Millhouse
Primary School and Nursery

Lite Bites

How to help your child at home with Maths

Created by S.Bridge 2017-2018

From Reception to Year Six at Millhouse Primary School and Nursery, children will learn many mathematical concepts. Some of them will be new to them that year while many will build on learning from previous years.

This Lite Bite document has been produced to support your child's learning at home. Throughout this document, it will show you what your child will be learning and how it is taught at Millhouse Primary School. It will also provide many useful strategies that children can apply to help them when solving complex problems.

At the end of each mathematical concept, the curriculum expectations are stated which will allow you to see what your child will be working towards during that school year.

There are some examples to try at the end of each concept. Feel free to try these problems with your child in earlier years.

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Place Value - whole numbers

When we teach place value in school, we are teaching how much each digit is worth in a number. This is determined by the place it falls within the number.

In this number, the 6 is worth 600, the 8 is worth 80 and the 5 is worth 5.

5 = 5,000,000 (5 million)
4 = 400,000 (400 thousand)
2 = 20,000 (20 thousand)
1 = 100 (1 hundred)
8 = 80 (8 tens)
7 = 7 (7 ones)

Place Value - decimal numbers

By the end of year 6, children will be dealing with numbers up to 3 decimal places (3dp).

This means that there will be up to 3 numbers after the decimal point.

This number is read as sixteen point five four two.

The 5 is worth 5 tenths because it falls in the tenths column $\left(\frac{1}{10}\right)$

The 4 is worth 4 hundredths. $\left(\frac{1}{100}\right)$

The 2 is worth 2 thousandths. $\left(\frac{1}{1000}\right)$

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Curriculum expectations:

Reception – count to and place numbers from 1 – 20 in order

Year 1 – count, read and write numbers to 100

Year 2 – recognise the value of each digit in a 2-digit number and compare and order numbers to 100

Year 3 – recognise the value of each difit in a 3-digit number, compare, order and round numbers to 1000

Year 4 – recognise the value of each digit in a 4-digit number, compare, order and round numbers beyond 1000

Year 5 – read, write, order, compare and round numbers to at least 1,000,000

Year 6 - read, write, order, compare and round numbers to at least 10,000,000

What is the coloured digit worth?

8615

158

12,569

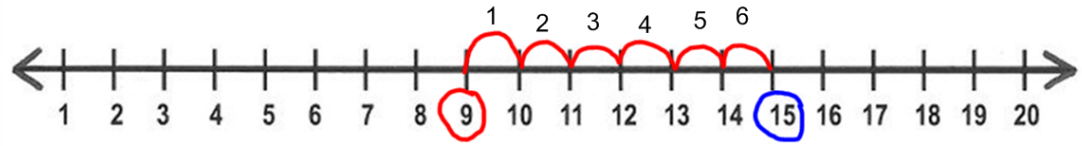
6,788,931

216.45

185.98

293.056

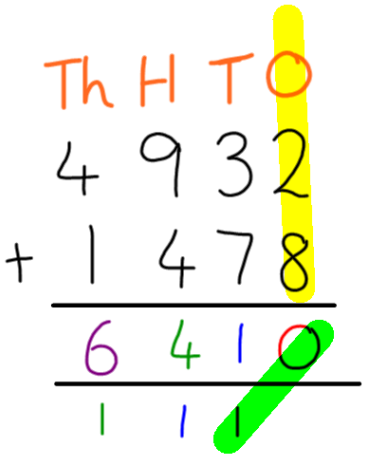
Addition using a number line



9 + 6 = 15

1. Find your starting number and circle it on the number line
2. Count on in 1s until you have added the right amount (6 in this case)
3. Identify the result/answer
4. If adding larger numbers, children may start to jump in larger increments e.g. 5s, 10s, 20s, 100s

Addition using formal column method



1. Add the digits in the ones column (2+8)
2. If the answer is 10 or larger, you need to write the number of tens you have underneath.
3. Add the digits in the tens column, don't forget the extra ten underneath! (3+7+1)
4. Repeat this process until you have added all the columns up.

Curriculum expectations:

Reception – add two single digit numbers

Year 1 – add 1 and 2 digit numbers together up to 20

Year 2 – add 1/2/3 digit numbers

Year 3 – add numbers with up to 3-digits

Year 4 – add numbers up to 4-dgits

Year 5 – add whole numbers with more than 4-digits

Year 6 – add a range of numbers confidently

18 + 6

98 + 31

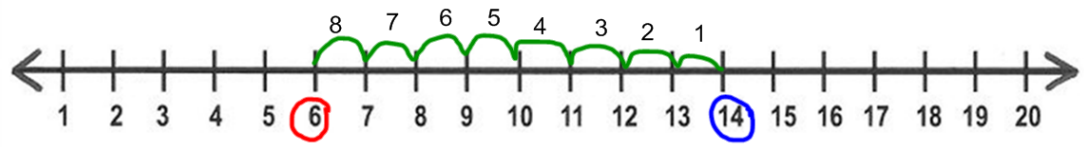
489 + 283

9314 + 364

8913 + 7113

64.182 + 34.823

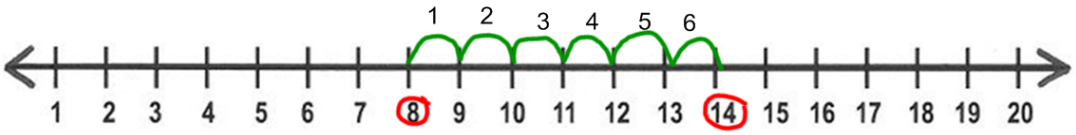
Subtraction using a number line - counting backwards



14 - 8 = 6

1. Find your starting number and circle it on the number line
2. Count back in 1s until you have subtracted the right amount (6 in this case)
3. Identify the result/answer
4. If subtracting larger numbers, children may start to jump in larger increments e.g. 5s, 10s, 20s, 100s

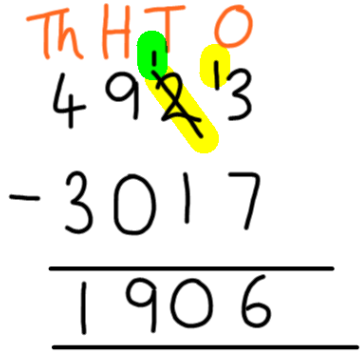
Subtraction using a number line - counting on



14 - 8 = 6

1. Find the number you are subtracting and circle it (8).
2. Count on in 1s until you have reached your starting number (14 in this case)
3. Identify how many jumps you have made (6). This is your answer
4. If subtracting larger numbers, children may start to jump in larger increments e.g. 5s, 10s, 20s, 100s

Subtraction using the column method



1. Subtract the digits in the ones column (3 - 7). This cannot be done using the column method.
2. You need to 'knock next door' and take one from the tens column. This means you now have 13 ones. Now you can solve 13 - 7 = 6
3. As you took one from the tens column, you now have 1 ten - 1 ten which leaves you with 0 tens.
4. Keep repeating until you have finished.

