Folksworth Church of England (VC) Primary School

Calculations Policy: Fractions, Decimals and Percentages

Inspiring a love of learning through
the bonds of **family**, **faith** and **friendship**.

Year 1
Fractions

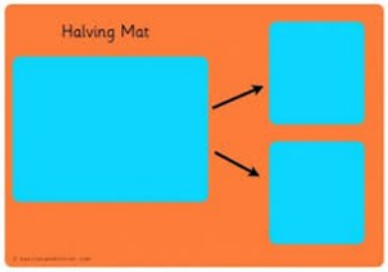
Objectives and Key Skills

When teaching fractions, the emphasis is often on situations where the object can easily be cut, folded, split or coloured in equal parts. Although there is some need for this sort of activity, children should be exposed to a wide variety of situations, some where such folding or splitting strategies will not be successful. This will aid children in developing a more firm grasp of the concept of fractions.

Recognise, find and name a half as one of two equal parts of an object, shape or quantity.

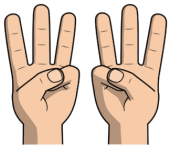
- Find $^1/_2$ of objects such as paper shapes, string, jugs of water, pieces of fruit, metre sticks and so on. This will involve pulling apart, cutting, folding and weighing. Show children that this is a half and we write this as one over two. It means one split into two equal parts — the parts are the same size.

- In a wide range of contexts children use objects and find half e.g. *find half of 16 cubes by giving one each repeatedly to two children. Use a sharing mat.*



- Find half of even numbers up to 12, including realising that it is hard to halve an odd number. Using a range of equipment including Numicon, cubes, counting objects.

- Half of 6 is 3 using our fingers.

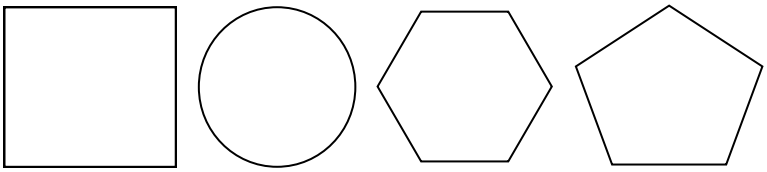


Examples of types of questions

Here is a set of 12 pencils. Sarah would like to use half the pencils. How many is half the set?

Make a square. How many different ways can you halve it?

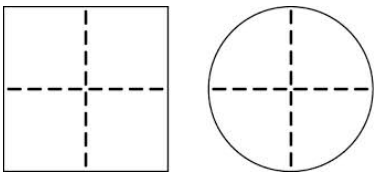
Shade one half of each shape.



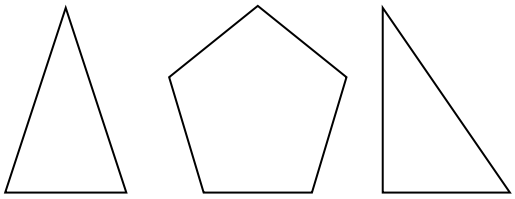
Year 1
Fractions

Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

- Find a quarter of shapes by folding and halving. Model finding a half and then halving again to create quarters. Write on each part $^1/_4$ and show children how all 4 quarters are equal to a whole.



Give children shapes that they can not easily fold into quarters.



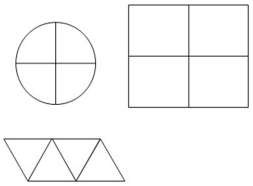
- Find a quarter of an amount of objects by sharing into 4 groups by using counters, bears, Numicon or other objects.

Examples of types of questions

Four children equally share 12 strawberries.
How many strawberries will each child have?

How many different ways can you split this shape into quarters?

Shade $^1/_4$ of each of these shapes. How can you prove that each quarter within a shape is equal in size?



Vocabulary

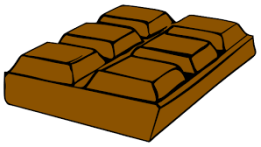
Whole, fraction, equal, parts, four equal parts, one half, two halves, a quarter, two quarters

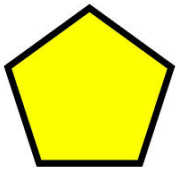
Year 2
Fractions

Objectives and Key Skills

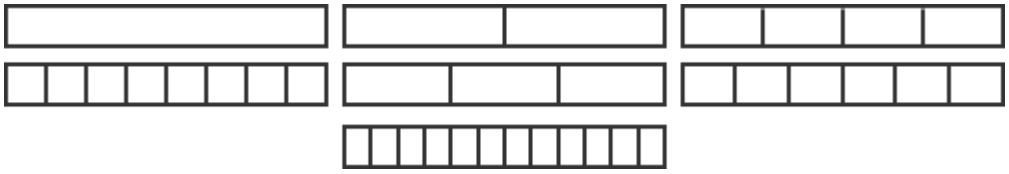
Recognise, find, name and write fractions $^1/_3$, $^1/_4$, $^3/_4$ of a length, shape, set of objects or quantity.

- Introduce thirds, emphasising that it is a whole split into 3 equal parts. Show children this through a range of examples including, shapes, quantities and lengths.
- Find $^1/_3$ of a shape, length or an object by cutting, folding into thirds. Give children examples where a shape can not be split into 3 equal parts through folding.



- Find $^1/_4$, $^2/_4$ and $^3/_4$ of a range of shapes by folding. Label each equal part.



- Find $^3/_4$ of a shape by cutting food including pizza, cakes, chocolate bars etc.

- Find $^1/_3$, $^1/_4$, $^2/_4$, $^3/_4$ of quantities by using objects initially to share into equal groups. If children are confident conceptually move onto pictorial representations, using the Singapore bar model method see Y3. Find half of a number by partitioning.

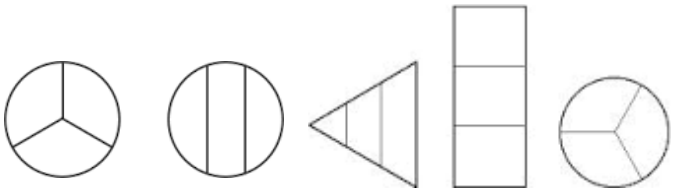
24 = 20 + 4

10 2

- Count in halves, quarters and thirds along a number line, counting stick.

Examples of types of questions

Explain how you know that one of these shapes has not been split into thirds.



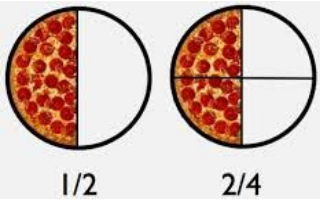
Michael and Chris share this picnic equally between them.

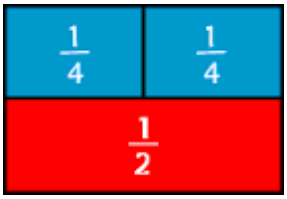
Exactly how much of each item will they get?

Year 2
Fractions

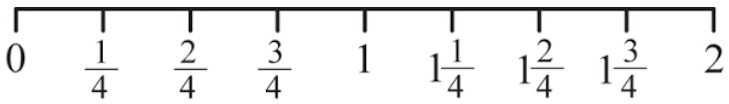
Write simple fractions for example, $^1/_2$ of 6 = 3 and recognise the equivalence of $^2/_4$ and $^1/_2$.

- Find the equivalence of $^2/_4$ and $^1/_2$ by showing the parts of a model or object. *How many quarters make a half?* Discuss answers modelling by placing two quarters over a half to show they are the same. Show $^2/_4 = {}^1/_2$, $^2/_2 = 1$ *and* $^4/_4 = 1$ emphasise two halves are a whole, four quarters are a whole and two quarters are a half. Show children a range of models and images to represent this.





