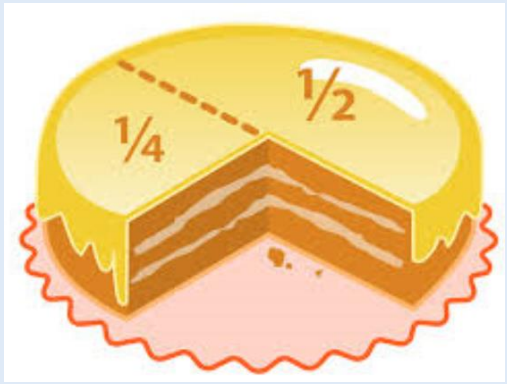
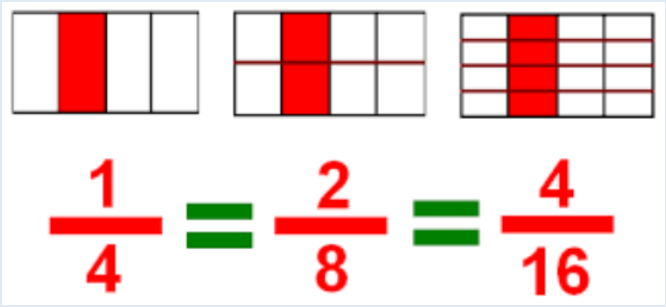
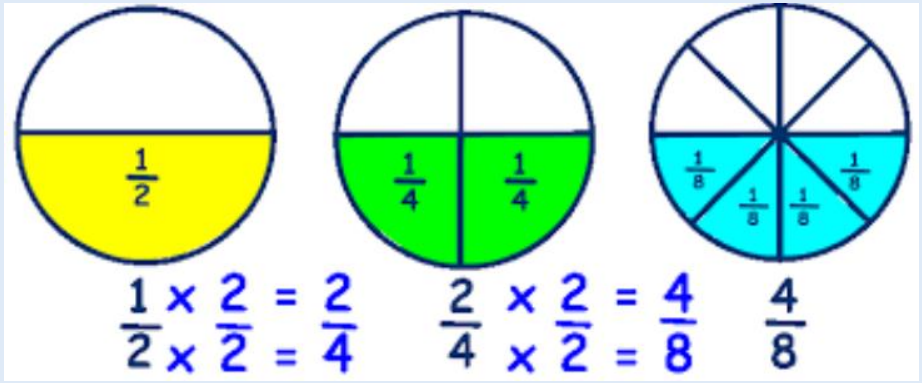
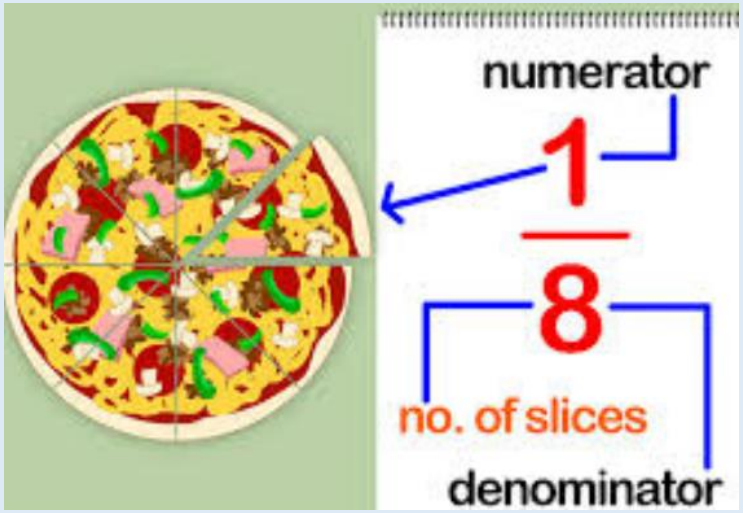




Fractions in Year 5 and Year 6





Fractions in Year 5

Fractions

Pupils should be taught to:

- compare and order fractions whose denominators are all multiples of the same number
- read and write decimal numbers as fractions [for example, 0.71 = 71/100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths

Fractions as operators

- add and subtract fractions with the same denominator and multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

Solve problems

- solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those with a denominator of a multiple of 10 or 25.

Multiplication and division link

- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Fractions in Year 5

Notes and Guidance (non-statutory)

Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions.

They extend their knowledge of fractions to thousandths and connect to decimals and measures.

Pupils connect equivalent fractions > 1 that simplify to integers with division and other fractions > 1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions.

Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions > 1.

Pupils practise adding and subtracting fractions to become fluent through a variety of increasingly complex problems. They extend their understanding of adding and subtracting fractions to calculations that exceed 1 as a mixed number.

Pupils continue to practise counting forwards and backwards in simple fractions.

Pupils continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities.

Pupils extend counting from year 4, using decimals and fractions including bridging zero, for example on a number line.

Pupils say, read and write decimal fractions and related tenths, hundredths and thousandths accurately and are confident in checking the reasonableness of their answers to problems.

They mentally add and subtract tenths, and one-digit whole numbers and tenths.

They practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, 0.83 + 0.17 = 1).

Pupils should go beyond the measurement and money models of decimals, for example, by solving puzzles involving decimals.

Pupils should make connections between percentages, fractions and decimals (for example, 100% represents a whole quantity and 1% is 1/100, 50% is 50/100, 25% is 25/100) and relate this to finding 'fractions of'.

Fractions in Year 6

Fractions

Pupils should be taught to:

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

Place value

- compare and order fractions, including fractions >1

Fractions as operators

- 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, $1/4 \times 1/2 = 1/8$]
- divide proper fractions by whole numbers [for example, $1/3 \div 2 = 1/6$]
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8]

Solve problems

- solve problems which require answers to be rounded to specified degrees of accuracy

Ratio and proportion link

- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples

Notes and guidance (non-statutory)

Pupils should practise, use and understand the addition and subtraction of fractions with different denominators by identifying equivalent fractions with the same denominator. They should start with fractions where the denominator of one fraction is a multiple of the other (for example, ½ + 1/8 = 5/8) and progress to varied and increasingly complex problems.

Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, for example as parts of a rectangle.

Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction to find the whole quantity (for example, if ¼ of a length is 36cm, then the whole length is 36 × 4 = 144cm).

They practise calculations with simple fractions and decimal fraction equivalents to aid fluency, including listing equivalent fractions to identify fractions with common denominators.

Pupils can explore and make conjectures about converting a simple fraction to a decimal fraction (for example, 3 ÷ 8 = 0.375). For simple fractions with recurring decimal equivalents, pupils learn about rounding the decimal to three decimal places, or other appropriate approximations depending on the context.