Curriculum expectations:

Reception – subtract two single digit numbers

Year 1 – subtract 1 and 2 digit numbers together up to 20

Year 2 – subtract 1/2/3 digit numbers

Year 3 – subtract numbers with up to 3-digits

Year 4 – subtract numbers up to 4-dgits

Year 5 – subtract whole numbers with more than 4-digits

Year 6 – subtract a range of numbers confidently

98 – 6

76 – 9

589 – 26

983 – 314

9431 – 2164

971.15 – 35.98

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Multiplication using arrays

4 x 5

X X X X

X X X X

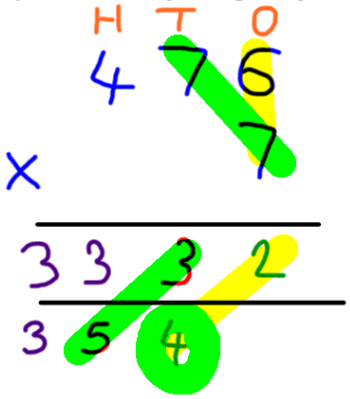
X X X X

X X X X

X X X X

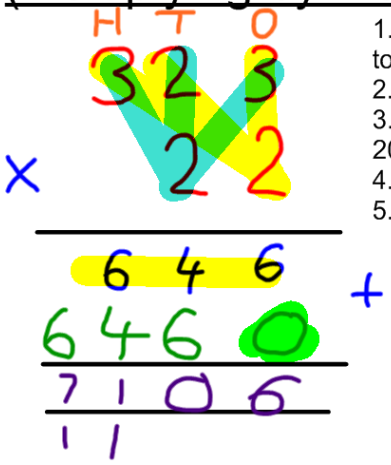
1. Create multiplication sentence by using crosses/counters
2. This shows that multiplication is the same as repeated addition
(4+ 4 + 4 + 4 + 4)

Multiplication using formal column method (multiplying by a single digit)

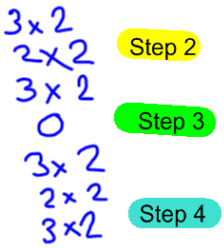


1. Multiply the digits in the ones column (6 x 7 = 42) and write it underneath
2. Multiply the digit from the tens column (7 x 7 = 49) and write it underneath - don't forget to add any digits underneath from the previous calculation! In this case 4.
3. Multiply the digit from the hundreds column (4 x 7 = 28). Again, remember to add the digit underneath (5)

Multiplication using formal column method (multiplying by 2 digits)



1. When setting it out, make sure you leave enough space to solve both calculations (ones and tens)
2. Multiply the ones (2) by the HTO (323)
3. Add a place holder (0) as you are now multiplying by 20.
4. Multiply the tens (2) by the HTO (323)
5. Add up the two answers to find your total



Curriculum expectations:

Reception – double objects and single digits

Year 1 – multiply by 2/5/10

Year 2 – multiply by 2/5/10 and solve problems involving these

Year 3 – multiply 2-digit numbers by single digit numbers

Year 4 – multiply 2/3 digit numbers by 1-digit numbers

Year 5 – multiply numbers up to 4-digits by a 1/2 digit number

Year 6 – multiply numbers up to 4-digits by a 1/2 digit number

Times tables:

Year 1 – 2/5/10

Year 2 – 2/3/4/5/10

Year 3 – 2/3/4/5/6/9/10/11

Year 4 – up to 12

Year 5 – up to 12

Year 6 – up to 12

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85 x 3

483 x 12

643 x 25

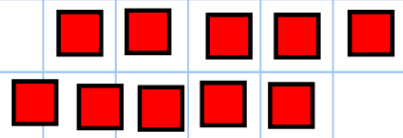
489 x 6

1589 x 8

2763 x 17

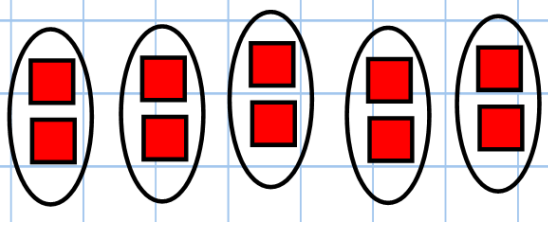
See ‘How to support your child with multiplication tables at home’ for tips and ideas on times tables.

Division as grouping



10 ÷ 2

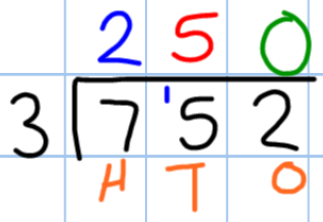
1. Divide quantities into equal groups



Division using formal written method with a remainder (short division)

Children may call this the bus stop method

7 5 2 ÷ 3



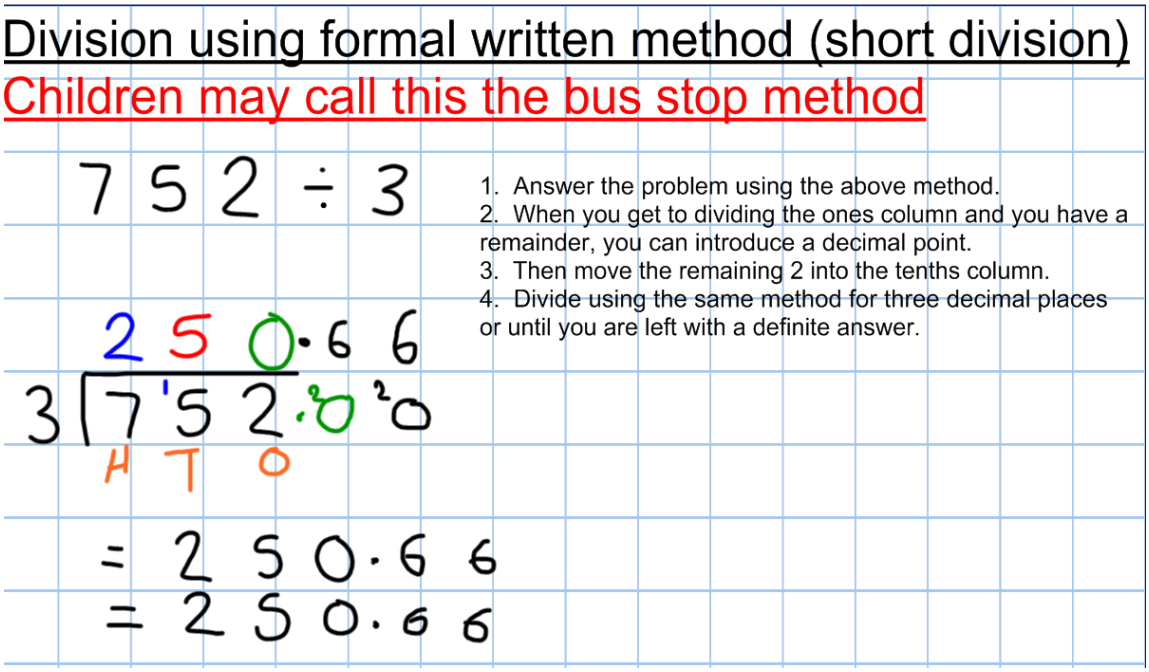
= 2 5 0r2

= 2 5 0 2/3

1. Set your calculation out so your divisor (the number you are dividing by - 3) is outside the bus stop.
2. Divide 7 by 3 = 2 remainder 1. We write 2 above the bus stop and the remainder moves over into the next column.
3. Now we have 15 in the tens column, so divide 15 by 3 = 5 and write this above the bus stop.
4. Now move to the next column and divide 2 by 3. You get 0 with 2 remaining (left over). As we do not have another column, you write r2 and this can be changed into a fraction of $\frac{2}{3}$

Division using formal written method (short division)

Children may call this the bus stop method



1. Answer the problem using the above method.
2. When you get to dividing the ones column and you have a remainder, you can introduce a decimal point.
3. Then move the remaining 2 into the tenths column.
4. Divide using the same method for three decimal places or until you are left with a definite answer.