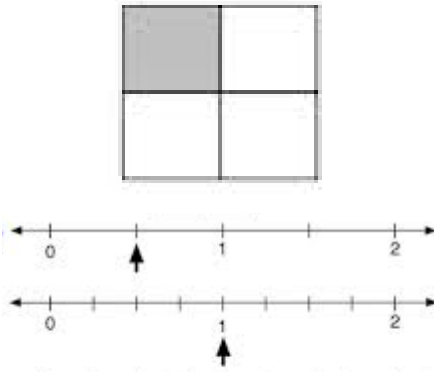
- Count in halves, quarters along a number line or counting stick from 0 to 10.



Examples of types of questions

Would a chocolate lover rather have $^1/_2$ or $^1/_4$ of this bar of chocolate? Explain your answer.

Which number line shows the same fraction as the square?



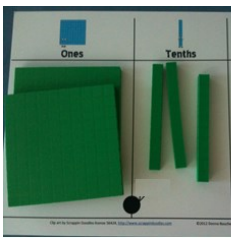
Vocabulary

Whole, fraction, equal, parts, four equal parts, one half, two halves, a quarter, two quarters, three quarters, one third, a third, equivalence, equivalent

Year 3
Fractions and decimals

Objectives and key skills

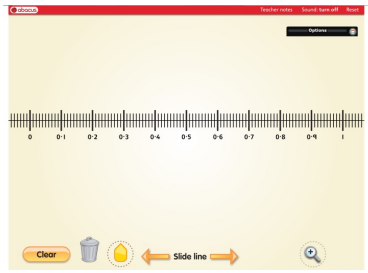
Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.



* Use decimal notation for tenths.
* Divide single digits or whole numbers by 10.
* Explain how finding $^{1}/_{10}$ is the same as dividing by 10.

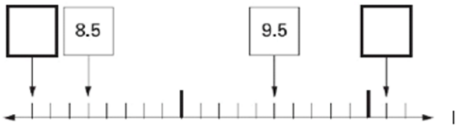
- Using base 10 equipment, build on prior learning, showing that a tenth is a whole divided by 10. Tenths can then be counted to make a whole (square).
- Show tenths recorded on a number line, count up and down in tenths going beyond 1.
- Use a place value chart to show dividing by 10.

hundreds	tens	ones		tenths	hundredths
			.		
			.		
			.		



Examples of types of questions

Here is part of a number line. Write in the numbers missing from the two empty boxes.

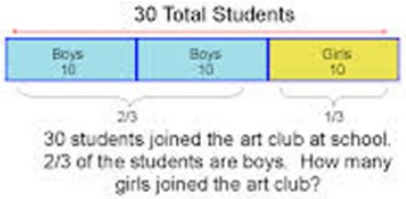


Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.

* Know what halves, quarters and thirds are.
* Understand that the numerator is how many parts you need.
* Understand that the denominator is how may equal parts the object or quantity is split in to.

Use sharing (into the bar) with concrete objects to model how the quantity is shared into each part. Move on to physically dividing the bar into how many parts. Then dividing the quantity by this amount and multiplying by how many parts you need.

i.e. 30 ÷ 3= 10 10 x 2 =



Year 3
Fractions and decimals

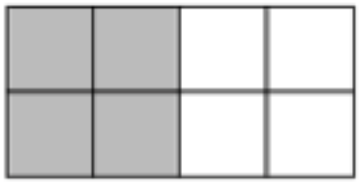
Unit Fractions. Unit means one. Here are some examples of unit fractions.

Can you spot the pattern? A unit fraction is one part of a whole that is divided into equal parts.
Non-unit fractions. Unit means one, so non-unit is any number apart from one. Here are some examples of non-unit fractions.

Many (or rather, more than one of the) parts, of an equally divided whole, is a non-unit fraction.

Examples and types of questions

What fraction of this shape is shaded? How do you know? Is there another way that you can describe the fraction?



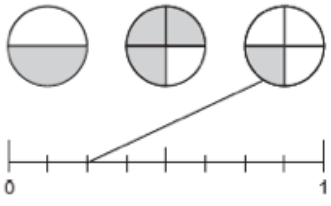
Here are 21 apples. Put a ring around one third of them.

Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators

* Position fractions on a number line; eg. mark fractions such as $^{1}/_{2}$, $3^{1}/_{2}$ and $2^{3}/_{10}$ on a number line marked from zero to 5.

Examples and types of questions

A fraction of each shape is shaded. Match each fraction to the correct place on the number line. One has been done for you.

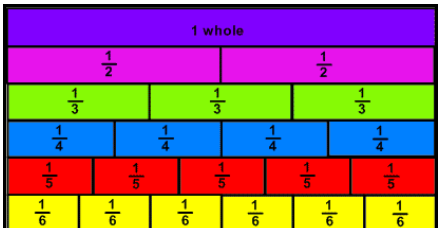


Year 3
Fractions and decimals

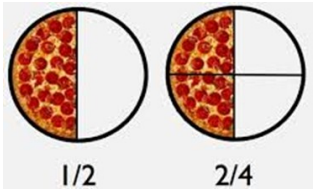
Recognise and show, using diagrams, equivalent fractions with small denominators.

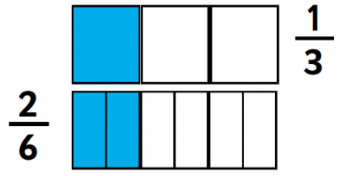
* Understand that when the same amount is shaded this is an equivalent fraction.
* Recognise the pattern between halves and quarters, thirds and sixths.
* Recognise how doubling and halving can be used to find equivalent fractions.

- Ask children to create a fraction wall. What do you notice? Are any of the fractions equivalent? Model how to identify equivalent fractions.



- Show children a range of models and images that depict equivalent fractions.

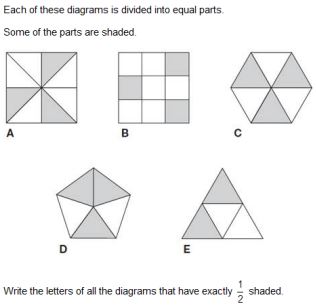




Examples and types of questions

Circle the **two** fractions that have the same value.

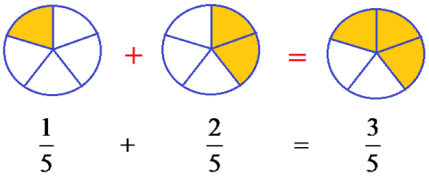
$\frac{2}{10}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{5}{10}$ $\frac{1}{4}$

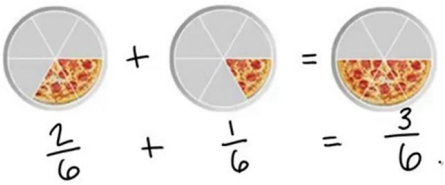


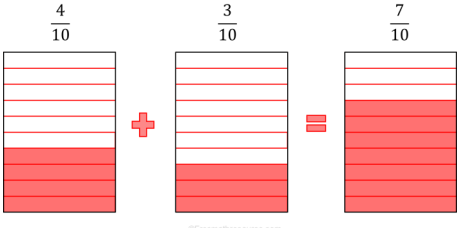
Add and subtract fractions with the same denominator within one whole (for example, $^5/_7 + {}^1/_7 = {}^6/_7$)

* Understand to only add the numerators.
* Understand and recognise that the denominator must stay the same.
* Explain why through the use of diagrams.

- Model using a range of images to highlight why the denominator stays the same, including Cuisenaire.





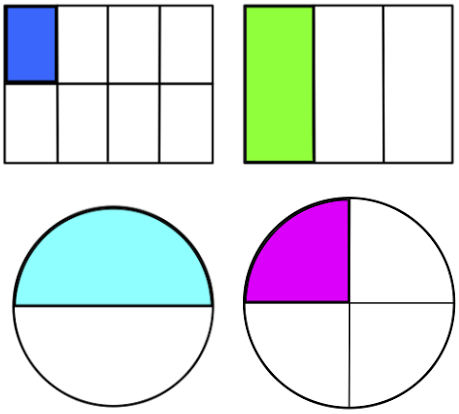


Year 3
Fractions and decimals

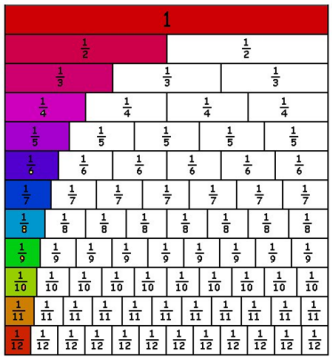
Compare and order unit fractions, and fractions with the same denominators.

