Unit 4
Fractions, decimals and percentages

Five daily lessons

National **Numeracy** *Strategy*

Year 6
Autumn term

Unit Objectives

Year 6

• **Reduce a fraction to its simplest form by cancelling common factors.**	Page 23
• Recognise the equivalence between the decimal and fraction forms.	Page 31
• Use decimal notation for tenths and hundredths; extend to thousandths for measurements.	Page 29
• Know what each digit represents.	Page 29
• **Understand percentage as the number of parts in every 100.**	Page 33
• **Find simple percentages of small whole number quantities.**	Page 33

Link Objectives

Year 5

- **Use decimal notation for tenths and hundredths.**
- **Relate fractions to their decimal representations.**
- Use fraction notation, including mixed numbers, and the vocabulary numerator and denominator.
- Begin to understand percentage as the number of parts in every 100, and find simple percentages of small whole number quantities.

Year 7

- **Simplify fractions by cancelling all common factors and identify equivalent fractions.**
- **Recognise the equivalence of percentages, fractions and decimals.**
- Calculate simple percentages.

(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:

- Resource sheet 4.1
- Resource sheet 4.2
- Resource sheet 4.3
- Resource sheet 4.4
- Resource sheet 4.5
- Resource sheet 4.6
- Resource sheet 4.7
- Resource sheet 4.8
- Resource sheet 4.9
- Counting stick
- Related Key Stage 2 national test questions

department for education and skills

Planning sheet	Day One	Unit 4 *Fractions, decimals, percentages*	Term: *Autumn*	Year Group: *6*

Oral and Mental

Objectives and Vocabulary

Recognise equivalent fractions.

VOCABULARY
equivalent
numerator
denominator

RESOURCES
Resource sheet 4.1

Teaching Activities

- Using a fraction wall (Resource sheet 4.1) on the OHP/wall chart to recap equivalent fractions, record

  $^1/_2 = {}^2/_4 = {}^4/_8$

  Ask children to continue the sequence, repeating with thirds, sixths and twelfths.

  Q Can you write four more fractions equivalent to half? Repeat with $^1/_2$, $^1/_3$, $^3/_4$

- Revise the meanings of numerator and denominator.

Main Teaching

Objectives and Vocabulary

Reduce a fraction to its simplest form by cancelling common factors in the numerator and denominator.

VOCABULARY
reduce to simplest form
cancel
factors
denominator
numerator

RESOURCES
Resource sheet 4.2

Teaching Activities

- Cutting up Resource sheet 4.2, order fractions by converting them to fractions with a common denominator and position them on a number line. Lead on to questions such as:

  Q How do you know that $^2/_5$ is more than $^1/_4$?

  Establish the need to change to a common denominator.

  Discuss other examples such as comparing $^1/_4$ and $^1/_3$, $^3/_4$ and $^7/_{10}$ etc.

  Repeat with other examples if appropriate.

- Bring the class back together and discuss some of their examples. Encourage children to explain their reasoning.

  Show a fraction family such as:

  $$^3/_{10} = {}^{30}/_{100} = {}^{300}/_{1000}$$

  Q How can we work backwards to reduce $^{300}/_{1000}$ to a family of fractions with smaller numbers?

  Introduce harder examples e.g. $^{600}/_{800}$ where different factors are required and cancelling can be introduced.

  Q Can you continue the fraction family?

  Q What is happening to the numerator / denominator?

  Repeat with other fraction families.

- Children work independently on further examples.

Plenary

Teaching Activities / Focus Questions

- Write the fraction $^{12}/_{48}$ on the board; make sure the fraction family extends in both directions.

  Q Can you tell me any other equivalent fractions?

  Q Can you give me a fraction that is equivalent to $^2/_3$ but has a denominator of 18. Invite individual children to explain their working.

  Q How do you know when you have the simplest form of a fraction?

By the end of the lesson children should recognise that:

- **A fraction such $^5/_{20}$ can be reduced to an equivalent fraction by dividing both numerator and denominator by a common factor;**
- **A fraction such as $^3/_{10}$ can be changed to an equivalent fraction by multiplying both the numerator and denominator by the same number;**
- **If the numerator and denominator have no common factors, the fraction is expressed in its lowest terms.**

(Refer to supplement of examples, section 6, page 23.)