Curriculum expectations:

Reception – halve objects and numbers, share objects equally

Year 1 – divide numbers/objects by sharing and using arrays

Year 2 – solve problems using division by using objects, sharing and arrays

Year 3 – solve problems involving division

Year 4 – divide 2/3 digit numbers by a 1-digit number

Year 5 – divide numbers up to 4-digits by a 1/2 digit number and interpret remainders appropriately

Year 6 – divide numbers up to 4-digits by a 2-digit whole number and interpret remainders appropriately

832 ÷ 2

9877 ÷ 7

1085 ÷ 5

86421 ÷ 13

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Multiplying and dividing by 10, 100 and 1000

When we multiply or divide by 10, 100 or 1000, children often say that we just add a zero or we take a zero off of the end. We do not encourage children to say this as we expect them to understand the process and how the value of the digits are affected.

Thousands	Hundreds	Tens	Ones
		2	5
	2	5	0

When we multiply by 10, 100, 1000, each of digits will get 10, 100 or 1000 times bigger.
For example, 25 x 10 = 250
The 2 tens have got ten times bigger so we have 2 hundreds and our 5 ones have also got ten times bigger so we have 5 tens. We need to put a 0 in the ones column for our place holder.
So when we multiply by 10, all of our digits move one column to the left.
When we multiply by 100, all of our digits move two columns to the left.
When we multiply by 1000, all of our digits move three columns to the left.

Multiplying and dividing by 10, 100 and 1000

Thousands	Hundreds	Tens	Ones
8	7	0	0
		8	7

When we divide by 10, 100, 1000, each of digits will get 10, 100 or 1000 times smaller.
For example, 8700 ÷ 100 = 87
The 8 thousands have got 100 times smaller so we have 8 tens and our 7 hundreds have also got hundred times smaller so we have 7 ones.
So when we divide by 10, all of our digits move one column to the right.
When we divide by 100, all of our digits move two columns to the right.
When we divide by 1000, all of our digits move three columns to the right.

Multiplying and dividing by 10, 100 and 1000 (decimal numbers)

The same rules apply for when we are working with decimal numbers.

Hundreds	Tens	Ones	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
		8	5	2	
	8	5	2		
1	4	5			
		0	1	4	5

8.52 x 10 = 85.2 (move all digits 1 place to the left)

145 ÷ 1000 = 0.145 (move all digits 3 places to the right)
Don't forget you need your place holder before the decimal point!

Rules:

10 1 place to the left
x100 2 places to the left
x1000 3 places to the left

÷10 1 place to the right
÷100 2 places to the right
÷1000 3 places to the right

Don't forget to add your place holder where needed.

Curriculum expectations:

Year 3 – multiply and divide 2-digit numbers by 10

Year 4 – multiply and divide 2-dighit numbers by 10

Year 5 – multiply and divide whole numbers and decimal numbers by 10/100/1000

Year 6 - multiply and divide whole numbers and decimal numbers by 10/100/1000

55 x 10

8.3 x 100

986 ÷ 1000

9 x100

18 ÷ 10

35 ÷ 100

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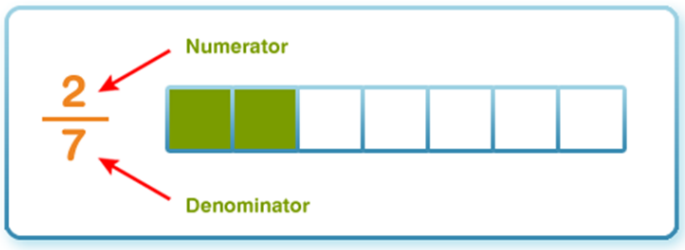
Fractions

A fraction is a part of a whole. There are two numbers to every fraction.



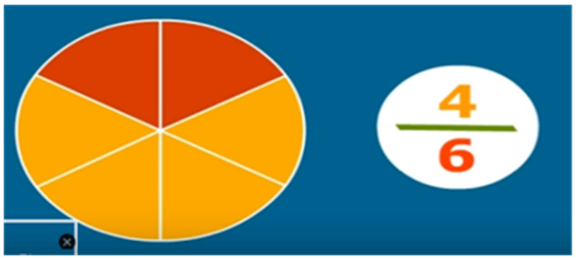
The top number of the fraction is called the **numerator**. The bottom number is called the **denominator**.

$\frac{3}{4}$ ← Numerator

← Denominator

The numerator shows how many parts we have (3 slices).

The denominator shows how many equal parts the item is divided into (4 equal slices).



There are six pieces altogether and four of them are yellow.
We read this fraction as four sixths.

There is one red square out of four.

We write it as $\frac{1}{4}$

and we say that one quarter is red.

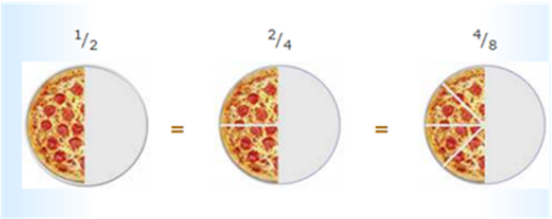
Three pieces out of four pieces are green therefore three quarters are green

$\frac{3}{4}$

The numerator and denominator always have to be a whole number (not a decimal number or another fraction).

Equivalent fractions

Equivalent fractions are fractions that look different but show exactly the same amount.



You can make equivalent fractions by multiplying or dividing the numerator and denominator by the same number. When you do this, the fraction keeps its value.

$$\frac{1}{3}\ \begin{matrix}\times 2\\ \times 2\end{matrix} = \frac{2}{6}\ \begin{matrix}\times 2\\ \times 2\end{matrix} = \frac{4}{12}$$

You can simplify fractions by dividing the numerator and denominator by the same number. Sometimes fractions will simplify more than once.

$$\frac{30}{42}\ \begin{matrix}\div 6\\ \div 6\end{matrix} = \frac{5}{7}$$

If you keep dividing until you cannot go any further, then you have simplified the fraction (made it as simple as possible).

Curriculum expectations:

Year 1 – recognise, find and name a half and quarter of objects, shapes and quantities

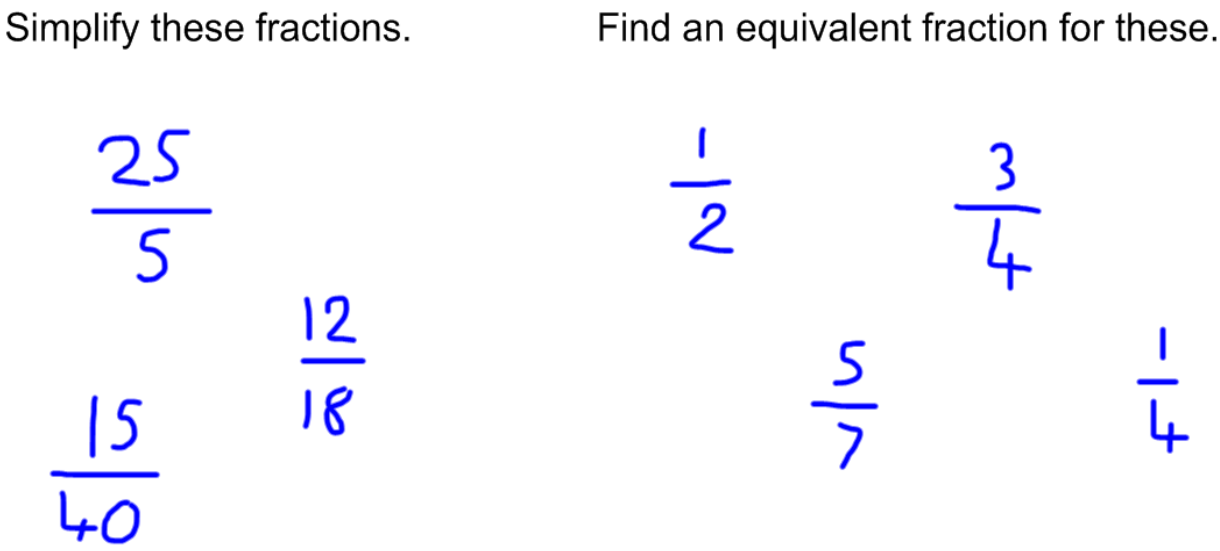
Year 2 – recognise, find, name and write fractions of lengths, objects and quantities