* Understand that the bigger the denominator the smaller the fraction.
* Understand and recognise that if the fraction has the same denominator the bigger the numerator the bigger the fraction and vice versa.
* Use the less than, greater than and equal to signs to compare fractions.

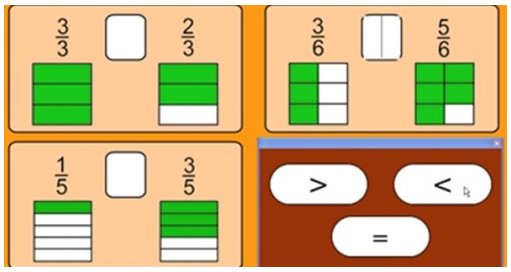
- Use a range of models to compare unit fractions.

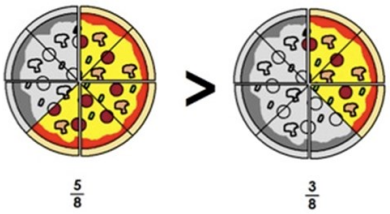


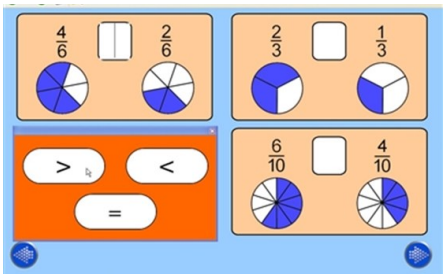
- Make your own fraction wall.



- Use a range of models and images to order and compare fractions with the same denominator.







Examples and types of questions

Would you rather have 1/3 of 30 sweets or $^{1}/_{5}$ of 40 sweets? Why?

Write these numbers in order starting with the smallest.

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{5}$

smallest

Vocabulary

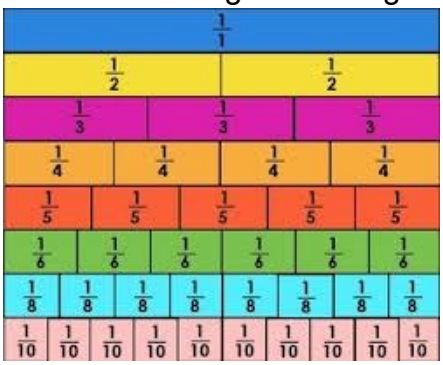
Whole, fraction, equal, parts, four equal parts, one half, two halves, a quarter, two quarters, three quarters, one third, a third, equivalence, equivalent, factor, two and three thirds, one tenth, tenths, denominator, numerator, compare order, decimal, decimal point

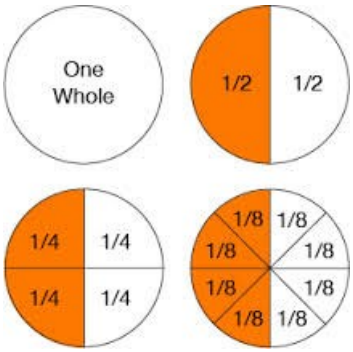
Year 4
Fractions and decimals

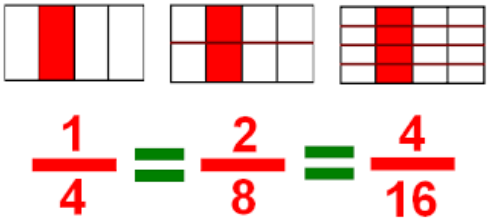
Objectives and Key Skills

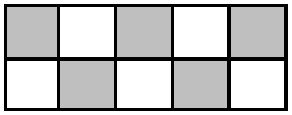
Recognise and show, using diagrams, families of common equivalent fractions.

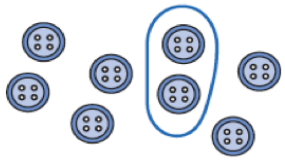
- Children should create their own fraction wall and then use this to identify equivalent fractions. Alongside a range of models and images.







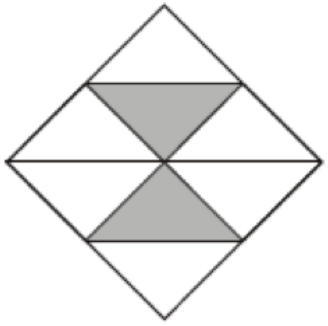




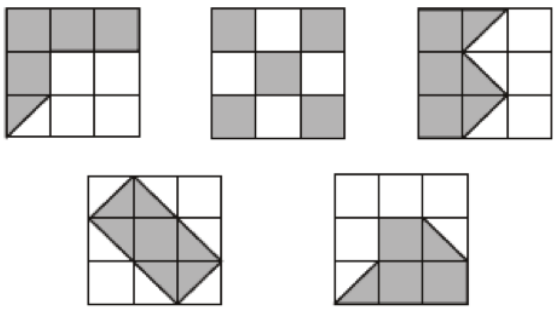
- Recognise that five tenths ($^5/_{10}$) or one half is shaded.
- Recognise that two eighths ($^2/_8$) or one quarter ($^1/_4$) of the set of buttons is ringed.
- Recognise that one whole is equivalent to two halves, three thirds, four quarters… For example, build a fraction 'wall' using a computer program.
- Recognise patterns in equivalent patterns, such as:
  $^1/_2 = {}^2/_4 = {}^3/_6 = {}^4/_8 = {}^5/_{10} = {}^6/_{12} = {}^7/_{14}$ and similar patterns for $^1/_3$, $^1/_4$, $^1/_5$, $^1/_6$, $^1/_{10}$

Examples and types of questions

Here is a square.
What fraction of the square is shaded?

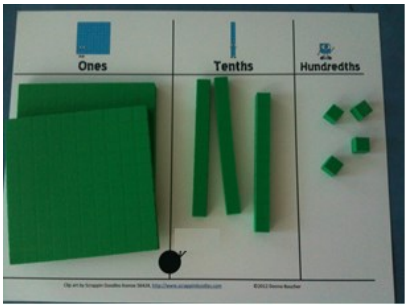


Here are five diagrams. Look at each one.
Put a tick (✔) on the diagram is exactly $^1/_2$ of it is shaded. Put a cross (✗) if it us not.



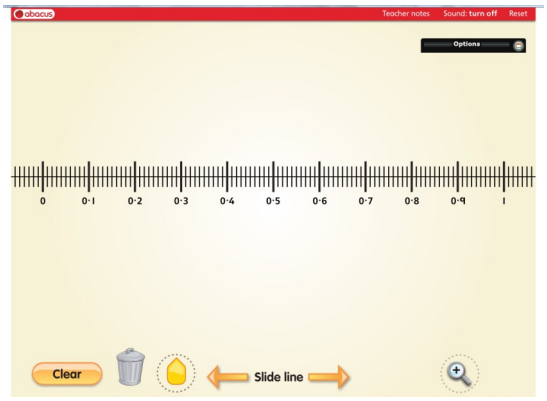
Year 4
Fractions and decimals

Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.



- Using base 10 equipment, build on prior learning, showing that a hundredth is a whole divided by 100 and that a tenth is divided by 10.

- Show tenths recorded on a number line, zoom in between then tenths and show how this is broken down further into hundredths.



Use a place value chart to show the value of a number.

hundreds	tens	ones		tenths	hundredths
			.		
			.		
			.		

Examples and types of questions

Respond to questions such as:
What does the digit 6 in 3.64 represent? The 4? What is the 4 worth in the number 7.45? The 5?

