Fractions, Decimals and Percentages

Help yourself to tea, coffee etc.

In What Year?

1. write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and ½.
2. divide proper fractions by whole numbers
3. compare and order unit fractions, and fractions with the same denominators
4. round decimals with one decimal place to the nearest whole number
5. recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.
6. add and subtract fractions with the same denominator and denominators that are multiples of the same number

In What Year?

1. write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and ½. *Year 2*
2. divide proper fractions by whole numbers *Year 6*
3. compare and order unit fractions, and fractions with the same denominators *Year 3*
4. round decimals with one decimal place to the nearest whole number *Year 4*
5. recognise, find and name a quarter as one of four equal parts of an object, shape or quantity. *Year 1*
6. add and subtract fractions with the same denominator and denominators that are multiples of the same number *Year 5*

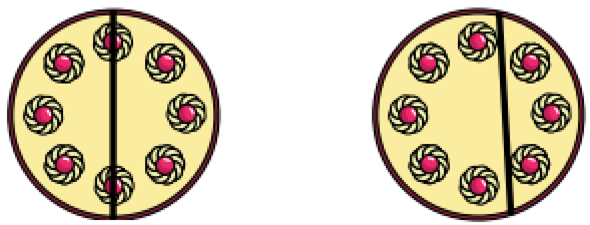
Year 1

Statutory requirements

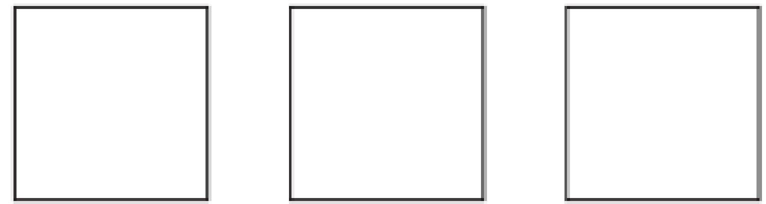
Pupils should be taught to:

- recognise, find and name a half as one of two equal parts of an object, shape or quantity
- recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

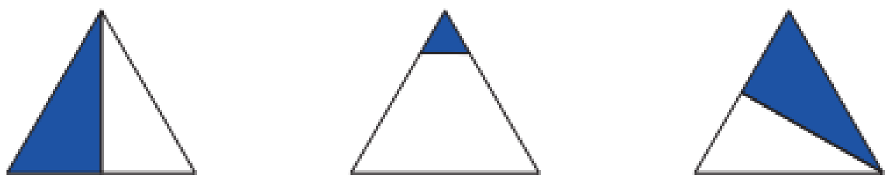
Which cake is cut in half?



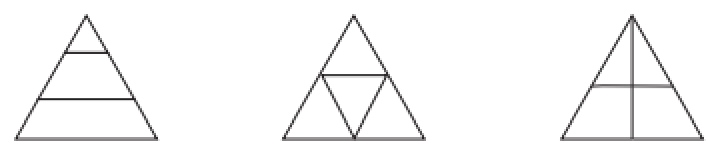
Show one half in three different ways.



Which shapes show one half?

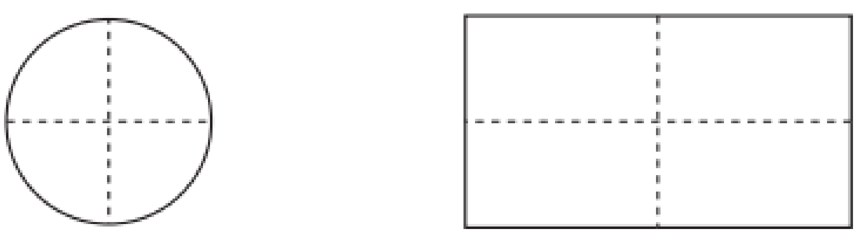


Kim wants to show a quarter.

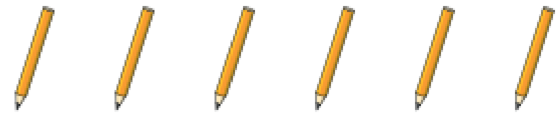


Do you agree with Kim? ____________

Colour a quarter of each shape.



a) Circle half of the pencils.



b) Complete the sentence.

Half of 6 is ☐

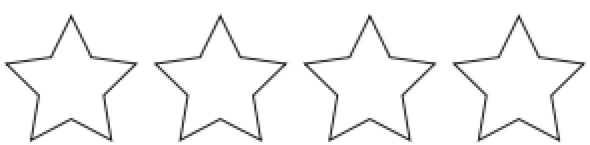
Complete the sentence.

7 is half of ☐

A quarter of 12 is ☐

Colour half of each group.