Year 3 – recognise and use fractions as numbers, recognise and show equivalent fractions with small denominators

Year 4 – recognise and show families of common equivalent fractions

Year 5 – identify, name and write equivalent fractions

Year 6 – simplify fractions



Mixed numbers and improper fractions

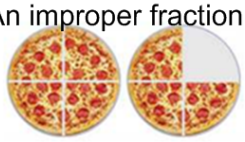
Fractions are made up of two numbers: numerator and denominator

$\frac{3}{4}$

A proper fraction is when the numerator is smaller than the denominator.

$\frac{7}{9}$ $\frac{8}{15}$ $\frac{3}{7}$

An improper fraction is when the numerator is larger than or equal to the denominator.



$\frac{7}{4}$

More Examples

$\frac{3}{2}$ $\frac{7}{3}$ $\frac{16}{15}$ $\frac{15}{15}$ $\frac{100}{5}$

Mixed numbers

A mixed number is when a number is recorded as whole numbers and fractions.

$1\frac{3}{4}$

I have one whole pizza and three quarters of a pizza. This means that I have one and three quarters pizza.

$2\frac{1}{5}$ $3\frac{4}{7}$ $1\frac{1}{2}$

Converting mixed numbers to improper fractions

To convert mixed numbers to improper fractions I need to know how many pieces make up the whole numbers I have. In this case I have 1 whole which is the same as four quarters, so in total I have seven quarters (4 quarters in the whole and the extra 3 pieces).

$1\frac{3}{4} = \frac{7}{4}$

1 x 4 and then add 3

When solving these problems, you always need to work in the denominator you have been given. In these cases,

quarters

fifths

$2\frac{3}{5} = \frac{13}{5}$

2 x 5 and then add 3

Converting Mixed Fractions to Improper Fractions

To convert a mixed fraction to an improper fraction, follow these steps:

- Multiply the whole number part by the fraction's denominator.
- Add that to the numerator
- Then write the result on top of the denominator.

Example: Convert $3\frac{2}{5}$ to an improper fraction.

Multiply the whole number part by the denominator:

$3 \times 5 = 15$

Add that to the numerator:

$15 + 2 = 17$

Then write that result above the denominator:

$$\frac{17}{5}$$

Curriculum expectations:

Year 5 expectation – convert mixed numbers to improper fractions and vice versa

Year 6 expectation – will need this skill to solve a range of fraction problems

$3\frac{4}{5} =$

$53\frac{2}{3} =$

$17\frac{1}{2} =$

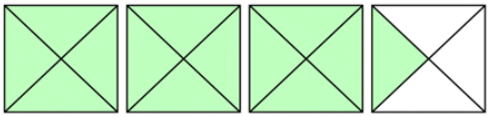
$9\frac{3}{7} =$

Converting improper fractions to mixed numbers

$\frac{13}{4}$

To convert improper fractions to mixed numbers, you need to know how many wholes you can make and then how many you have remaining.

I can represent this by drawing a diagram. As my denominator is 4, all my boxes must be cut into four. I will then shade in 13 boxes. When this is done, I have 3 whole and one quarter. This can be written as



$3\frac{1}{4}$

Converting Improper Fractions to Mixed Fractions

To convert an improper fraction to a mixed fraction, follow these steps:

- Divide the numerator by the denominator.
- Write down the whole number answer
- Then write down any remainder above the denominator.

Example: Convert $\frac{11}{4}$ to a mixed fraction.

Divide:

$11 \div 4 = 2$ with a remainder of 3

Write down the 2 and then write down the remainder (3) above the denominator (4).

Answer:

$2\frac{3}{4}$

Curriculum expectations

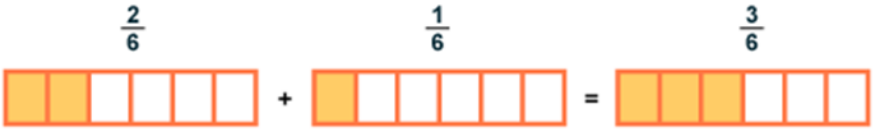
Year 5 expectation – convert mixed numbers to improper fractions and vice versa

Year 6 expectation – will need this skill to solve a range of fraction problems

$\frac{19}{5} =$ $\frac{32}{6} =$

$\frac{91}{5} =$ $\frac{115}{5} =$

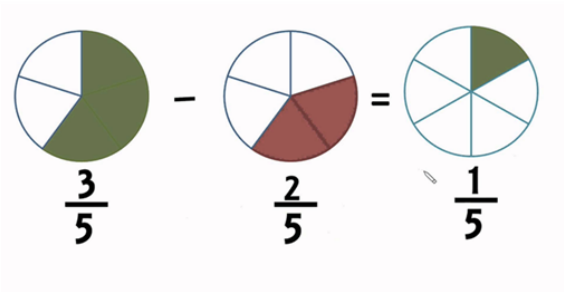
Adding and subtracting fractions



When you add fractions with the same denominator (6 in the example above), you only add the numerators.

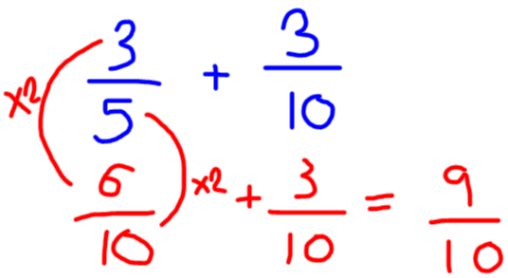
$$\frac{2}{9} + \frac{5}{9} = \frac{7}{9}$$

Subtracting fractions with the same denominator is the same as when you add. You only subtract the numerators.

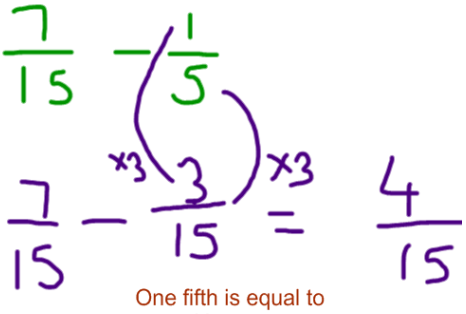


What happens if the denominators are different?

If you have an addition or subtraction problem where the denominators are different, you need to convert the fractions so they have the same denominator. This is where you need to find an equivalent fraction (see earlier edition of Lite Bite).



Three fifths is equal to six tenths.



One fifth is equal to three fifteenths.