Write the decimal fraction equivalent to:
two tenths and five hundredths; twenty-nine hundredths; fifteen and nine hundredths.

Continue the count 1.91, 1.92, 1.93, 1.94 …

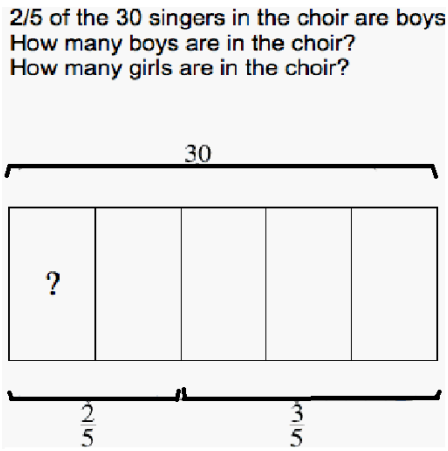
Know how many 10 pence pieces equal a pound, how many 1 pence pieces equal a pound, how many centimetres make a metre.

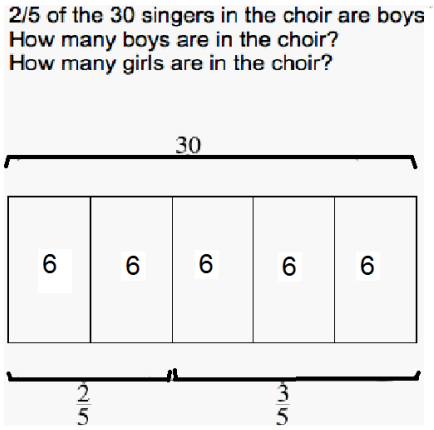
Year 4
Fractions and decimals

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.

- Model finding fractions of amounts using the Singapore bar method. Use sharing (into the bar) with concrete objects to model how the quantity is shared into each part. Using strips of paper divide into equal parts according to the denominator.
- Show the quantity of the whole e.g. 30. How many would be in each equal part? What is the number sentence?

  E.g. 30 ÷ 5 = 6 and I have $^2/_5$ so 6 x 2 = 12. 12 of the singers in the choir are boys.





Examples and types of questions

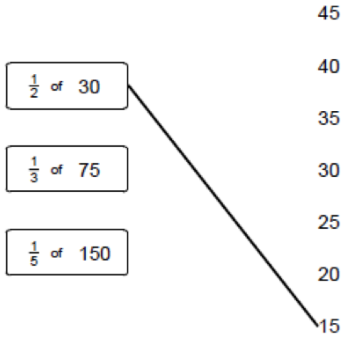
What is one-fifth of twenty-five?

Write the missing number to make this correct.

$$\frac{1}{4} \text{ of } 24 = \frac{1}{2} \text{ of } \square$$

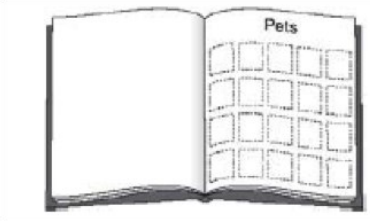
Match each box to the correct number.

One has been done for you.



Mary has 20 pet stickers to go on this page.

$^1/_4$ of them are dog stickers. $^1/_2$ of them are cat stickers. The rest are rabbit stickers. How many rabbit stickers does she have?



Year 4
Fractions and decimals

Add and subtract fractions with the same denominator.

- Model practically using paper strips and a fraction wall. Then move on to using a range of images. Ensure children understand why the denominator stays the same.

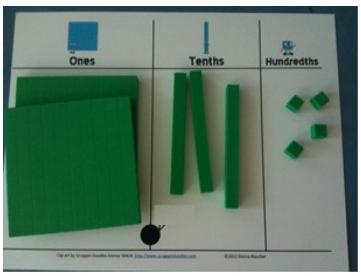
- Ensure children see the visual with the number sentence written alongside.

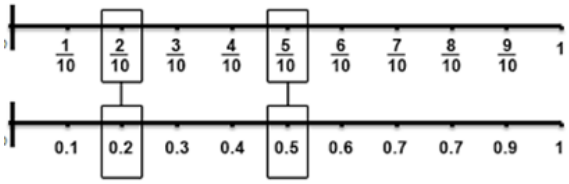
Examples and types of questions

$^{1}/_{2} + {}^{1}/_{2}$, $^{1}/_{4} + {}^{3}/_{4}$, $^{3}/_{8} + {}^{5}/_{8}$, $^{3}/_{5} + {}^{4}/_{5} + {}^{1}/_{5}$, $^{7}/_{10} + {}^{3}/_{1}$

Recognise and write decimal equivalents of any number of tenths or hundredths.

- Ask children to label a number line between 0 and 1 that has been divided into 10 equal parts with the decimal number, repeat with a fraction number line. Show these below each other and discuss why $^{2}/_{10}$ is equivalent to 0.2. Use base 10 equipment to support e.g. I have 5 tenths, what is that as a decimal and how many parts from the whole have I got… $^{5}/_{10}$





- Move on to numbers greater than 1

Examples and types of questions

Recognise that, for example:

0.07 is equivalent to $^{7}/_{100}$ 6.35 is equivalent to $6\ ^{35}/_{100}$

Which of these decimals is equal to $^{19}/_{100}$? 1.9 10.19 0.19 19.1

Write each of these as a decimal fraction: $^{27}/_{100}$ $^{3}/_{100}$ $2\ ^{33}/_{100}$

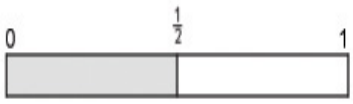
Year 4
Fractions and decimals

Recognise and write decimal equivalents to $^1/_4$, $^1/_2$, $^3/_4$

- Begin with the context of money and measures e.g. $^1/_2$ of £1 is 50 which I can write as £0.50.
- I can find $^1/_4$ of £1 by halving and halving again (model why this is true) so it is 25p which I can write as £0.25

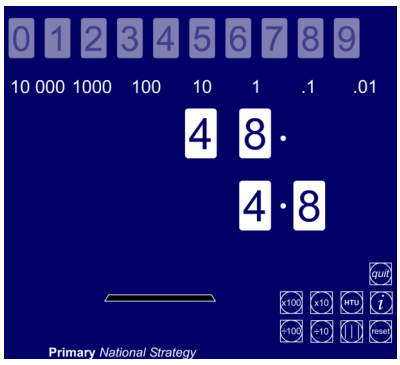
Example

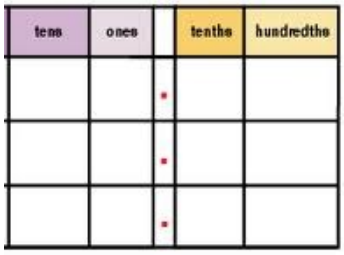
The temperature reading in my car is **28.5°C**. How would I write this as a fraction?
0.5 is the same as $\frac{1}{2}$. So the temperature is the same as **28**$\frac{1}{2}$**°C.** See the number line below:



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.

- Model using a moving digits interactive teaching tool. Ensure children use a place value chart as part of their jottings.





Examples and types of questions

Keep dividing this number by 10 and record the answer. Describe the pattern.

26
2.6
0.26
0.026

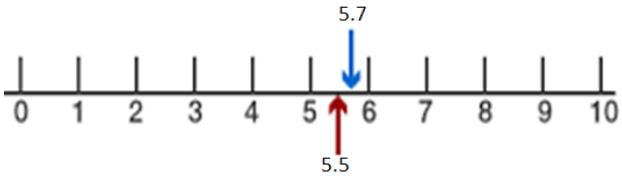
How many times larger is 2600 than 26?
How many £1 notes are in £120, £1200?
Divide three hundred and ninety by ten.

Write in the missing number. $\square \div 10 = 20.$

Year 4
Fractions and decimals

Round decimals with one decimal place to the nearest whole number.