Pupils multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. Pupils multiply decimals by whole numbers, starting with the simplest cases, such as 0.4 × 2 = 0.8, and in practical contexts, such as measures and money.

Pupils are introduced to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication.

Pupils also develop their skills of rounding and estimating as a means of predicting and checking the order of magnitude of their answers to decimal calculations. This includes rounding answers to a specified degree of accuracy and checking the reasonableness of their answers.

Key Vocabulary

Numerator – the top number in a fraction.

Denominator – the bottom number in a fraction.

Equivalent – two fractions which have the same value; they are not 'the same as' because they look different.

Unit fraction – a fraction which has 1 as the numerator such as ½ or 1/3.

Non unit fraction – a fraction which has a number greater than 1 as the numerator such as ¾ and 3/5.

Improper fraction – a fraction which has a bigger numerator than denominator such as 9/5.

Mixed number – a number which includes and integer (whole number) and a fraction such as 3 ¼.

Common multiples – a multiple which appears in more than one times table. A common multiple of 3 and 4 is 12 as 12 is in both the 3 and 4 times tables.

Common factor – a number which 2 or more numbers will divide by. For example 4 is a factors of both 20 and 32. 20 and 32 can be divide equally by 4.

Simplify – this involves finding a common factor of both the numerator and the denominator and dividing both by this.

More Than Just Fractions...

Fractions links closely to other areas of maths, especially with decimals and percentages.

Fractions are a way of expressing part of a whole amount, as are decimals and percentages.

Whole chocolate bar =

5/5 1 100%

One piece of chocolate =

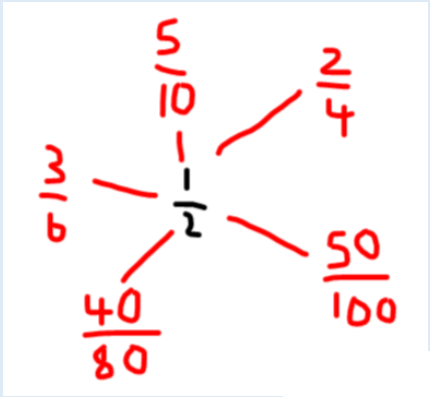
1/5 0.2 20%

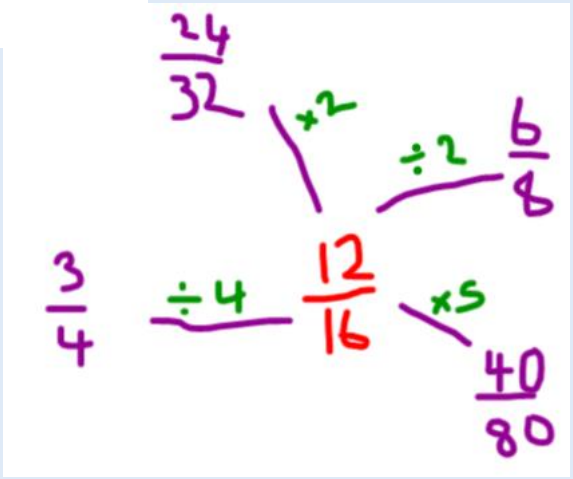
Three pieces of chocolate =

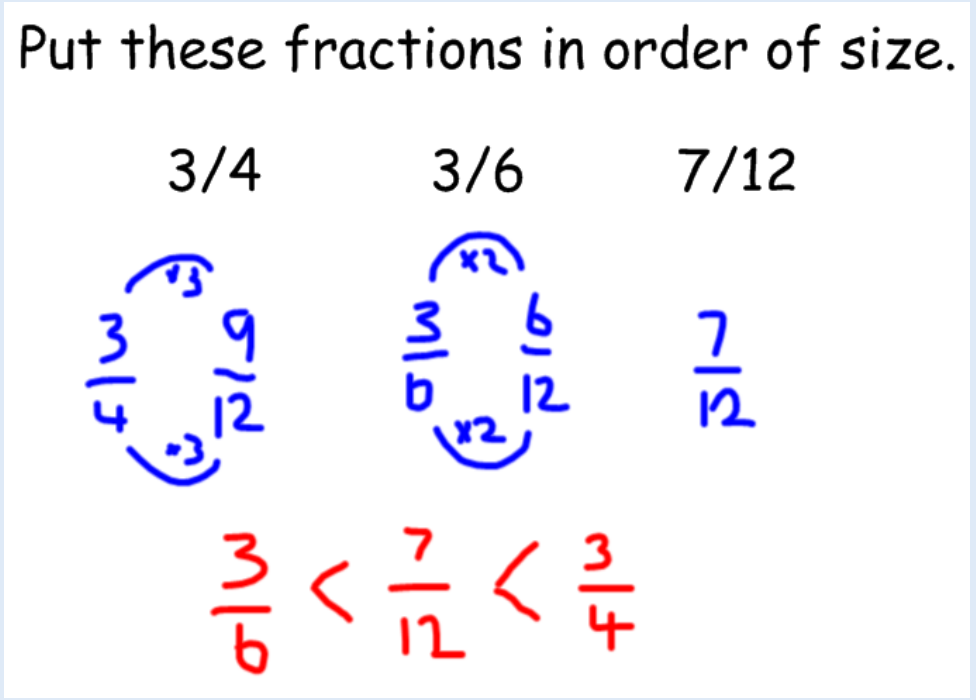
3/5 0.6 60%

Equivalent Fractions

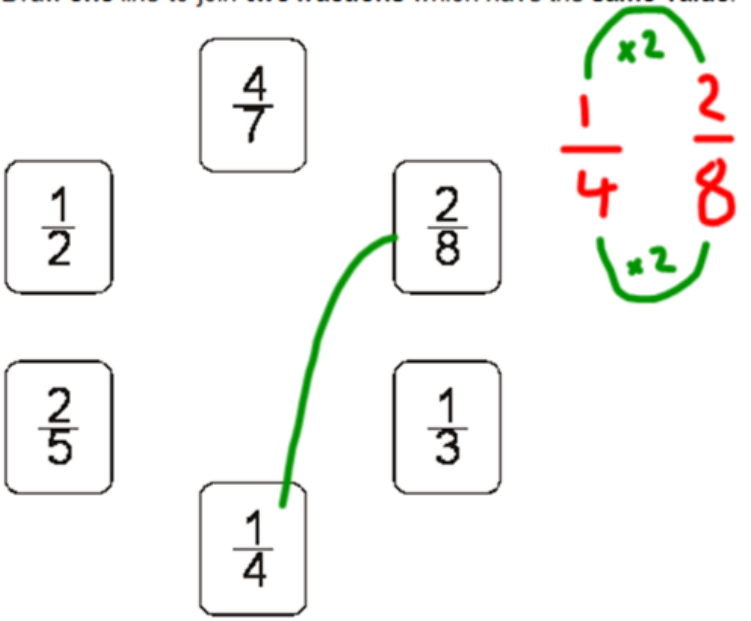
Children need to be able to identify equivalent fractions in order to be able to compare and order fractions.
When comparing fractions they will need to convert all fractions to the same denominator by finding a common multiple.