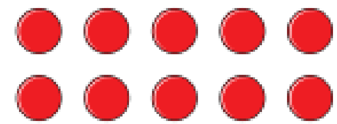
a)



How many counters are there in each group?

Find half of each group.

a)



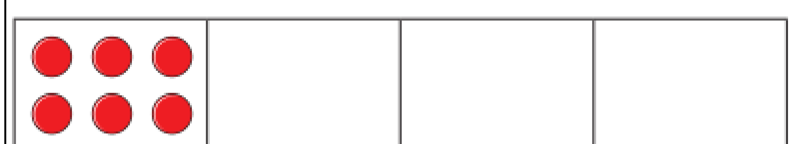
Half of ☐ is ☐

c) Half of 8 is ☐

A quarter of 8 is ☐

What do you notice?

A quarter is 6



What is the whole?

How can I help my child?

During a meal, ask your child to cut something in half and compare the two.

Cut toast or sandwiches in half for somebody.

When sharing something out (pennies, grapes, sweets) deliberately share them unequally. When your child realises that you have more than them, they are sure to say something. During the conversation discus whether both parts are equal and ask them to help ‘make it right’.

Year 2

Statutory requirements

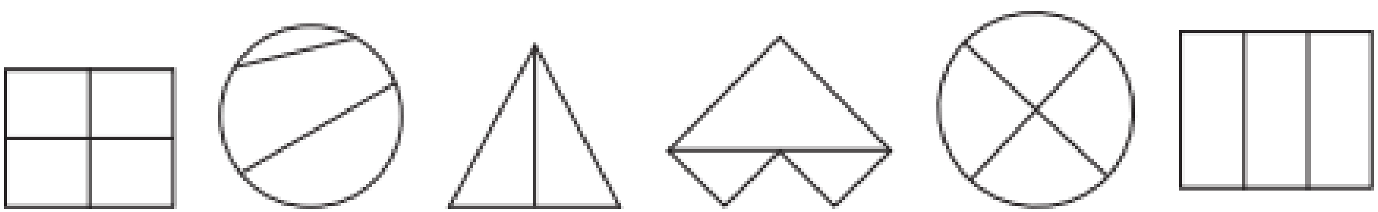
Pupils should be taught to:

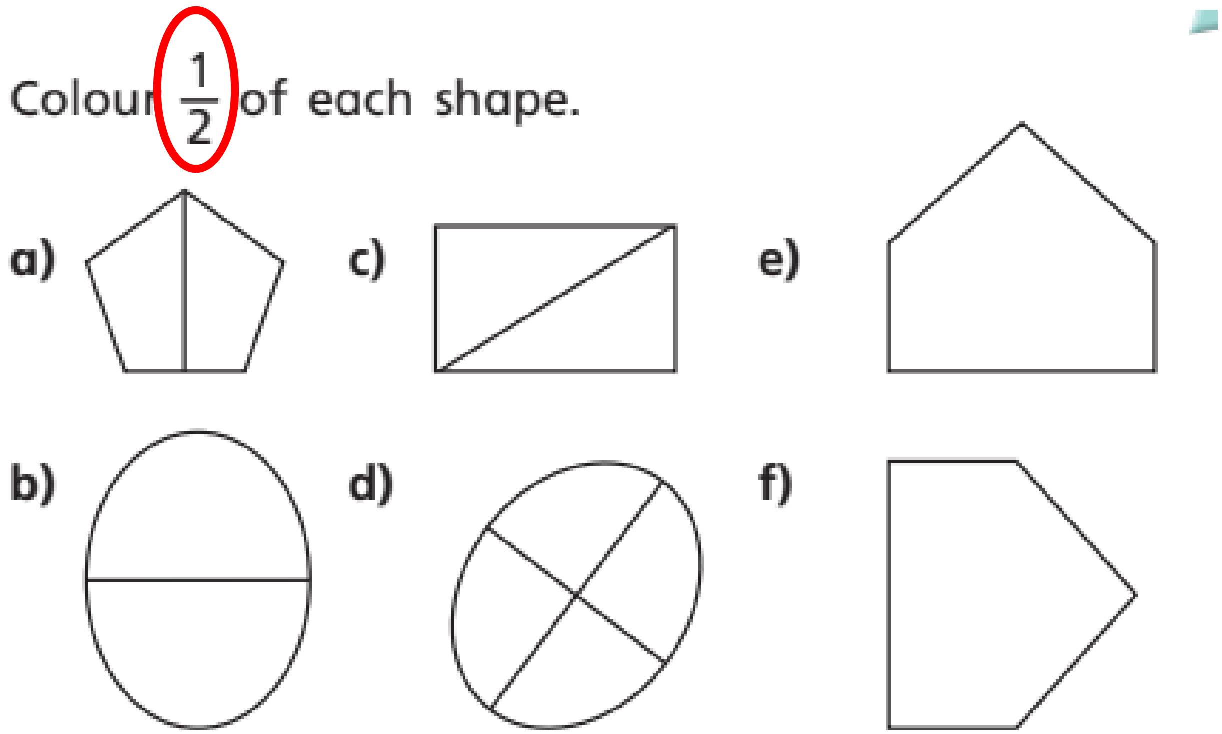
- recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
- write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.