- Identify the whole number before and after, mark halfway point then identify where given decimal is - is it closer to 5 or 6? Challenge children to identify a rule.



Examples and types of questions

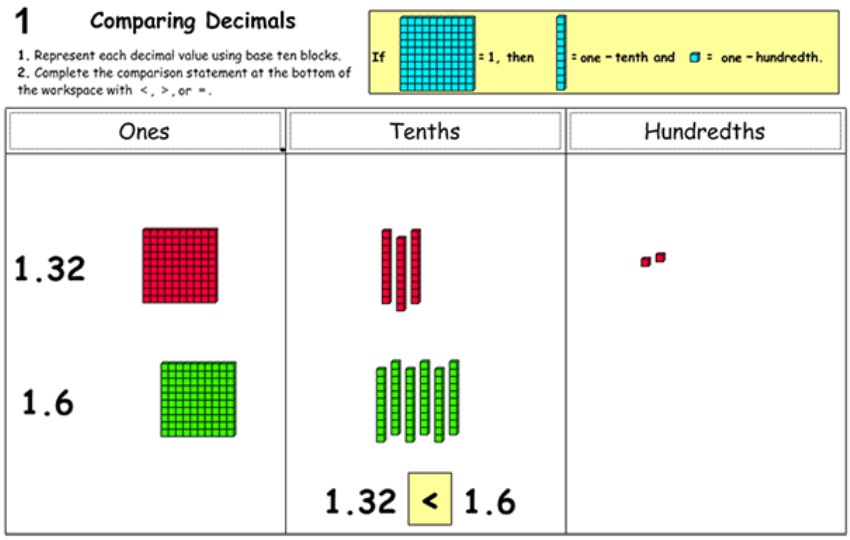
Round these to the nearest whole number.
9.7, 25.6, 148.3

Round these costs to the nearest £:
£3.27, £12.60, £14.05, £6.50

Round these lengths to the nearest metre:
1.5m, 6.7m, 4.1m, 8.9m

Compare numbers with the same number of decimal places up to two decimal places.

- Initially make each number using base 10 equipment for children to be reminded of the difference between tenths and hundredths.



- Arrange all numbers into a place value chart and ensure the decimal points are lined up. Use place holders if needed.

hundreds	tens	ones		tenths	hundredths
		0	.	1	5
		0	.	6	

Line up the decimals.

Year 4
Fractions and decimals

Examples and types of questions

Place these decimals on a line from 0 to 2:
0.3, 0.1, 0.9, 0.5, 1.2, 1.9

Which is lighter: 3.5kg or 5.5kg? 3.72kg or 3.27kg? Which is less: £4.50 or £4.05?

Put in order, largest/smallest first:
6.2, 5.7, 4.5, 7.6, 5.2, 99, 1.99, 1.2, 2.1

Solve simple measure and money problems involving fractions and decimals to two decimal places.

These are the prices in a shoe shop

How much more do the boots cost than the trainers? Rosie buys a pair of trainers and a pair of sandals. How much change does she get from £50?

A box of four balls costs £2.96. How much does each ball cost? Dean and Alex buy 3 boxes of balls between them. Dean pays £4.50. How much must Alex pay?

A full bucket holds 5½ litres. A full jug holds ½ a litre. How many jugs full of water will fill the bucket?

Harry spent one quarter of his savings on a book. What did the book cost if he saved: £8… £10…£2.40…?

Gran gave me £8 of my £10 birthday money. What fraction of my birthday money did Gran give me?

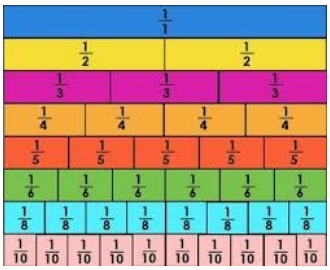
Vocabulary

Whole, fraction, equal, parts, four equal parts, one half, two halves, a quarter, two quarters, three quarters, one third, a third, tenths, equivalence, equivalent, factor, denominator, numerator, compare, order, decimal, decimal point, decimal place, eighth, sixth, fifth, twentieth, hundredth, nearest whole number, proportion, …..in every…

Year 5
Fractions, decimals and percentages

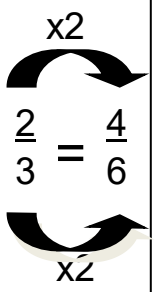
Objectives and Key Skills

Compare and order fractions whose denominators are all multiples of the same number.



* Know multiples of numbers up to 10.
* Order fractions.
* Convert fractions so denominator is the same in each.
* Know times tables facts up to 12x12.

- Show children a fraction wall and recap equivalent fractions. Look at an example e.g. $^1/_6$ and $^2/_3$. Use the fraction wall to establish that $^2/_3$ is equivalent to $^4/_6$. Encourage children to explore the relationship between these two fractions. Model how to convert thirds into sixths.
- List multiples of each denominator and identify a common multiple for all fractions. Convert all fractions into fractions with a common denominator to allow easier comparisons and ordering.



Examples of types of questions

Children should be able to circle the two fractions that have the same value, or choose which one is the odd one out and justify their decision.

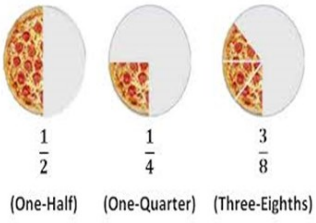
$^6/_{10}$ $^3/_5$ $^{18}/_{20}$ $^9/_{15}$

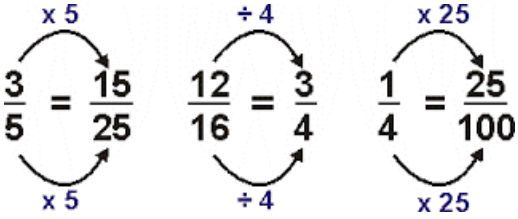
Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.

* Know equivalent fractions of $^1/_2$, $^1/_4$, $^1/_3$ and up to $^1/_{10}$, $^1/_{100}$.
* Represent fractions on a fraction wall to help show equivalence.
* Identify common factors of the numerator and denominator.
* Explain why one fraction is equivalent to another fraction.

- Use fraction walls to identify equivalent fractions. Cuisenaire rods can be used to build a 3D fraction wall.

- Develop a range of practical experiences, folding, cutting paper circles, paper strips.





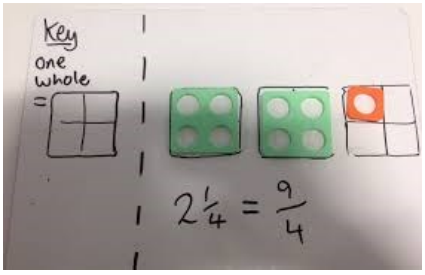
Year 5
Fractions, decimals and percentages

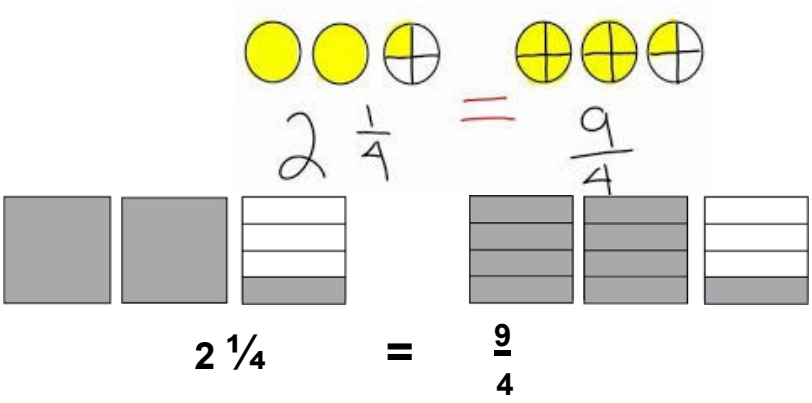
Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (for example, $^{2}/_{5} + {}^{4}/_{5} = {}^{6}/_{5} = 1{}^{1}/_{5}$)

* Know the difference between a mixed number and an improper fraction.
* Understand the symbols < and > than.
* Convert mixed numbers into improper fractions and vice versa.