When you add or subtract fractions, the answer may be an improper fraction. It is important for children to be able to convert this to a mixed number (see proevious editions of Lite Bite).

Curriculum expectations:

Year 3 expectations – add and subtract fractions with the same denominator (answer is below 1 whole)

Year 4 expectations - add and subtract fractions with the same denominator

Year 5 expectations - add and subtract fractions with the denominators in the same times tables

Year 6 expectations - add and subtract fractions with the different denominators and mixed numbers

$\frac{1}{4} + \frac{1}{4}$ $\quad$ $\frac{3}{5} + \frac{2}{5}$

$\frac{7}{10} + \frac{17}{20}$ $\quad$ $1\frac{1}{2} - \frac{3}{4}$

$\frac{8}{9} - \frac{4}{9}$ $\quad$ $\frac{15}{16} - \frac{3}{8}$

Multiplying fractions

We can multiply fractions by whole numbers.

$\frac{5}{6} \times \frac{7}{1} = \frac{35}{6} = 5\frac{5}{6}$

$\frac{12}{17} \times \frac{3}{1} = \frac{36}{17} = 2\frac{2}{17}$

To help with the year 6 curriculum, we encourage the children to write the whole number over one. This is because 7 is equal to $\frac{7}{1}$

Now, to solve this calculation you multiply straight across. Therefore you multiply the numerators together and then you multiply the denominators together.

Once you have your answer, you can now change it from an improper fraction into a mixed number (see previous Lite Bite)

Multiplying mixed numbers by whole numbers

$3\frac{1}{4} \times 5 =$

1. Change the mixed number into an improper fraction.
2. Write the whole number over 1.
3. Multiply the two numerators together.
4. Multiply the two denominators together.
5. Record your answer as a mixed number.

$\frac{13}{4} \times \frac{5}{1} = \frac{65}{4} = 16\frac{1}{4}$

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Multiplying fractions by fractions

When you multiply fractions by fractions, you follow the same rule as multiplying fractions by whole numbers. You multiply the numerators together and then you multiply the denominators together. Remember to simplify your answer if possible!

$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12} = \frac{1}{2}$

$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

Curriculum expectations:

Year 5 – multiply proper fractions and mixed numbers by whole numbers

Year 6 – multiply proper fractions together (recording the answer in its simplest form)

$\frac{1}{4} \times 3$

$\frac{8}{9} \times 5$

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

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

Dividing fractions by a whole number

There are three simple steps to remember when dividing fractions:
Keep, change, flip

You need to remember to write the whole number over one (as explained in last week's Lite Bite)

To help with the year 6 curriculum, we encourage the children to write the whole number over one. This is because 2 is equal to $\frac{2}{1}$

$\frac{3}{5} \div \frac{2}{1}$

$\frac{3}{5} \times \frac{1}{2} = \frac{3}{10}$

Keep - keep the first fraction the same
Change - change the ÷ for a x
Flip - flip the second fraction over

Solve as a multiplication problem (last week's Lite Bite)

Dividing fractions

The same steps apply when you are dividing a fraction by a fraction.

$\frac{1}{2} \div \frac{1}{6}$

$\frac{1}{2} \times \frac{6}{1} = \frac{6}{2} = 3$

Keep - keep the first fraction the same
Change - change the ÷ for a x
Flip - flip the second fraction over

Solve as a multiplication problem

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Curriculum expectations:

Year 6 – divide proper fractions by whole numbers

$\frac{1}{2} \div 4$ $\frac{7}{15} \div 8$

$\frac{2}{9} \div 3$

Finding fractions of amounts

$\frac{1}{2}$ of 360

To find half of a number you divide by 2.

This is because you are splitting your total between two groups.

The number of groups is shown by the denominator.

360	
180	180

360 is your whole amount

To find any fraction of a number, you divide by the denominator because this is how many groups you are splitting your amount into.

$\frac{1}{4}$ Divide by 4

$\frac{1}{12}$ Divide by 12

$\frac{1}{5}$ Divide by 5

$\frac{1}{3}$ Divide by 3

$\frac{1}{9}$ of 153 = 17

$$9\overline{)153} = 17$$

What do I do if I want $\frac{4}{9}$? $= 68$

$\frac{1}{9}$

You need to find $\frac{1}{9}$ first and then multiply the answer by the numerator.

You do this because then you end up with 4 lots of $\frac{1}{9}$

$\frac{1}{9}$ of 153 = 17

$$9\overline{)153} = 17$$

$$17 \times 4 = 68$$

$$153 - 68 = 2$$

We can remember this by the phrase DDTT

Divide by
Denominator
Times by
Top

$\frac{2}{5}$ of 350

$350 \div 5 = 70$

$70 \times 2 = 140$

Curriculum expectations:

Year 1 – recognise, find and name a half and a quarter of an object, shape or quantity

Year 2 – recognise, find, name and write fractions of a length, shape, objects and quantities

Year 3 – recognise and find fractions of objects where the numerator is not always 1

Year 4 – find fractions of amounts where the numerator is not always 1

Year 5 – confidently find fractions of amounts and objects

Year 6 – confidently find fractions of amounts and objects

$\frac{3}{4}$ of 96

$\frac{2}{3}$ of 111

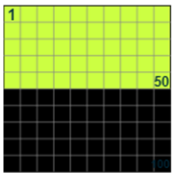
$\frac{7}{8}$ of 656

$\frac{9}{10}$ of 730

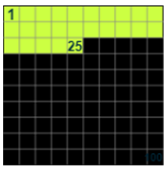
Percentages

When we say percent we are saying per 100.
1% means we are saying 1 per hundred.

1% of this line is shaded green.

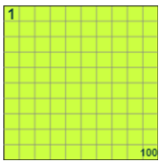


50% means 50 per 100.
50% of this box is shaded green



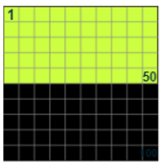
25% means 25 per 100.
25% of this box is shaded green

100% means all

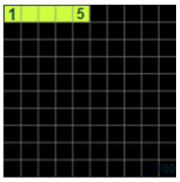


50% means half

$\frac{1}{2}$



5% means 5 per hundred $\frac{5}{100}$



All percentages can be recorded as a decimal and a fraction.

50% = 0.50 = $\frac{50}{100} = \frac{1}{2}$

25% = 0.25 = $\frac{25}{100} = \frac{1}{4}$

10% = 0.10 = $\frac{10}{100} = \frac{1}{10}$

1% = 0.01 = $\frac{1}{100}$

83% = 0.83 = $\frac{83}{100}$

To convert a percentage to a decimal number, we divide by 100.
The easiest way to divide by 100 is to move each digit two places to the right (see place value Lite Bite).
To convert a decimal to a percentage you multiply by 100 and add % sign.
The easiest way to multiply by 100 is to move each digit two places to the left.

As a percent is per 100, you can record all percentages as a fraction. The easiest way to do this is to remove the percent sign and write it over 100. The numerator will be the percentage you have and the denominator will be 100. This is because percent is per hundred. You can then simplify the fraction if possible (see fractions Lite Bite).

Finding percentages of amounts

We often need to find percentages of amounts when we are shopping. There may be a sale which is 25% or 10% off.

We are able to calculate these in our head and there are some handy strategies to help us do this.

We know that 100% is the whole amount.
So 100% of £50 is £50.

Using our knowledge of percentages, we know that 50% is the same as a half. So 50% of £50 is the same as half of £50 which is £25. To find 50% of an amount, we just half the original amount.

