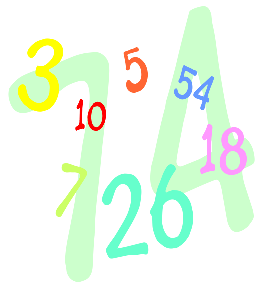
Underhill School

A guide to



Maths at Home

"IT WASN'T LIKE THIS WHEN I WAS AT SCHOOL!"

Have you ever wished that you understood current Maths methods better? Many parents find that their children are using methods or strategies, which are very different from those used in the past. This can often cause confusion when trying to support your child at home.

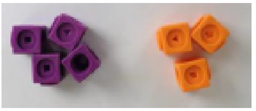
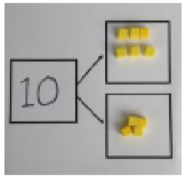
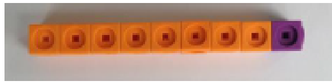
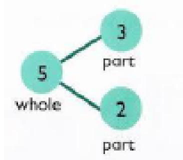
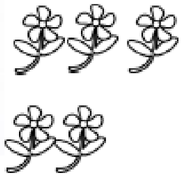
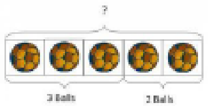
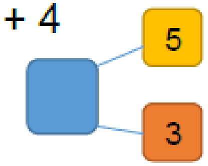
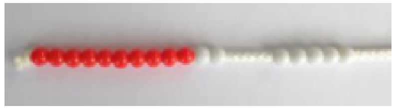
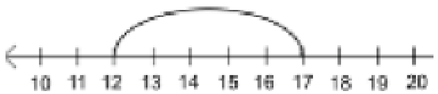
The main methods used in each year group by the majority of pupils for addition, subtraction, multiplication and division are shown. These methods are introduced throughout the teaching year so most pupils should be familiar with all methods by the end of the year. Each sheet also shows typical maths vocabulary that children will be acquiring and using at this stage.

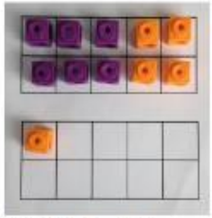
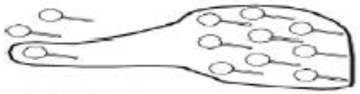
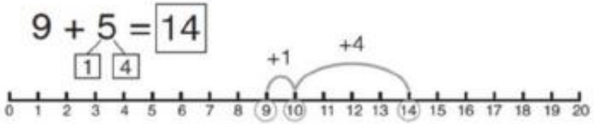
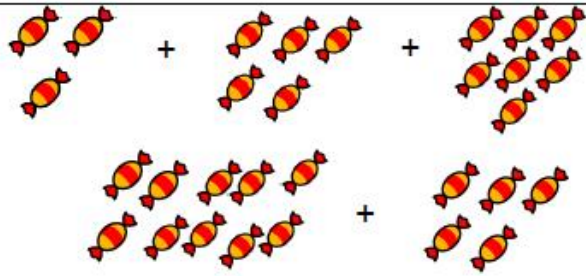
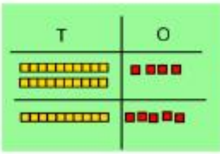
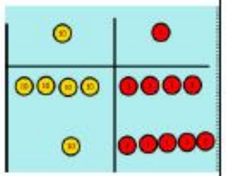
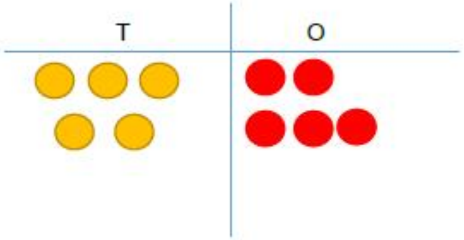
This is a guide only, children will always progress at different speeds. However, support from you will undoubtedly be of great benefit to them at all times. If you have any questions, your child's teacher will be pleased to discuss the strategies with you.