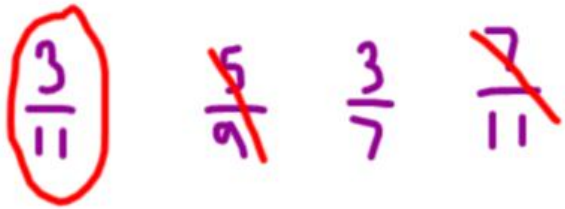


Draw **one** line to join **two fractions** which have the **same value**.



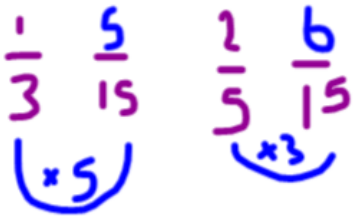
Here are some number cards.

Use **two** of the cards to make a fraction which is **less than** $\frac{1}{2}$.



Which is larger, $\frac{1}{3}$ or $\frac{2}{5}$?

Explain how you know.



2/5 is greater than 1/3 because when you convert the denominators to the same number you would get 6 out of 15 rather than 5 out of 15.

Write these fractions in order of size starting with the smallest.

$\frac{3}{4}$ $\frac{3}{5}$ $\frac{9}{10}$ $\frac{17}{20}$

$\frac{3}{5}$ $\frac{3}{4}$ $\frac{17}{20}$ $\frac{9}{10}$

smallest

Common multiple = 20

$\frac{3}{4}$ $\frac{15}{20}$ ×5

$\frac{3}{5}$ $\frac{12}{20}$ ×4

$\frac{9}{10}$ $\frac{18}{20}$ ×2

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

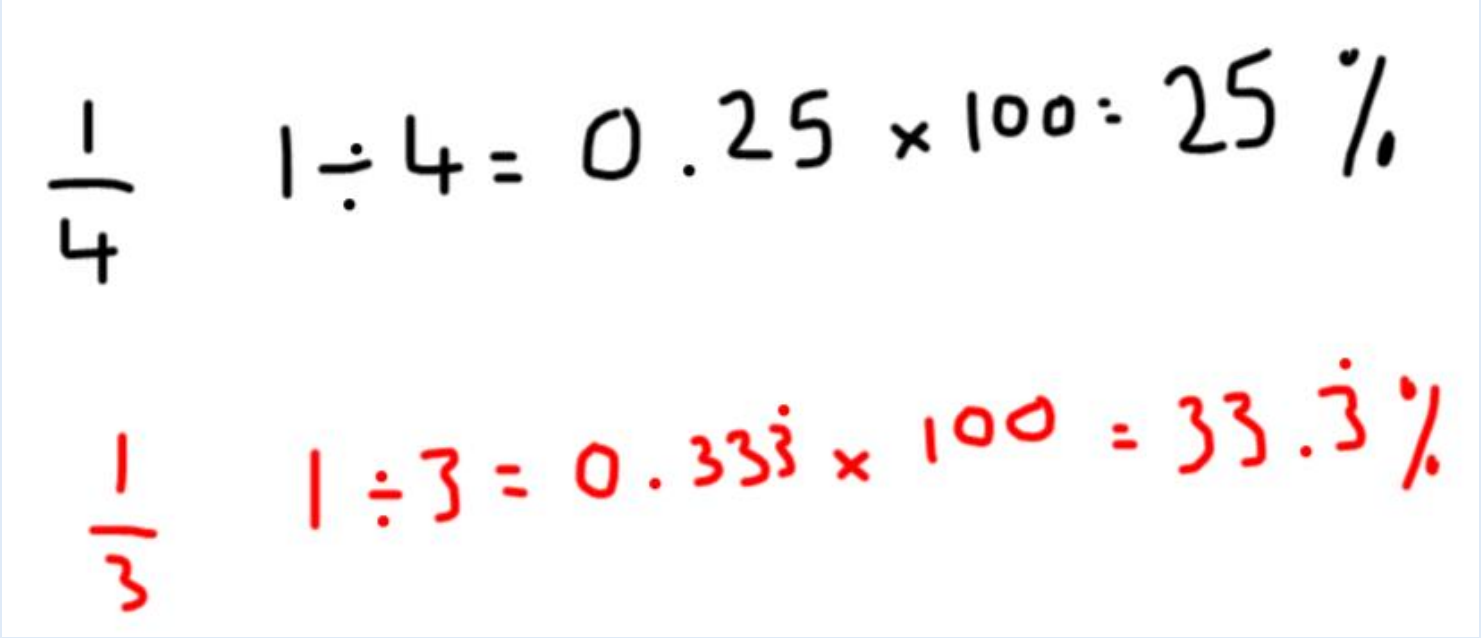
$\frac{3}{5}$ ×2 $\frac{6}{10}$

$\frac{3}{5}$ ×3 $\frac{9}{15}$

$\frac{3}{5}$ ×4 $\frac{12}{20}$

Equivalent Fractions, Decimals and Percentages

To convert a fraction to a decimal divide the numerator by the denominator.
To convert a fraction to a percentage, first convert to a decimal and then multiply by 100.



To convert non unit fractions the children would then use a unit fraction and then multiply.
If they know that ¼ = 0.25 then ¾ would be 0,25 x 3 = 0.75.

If they know what a ¼ converts to then they can use this knowledge to find 1/8.