To find 25% of an amount, we need to understand that 25% is the same as one quarter. To find one quarter we can either divide our original amount by 4 or we can halve and halve again.

So 25% of £50 is either £50 ÷ 4 = £12.50

or halve £50 to get £25 and then halve again to get £12.50

To find 10% of a value we can divide our original amount by 10 (as there are ten 10% in a whole).
So 10% of £50 is £5.

To find 1% of a value we can divide our original amount by 100 (as there are one hundred 1% in a whole).
So 1% of £50 is 50p (or £0.50 see multiplying and dividing by 10/100/1000 lite bite).

Once you can find 10% and 1% of an amount you can find any percentage of an amount.

For example:

70% is the same as seven 10%.
70% of £50
Find 10% first by dividing by 10 = £5
Multiply this amount by 7 = 7 x £5 = £35
70% of £50 = £35

8% is the same as eight 1%.
8% of £50
Find 1% by dividing by 100 = £0.50
Multiply this amount by 8 = 8 x £0.50 = £4.00
8% of £50 = £4

You can also find percentages of amounts like this.

95% is the same as nine 10% and five 1%.
90% of £50
Find 10% first by dividing by 10 = £5
Multiply this amount by 9 = 9 x £5 = £45

Find 1% by dividing by 100 = £0.50
Multiply this amount by 5 = 5 x £0.50 = £2.50

Add these two together (90% and 5%)
£45 + £2.50 = £47.50

Curriculum expectations:

Year 5 – understand the concept of percentages and find percentages of amounts

Year 6 – understand the concept of percentages and find percentages of amounts

40% of 780

50% of 95

10 % of 854

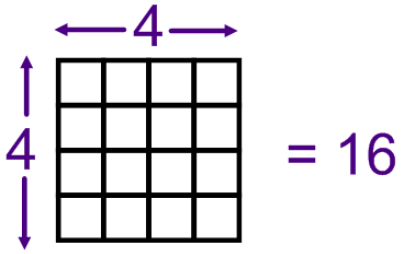
99% of 220

25% of 670

Square numbers

A square number is the number you get when you multiply an integer (whole number) by itself. The numbers in red are the square numbers.

1 x 1 = 1
2 x 2 = 4
3 x 3 = 9
4 x 4 = 16
5 x 5 = 25
6 x 6 =
7 x 7 =

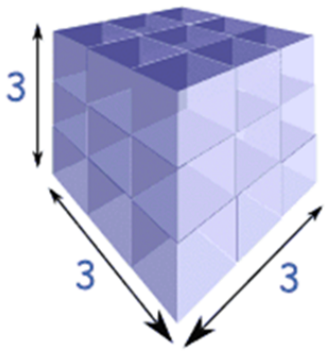


You can record 3 x 3 as 3^2. This means the same thing. So $3^2 = 9$.

Cube numbers

A cube number is the number you get when you multiply an integer (whole number) by itself three times. The numbers in blue are the cube numbers.

1 x 1 x 1 = 1
2 x 2 x 2 = 8
3 x 3 x 3 = 27
4 x 4 x 4 = 64
5 x 5 x 5 = 125
6 x 6 x 6 =
7 x 7 x 7 =



You can record 3 x3 x 3 as 3^3. This means the same thing. So $3^3 = 27$.

Curriculum expectations:

Year 5 – recognise and use square and cube numbers and recognise the notations of squared (^{2}) and cubed (^{3})

Year 6 - recognise and use square and cube numbers and recognise the notations of squared (^{2}) and cubed (^{3})

4^3

6^2

11^2

$12^2 - 10^2$

$4^2 \times 2^2$

Order of operations

"Operations" mean things like add, subtract, multiply, divide, squaring etc.

but when you see something like ...

$7^2 + (6 \times 5)$

... what part should you calculate first?

Warning! If you calculate them in the wrong order, you will get a wrong answer.

BODMAS - this is the acronym that is followed. This will tell you what order to calculation.

Brackets - anything in brackets is solved first
Others - anything else e.g. squaring and cubing numbers
Divide - the division part of the problem
Multiply - the multiplication part of the problem
Add - the addition part of the problem
Subtract - the subtraction part of the problem

$7^2 + (6 \times 5)$

BODMAS
Brackets first $(6 \times 5) = 30$
The calculation will now read as
$7^2 + (30)$
Others next $7^2 = 7 \times 7 = 49$
The calculation will now read as
$49 + (30)$
Divide - there is no division
Multiply - there is no multiplication
Add $49 + (30) = 79$
Subtract - there is no subtraction
The answer is 79

$12^2 - (16 + 15)$

BODMAS
Brackets first (16 + 15) = 31
The calculation will now read as
$12^2 - (31)$
Others next $12^2 = 12 \times 12 = 144$
The calculation will now read as
144 - (31)
Divide - there is no division
Multiply - there is no multiplication
Add - there is no addition
Subtract 144 - 31 = 113
The answer is 113

Curriculum expectations:

Year 6 – use knowledge of order of operations to solve calculations

$18 - 2^2 + 3$

$115 \div 5 + (6 \times 2)$

$4^3 - 8 \div 8$

Created by S.Bridge 2017-2018

Measures

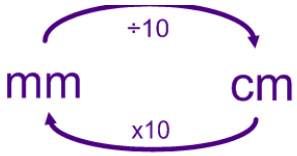
During primary school, children will be learning to measure in and use a variety of different units of measurement.

Length:
mm - millimetres
cm - centimetres
m - metres
km - kilometres

Capacity:
ml - millilitres
l - litres

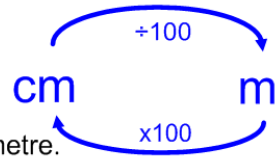
Mass/weight:
g - grams
kg - kilograms

Length



Small units of length are called millimetres.
When we have 10 millimetres, it can be called a centimetre.

We can convert from mm to cm and cm to mm by multiplying/dividing by 10. This is because there are 10mm in 1cm.

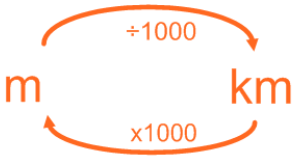


A metre is equal to 100 centimetres. When we have 100cm, it can be called a metre.

We can convert from cm to m and m to cm by multiplying/dividing by 100. This is because there are 100cm in 1m.

A kilometre is equal to 1000 metres. When we have 1000m, it can be called a kilometre.

We can convert from m to km and km to m by multiplying/dividing by 1000. This is because there are 1000m in 1km.



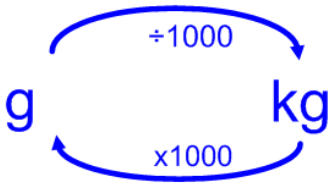
Mass/Weight

Grams are small units of weight. We will often write grams as g for short.

Kilograms are larger units of weight. We will often write kilograms as kg for short.

1 kg = 1000g

Because of this fact, when we are converting g to kg and kg to g we multiply/divide by 1000.



Capacity

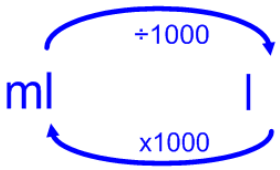
When measuring capacity, we are looking at how much of a substance will fill a container. We will often use liquid for this in school.

Millilitres are small units of capacity. We will often write millilitres as ml for short.

Litres are larger units of capacity. We will often write litres as l for short.

1 l = 1000ml

Because of this fact, when we are converting ml to l and l to ml we multiply/divide by 1000.