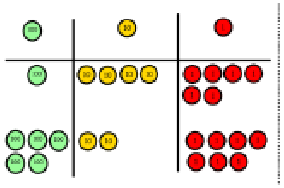
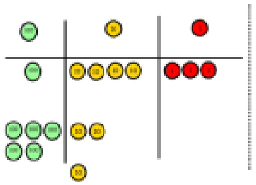
Turn your child into a Mathemagician!

Progression in Calculations

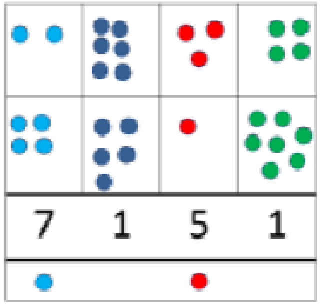
Addition

Objective and Strategies	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model	   Use cubes to add two numbers together as a group or in a bar. 	   Use pictures to add two numbers together as a group or in a bar. 	4 + 3 = 7 10= 6 + 4  Use the part-part whole diagram as shown above to move into the abstract.
Starting at the bigger number and counting on	 Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	12 + 5 = 17  Start at the larger number on the number line and count on in ones or in one jump to find the answer.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.

Regrouping to make 10.	 6 + 5 = 11  Start with the bigger number and use the smaller number to make 10.	 Use pictures or a number line. Regroup or partition the smaller number to make 10.  	7 + 4= 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?
Adding three single digits	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.  Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	$\underbrace{4 + 7 + 6}_{10} = \boxed{10} + \boxed{7}$ $= \boxed{17}$ Combine the two numbers that make 10 and then add on the remainder.
Column method- no regrouping	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.  	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.  	Calculations 21 + 42 = $\begin{array}{r} 21 \\ +\ \underline{42} \end{array}$

<table>
<tr>
<td>Column method-regrouping</td>
<td>Make both numbers on a place value grid.

146
+ 527
Add up the units and exchange 10 ones for one 10.

146
+ 527
Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.

This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

As children move on to decimals, money and decimal place value counters can be used to support learning.</td>
<td>Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.

</td>
<td>Start by partitioning the numbers before moving on to clearly show the exchange below the addition.
20 + 5
40 + 8
60 + 13 = 73

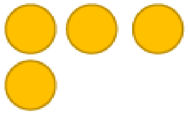
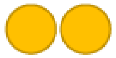
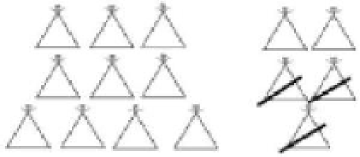
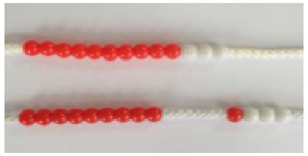
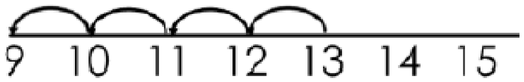
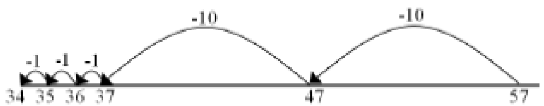
536
+ 85
621
1 1
As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