Planning sheet	Day Two	Unit 4 *Fractions, decimals, percentages*	Term: *Autumn*	Year Group: *6*

Oral and Mental

Objectives and Vocabulary

Change an improper fraction to a mixed number and vice versa.

VOCABULARY
proper fraction
improper fraction
mixed number

Teaching Activities

- Write $^{25}/_{20}$ on the board.

Q Can you think of a different way to write this fraction?

If necessary, suggest writing a mixed number.

- Practise converting from mixed numbers to improper fractions and back.

Main Teaching

Objectives and Vocabulary

Recognise the equivalence between the decimal and fraction forms.

VOCABULARY
decimal fractions

RESOURCES
Resource sheets 4.3, 4.4

Teaching Activities

- Write the following fractions on the board:

$^{3}/_{10}$ $^{1}/_{4}$ $^{2}/_{25}$ $^{4}/_{5}$

Q Can you put these fractions in order?

Discuss how it can be done, leading to converting to hundredths.

Q Would it have been easier it the numbers had already been written in hundredths or as decimal fractions?

Discuss how they can be converted to decimal form (i.e. 0.3, 0.25, 0.08, 0.8) and use the discussion to assess children's previous knowledge of decimal notation in hundredths.

Repeat with other examples.

- Draw a number line on the board.

Give out the cards on Resource sheets 4.3 and 4.4.

Q Can you place your cards in the correct place on the number line?

Encourage children to justify why they choose a particular place on the number line.

Draw children's attention to the fact that some children will want to put two or more cards in the same place. For example $^{3}/_{4}$, $^{75}/_{100}$ and 0.75.

- Provide differentiated examples for pupils to practise ordering fractions, decimals, then a mixture of both on a number line.

Plenary

Teaching Activities / Focus Questions

- Write on the board or use on OHT:

$0.5 = {}^{1}/_{2}$

$0.25 = \square$

$\square = {}^{3}/_{4}$

$\square = {}^{1}/_{10}$

$0.01 = \square$

$\square = {}^{1}/_{1000}$

Discuss what goes in the boxes and ask children to write out their own copy.

HOMEWORK – Learn the common fraction and decimal equivalences by heart.

Q What other equivalences can I work out?

By the end of the lesson children should be able to:

- **Convert an improper fraction to a mixed number, such as $^{33}/_{8}$ to $4^{1}/_{8}$ and $^{57}/_{12}$ to $4^{3}/_{4}$;**
- **Recognise the equivalence between decimals and fractions.**

(Refer to supplement of examples, section 6, page 23; page 31.)

Planning sheet	Day Three	Unit 4 *Fractions, decimals, percentages*	Term: *Autumn*	Year Group: *6*

Oral and Mental

Objectives and Vocabulary

Consolidate knowing by heart up to 10×10.

Derive quickly division facts corresponding to tables up to 10×10.

VOCABULARY
multiple

RESOURCES
Resource sheets 4.5, 4.6

Teaching Activities

- Play a 'loop' or 'follow me' card game (Resource sheets 4.5 and 4.6). Set a time. Try to beat your own record.

Main Teaching

Objectives and Vocabulary

Use decimal notation for tenths and hundredths; extend to thousandths for measurements.

Know what each digit represents.

VOCABULARY
double
factors
multiple

Teaching Activities

- Ask questions like:

Q When do we meet decimals in real life?

Q What in this room would measure 0.5m, 0.08m, 15.7cm etc.?

Q What in this room holds 0.27 litres?

- Explore metric units and the relationship between them.

Pupils begin to convert larger metric units to smaller and convert halves, quarters, tenths and hundredths to larger units.

e.g.

$^3/_4$ kg = ? grams
3.5m = ? cm
1.25 km = ? metres
2 litres = ? ml
500 ml = ? litres
6000 cm = ? m
100 mm = ? cm

Some children might be limited to one decimal place whilst others can be introduced to thousandths and associated word problems.