How do you know the loaf of bread is not in equal parts?

Key knowledge of equal parts

Which shapes show equal parts?

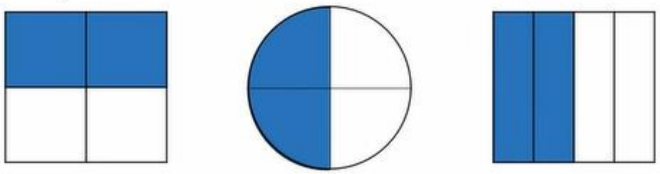




- Children will be exposed to fractions.
- Numerator and denominators discussed.
- Thirds (1/3) are introduced.
- Language of unit fractions (where the numerator is one) and non-unit fractions (the numerator is bigger than one) is introduced)

Shade $\frac{1}{2}$ of the shapes.

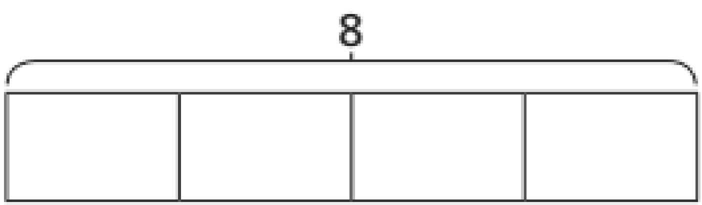
Shade $\frac{2}{4}$ of the shapes.



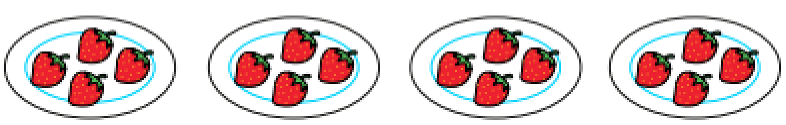
Here is a delicious chocolate bar.

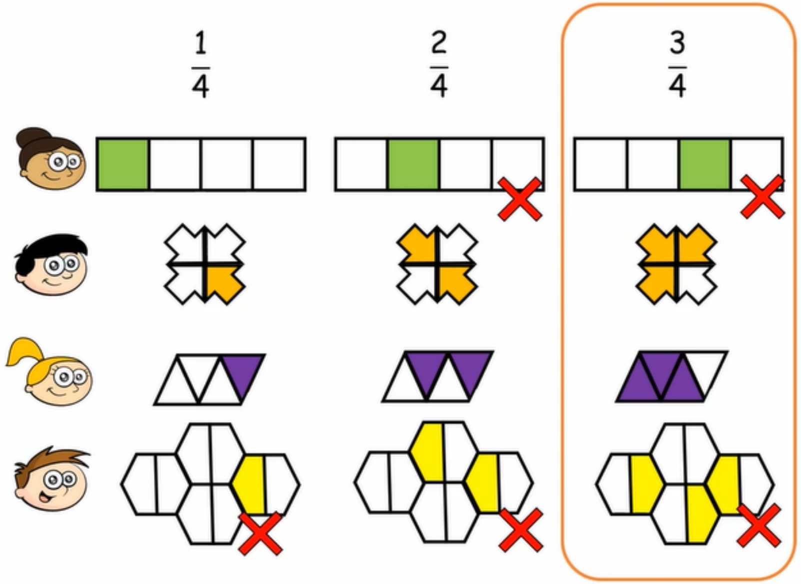
Would you rather have ½ or 2/4?

The idea of equivalence is introduced.



