white inter-locking cubes.  <p>Ask children in pairs to record in their books statements describing this strip e.g. $\frac{2}{5}$ is black, $\frac{3}{5}$ is white, 60% is white, 40% is black, 0.4 is black, 0.6 is white, 2 black for every 3 white, 3 white for every 2 black., (the ratio of black to white is 2 to 3, the ratio of white to black is 3 to 2.)</p> <ul style="list-style-type: none"> Ask children to draw another strip or tower using a different ratio of colours and to write similar statements about it. 		<ul style="list-style-type: none"> Develop and extend ratio by asking: <div>Q A box of 10 fireworks contains rockets and roman candles at a ratio of 2 : 3, 2 for every 3. How many of each do you have?</div> <p>Emphasise the vocabulary '2 rockets for every 3 roman candles'.</p> <div> Q How many rockets would you get in 5 boxes? Q If you want 12 roman candles, how many boxes do you need to buy? Q What fraction of the fireworks are rockets? Q What is this as a decimal? Q What percentage are roman candles? </div> <p>Discuss each response, asking children to justify their answers.</p> <div> <p>By the end of the lesson, the children should be able to:</p> <ul style="list-style-type: none"> Discuss statements such as: John has one stamp for every two Mark has; Solve simple problems involving 'in every' or 'for every'. <p>(Refer to supplement of examples, section 6, page 27.)</p> </div>

VOCABULARY
double
halve

1.6 m	375 cm	250 cm	160 cm
3.1 m	0.75 m	4.2 m	0.9 m
160 cm	2.8 m	430 cm	2.4 m

£1.50	1069 p	£8.05	730 p
506 p	£2.32	5230 p	£10.80
£15.95	475 p	£3.75	635 p

36	18	52	59
76	67	64	25
48	82	33	75
41	24	19	81

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
$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{8}{10}$	$\frac{9}{10}$
$\frac{1}{100}$	$\frac{2}{100}$	$\frac{3}{100}$	$\frac{4}{100}$	$\frac{5}{100}$	$\frac{6}{100}$	$\frac{7}{100}$	$\frac{8}{100}$	$\frac{9}{100}$
$\frac{1}{1000}$	$\frac{2}{1000}$	$\frac{3}{1000}$	$\frac{4}{1000}$	$\frac{5}{1000}$	$\frac{6}{1000}$	$\frac{7}{1000}$	$\frac{8}{1000}$	$\frac{9}{1000}$

Jump 1	2.14 m
Jump 2	2.06 m
Jump 3	2.42 m
Jump 4	2.86 m
Jump 5	2.08 m
Jump 6	2.82 m