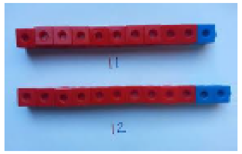
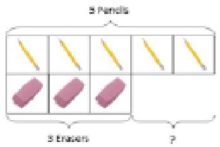
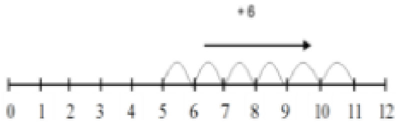
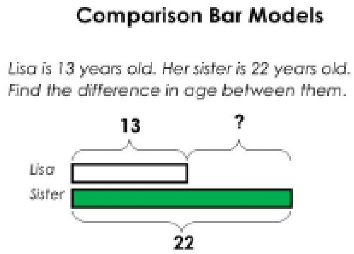
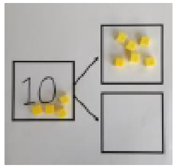
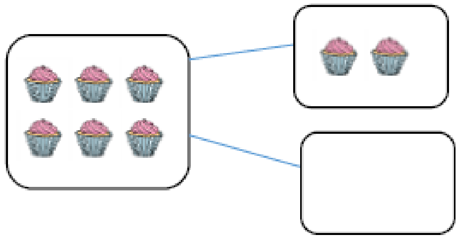
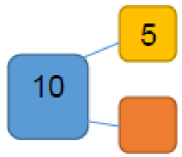
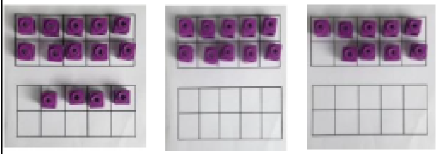
72.8
+ 54.6
127.4
1 1

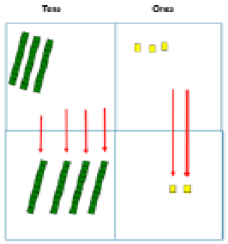
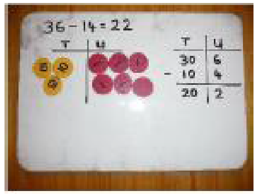
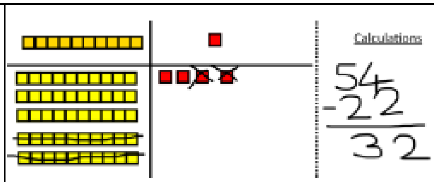
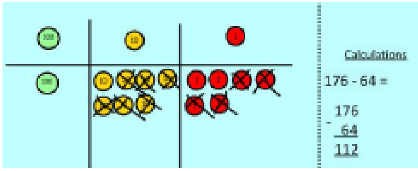
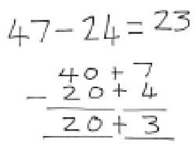
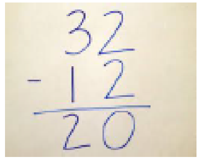
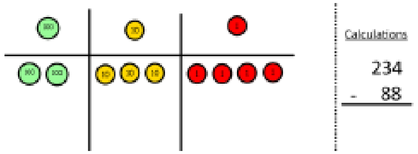
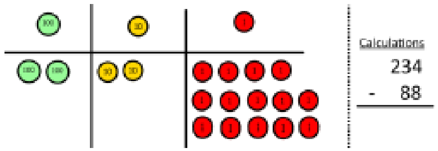
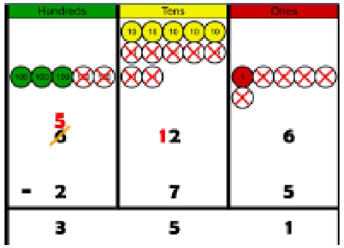
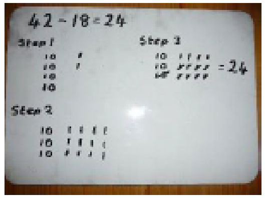
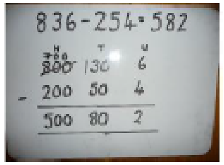
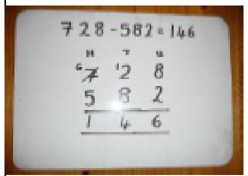
£ 2 3 . 5 9
+ £ 7 . 5 5
£ 3 1 . 1 4
1 1 1