Recognising and finding 3/4





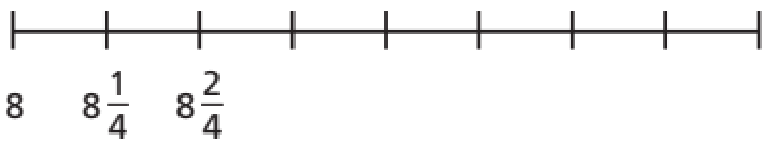
Counting in fractions

Write the missing fractions.

a)

5	$5\frac{1}{4}$	$5\frac{2}{4}$				

b)



Helping your child at home

- Point out the fractions all around you – such as when you are in the shops (for example, 1/2 price offers) or in recipes (1/4 tablespoon) and so on. Talk about what the different numbers mean.
- Try sharing objects equally to find fractions of amounts. You could do this by using things around the house – for example, grapes, buttons, beads, or pieces of dried pasta
- Ask ‘Would you rather questions? E.g. would you rather have 2/4 or ½ of twelve sweets?
- Extend your child’s knowledge of equivalence by asking questions such as the ones below as this will make them reason that the size of the whole can make a difference to the outcome
    - Is ½ of a square equivalent to ½ of a triangle?
    - Is ½ of a two finger kit-kat equivalent to 2/4 of a four finger kit-kat?

Year 3

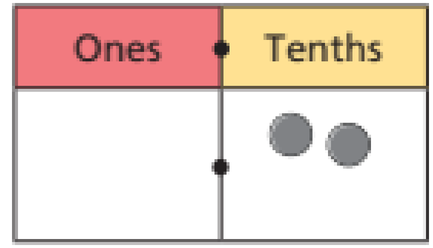
Statutory requirements

Pupils should be taught to:

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]
- compare and order unit fractions, and fractions with the same denominators
- solve problems that involve all of the above.

Which fractions are equivalent to one whole?

$\frac{3}{5}$	$\frac{4}{4}$	$\frac{6}{10}$	$\frac{2}{2}$
$\frac{10}{10}$	$\frac{8}{9}$	$\frac{3}{3}$	$\frac{5}{5}$



Decimals are introduced.

2/10 = 0.2

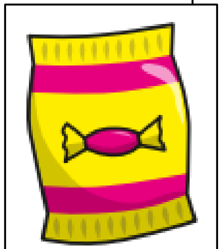
Dani has a bag of sweets.

$\frac{1}{2}$ of the sweets are red.

$\frac{3}{10}$ of the sweets are yellow.

The rest are green.

What fraction of the sweets are green?



Draw counters in the bar models to help you complete each number sentence.

a) $\frac{2}{3}$ of 15 =

b) $\frac{3}{4}$ of 8 =

c) $\frac{2}{5}$ of 20 =

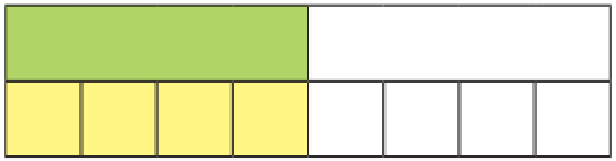
When adding fractions, you add the numerator and the denominator stays the same.

d) $\frac{6}{7}$ ◯ $\frac{2}{7}$

$$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$$

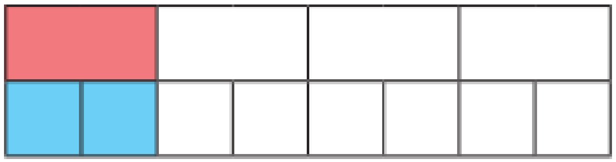
Complete the equivalent fractions.

a)



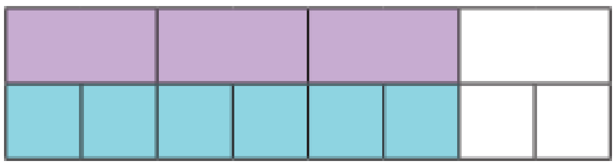
$\frac{1}{2} = \frac{\square}{8}$

b)

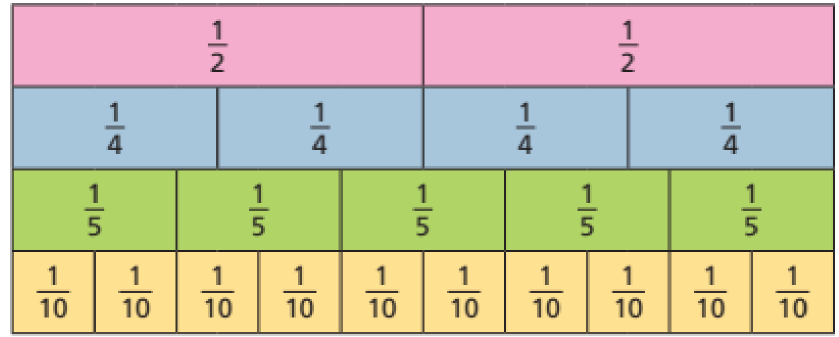


$\frac{1}{4} = \frac{2}{\square}$

c)