Circle the **two** fractions that are equivalent to **0.6**

$\frac{6}{10}$ $\frac{1}{60}$ $\frac{60}{100}$ $\frac{1}{6}$

$0.6 = \frac{6}{10} = \frac{60}{100}$ (×10, ×10)

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		✓

$\frac{11}{20}$ $\frac{10}{20} = \frac{1}{2}$ $\frac{21}{100}$ $\frac{50}{100} = \frac{1}{2}$

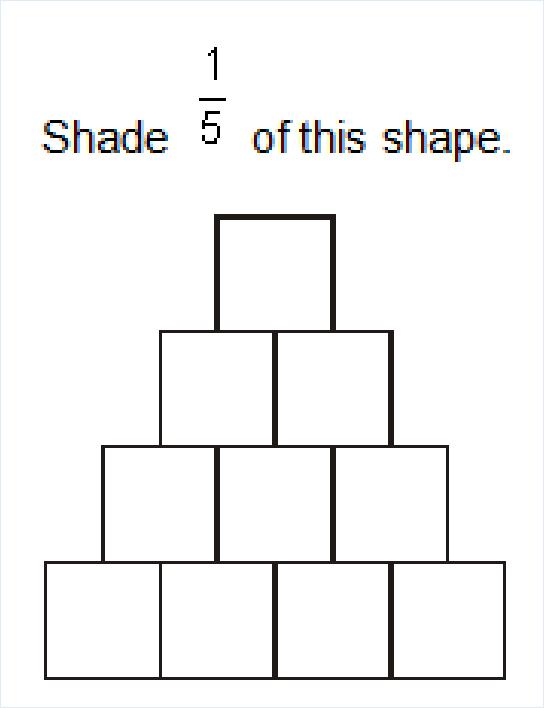
$\frac{6}{100}$

$\frac{3}{4}$	0.5
$\frac{1}{2}$	0.8
$\frac{4}{5}$	0.3
	0.75
	0.4

$\frac{1}{5} = 0.2$

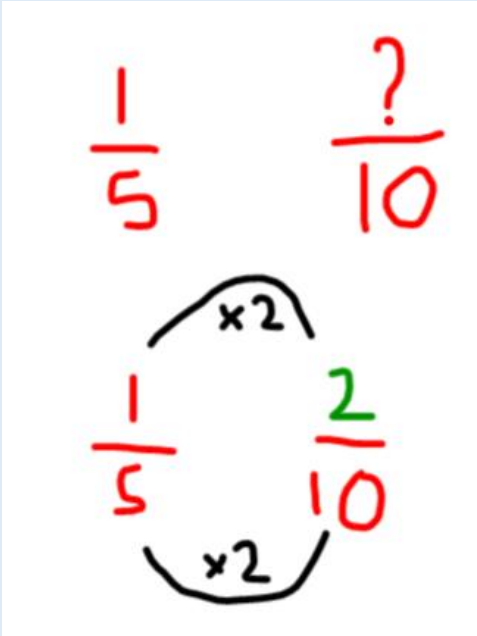
$\frac{4}{5} = 0.8$

Finding Fractions of Shapes



Children need to shade 1 out of every 5 squares.
As there are 10 squares they should shade 2 squares.

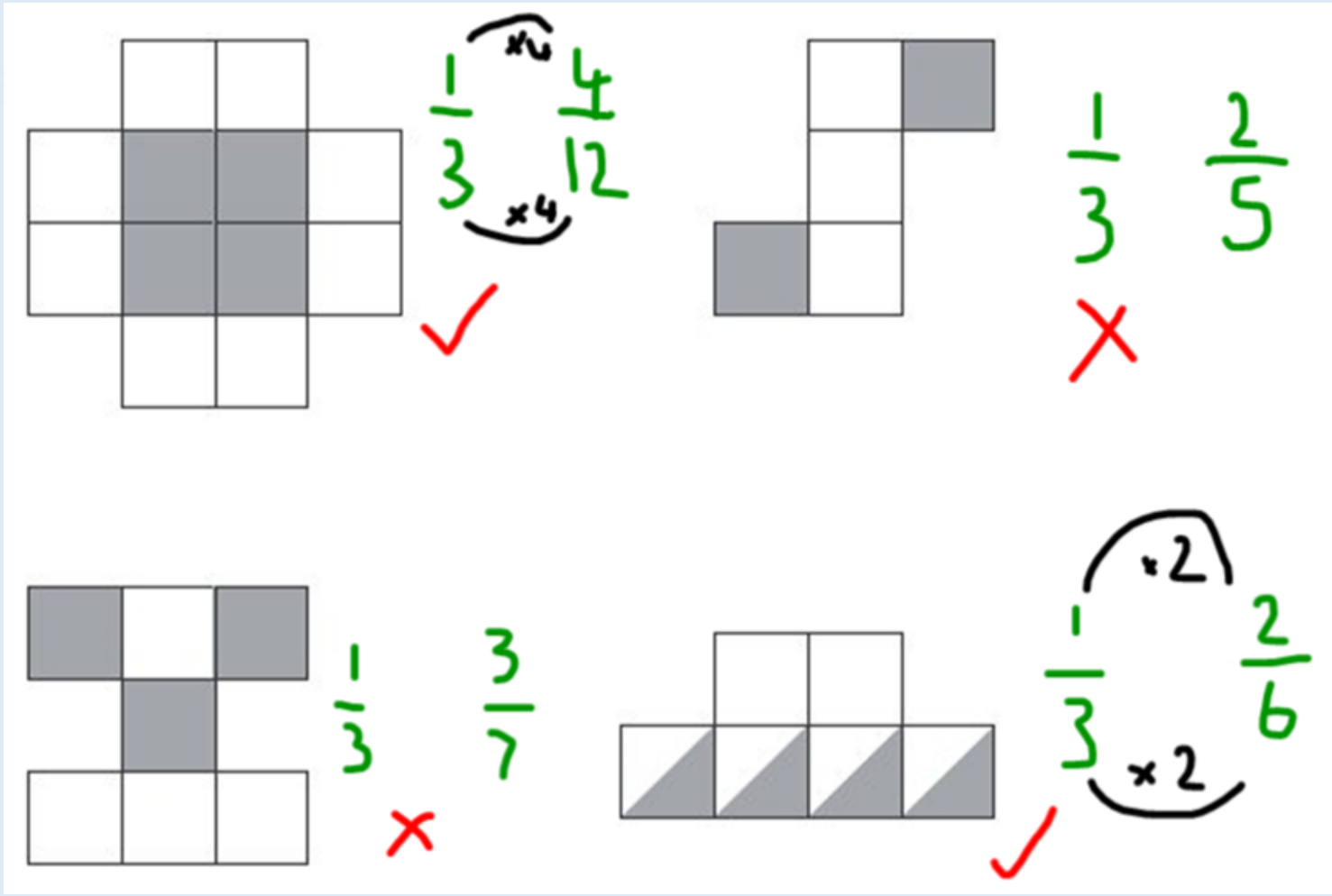
They can also use their skills of equivalent fractions.



These diagrams are all made of squares.

Look at each diagram.

Put a tick (✓) if exactly $\frac{1}{3}$ of it is shaded. Put a cross (✗) if it is not.