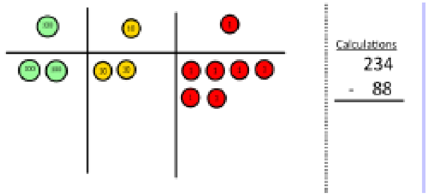
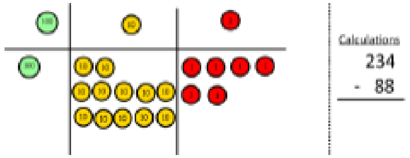
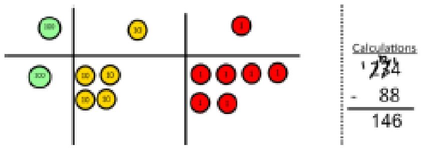
2 3 . 3 6 1
9 . 0 8 0
5 9 . 7 7 0
+ 1 . 3 0 0
9 3 . 5 1 1
2 1 2</td>
</tr>
</table>

Subtraction

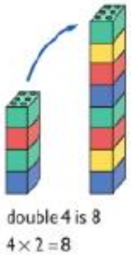
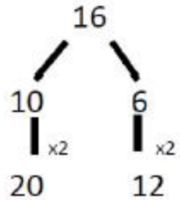
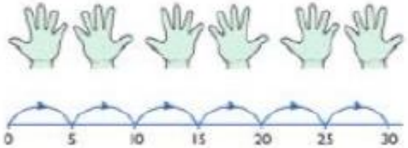
Objective and Strategies	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects, counters, cubes etc to show how objects can be taken away.  6 – 2 = 4  	Cross out drawn objects to show what has been taken away.  15 – 3 = $\boxed{12}$	18 -3= 15 8 – 2 = 6
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4  Use counters and move them away from the group as you take them away counting backwards as you go. 	Count back on a number line or number track  Start at the bigger number and count back the smaller number showing the jumps on the number line.  This can progress all the way to counting back using two 2 digit numbers.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.

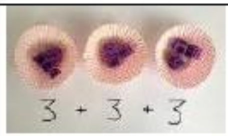
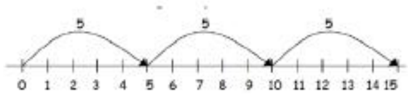
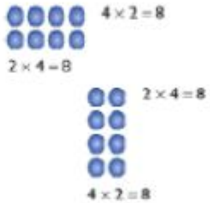
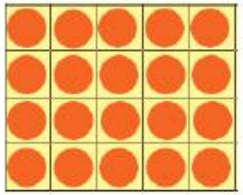
Find the difference	Compare amounts and objects to find the difference.  Use cubes to build towers or make bars to find the difference  Use basic bar models with items to find the difference	 Count on to find the difference. Draw bars to find the difference between 2 numbers. 	Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.
Part Part Whole Model	 Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part part whole model. 	 Move to using numbers within the part whole model.
Make 10	14 – 9 =  Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.	 Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	16 – 8= How many do we take off to reach the next 10? How many do we have left to take off?

Column method without regrouping	 Use Base 10 to make the bigger number then take the smaller number away. Show how you partition numbers to subtract. Again make the larger number first. 	  Draw the Base 10 or place value counters alongside the written calculation to help to show working.	 This will lead to a clear written column subtraction. 
Column method with regrouping	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters  Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones. 	 Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.  When confident, children can find their own way to record the exchange/regrouping. Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.	 Children can start their formal written method by partitioning the number into clear place value columns.  Moving forward the children use a more compact method.

	Now I can subtract my ones.  Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.  Now I can take away eight tens and complete my subtraction  Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.		This will lead to an understanding of subtracting any number including decimals. $$\begin{array}{cccccc} & & 5 & 12 & & 1 \\ & 2 & \cancel{6} & \cancel{3} & . & 0 \\ - & & 2 & 6 & . & 5 \\ \hline & 2 & 3 & 6 & . & 5 \end{array}$$

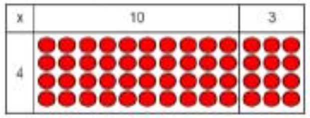
Multiplication

Objective and Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number. 	Draw pictures to show how to double a number. Double 4 is 8 	 Partition a number and then double each part before recombining it back together.
Counting in multiples	  Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30

Repeated addition	   Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 add 2 add 2 equals 6  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures. 
Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.   Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

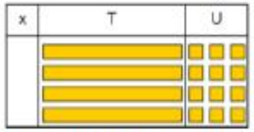
Grid Method

Show the link with arrays to first introduce the grid method.