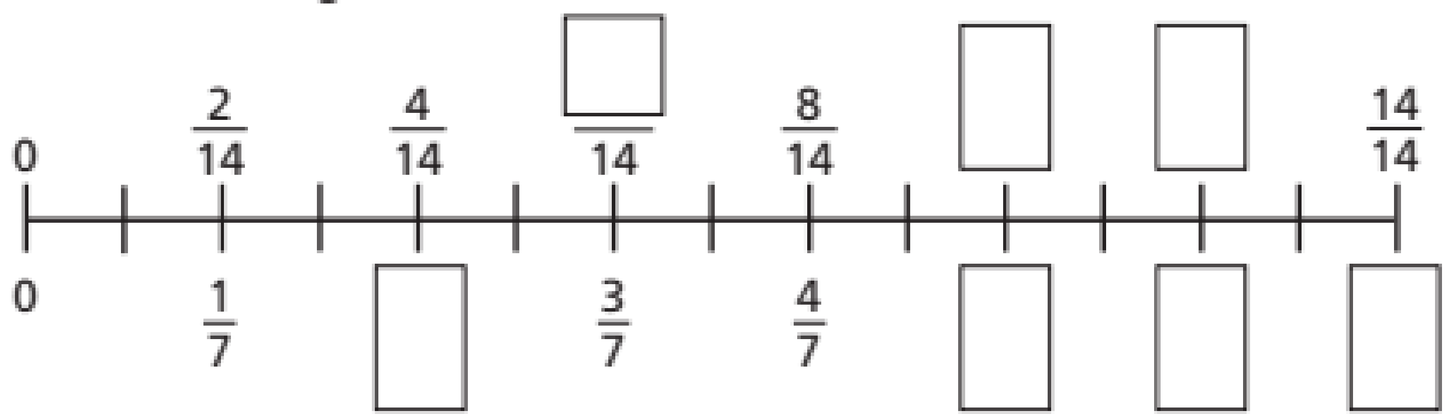


$\frac{3}{4} = \frac{6}{\square}$



Equivalent Fractions

Find the missing numbers.



Helping your child at home

1. Give your child three evenly sized balls of playdough.
2. Get them to break one ball down into halves, another into quarters and the third into eight evenly sized pieces.
3. Now, use a scale – preferably a balance scale – to show that the half is equal to two quarters and four eighths. (Also, that a quarter is equal to two eighths, and that three quarters is equivalent to six eighths.)
4. You could get them to reform the three original balls of playdough, breaking them down into three, six and nine equal pieces. Again, you can demonstrate that a third is equal to two sixths and three ninths, and that two thirds are the same as four sixths and six ninths.

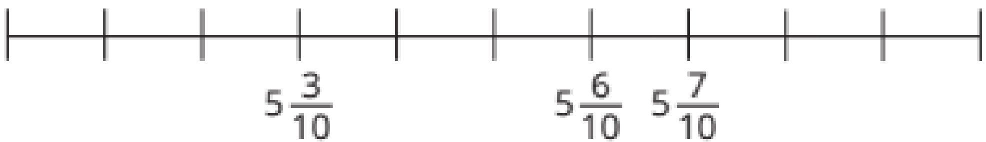
1. Firstly, cut some strips of paper. They must be paper strips of equal length.
2. Fold the first strip in half.
   Fold the second strip into quarters.
   Fold the third strip into six equal parts or sixths.
   Fold a fourth strip into eight equal parts or eighths.
   Finally, fold a strip into twelve.
3. Next, work with your child to label the strips, so each part on the first strip has ½ written on each part, the second strip is labelled with ¼s, and so on. Now, you / they can show that a half is equal to two quarters, three sixths, four eighths, and six twelfths.

Year 4

Statutory requirements

Pupils should be taught to:

- recognise and show, using diagrams, families of common equivalent fractions
- count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- add and subtract fractions with the same denominator
- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- solve simple measure and money problems involving fractions and decimals to two decimal places.

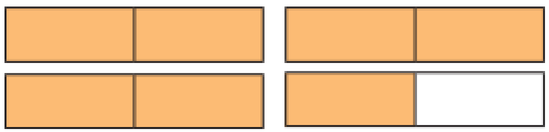


a) $4 = \frac{\square}{4}$

b) $8 = \frac{\square}{4}$

Convert the improper fractions to mixed numbers.

a)



$\frac{7}{2}$

Concept of mixed numbers and improper fractions are introduced

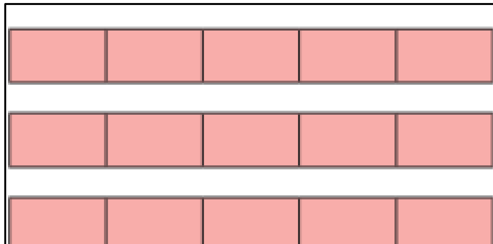
a) $\frac{3}{8} + \frac{\square}{8} = \frac{7}{8}$

b) $\frac{3}{8} + \frac{\square}{8} = 1$

e) $\frac{4}{9} + \frac{\square}{9} = \frac{13}{9} = 1\frac{\square}{9}$

f) $\frac{4}{9} + \frac{\square}{9} = \frac{\square}{9} = 1\frac{7}{9}$

$9\frac{4}{5} - \frac{3}{5}$



$3 - \frac{8}{5}$

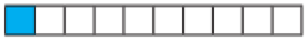
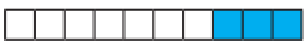
$\frac{7}{12}$ of the audience at a concert are adults.