Curriculum expectations:

Reception – order two or three items by length or height or weight or capacity

Year 1 – use language like longer/shorter/heavy/light/full/empty. Begin to measure and record these measurements

Year 2 – use standard units to estimate and measure (m/cm, kg/g, ml/l) and then compare and order measurements

Year 3 – Measure, compare, convert, add, subtract measurements (m/cm/mm, kg/g, l/ml)

Year 4 – convert between different unites of measure

Year 5 – convert between different units of measure

Year 6 – solve problems involving calculation and conversion of units of measure

5cm = ……..mm

0.885l = ……..ml

7000g = …….kg

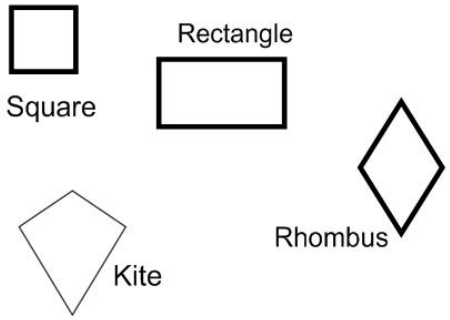
8.482km = …….m

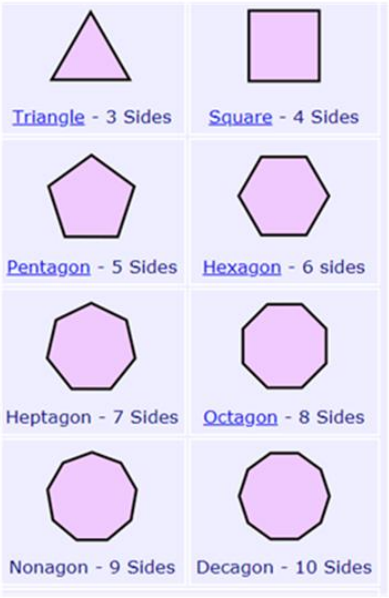
6.157kg = ……..g

2D shapes

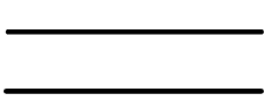
A polygon is a 2D shape with straight sides.
To be a regular polygon, all the sides and angles must be the same.

Any four sided shape is called a quadrilateral.



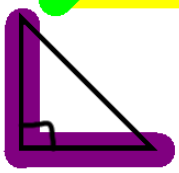


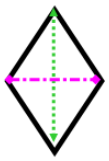
Properties of shapes



Parallel sides/faces - they are opposite sides/faces that stay the same distance apart. They will never cross/meet.
The yellow sides are parallel to each other in this parallelogram. The green sides are parallel to each other.

Perpendicular lines - lines that meet at right angles (90°).
The purple sides are perpendicular to each other as they meet at a right angle.



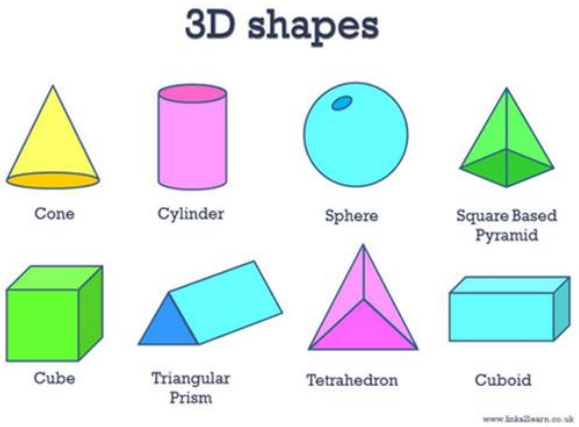


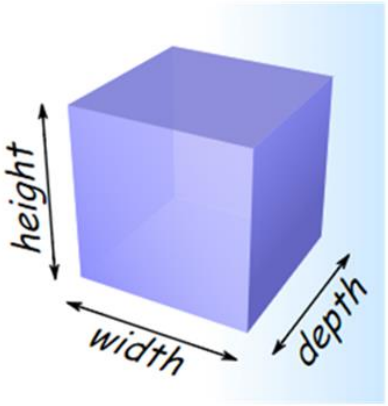
Rhombus

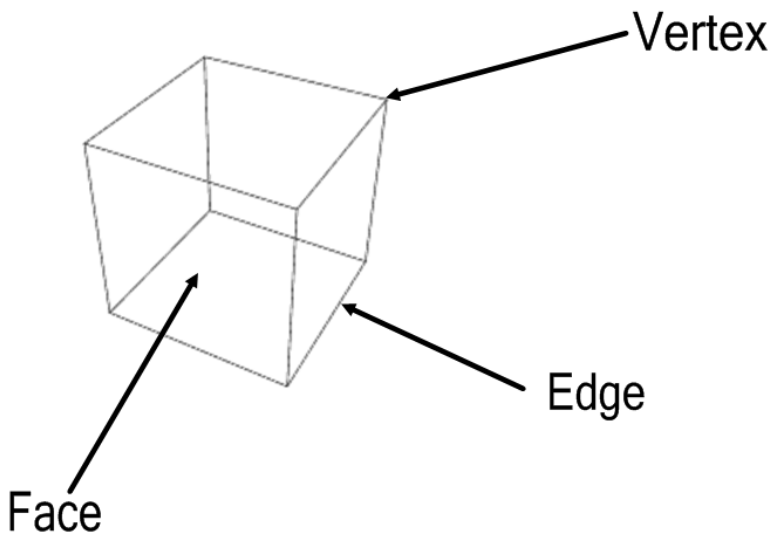
Line of symmetry - an imaginary line that runs through a shape/image and if folded at this point, both sides will be exactly the same.

3D shapes

3D shapes are called three-dimensional shapes because there are three dimensions: width, depth and height.







Curriculum expectations:

Reception - begin to use names for 2D and 3D shapes and identify shapes within a group

Year 1 - recognise and name 2D and 3D shapes

Year 2 - identify and describe the properties of 2D and 3D shapes

Year 3 - draw 2D shapes and make 3D shapes and recognise nets of a cube

Year 4 - compare and classify shapes and identify lines of symmetry in 2D shapes

Year 5 - identify 3D shapes from 2D representations

Year 6 - draw 2D shapes, compare and classify shapes based on their properties and recognise and describe 3D shapes and their nets

How many lines of symmetry does a rhombus have?

How many pairs of parallel lines does a square have?

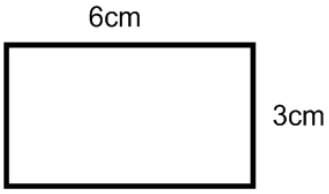
What 3D shape has 4 vertices?

What 3D shape has 4 faces?

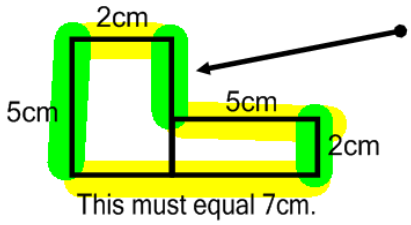
Perimeter of 2D shapes

Perimeter is the distance around a two-dimensional shape.

To find the perimeter of a shape, you add up all of the sides.



Perimeter = 6 + 6 + 3 + 3
Perimeter = 18cm



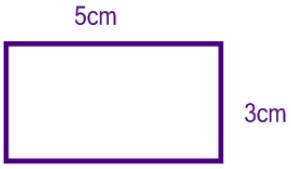
The same idea applies this shape but you may have to work out the missing measurements.