Plenary

Teaching Activities / Focus Questions

- Write on the board and discuss:

Q If the running track is 500m how many laps are needed to run 2.5km?

Establish that conversion to the same unit of measurement is necessary to solve the problem.

- **Q** There are 2.54cm to 1 inch. 1 yard is 36 inches. About how many centimetres are there in a yard?

(Other problems from supplement of examples, section 6, page 87.)

By the end of the lesson children should be able to:

- **Convert, for example 3.125km to metres; 300ml to 0.3 litres.**

(Refer to supplement of examples section 6, page 29.)

Planning sheet	Day Four	Unit 4 *Fractions, decimals, percentages*	Term: *Autumn*	Year Group: *6*

Oral and Mental

Objectives and Vocabulary

Recognise the equivalence between the decimal and fraction forms.

VOCABULARY
equivalent
equivalence

Teaching Activities

- Use questions to recall the homework from day 2.

Q What other equivalences can you work out?

- Extend children's understanding by asking questions about other fractions and decimals using an equivalence table for example:

$0.1 = \square$
$0.2 = \square$
$0.7 = \square$
$0.04 = \square$
$0.09 = \square$
$\square = {}^{3}/_{100}$
$0.006 = \square$
$\square = {}^{9}/_{1000}$

Main Teaching

Objectives and Vocabulary

Understand percentage as the number of parts in every 100.

Find simple percentages of small whole number quantities.

VOCABULARY
percentage
per cent
%
in every

RESOURCES
Resource sheet 4.7

Teaching Activities

- Using a 100 square, shade all the even numbers. (Teacher could do this using an OHT of Resource sheet 4.7, or children could do this on their own copy).

Q What percentage of the square is shaded?

Q What percentage of the square is not shaded?

Now shade all the multiples of 5.

Q What percentage of the square is / is not shaded?

Repeat with other examples.

- Stressing appropriate vocabulary, remind the children that percentage means the number of parts in every 100.

Using the multiples of 5 example, point out that: ${}^{20}/_{100} = 20\% = 0.2$

Repeat with other examples.

- Children work in pairs to make up some of their own.

Make sure that they can make connections between the fraction and percentage notation.

For example: digits whose sum is 10 is: ${}^{9}/_{100} = 9\% = 0.09$.

Plenary

Teaching Activities / Focus Questions

- Allow children to report back their findings.

Draw out the connections between fraction, decimal and percentage notation.

For example: ${}^{15}/_{100} = 15\% = 0.15$

- **Q** Which would you rather have?

  a) 50% of £90

  b) 25% of £200

Children work in pairs and feed back their answers and methods. Repeat with other examples if appropriate.

By the end of the lesson children should be able to:

- **Answer questions such as which of these percentages is equivalent to 0.26? 0.26%, 2.6%, 26%, 260%;**
- **Know that ${}^{13}/_{100} = 13\% = 0.13$**

(Refer to supplement of examples section 6, page 33.)

Planning sheet	Day Five	Unit 4 *Fractions, decimals, percentages*	Term: *Autumn*	Year Group: *6*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Count on in steps of 0.1, 0.2, 0.25, 0.5 ... and then back. VOCABULARY tenth twentieth hundredth RESOURCES Counting stick	• Using a counting stick, count on and back in steps of 01, 0.2, 0.25, 0.5 from different start points. Pointing to various places, ask **Q** If this is 0.2, what will this be? **Q** Will 0.35 (for example) be in this sequence?

Main Teaching

Objectives and Vocabulary	Teaching Activities
Find simple percentages of small whole number quantities. VOCABULARY percentage per cent % RESOURCES Percentage cards Measurement cards Resource sheet 4.8 Resource sheet 4.9	• Remind children of the previous lesson's question: **Q** Which is bigger: 50% of £90 or 25% of £200? Encourage children to discuss their methods of finding these percentages. • Use two sets of cards – three cards selected from Resource sheet 4.8 (to suit the ability range of the pupils) – all the cards from Resource sheet 4.9 placed face down on a table. Ask a child to choose at random one card from each set to create a problem such as 20% of 240m. Ask everyone to calculate the percentage of the measurements and discuss methods used. Repeat with different combinations. • Ask questions like: **Q** If I know 10% of £40 is £4 what other percentages do I know? **Q** What are the most useful percentages to find? • Children work in pairs to calculate other percentages.