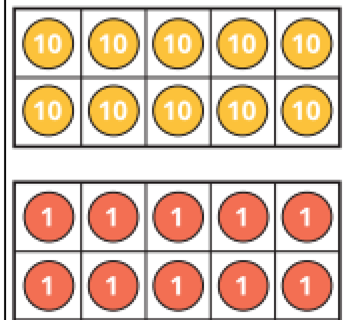
The rest are children.

$\frac{2}{12}$ of the audience are children who wear glasses.

What fraction of the audience are children who do **not** wear glasses?

Decimals

Bar model	Fraction	Decimal
		0.1
	$\frac{5}{10}$	
		
		



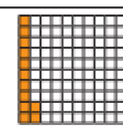
c)

Write <, > or = to make the statements correct.

a) 2 ÷ 10 ◯ 10 ÷ 2

b) 7 ÷ 10 ◯ 3 ÷ 10

c) 4 ÷ 10 ◯ 0.4 × 10

Hundred square	Words	Fraction	Decimal
	thirty-six hundredths		
		$\frac{82}{100}$	
			0.27
			
	seven tenths		
			0.3

a) 3 ÷ 100 = ☐

b) 90 ÷ 100 = ☐

c) ☐ = 5 ÷ 100

d) ☐ = 60 ÷ 100

e) ☐ ÷ 100 = 0.5

f) 0.02 = ☐ ÷ 100

How can you help at home?

If in the shops, ask them to convert between pounds and pence to practise multiplying and dividing by 10, 100 and 1,000

Food for Thought

Fractions and decimals can be modelled with food at home. Look for opportunities to make fractions with foods that can be cut into smaller pieces such as cakes and pizzas. Try to cut things into ten pieces and discuss the fraction and the decimal with your child (each piece is 1/10 or 0.1). State what fraction you have eaten and then ask your child to do the same. For example, if you have eaten three slices of the pizza, you could say, 'I have eaten 3/10 or 0.3 of the pizza'.

Decimal Counting

Play a game of decimal counting with your child to see how far you can go before making a mistake. To do this, one person chooses a starting decimal number and you must decide if you will count up or down and by how much each time. Then the next person says the next number in the decimal sequence. For example, if you decided to start at 0.22 and count up in hundredths, the next numbers in the sequence would be 0.23, 0.24, 0.25, 0.26 etc. Continue to take turns to do this until somebody makes a mistake.

Year 5

Statutory requirements

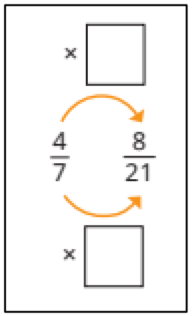
Pupils should be taught to:

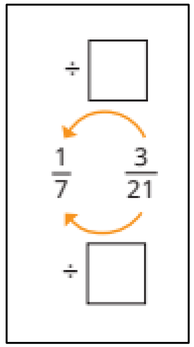
- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25.

a) $\frac{1}{4} = \frac{6}{\square}$

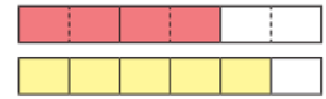
a) Which of the fractions are equivalent to $\frac{1}{8}$?

$\frac{4}{32}$ $\frac{3}{10}$ $\frac{100}{800}$ $\frac{10}{18}$ $\frac{5}{40}$





The bar models show $\frac{2}{3}$ and $\frac{5}{6}$



Write <, > or = to compare the fractions.

a) $\frac{2}{3}$ ◯ $\frac{4}{6}$ b) $\frac{2}{3}$ ◯ $\frac{5}{6}$ c) $\frac{5}{6}$ ◯ $\frac{2}{3}$

Write <, > or = to compare the fractions.

a) $\frac{3}{4}$ ◯ $\frac{5}{8}$ c) $\frac{4}{5}$ ◯ $\frac{11}{15}$

b) $\frac{5}{12}$ ◯ $\frac{2}{6}$ d) $\frac{2}{3}$ ◯ $\frac{11}{12}$

Write the fractions in order, starting with the greatest fraction.