Perimeter = 5 + 2 + 3 + 5 + 2 + 7 = 24cm

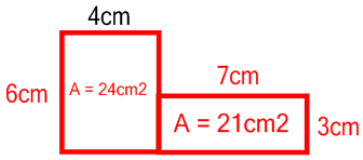
Area of 2D shapes

The area of a shape is the size of the surface.

The area of a shape of a rectangular shape can be calculate by multiplying the length and the width.

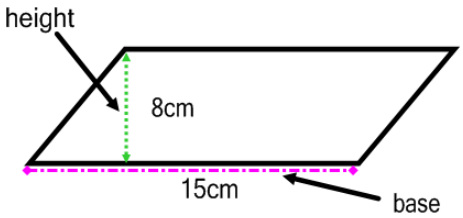


The area of this rectangle is 5 x 3 = 15cm2



You can find the area of this shape by calculating the area of the two separate rectangles and then adding them to find the total area.
Total area = 24 + 21 = 45cm2

Area of a parallelogram

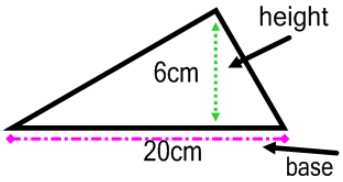


To find the area of a parallelogram, you multiply the base by the height.
The area of this parallelogram is:
$15 \times 8 = 120cm^2$

Area of a triangle

To find the area of a triangle, you multiply the base by the height and then halve your answer.
The area of this triangle is:

$$\frac{20 \times 6}{2} = \frac{120}{2} = 60cm^2$$

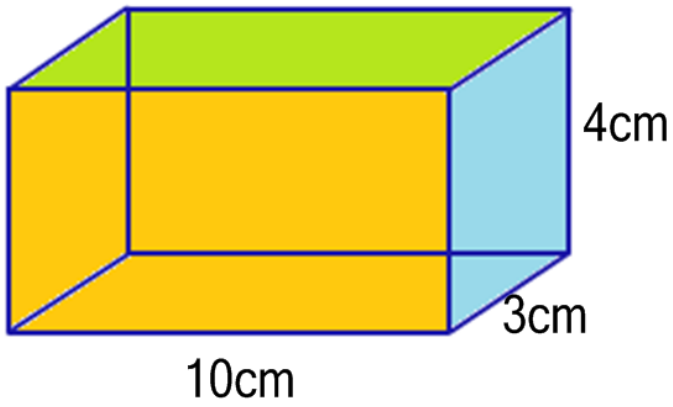


Volume - 3D shapes

Volume is the amount of 3-dimensional space a shape takes up.

To calculate the volume of a cube or cuboid you multiply the width by the depth by the height:

width x depth x height



The volume of this cuboid would be:

$$10 \times 3 \times 4 = 120cm^3$$

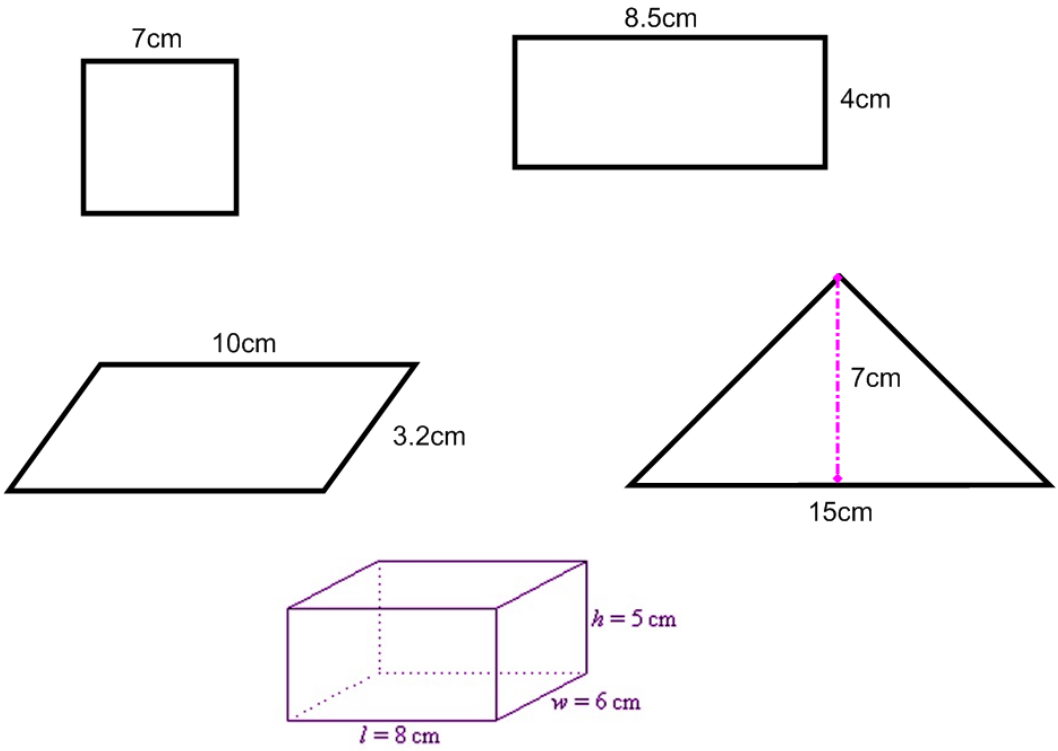
Curriculum expectations:

Year 4 - measure and calculate the area and perimeter of rectangles and squares

Year 5 - measure, calculate and compare the perimeter and area of composite shapes (made from rectangles

Year 6 - calculate the area of parallelograms and triangles and calculate the volume of cubes and cuboids

Can you calculate the area, perimeter and volume of these shapes?



Roman numerals

The ancient Romans used a special method of writing numbers.

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

Roman numerals can be grouped to form numbers
II = 2
XX = 20
CCC = 300
MM = 2000

Forming Numbers - The Rules

When a symbol appears after a larger (or equal) symbol it is added

Example: VI = V + I = 5 + 1 = 6
Example: LXX = L + X + X = 50 + 10 + 10 = 70

But if the symbol appears before a larger symbol it is subtracted

Example: IV = V − I = 5 − 1 = 4
Example: IX = X − I = 10 − 1 = 9
Example: XCIX = (100 - 10) + (10 - 1) = 90 + 9 = 99
Example: CD = D - C = 500 - 100 = 400

To Remember: **A**fter Larger is **A**dded

Don't use the same symbol more than three times in a row!

How to Convert to Roman Numerals

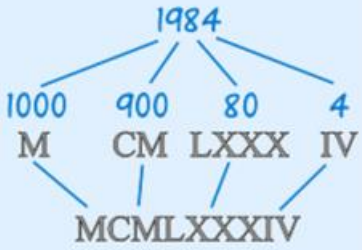
Break the number into Thousands, Hundreds, Tens and Ones, and write down each in turn.

Example: Convert 1984 to Roman Numerals.

Break 1984 into 1000, 900, 80 and 4, then do each conversion

- 1000 = M
- 900 = CM
- 80 = LXXX
- 4 = IV

1000 + 900 + 80 + 4 = 1984, so **1984** = **MCMLXXXIV**



Curriculum expectations:

Year 4 – read Roman Numerals to 100

Year 5 – read Roman Numerals to 1000

Year 6 – read years using Roman Numerals

MXI

1582

1066

MM

MMXVIII