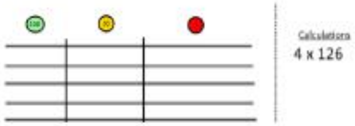
4 rows of 10
4 rows of 3

Move on to using Base 10 to move towards a more compact method.

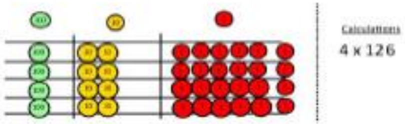


4 rows of 13

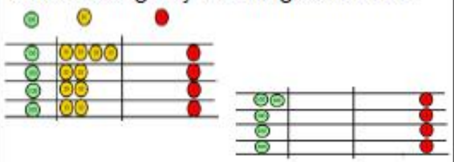
Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.



Fill each row with 126.



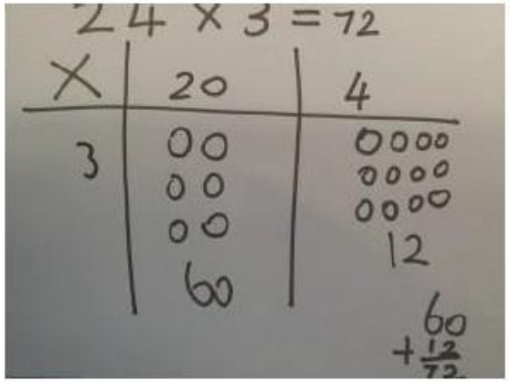
Add up each column, starting with the ones making any exchanges needed.



Then you have your answer.

Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

×	30	5
7	210	35

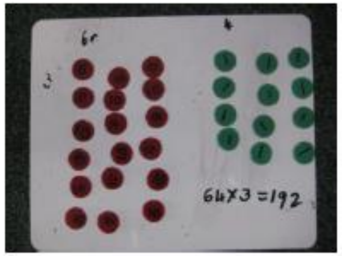
210 + 35 = 245

Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

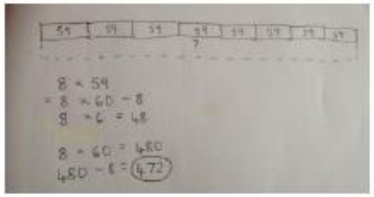
	10	8
10	100	80
3	30	24

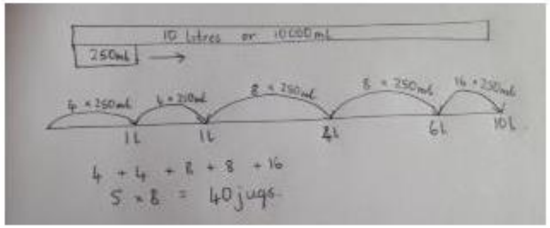
X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

<table>
<tr>
<td>Column multiplication</td>
<td>Children can continue to be supported by place value counters at the stage of multiplication.



It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.</td>
<td>Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.




</td>
<td>Start with long multiplication, reminding the children about lining up their numbers clearly in columns.

If it helps, children can write out what they are solving next to their answer.