- Introduce mixed number and improper fractions through the use of models and images

e.g. Numicon



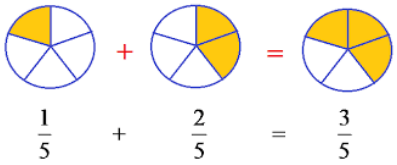


Examples of types of questions

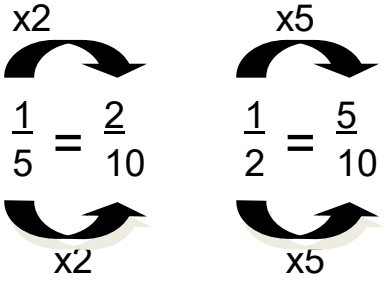
How many halves in: 1 ½ 3 ½ 9 ½ …?
How many quarters in: 1 ¼ 2 ¼ 5 ¼ ….?

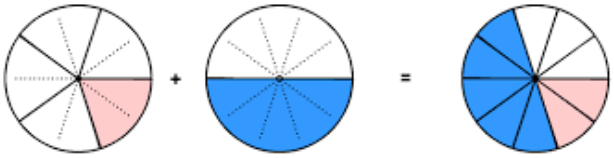
Add and subtract fractions with the same denominator and denominators that are multiples of the same number.

* Find equivalent fractions to common fractions.
* Find a common denominator for a group of fractions.



- Recap with fractions with the same denominator and use models and images to reinforce that the numerator changes but the denominator stays the same.
- Add and subtract fractions with different denominators. Link to equivalent fractions and how to convert one fraction into another by looking at the denominators and identifying common multiples e.g. $^{1}/_{5} + {}^{1}/_{2}$, list multiples of 5 and 2 until you find a common multiple 5, **10**, and 2,4,6,8,**10.** Now link with equivalent fractions, what must I do to each fraction to turn it into tenths?



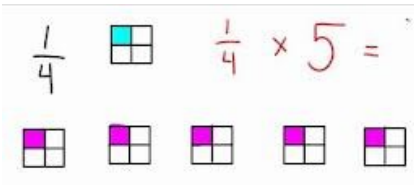


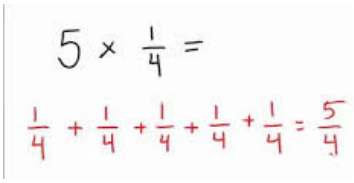
Year 5
Fractions, decimals and percentages

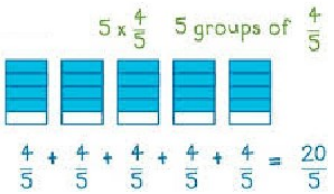
Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.

* Know multiplication tables up to 12 x 12.
* Be able to change a mixed number into a proper fraction and vice versa.

- Model through the use of diagrams. Ask children to explore what has happened to the numerator and denominator within a number of examples. Ask children to generate a rule.



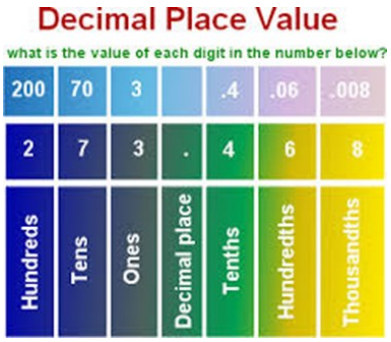


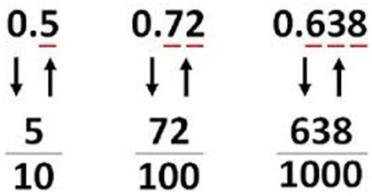


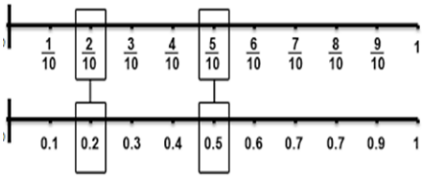
Read and write decimal numbers as fractions (for example, 0.71 = $^{71}/_{100}$)

* Know 1.00 = £1 = £1.00 = $^{100}/_{100}$.
* Make links between tenths are $^{1}/_{10}$ = 10p, hundredths are $^{1}/_{100}$ = 1p.
* Use a place value chart to write decimal numbers into the correct column.
* Know the value of each digit.

- Through the use of a place value chart ask children to write decimal numbers in the correct places. Identify if the number will be written in tenths, hundredths, thousandths. Make links with money, I have 4 tenths and 6 hundredths, which is like 46p $^{46}/_{100}$, 46p out of 100p







Examples and types of questions

What decimal is equal to 25 hundredths?

Write the total as a decimal:

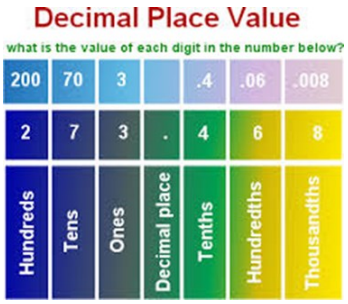
$4 + {}^{6}/_{10} + {}^{2}/_{100} =$

Children partition decimals using both decimal and fraction notation, for example, recording 6.38 as $6 + {}^{3}/_{10} + {}^{8}/_{100}$ and as 6 + 0.3 + 0.08.

Year 5
Fractions, decimals and percentages

Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.

* Know place value of digits using a place value chart.
* Understand that a thousandth is one whole split into one thousand equal pieces.

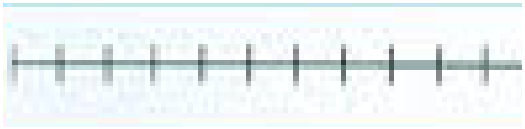


Record decimal numbers as fractions e.g.
0.007 is equivalent to $^{7}/_{1000,}$ 6.305 is equivalent to $^{6305}/_{1000}$

Round decimals with two decimal places to the nearest whole number and to one decimal place.

* Place numbers on a number line.
* Know that if you are rounding you need to round up if the identified digit is a 5 or above and down if the identified digit is 4 or below.

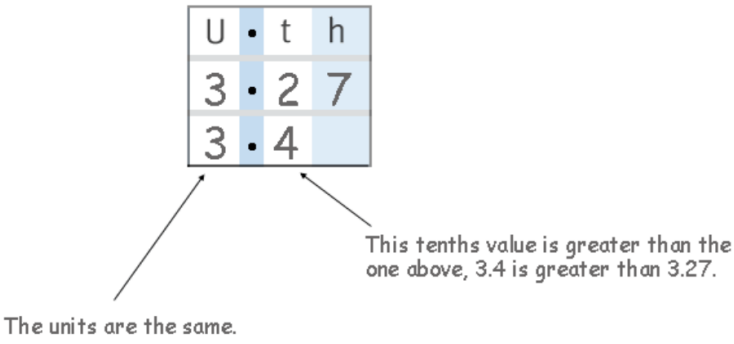
- Underline the digit that is being rounded to e.g rounding 14.61 to the nearest whole number, underline the units 1**4**.61 . Draw the number line, 14.61 is between two whole numbers, so it is between 14 and 15. Focus on the next digit 6 tenths, where would this come on the number line? Position and show how it is closer to 15 than 14.



Read, write, order and compare numbers with up to three decimal places.

* Know the place value of digits up to 3 decimal places.
* Compare numbers with a different number of digits. 3.02, 3.2, 3, 3.105

- Always arrange numbers in a place value chart when ordering and comparing.
- Begin by comparing the largest value, then the next largest and so on. If two numbers have digits of the same value then compare the next digit to identify the order.
- When children have identified the smallest number, cross it off the place value chart and repeat until all numbers have been ordered.



Year 5
Fractions, decimals and percentages

Solve problems involving numbers up to three decimal places.