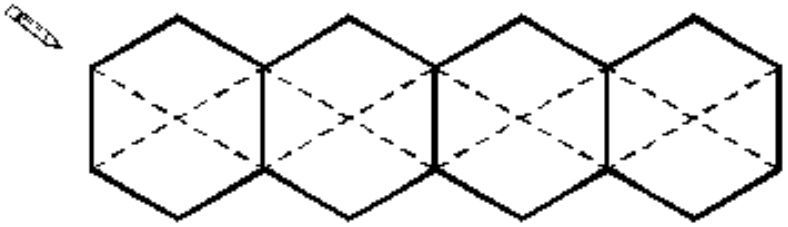


Are 1 out of 3 shapes shaded?

Children could use their converting skills to check.

This diagram shows four regular hexagons.

Shade in **one third** of the diagram.



This diagram shows four regular hexagons.

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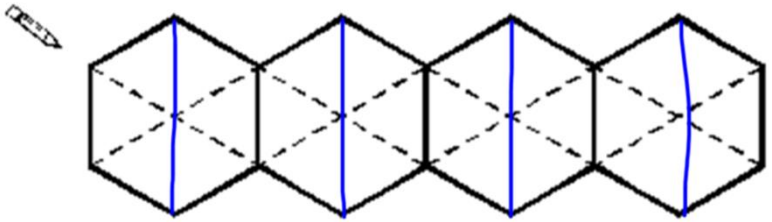
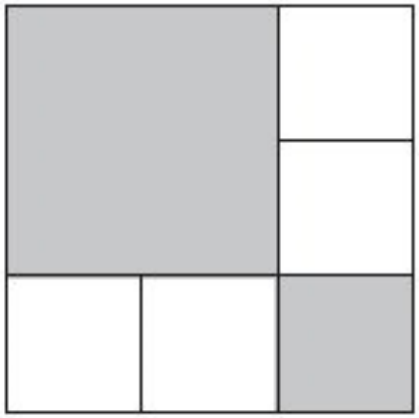


$\frac{1}{3}$ ×8 $\frac{8}{24}$

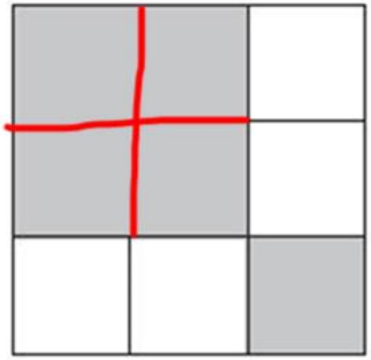
The diagram is made of squares.

What fraction of the diagram is shaded?



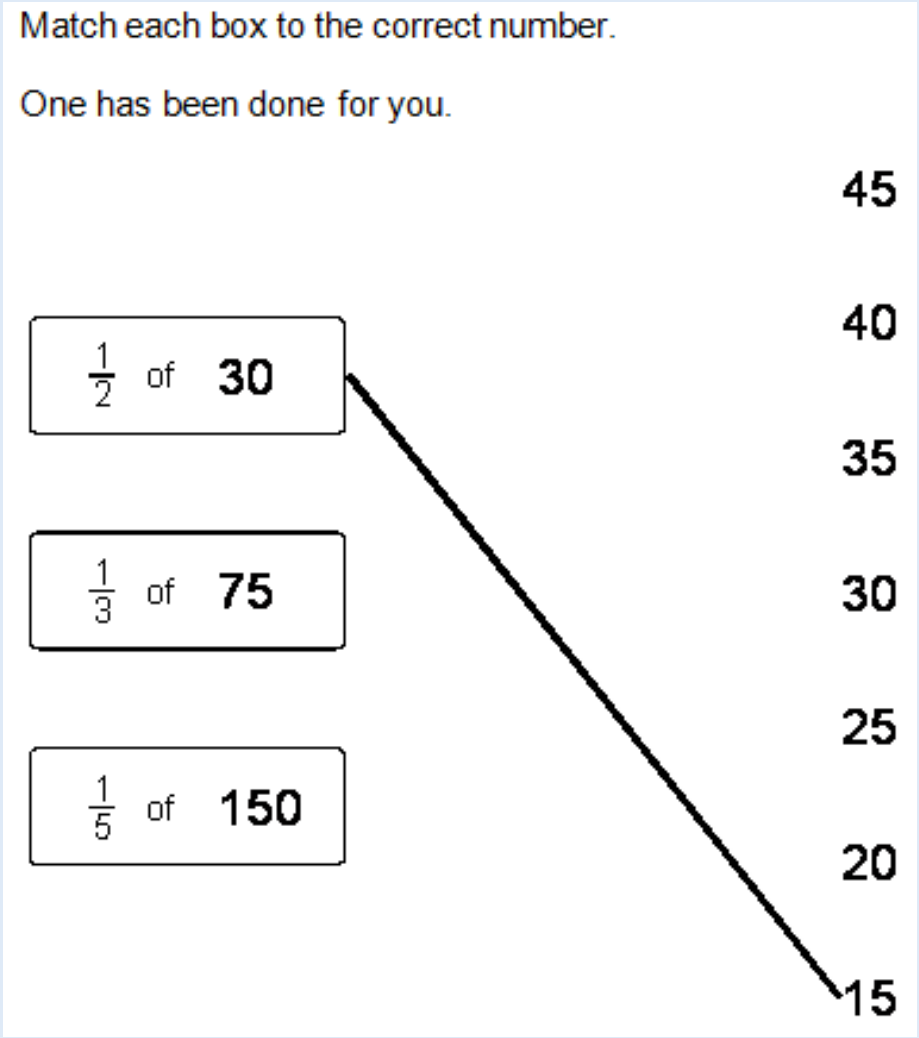
The diagram is made of squares.

What fraction of the diagram is shaded?



$\frac{5}{9}$

Finding Fractions of a Quantity



Children will be expected to find quantities of amounts by dividing the number by the denominator.

½ of 30 = 30 ÷ 2 = 15

For non unit fractions they will need to divide by the denominator and then multiply by the numerator.