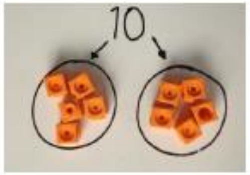
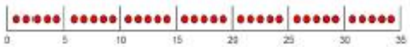
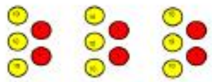
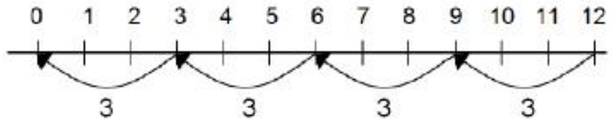
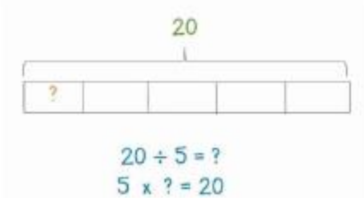
32
x 24
8 (4 x 2)
120 (4 x 30)
40 (20 x 2)
600 (20 x 30)
768

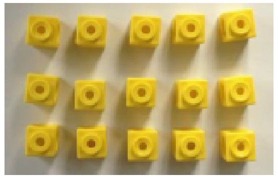
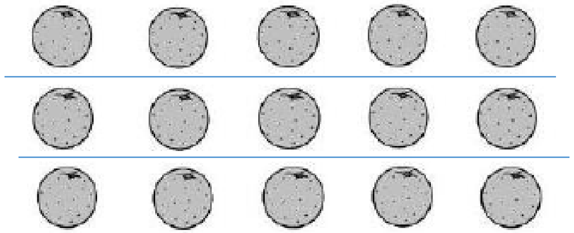
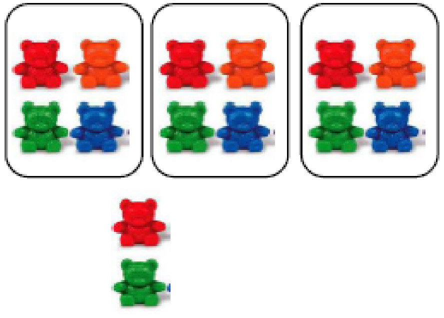
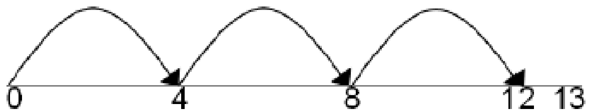
74
× 63
12
210
240
+ 4200
4662

This moves to the more compact method.

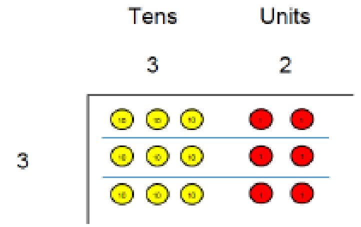
2 3 1
1342
x 18
13420
10736
24156
1</td>
</tr>
</table>

<u>Division</u>

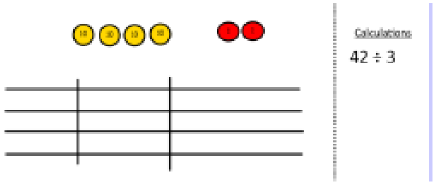
Objective and Strategies	Concrete	Pictorial	Abstract
Sharing objects into groups	   I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities.  $8 \div 2 = 4$	Share 9 buns between three people. $9 \div 3 = 3$
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.   96 ÷ 3 = 32  	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  Draw dots and group them to divide an amount and clearly show a remainder. 	Complete written divisions and show the remainder using r. 

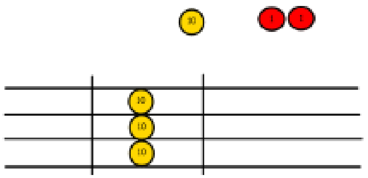
Short division



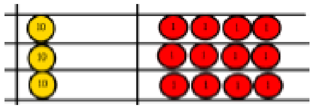
Use place value counters to divide using the bus stop method alongside



42 ÷ 3=
Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.

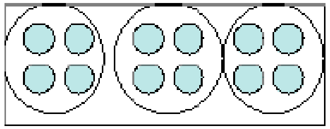


We exchange this ten for ten ones and then share the ones equally among the groups.



We look how much in 1 group so the answer is 14.

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.



Encourage them to move towards counting in multiples to divide more efficiently.

Begin with divisions that divide equally with no remainder.