$\frac{1}{4}$ $\frac{2}{6}$ $\frac{10}{12}$ $\frac{5}{24}$

Convert the improper fractions to mixed numbers.

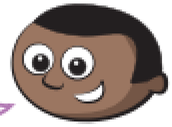
a) $\frac{10}{2}$ c) $\frac{10}{4}$ e) $\frac{12}{5}$ g) $\frac{13}{7}$

b) $\frac{10}{3}$ d) $\frac{10}{5}$ f) $\frac{13}{6}$ h) $\frac{31}{8}$

Fractions

Mo is thinking about tenths and hundredths.

> In the number 2.49, the digit 4 represents 4 tenths or 0.4



What is the value of the digit 4 in each of these numbers?

a) 14.8 **c)** 8.04 **e)** 106.48

b) 13.74 **d)** 42.03 **f)** 176.4

Annie has three digit cards.

0	**2**	**5**

Are the statements true or false? Explain your answers.

a) The greatest number Annie can make is 5.02

b) The smallest number Annie can make is 0.25

c) Annie can make six different numbers.

Here are some numbers.

2.05	$2\frac{5}{10}$	$2\frac{1}{2}$
$2\frac{5}{100}$	2.53	$2\frac{3}{5}$
2.501	$2\frac{80}{100}$	$2\frac{3}{10}$

a) Which of the numbers are equal to 2.5?

b) Which of the numbers are greater than 2.5?

Write a decimal answer for each addition.

a) $\frac{7}{10} + \frac{3}{100} + \frac{9}{1000}$

b) $\frac{9}{10} + \frac{7}{100} + \frac{1}{1000}$

c) $2 + \frac{7}{100} + \frac{9}{10} + \frac{1}{1000}$

d) $\frac{2}{10} + \frac{7}{1000}$

e) $7 + \frac{6}{100} + \frac{3}{1000}$

Write the numbers in ascending order.

a)	0.45	0.654	0.546	0.405
b)	7.2 kg	7.212 kg	7.21 kg	7.201 kg
c)	25.391	25.309	25.093	25.193

Use the number line to complete the sentences.

6.18 rounded to the nearest integer is $\boxed{}$

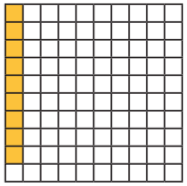
6.85 rounded to the nearest integer is $\boxed{}$

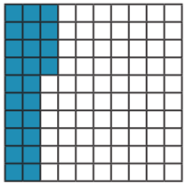
Decimals

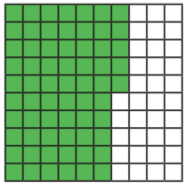
Percentages

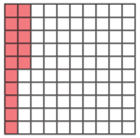
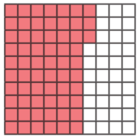
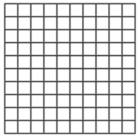
There are ☐ parts out of a hundred shaded.

This is ☐ %.

a) 

b) 

c) 

Hundred square	Percentage
	
	
	82%

Dora is doing a school survey.

She compares how many children wear glasses in Class 4 and Class 5

- $\frac{1}{5}$ of the children in Class 4 wear glasses.
- 25% of the children in Class 5 wear glasses.
- Both classes have the same number of children.

Which class has more children who wear glasses?

Passengers are boarding a plane.

The plane has 100 seats.

a) 10% of the seats are already full.

How many passengers are already on the plane?

b) 15% of the seats have not been booked.

How many seats have been booked?

c) How many passengers still need to board the plane?

Dexter has £1 to spend.

He buys some stickers.

What percentage of his money did Dexter spend?

a) 0.24 ◯ 42%

b) 0.58 ◯ 51%

Write the values in order from smallest to greatest.

a) 33% $\frac{30}{100}$ 3% $\frac{13}{100}$

b) 99% $\frac{91}{100}$ 9% $\frac{9}{10}$

Helping at Home

Encourage your child to compare price tags. This is great practice for comparing numbers with two decimal places. For example, one item may cost £1.67 and another may cost £1.76. Ask your child to say which one is bigger and to explain how they know. They could even use the greater than > or less than < symbols to compare numbers up to two decimal places (for example, 5.67 < 5.71).

Calculate Costs

This is where you can really put your child's maths skills to the test. Ask them questions to do with real-life experiences. For example, if you book a holiday that costs £754 for three people, ask your child to calculate how much it costs per person to the nearest pound. Using money problems is a great way to get your child to practise doing calculations with decimal numbers in everyday life situations.