Plenary

Teaching Activities / Focus Questions

Q What is wrong with this statement?

To calculate 10% of a quantity you divide it by 10. So to find 20%, you must divide it by 20.

Take feedback on responses.

Emphasise that in some cases, calculations can be done in a single step. Often two or more steps may be more appropriate. Show examples.

By the end of the lesson children should understand:

- **How to find simple percentages of small whole number quantities, without a calculator e.g. find 60% of £40, 40% of 3m.**

(Refer to supplement of examples section 6, page 33.)

$\frac{1}{2}$						$\frac{1}{2}$					
$\frac{1}{3}$				$\frac{1}{3}$				$\frac{1}{3}$			
$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$		
$\frac{1}{5}$		$\frac{1}{5}$			$\frac{1}{5}$			$\frac{1}{5}$			$\frac{1}{5}$
$\frac{1}{6}$		$\frac{1}{6}$			$\frac{1}{6}$			$\frac{1}{6}$			$\frac{1}{6}$
$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$	
$\frac{1}{10}$		$\frac{1}{10}$		$\frac{1}{10}$		$\frac{1}{10}$		$\frac{1}{10}$		$\frac{1}{10}$	
$\frac{1}{12}$		$\frac{1}{12}$		$\frac{1}{12}$		$\frac{1}{12}$		$\frac{1}{12}$		$\frac{1}{12}$	

$\frac{1}{20}$	$\frac{1}{10}$	$\frac{3}{20}$	$\frac{1}{5}$
$\frac{1}{4}$	$\frac{3}{10}$	$\frac{7}{20}$	$\frac{2}{5}$
$\frac{9}{20}$	$\frac{1}{2}$	$\frac{11}{20}$	$\frac{3}{5}$
$\frac{13}{20}$	$\frac{7}{10}$	$\frac{3}{4}$	$\frac{4}{5}$
$\frac{17}{20}$	$\frac{9}{10}$	$\frac{19}{20}$	1

$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{10}$
$\frac{1}{5}$	$\frac{1}{100}$	$\frac{75}{100}$	$\frac{3}{100}$
$\frac{30}{100}$	$\frac{7}{1000}$	$\frac{6}{10}$	$\frac{2}{5}$
$\frac{3}{5}$	$\frac{8}{10}$	$\frac{13}{1000}$	$\frac{99}{100}$

0.5	0.25	0.07	0.1
0.2	0.01	0.75	0.03
0.3	0.007	0.6	0.4
0.13	0.8	0.013	0.99

START What is 3×4?	I am 12 What is 4×5?	I am 20 What is 7×7?	I am 49 What is 8×3?
I am 24 What is $56 \div 7$?	I am 8 What is 10×7?	I am 70 What is 4×8?	I am 32 What is $24 \div 6$?
I am 4 What is 6×7?	I am 42 What is $90 \div 9$?	I am 10 What is 4×4?	I am 16 What is 7×9?
I am 63 What is $81 \div 9$?	I am 9 What is 9×3?	I am 27 What is 4×9?	I am 36 What is 9×5?

I am 45 What is 5×3?	I am 15 What is $24 \div 8$?	I am 3 What is 8×8?	I am 64 What is 5×7?
I am 35 What is $54 \div 9$?	I am 6 What is 8×7?	I am 56 What is 3×6?	I am 18 What is 7×4?
I am 28 What is 3×7?	I am 21 What is $63 \div 9$?	I am 7 What is 5×8?	I am 40 What is 10×6?
I am 60 What is 10×10?	I am 100 What is 5×6?	I am 30 What is 6×8?	I am 48 END

