

How can I help at home?

- Play games using two dice and encourage child to say how many spots without counting. Talk to children about spotting patterns in the dice numbers eg a 5 is made up of 4 and 1 or a 6 is two threes
- When children give an answer, ask "How did you know?". "How did you work that out?" or "Can you explain what you did?"
- Deliberately make mistakes. Children need to understand mistakes are normal and everyone makes them eg saying 3 multiplied by 5 equals 20. Ask children to explain what you did wrong.
- Hide numbers around the house or garden for children to find. Give children a total number they have to make and ask them to find two numbers to go together to make it eg 50 and 5
- Encourage children make up their own games and decide how to score points.
- Count in steps of 2, 5 and 10 eg using coins
- Play 'shops' and ask children to add totals and give change
- Point out money symbols in shops – pounds (£) and pence (p)
- Ask children to divide things into halves and quarters – fractions of a whole such as pizza, fractions of amounts, such as sweets etc. Encourage mathematical thinking by deliberately making the fraction unequal and asking if it shows halves or quarters
- Talk about time. Talk about what time they go to bed, go to school etc. Ask time questions about how long until it's time for bed etc
- Allow children to measure ingredients for baking using scales or measuring jugs.
- Sing number songs; there are lots of songs for times tables, counting in steps and doubles on YouTube.
- Practise times tables in fun ways such as online games or by joining in with BBC Supermovers
<https://www.bbc.co.uk/sport/supermovers/42612496>
- Talk about shapes on the faces of 3D objects, eg circles on cylinders. Point out 3D shapes in real life, eg spheres (balls), cylinders (tin cans, vases, Amazon Echo), triangular prism (Toblerone box), cubes and cuboids (dice, boxes) cones or pyramids.



A Guide to Maths Mastery in Year 2



NEW HARTLEY FIRST SCHOOL

Learning multiplication facts

Pupils also need to develop an understanding of multiplication facts. They need to become fluent in the 2, 5 and 10 times tables, linking the 10 multiplication table to place value and the 5 multiplication table to the divisions on a clock face. In this concept, numbers are also linked to measures and fractions, for example linking dividing by 2 to halving.

By becoming fluent in maths facts, it allows our brain to concentrate on higher level skills, allowing maths to be done more efficiently and accurately.

Reasoning

Reasoning in maths helps children to be able to explain their thinking, therefore making it easier for them to understand what is happening in the maths they are doing and to make connections to new concepts. It helps them to think about how to solve a problem, explain how they solved it and to think about what they could do differently.

In Year 2, some examples of reasoning are:

- true and false statements eg *if I add zero to a number it makes it bigger*
- spotting nonsense maths calculations eg
Tick the correct calculation. Explain why the others don't make sense.
 $5 \times 5 = 10$ $25 = 5 \times 5$ $5 \times 25 = 5$
- Answering Always, Sometimes, Never questions eg
An odd number plus an odd number equals an even number
- explaining how we know something or how we worked it out
- Would you rather? eg *Would you rather have half of ten sweets or a quarter of 16 sweets? Why?*

What is Teaching for Mastery?

Our Definition



At [New Hartley First School](#), we see teaching for mastery in maths as allowing the pupils to gain a deep understanding of maths, allowing them to acquire a secure and long-term understanding of maths that allows them to make continual progress to move onto more complex topics.

Our Ethos



We believe that everyone can do maths and there's no such thing as a maths person. Maths is a subject that everyone can and should be able to perform confidently and competently.

Teaching for Mastery



We choose to teach by breaking down maths objectives into the smallest steps, so that every pupil is secure in every new concept before moving on. We focus upon teaching to gain fluency with maths facts, reasoning about maths and problem solving.

National Curriculum in Year 2

This is what most children in Year 2 are expected to be able to do by the end of their school year.

Number – number and place value

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Number – addition and subtraction

- solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
 - a two-digit number and ones
 - a two-digit number and tens
 - two two-digit numbers
 - adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Allowing children to compare using objects, pictures and numbers at the same time allows them to gain a much better understanding of what is happening with the numbers. It also leads into children being able to solve missing number calculations such as $50 + ? = 100$

100	
50	?

Spotting connections and patterns

Understanding how numbers are composed alongside using number facts means children are able to add mentally

"I know $5 + 3 = 8$ so I also know $35 + 3 = 38$ "

They can use skills learned in Year 1, such as portioning numbers into their parts to solve calculations, such as for $67 + 8$

"I know I need 3 to make 70 then there are five left from the 8, so $70+5$ equals 75."

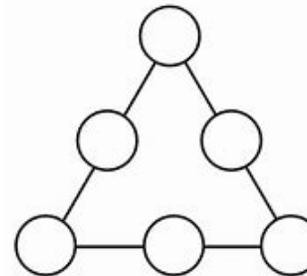
Reasoning about numbers using facts they already know

Children reason about maths using facts they already know, such as recognising odd and even numbers or multiples of 5 and 10 eg

"I know 75 is a multiple of 5 as multiples of 5 end in a 5 or 0."