¾ of 60 =
¼ = 60 ÷ 4 = 15
¾ = 15 x 3 = 45

Calculate $\frac{3}{4}$ of £15

$\frac{3}{4}$ of £15 =

$\frac{1}{4}$ = £15 ÷ 4 = £3.75

15 ÷ 2 = 7.50 ÷ 2 = £3.75

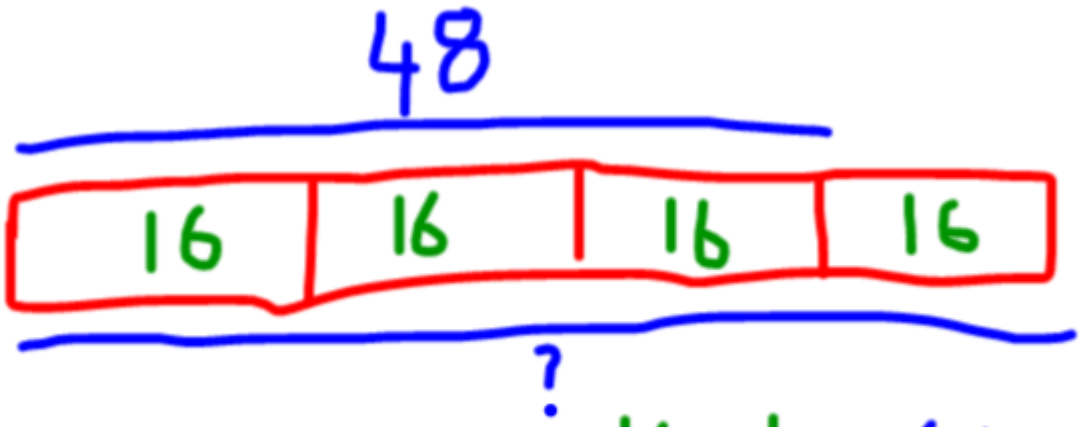
$\frac{3}{4}$ = £3.75 x 3 = £11.25

	300	70	5
3	900	210	15

= 11.25

Three-quarters of a number is **48**

What is the number?

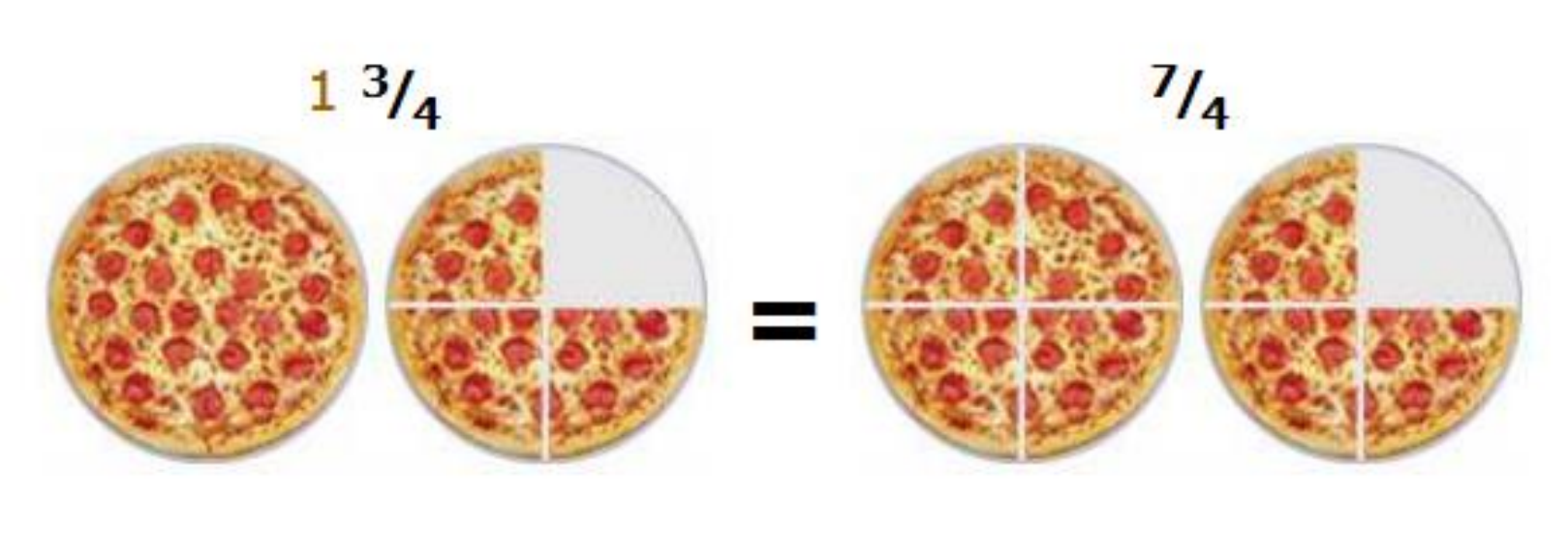


48 ÷ 3 = 16

16 x 4 = 64

Mixed Numbers and Improper Fractions

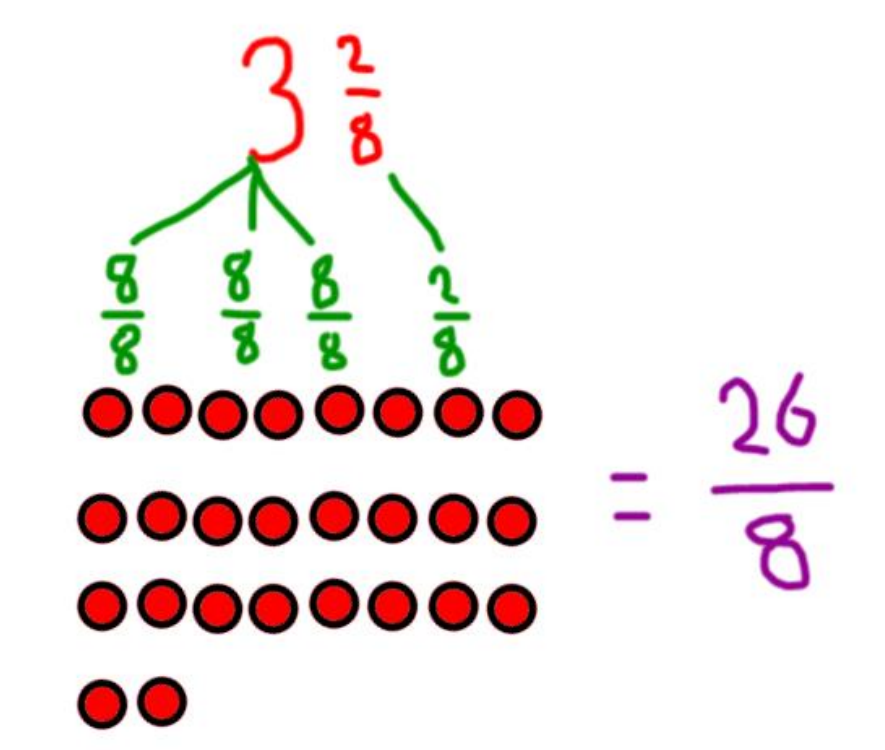
By the end of Year 6, children need to be able to add, subtract and multiply mixed numbers.
Mixed numbers are numbers made up of whole numbers and fractions. These can be converted into improper fractions.
To gain a deeper understanding of this concept this will be taught using models and visual representation.