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

5%	10%	15%	20%
25%	30%	35%	40%
45%	50%	55%	60%
65%	70%	75%	80%
85%	90%	95%	100%

100ml	200g	£50	£42
60m	240m	27cm	250 litres
90 grams	150ml	15km	48mm
1000g	£25	32 metres	120kg

Related Key Stage 2 national test questions:

2000 Mental arithmetic test

5	How many metres are there in one point five kilometres?	m

11	What is three-quarters of two hundred?	

15	What is two per cent of three hundred?	

2001 Mental arithmetic test

4	What is three-quarters as a decimal?	

15	Look at your answer sheet. Put a ring around the decimal which is equivalent to two-fifths.	0.25 0.52 0.5 0.4 0.2

2002 Mental arithmetic test

11	Look at your answer sheet. Put a ring around the fraction which is equal to nought point four.	$\frac{1}{4}$ $\frac{1}{40}$ $\frac{1}{400}$ $\frac{4}{10}$ $\frac{4}{100}$

15	What is ninety-nine per cent of two hundred?		99%

2000 Test A

13 Calculate $\frac{3}{4}$ of **840**

13

1 mark

2000 Test B

16 Calculate **60%** of **765**

16

1 mark

2001 Test A

8 Put a tick (✓) in **each row** to complete this table.

One has been done for you.

	greater than $\frac{1}{2}$	less than $\frac{1}{2}$
0.9	✓	
0.06		
$\frac{11}{20}$		
0.21		

8
1 mark

19 Complete these fractions to make each equivalent to $\frac{3}{5}$

$\frac{\square}{10}$ $\frac{\square}{15}$ $\frac{12}{\square}$

19
1 mark

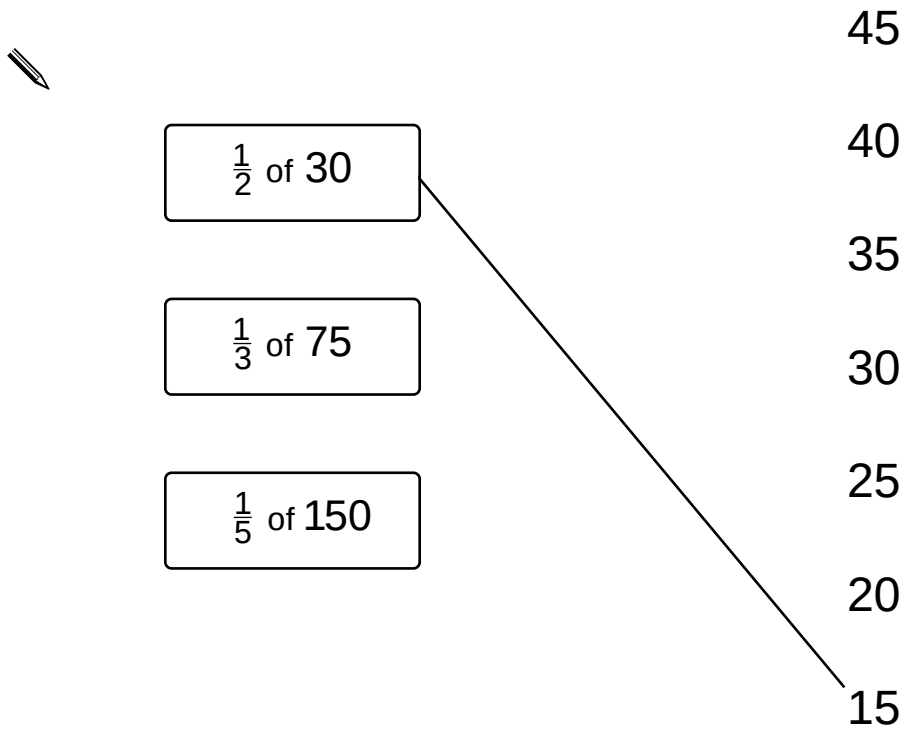
24 Calculate **15%** of **460**

24
1 mark

2001 Test B

14 Match each box to the correct number.

One has been done for you.



14

1 mark

24 Calculate $\frac{5}{12}$ of **378**

24

1 mark