Examples and types of questions

A racing driver can travel at 166.345 miles in an hour in his Ferrari. How far can he travel in 3 hours?

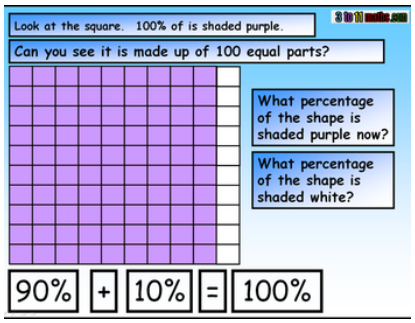
The temperature in the classroom was 21.8 °C. Claire left the door open and the temperature dropped by 3.7 °C. What was the temperature now?

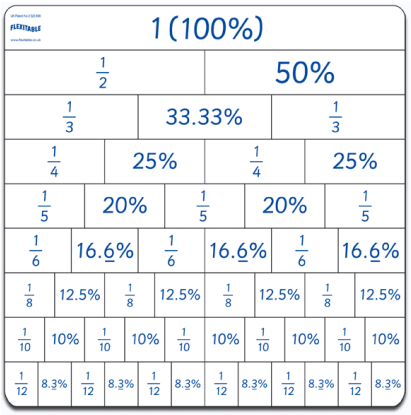
Charley was 88.49 cm tall when they were 3 years old. By the time they were 18, Charley had grown a further 83.91 cm. How tall were they when they were 18?

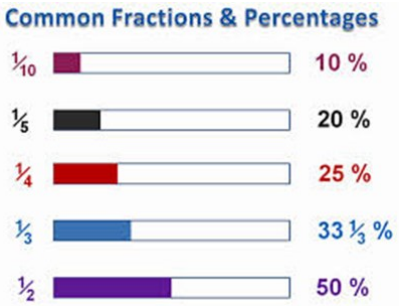
Recognise the percent symbol (%) and understand that percent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal.

* Know these facts 100% = $^{100}/_{100}$, 50% = $^{1}/_{2}$ = $^{50}/_{100}$ = 0.5 25% = $^{1}/_{4}$ = $^{25}/_{100}$ = 0.25
* Understand that per cent is number of parts per hundred.
* Convert percentages to fractions and decimals.

- Relate percentages to base 10 equipment , fraction walls, hundred squares.
- Discuss where children have seen percentages.
- When writing percentages always refer to the equivalent fraction and decimal.

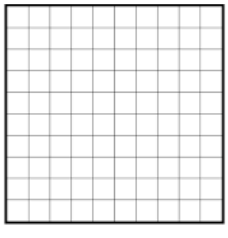






Examples and types of questions

Shade 10% of this grid.



Which is bigger: 65% or ¾? How do you know?

What percentage is the same as $^{7}/_{10}$? Explain how you know?

What is $^{31}/_{100}$ as a percentage?

Which is a better mark in a test: 61%, or 30 out of 50? How do you know?

Year 5
Fractions, decimals and percentages

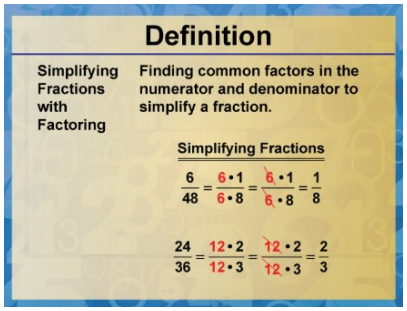
Vocabulary

Whole, fraction, equal, parts, four equal parts, one half, two halves, a quarter, two quarters, three quarters, one third, a third, tenths, equivalence, equivalent**,** factor, denominator, numerator, compare, order, decimal, decimal point, decimal place, eighth, sixth, fifth, twentieth, hundredth, nearest whole number, proportion, …..in every…, proper and improper fractions, mixed number, reduced to, cancel, proportion, ratio, for every, to every, as many as, decimal equivalent, simplest form, percentage, per cent, %

Year 6
Fractions, decimals and percentages

Objectives and Key Skills

Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.



* Identify common factors, multiples and prime numbers.
* Find common factors of two or more numbers and relate to finding equivalent fractions.
* Know that finding the greatest common factor of two or more numbers is the quickest way to simplify fractions.
* Simplify fractions, including remainders after division, by cancelling common factors of the numerator and denominator, e.g. divide the numerator and the denominator of $^{14}/_{35}$ by 7 to simplify to $^{2}/_{5}$.
* Know that a common multiple is a number that is a multiple of two or more numbers.
* Be able to find the least common multiple (LCM) of two numbers, i.e. the smallest number (not zero) that is a multiple of both, to express fractions in the same denomination.

Compare and order fractions, including fractions > 1.

* Recall and explain the terms denominator, numerator, common denominator.
* Understand the relationships between common fractions through practical experience e.g. $^{1}/_{7}$ is smaller than $^{1}/_{6}$ and $^{1}/_{6}$ is half of $^{1}/_{3}$.
* Use patterns to predict and test similar relationships e.g. $^{1}/_{10}$ is half of $^{1}/_{5}$.

Examples and types of questions

What fraction lies halfway between $^{3}/_{10}$ and $^{7}/_{10}$?

Which of these fractions is less than $^{1}/_{2}$? $^{7}/_{10}$, $^{6}/_{100}$, $^{2}/_{5}$, $^{1}/_{10}$, $^{11}/_{20}$, $^{1}/_{20}$.

Order a set of fractions in which some are not in their lowest form.

1) $\frac{1}{5}, \frac{7}{10}, \frac{3}{5}, \frac{15}{20}, \frac{8}{15}$

2) $\frac{5}{12}, \frac{3}{8}, \frac{1}{16}, \frac{3}{4}, \frac{10}{16}$

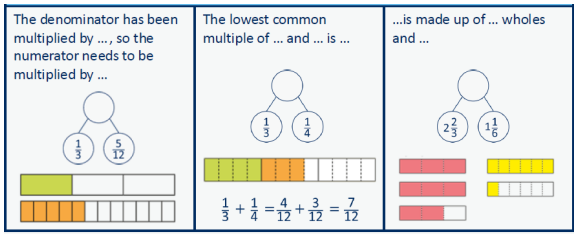
1) $2\frac{3}{10}, 3\frac{2}{5}, 1\frac{1}{20}, 2\frac{2}{15}$

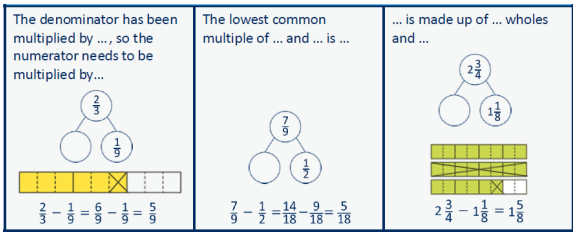
2) $1\frac{1}{12}, 3\frac{5}{6}, 1\frac{7}{18}, 5\frac{2}{3}$

Year 6
Fractions, decimals and percentages

Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

* Mentally recall multiples of two or three numbers in readiness for finding common denominators e.g. A multiple of 5 and 6 is 30 and another is 60, a multiple of 3 and 5 and 2 is 30, etc.
* Find all the factors of a given number e.g. Which numbers divide into 30?
* Understand that to make equivalent fractions scaling is used.
* Mentally calculate some equivalent fractions using multiplication and division facts.
* Add and subtract two fractions with different denominators in the same fraction family by changing one fraction into an equivalent fraction with the same denominator e.g. $^{11}/_{2} + {}^{27}/_{8} = 3 + {}^{4}/_{8} + {}^{7}/_{8} = 3 + {}^{11}/_{8} = {}^{43}/_{8}$.
* Know that to add and subtract two fractions from different fraction families both fractions need to be changed to an equivalent fraction with the same denominator e.g. $^{11}/_{3} + {}^{1}/_{5} = 1 + {}^{5}/_{15} + {}^{3}/_{15} = {}^{18}/_{15}$.
* Explain why the numerator is 'added' or 'subtracted' and the denominator remains the same.