Decimal Card Game

Cut a piece of card into small squares, all the same size. Write a selection of decimal numbers on the cards all with the same number of decimal places (1 or 2 decimal places). Then, ask your child to order the numbers from smallest to biggest. Once completed, ask your child to explain how they knew to place the numbers in that order.

Year 6

Statutory requirements
Pupils should be taught to: ▪ use common factors to simplify fractions; use common multiples to express fractions in the same denomination ▪ compare and order fractions, including fractions > 1 ▪ add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions ▪ multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$] ▪ divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$] ▪ associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] ▪ identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places

Year 6

Statutory requirements
▪ multiply one-digit numbers with up to two decimal places by whole numbers ▪ use written division methods in cases where the answer has up to two decimal places ▪ solve problems which require answers to be rounded to specified degrees of accuracy ▪ recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison

Sort the calculations into the correct part of the table.

$\frac{3}{4}+\frac{5}{8}$ $\frac{2}{5}+\frac{9}{25}$ $\frac{3}{4}-\frac{5}{8}$ $\frac{2}{5}-\frac{9}{25}$ $\frac{1}{8}-\frac{1}{56}$ $\frac{23}{24}-\frac{1}{4}$ $\frac{23}{24}+\frac{1}{4}$ $\frac{1}{7}+\frac{1}{56}$

Calculations with answers less than 1	Calculations with answers greater than 1

a) $2\frac{3}{5}+1\frac{3}{10}$

c) $3\frac{5}{9}+1\frac{1}{4}$

b) $4\frac{7}{15}+2\frac{1}{3}$

d) $7\frac{5}{8}+1\frac{2}{3}$

a) $8-\frac{1}{4}=\square$

$8-1\frac{1}{4}=\square$

$8-\square=3\frac{3}{4}$

$8-\square=3\frac{1}{4}$

b) $8\frac{1}{8}-\frac{1}{4}=\square$

$8\frac{1}{8}-1\frac{1}{4}=\square$

$8\frac{1}{8}-\square=2\frac{7}{8}$

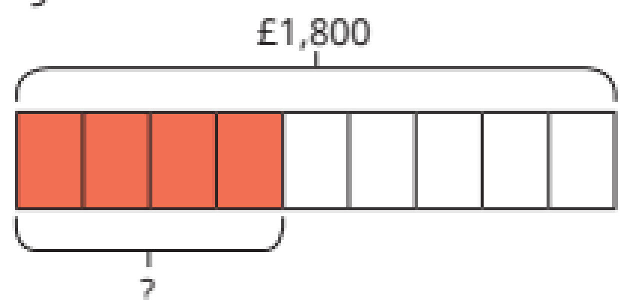
$8\square-3\frac{1}{4}=5\frac{5}{8}$

$1\frac{1}{2}\times 3$

a) $\frac{1}{4}\times\frac{1}{5}$

$\frac{3}{5}\div 5$

$\frac{4}{9}$ of £1,800



%

a) $\frac{9}{10} = \frac{\square}{100} = \square$ %

b) $\frac{9}{20} = \frac{\square}{100} = \square$ %

c) $\frac{9}{50} = \frac{\square}{100} = \square$ %

d) $\frac{9}{25} = \frac{\square}{100} = \square$ %

Fraction	Decimal	Percentage
	0.21	
		12%
$\frac{2}{10}$		
	0.4	
	0.44	
		4%
$\frac{3}{4}$		
	0.99	

66% of 3,000 = $\square$

70% of 80 = $\square$

28% of 650 = $\square$

Write **<**, **>** or **=** to complete the statements.

a) 64% ◯ 0.46

b) 0.96 ◯ $\frac{97}{100}$

c) $\frac{3}{5}$ ◯ 35%

d) 0.8 ◯ 80%

e) 67% ◯ $\frac{7}{10}$

f) $\frac{7}{20}$ ◯ 0.3

Helping at Home

- Calculate with numbers that have 3 decimal places in the real world. For example, when you fill the car with petrol, ask your child to tell you what the number is by explaining how many tenths, hundredths, or thousandths it has. Can they round the total price or the total amount of petrol to the nearest whole number, tenth, or hundredth? For example: If you have 56.784 litres of petrol, you could round to the nearest litre (57L), tenth (56.8L), or hundredth (56.78L).
- Money and measures are great for practising using numbers with 2 decimal places. You could show your child your shopping receipt with the total hidden. Ask your child to work out the total cost of the shopping receipt. How much change you would be given if you paid using, for instance, a £10 note?
- Sales at the shops can provide great real-life opportunities to work with percentages. For example, you could ask your child to help you work out the sale price of an item. If there is 30% off a T-shirt and the full price is £9.99, what is 30% of the full price and what is the sale price?