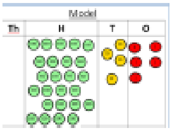
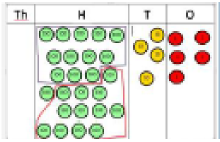
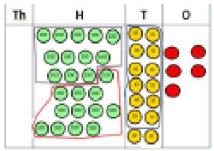
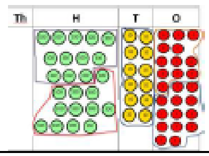
```
      2  1  8
   ┌─────────
 4 │ 8  7 ³2
```

Move onto divisions with a remainder.

```
      8  6  r 2
   ┌──────
 5 │ 4 ³3  2
```

Finally move into decimal places to divide the total accurately.

```
          1    4  .   6
      ┌─────────────────
 3  5 │ 5  1  ¹⁶1  .  ²¹0
```

Long division	 2544 ÷ 12 How many groups of 12 thousands do we have? None Exchange 2 thousand for 20 hundreds.  $\begin{array}{r}0\\ 12\overline{)2544}\end{array}$ How many groups of 12 are in 25 hundreds? 2 groups. Circle them. We have grouped 24 hundreds so can take them off and we are left with one.  $\begin{array}{r}02\\ 12\overline{)2544}\\ \underline{24}\\ 1\end{array}$ Exchange the one hundred for ten tens so now we have 14 tens. How many groups of 12 are in 14? 1 remainder 2  $\begin{array}{r}021\\ 12\overline{)2544}\\ \underline{24}\\ 14\\ \underline{12}\\ 2\end{array}$ Exchange the two tens for twenty ones so now we have 24 ones. How many groups of 12 are in 24? 2  $\begin{array}{r}0212\\ 12\overline{)2544}\\ \underline{24}\\ 14\\ \underline{12}\\ 24\\ \underline{24}\\ 0\end{array}$	Instead of using physical counters, students can draw the counters and circle the groups on a whiteboard or in their books. Use this method to explain what is happening and as soon as they have understood what move on to the abstract method as this can be a time consuming process.	$\begin{array}{r}0\,3\,1\,8\ r5\\ 20\overline{)6\,3\,6\,5}\\ -\underline{6\,0}\\ 3\,6\\ -\underline{2\,0}\\ 1\,6\,5\\ -\underline{1\,6\,0}\\ 5\end{array}$

How you can help your child at home:

- It is most important that you *talk & listen* to your child about their work in maths. It will help your child if they have to explain to you.
- Share the maths activity with your child and discuss it with them.
- Be positive about maths, even if you don't feel confident about it yourself.
- Remember, you are not expected to teach your child maths, but please share, talk and listen to your child.
- If your child cannot do their homework do let the teacher know by either writing a note in your child's book or telling the teacher.
- A lot of maths can be done using everyday situations and will not need pencil and paper methods.
- Play games and have fun with maths!

Here are some examples of how you can include mathematics at home:

Shopping

£ Looking at prices

£ Calculating change – which coins, different combinations.

£ Weighing fruit and vegetables in the supermarket.

£ Counting pocket money.

£ Reading labels on bottles, packets, in order to discuss capacity, weight, shape and colour.

£ Estimating the final bill at the end of shopping while waiting at the cash out.

£ Calculating the cost of the family going to the cinema, swimming baths, etc.

Time

- Looking at the clock – identify the numbers telling the time using analogue and digital clocks.
- Calculating how long a journey will take looking at train/bus/airline timetables.
- Using TV guide to calculate the length of programmes.
- Programming the video or the microwave.
- Looking at the posting times on the post box.
- Discussing events in the day e.g. teatime, bed time, bath time.
- Setting an alarm clock.

Starting off

Discuss with the family what would be the most popular outings. Countryside, seaside, a theme park, a museum, a tourist attraction or just a picnic in the local park?
Which outings can you reach from home in…?