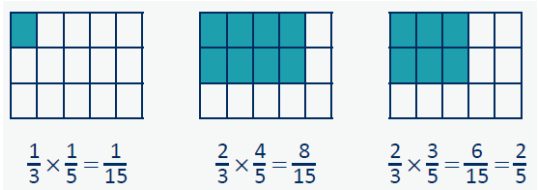


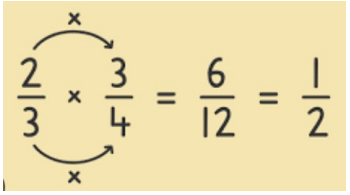


Multiply simple pairs of proper fractions, writing the answer in its simplest form (for example, $^{1}/_{4} \times {}^{1}/_{2} = {}^{1}/_{8}$).

* Understand that when multiplying proper fractions together the answer is always smaller than the starting quantity and use this to check if answers make sense.
* Know that a proper fraction multiplied by a proper fraction is always less than 1.

- Use models and images to explain and describe how fractional parts can themselves be divided into fractions, writing equations for the outcome e.g. One-quarter of one-half is $^{1}/_{4} \times {}^{1}/_{2} = {}^{1}/_{8}$. Three-quarters of one-half is $^{3}/_{4} \times {}^{1}/_{2} = {}^{3}/_{8}$.





- Use known answers to understand how equations can be calculated without the need for drawings i.e. multiplying numerator by numerator and denominator by denominator.

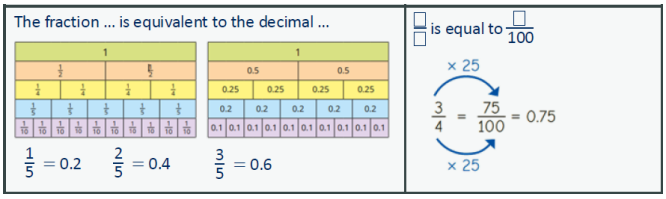
Year 6
Fractions, decimals and percentages

Divide proper fractions by whole numbers (for example, $^1/_3 \div 2 = {}^1/_6$).

- Be able to visualise a fraction being shared into equal parts, e.g. sharing ⅓ of a pizza between 2 would result in there being ⅙ each.
- Use known answers to equations to understand how equations can be calculated without the need for drawings i.e. when dividing a proper fraction by a whole number the numerator remains the same and the denominator is divided by the whole number.
- Calculate answers without the support of diagrams.

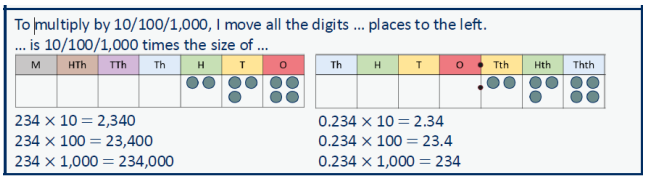
Associate a fraction with division and calculate decimal fraction equivalents (for example, 0.375) or a simple fraction (for example, $^3/_8$).

- Recall that $^1/_2$ is the same as 1 ÷ 2 and $^4/_5$ is the same as 4 ÷ 5, etc.
- Explore dividing the numerator by the denominator for a systematic set of unit fractions (½, ⅓, ¼, etc.) noting that some of them 'never end' (recurring number patterns).
- Know that fractions with recurring decimal equivalents are rounded to 2 or 3 decimal places (in context) e.g. ⅓ = 0·33 or 0·333, ⅔ = 0·67 or 0·667.
- Use standard written methods to find the decimal equivalents for unit and non-unit fractions, e.g. ⅜ = 3 ÷ 8 = 0·375.



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.

- Say, read and write numbers up to 10,000,000 with decimal fractions accurately.
- Understand that the value of adjacent columns is ten times more to the left or ten times less to the right.
- Place one-, two- and three-decimal place numbers accurately on number lines.
- Explain why a place keeping 0 may be necessary.
- Consolidate understanding of multiplication by 10, 100 and 1,000 as movement of place not the 'adding of 0s', e.g. adding two 0s to 3·4 when multiplying by 100 produces the wrong outcome.

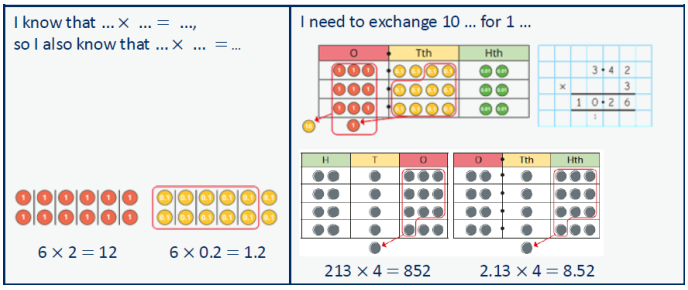


- Know the value of each digit of any number up to 10,000,000 with up to three decimal places. Order a set of decimal numbers in ascending / descending order recognising that the left-most, non-zero column is the most significant.

Year 6
Fractions, decimals and percentages

Multiply one-digit numbers with up to two decimal places by whole numbers.

* Multiply a number less than 10 with two decimal places by a whole number.
* Estimate answers to calculations, by rounding accurately, to get an idea of the magnitude of the answer and check answers for sense.



Examples and types of questions

Each box weighs 0·45 kg. How much do 7 boxes weigh? (Estimation 0·5 x 7 is 3·5 so it will be between 3 kg and 3·5 kg.)

Place three digits to make a U·t × U calculation and find examples where the answer is a whole number e.g. 4·2 × 5.

Use written division methods in cases where the answer has up to two decimal places.

* Recognise and appreciate column place value within the formal written method.
* 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.

* Recurring fractions will always need rounding.
* Decide, in context of the problem, what to do with a remainder – round up, round down, ignore.
* Decide, in context of the problem, how many decimal places should be presented.

Examples and types of questions

A bill of £9·50 is shared equally between 4 people. What is the minimum each needs to pay?

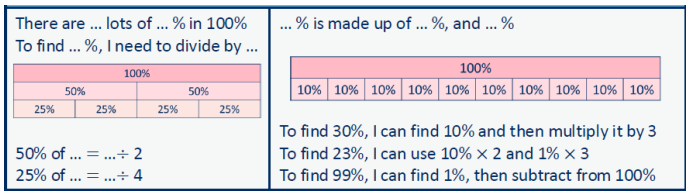
How many portions of cheese weighing 100g each can be cut from a block that is 824g?

Pizzas are £1·49 each. They are packed in boxes of 20. How much will a box cost to the nearest pound?

Year 6
Fractions, decimals and percentages

Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

* Simplify fractions to their lowest term when presenting answers.
* Find equivalent fractions, both fraction notation and decimals, to aid efficiency when calculating.
* Know how to find 1%, 10%, 20%, 25% and 50% before using multiples of these amounts to find any percentages.
* Recognise and use fractional and decimal equivalents when calculating with percentages, e.g. 25% = $^{25}/_{100}$ = 0·25 = $^{1}/_{4}$, so to find 25% divide by 4.



Examples and types of questions

What is 15% of 360?

What fraction or % of 60 is 45?

Which of these are equivalent amounts? 0·4, $^{1}/_{3}$, 40%, 0·3, $^{2}/_{5}$, 0·75, $^{6}/_{15}$.

Vocabulary

Whole, fraction, equal, parts, four equal parts, one half, two halves, a quarter, two quarters, three quarters, one third, a third, tenths, equivalence, equivalent**,** factor, denominator, numerator, compare, order, decimal, decimal point, decimal place, eighth, sixth, fifth, twentieth, hundredth, nearest whole number, proportion, …..in every…, proper and improper fractions, mixed number, reduced to, cancel, proportion, ratio, for every, to every, as many as, decimal equivalent, simplest form, percentage, per cent, %, mixed number, ninth, twelfth, thousandth, decimal fraction, common factors, simplest form, simplify, common multiples.