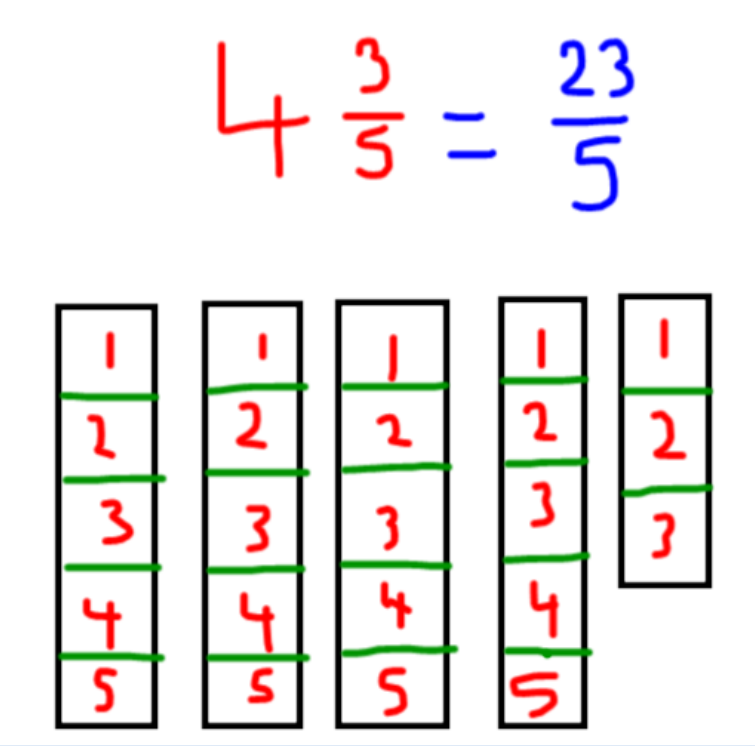


Adding and subtracting mixed numbers used to be a Level 6 objective but now it is expected that all children by the end of Year 6 will be able to do this.

To add or subtract a mixed number first convert to an improper fraction.

Before children can access this topic they need to fully understand what a mixed number is and be able to show a visual representation of this.





Once they understand how to represent mixed numbers visually they should be able to link their multiplication knowledge to convert these into improper fractions.

Example: What is $2\frac{3}{4} + 3\frac{1}{2}$?

Convert to Improper Fractions:

$$2\frac{3}{4} = \frac{11}{4}$$

$$3\frac{1}{2} = \frac{7}{2}$$

Common denominator of 4:

$\frac{11}{4}$ stays as $\frac{11}{4}$

$\frac{7}{2}$ becomes $\frac{14}{4}$

(by multiplying top and bottom by 2)

Now Add:

$$\frac{11}{4} + \frac{14}{4} = \frac{25}{4}$$

Convert back to Mixed Fractions:

$$\frac{25}{4} = 6\frac{1}{4}$$

Example: What is $15\frac{3}{4} - 8\frac{5}{6}$?

Convert to Improper Fractions:

$$15\frac{3}{4} = \frac{63}{4}$$

$$8\frac{5}{6} = \frac{53}{6}$$

Common denominator of 12:

$$\frac{63}{4} \text{ becomes } \frac{189}{12}$$

$$\frac{53}{6} \text{ becomes } \frac{106}{12}$$

Now Subtract:

$$\frac{189}{12} - \frac{106}{12} = \frac{83}{12}$$

Convert back to Mixed Fractions:

$$\frac{83}{12} = 6\frac{11}{12}$$

♫ *"Multiplying fractions no big problem,*
Top times top over bottom times bottom,

"Dividing fraction, as easy as pie,
Flip the second fraction, then multiply,

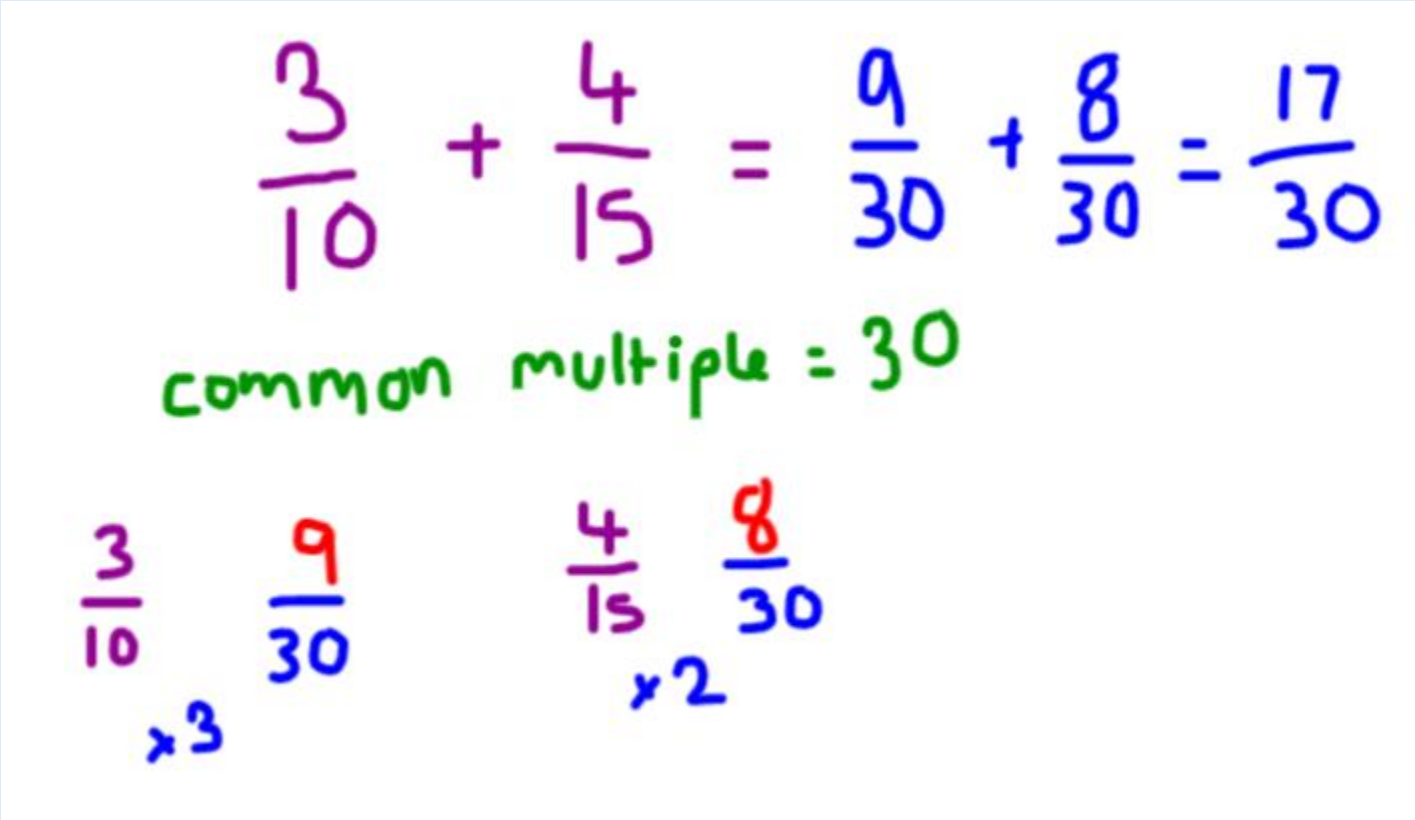
"If adding or subtracting is your aim,
The bottom numbers must be the same!