They can use known number facts to avoid having to calculate, for example in this problem

Use the numbers 1, 2, 3, 4, 5, 6 once only to make 9 in each line.



"I know I can't use 5 and 6 together as 5 and 5 is ten and that's more than 9."

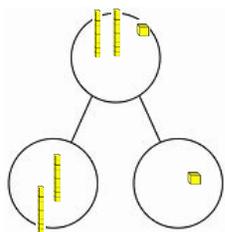
We can also know the opposite (inverse), for example $7-2=5$ and $7-5=2$, so $70-20=50$ and $70-50=20$. However, these connections often do not come naturally to children and need to be shown to them in many ways.

In Year 2 we need to learn lots of number bonds

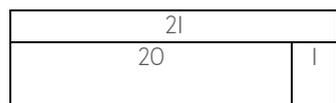
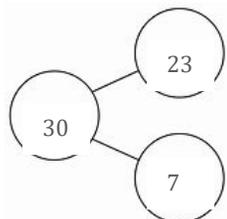
+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

The number bonds in green should already be known by the end of Year 1 and the numbers in yellow should be known by the end of Year 2. Although this looks a lot, if we know, for example $7+6$, we also know $6+7$. If we know doubles, we also know 'near doubles' such as if we know $7+7$ is 14, we know that $7+8$ is one more because 8 is one more than 7, therefore the answer is 15.

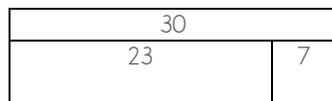
We use lots of ways of showing number bonds including using real life objects that we can physically move, physical and pictorial examples such as part whole models or bar models, through to abstract examples using the numeral.



Part whole models



Bar models



Number – multiplication and division

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in different contexts.

Number – fractions

Pupils should be taught to:

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

Measurement

- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature ($^{\circ}\text{C}$); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- compare and order lengths, mass, volume/capacity and record the results using $>$, $<$ and $=$
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- find different combinations of coins that equal the same amounts of money
- solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- compare and sequence intervals of time
- tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
- know the number of minutes in an hour and the number of hours in a day.

How do we teach for Mastery in Year 1?

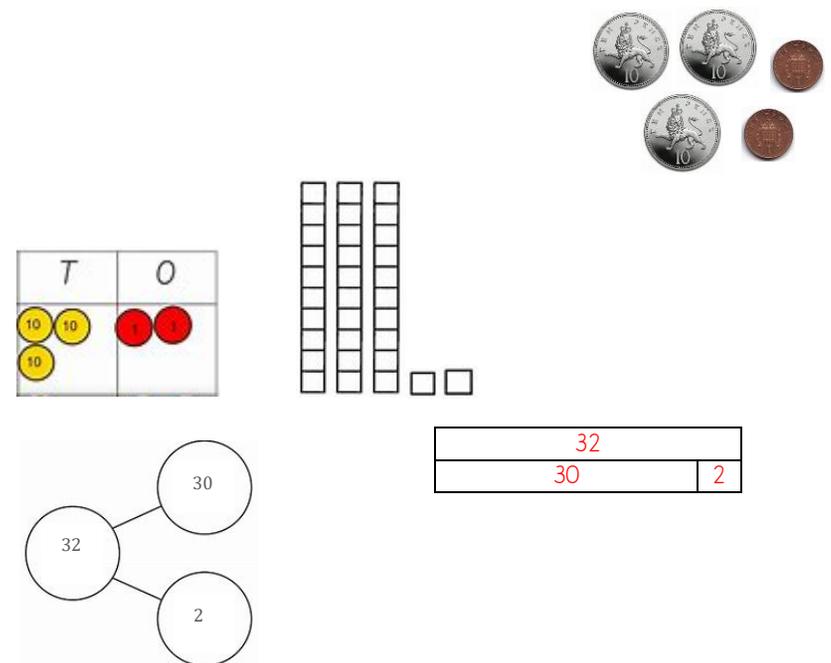
Fluency

In Year 2, we aim to teach so that children have a deep understanding of number.

Representing Numbers

We want to develop children's number sense so that they understand the number rather than just recognising the numeral. Children need to understand that numbers can be represented in many ways, not just as a written numeral. We use many different objects and pictures to show that numbers can be represented in lots of ways.

Some ways to represent two digit numbers – thirty two



Children sometimes need lots of practise to recognise numbers in different forms. Seeing numbers in different contexts helps them to make connections and to generalise about concepts.

Number Bonds

Learning number bonds is of high importance in understanding maths. Number bonds are pairs of numbers that go together to make another number. Once number bonds are learned they form the basis of many other calculations, for example if we know $5 + 2 = 7$, we also know $50 + 20 = 70$, $500 + 200 = 700$ etc.

Geometry – properties of shapes

- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects.

Geometry – position and direction

- order and arrange combinations of mathematical objects in patterns and sequences
- use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anticlockwise)

Statistics

- interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- ask and answer questions about totalling and comparing categorical data.