- Less than 1 hour
- Between 1 and 2 hours
- More than 2 hours

Sequencing

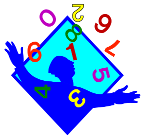
- The main events of the day;
- Routines and what comes next;
- The parts of a recipe, set of instructions;
- Getting dressed;
- Tying shoe laces;
- Imagine you have a week to do whatever you wish. Plan your week on the timetable;

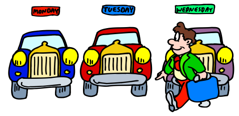
Measurement

- Calculating distances in a journey e.g. how much further?
- Calculating heights of family members – who is the tallest?
- Measuring weights of ingredients for baking.

- Comparing sizes of clothes – bigger than, smaller than.
- Wrapping parcels – what amount of paper, string do we need?
- Reading the scale on weighing machines and calculating the calibrations.
- Measuring ingredients out for a recipe using different types of spoons
- Weigh your child on the bathroom scales.
- Weigh them again while they are holding the family pet. Can they work out how much heavier they are?
- Can you find two things heavier than your child and two things lighter than your child around the house?

Counting





- Collections of objects – shells, buttons, pretty stones.
- Cars on a journey e.g. how many red cars?
- Animals in a field e.g. sheep, cows.
- Stairs up to bed, steps etc.
- Sports scores – cricket averages, goal averages.
- Pages in a storybook.
- Counting up to 10, 20, and 100 – backwards and forwards.
- Counting buttons, shoes, socks as a child gets dressed.
- Tidy a cupboard or shelf and count the contents e.g. tins, shoes, etc.
- Counting particular vehicles on a journey e.g. Eddie Stobart lorries, motorbikes, etc.

Beat the clock

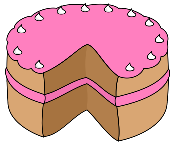
Time your child as they do one of the following:

- Count back from 100 in tens.
- Count back from 75 in fives.
- Starting at six, count up in tens to 206.
- Starting at 39, count up in twenties to 239.
- Starting at 67, count up in thirties to 367.

Can they beat their record?

Activities using numbers around us

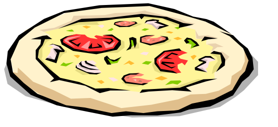
- Using car number plates – add the digits to find biggest, smallest and total.
- Sharing out sweets, toys etc in groups of 2, 3, 4, 5, 6 etc to help with times tables.
- Using telephone numbers – value of each digit.
- Using sandwiches to show fractions ½, ¼.
- Using a round sandwich cake to show fractions ½, ¼, 1/6, 1/8 etc.



Pizza please!

Your pizza costs £3.60. Cut it into six equal slices.
How much does each slice cost?

The answer is that each slice costs 60p



- How much is half a slice?
- How much do two slices cost?
- How much does half (1/2) of the whole pizza cost?
-

What if you cut your pizza into four equal slices (quarters)?

- How much does one slice (1/4) cost now?
- How much does half cost now?
- Is it the same, more or less than above?

Number Games

- Skipping – every skip count 2, 3, 4 etc.
- Hop scotch
- Ludo
- Snakes and ladders
- Dominoes
- Cards – number sequences
- Cards – Rummy, Patience, Pontoon, Snap

- Bingo
- Yahtzee
- Darts
- Heads & Tails and keep a tally
- Chess and draughts
- Monopoly
- Beetle
- Connect 4
- Counting games to practise times tables
- I spy a number in town, on a journey
- Number jigsaws
- Snooker and pool
- Number Lotto
- Dot to dot with numbers
- Skittles
- Happy families
- Whist
- Cribbage
- Number crosswords, dot to dot, puzzles

The level of mathematical challenge in a board game can be altered by introducing more dice & either adding or subtracting the numbers thrown

Reasoning

? Laying the table for four people, 'How many knifes, forks and spoons will I need altogether?

? Planning a TV viewing session, 'How long will the programme last?'

Have a look at Kids Zone for ideas of websites to help your child with maths.