"Change the bottom using multiply or divide,
But the same to the top must be applied,

"And don't forget to simplify,
Before it's time to say goodbye" ♫

Adding and Subtracting Fractions

As the song says: 'If adding and subtracting is your aim, the bottom numbers must be the same!'
This will mean that the children need to identify common multiples of the denominators that they are working with.



$$\frac{7}{12} - \frac{3}{8} = \frac{14}{24} - \frac{9}{24} = \frac{5}{24}$$

common multiple = 24

$\frac{7}{12}$ $\frac{14}{24}$ $\frac{3}{8}$ $\frac{9}{24}$

×2 ×3

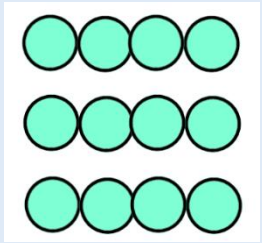
Multiplying and Dividing Fractions

The children will also need to be able to multiply a pair of fractions and multiply a whole number by a fraction.

Multiplication can cause some confusion as the fraction actually gets smaller!

$3 \times 4 = 12$

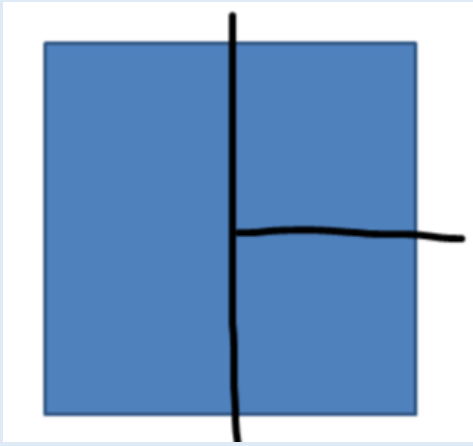
3 of the group of 4



$1/2 \times 1/2 = \frac{1}{4}$

1/2 of the group of 1/2

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



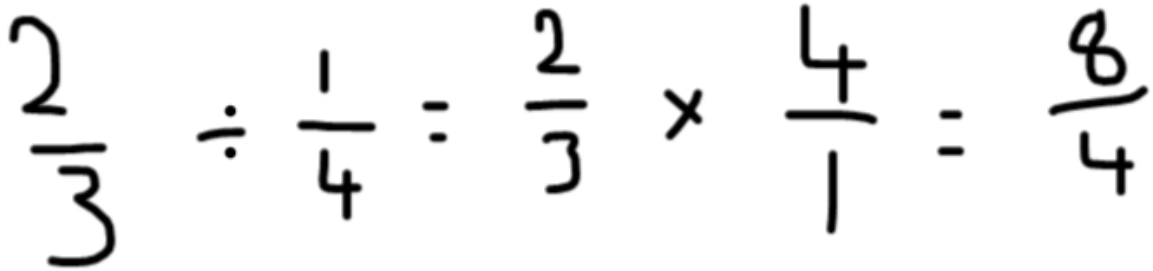
There are 3 Simple Steps to Divide Fractions:

Step 1. Turn the second fraction *(the one you want to divide by)* upside down (this is now a reciprocal).

Step 2. Multiply the first fraction by that reciprocal

Step 3. Simplify the fraction (if needed)

$$\frac{2}{3} \div \frac{1}{4} = \frac{8}{3}$$ ✓



Espresso Video - Dividing Fractions

How Many?

A question like **20 divided by 5** is asking **"how many 5s in 20?"** (=4)

So **$^1/_2$ divided by $^1/_6$** is asking **"how many $^1/_6$s in $^1/_2$"**

$$\frac{1}{2} \div \frac{1}{6} \text{ is really asking:}$$

$$\text{How many } \frac{1}{6} \text{ in } \frac{1}{2} \text{ ?}$$

Now look at the pizzas below ... how many "1/6th slices" fit into a "1/2 slice"?

How many  in  ? **Answer: 3**

So now you can see why $\frac{1}{2} \div \frac{1}{6} = 3$

Useful Websites

http://www.mathletics.co.uk/

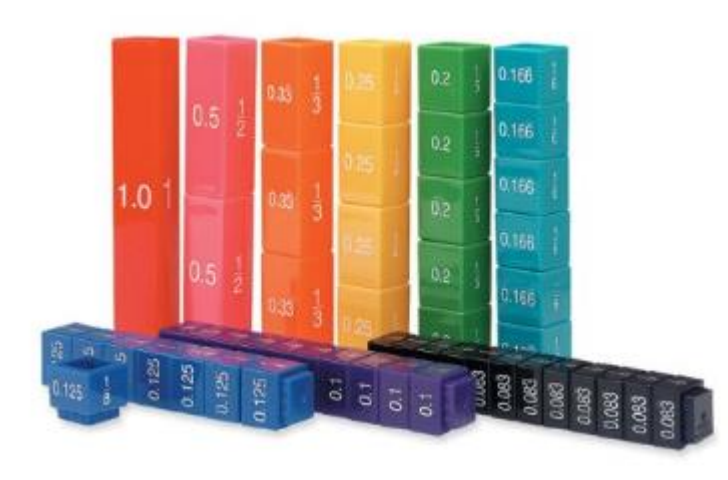
https://www.mathsisfun.com/

http://www.topmarks.co.uk/interactive.aspx?cat=24

http://resources.woodlands-junior.kent.sch.uk/maths/fractions/

http://www.bbc.co.uk/bitesize/ks2/maths/number/fractions_basic/play/

Resources



Learning Resources
Fraction Tower
Equivalency Cube