How can I help at home?

- 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. Pupils need to understand mistakes are normal and everyone makes them. Ask children to explain what you did wrong.
- Encourage children make up their own games and decide how to score points.
- Use the CGP revision book to consolidate key learning
- Past End of KS2 papers are available for children to practice at home
- Talk about time. Ask time questions about how long until it's time for school, how long does the film last, how long was the football game etc. Look at time using digital and analogue clocks.
- Allow pupils to measure ingredients for baking using scales or measuring jugs. Talk about the scale on items for measuring, especially the ones that aren't numbered eg
  "If that mark shows 100 and that one shows 200, what does this mark in between represent?"
- Practise times tables in fun ways such as online games - Times Table Rockstars is another good online game for practsing tables facts. Don't forget to also practice the inverse eg how many 9s in 45?
- Talk about properties of 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. Talk about how many faces, vertices and edges they have.
- Talk about months of the year and count days until special events, noting how many days on the month

A Guide to Maths Mastery in Year 6

SALTAIRE PRIMARY SCHOOL

Information for parents

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Spotting Patterns and sequences

Pupils need to be taught to spot patterns in maths. This often does not come naturally and generally needs to be specifically taught

- Spotting repeated addition or subtraction patterns eg if 10 x 8 is 80 then 9 x 8 will be 8 less, therefore 72
- Linking calculations to their inverse operations eg knowing that if 8 x 9 = 72 then 9 x 8 will also be 72
- Spotting patterns in multiplication tables such as knowing the link between the eight multiplication table and the four multiplication table.

Problem Solving

Problem solving in maths allows pupils to use their maths skills in lots of contexts and in situations that are new to them. It allows them to seek solutions, spot patterns and think about the best way to do things rather than blindly following maths procedures.

In Year 3, problem solving might include:

- Choosing different ways to find answers
- Solving 'puzzles'
- Problems that involve trial and error
- Working systematically to find all possible solutions
- Discussing 'what if?' problems and making generalisations
- Working backwards from known facts
- Finding the most efficient ways to work out answers from a range of known strategies

Fluency, reasoning and problem solving are not taught in isolation from each other. Lessons are carefully planned to interweave all three aspects in a cohesive teaching sequence to allow pupils to fully understand the concept being taught and to be able to make connections.

Pupils also need to be able to link multiplication facts to other concepts, such as linking multiples of 50 and 100 to measuring length, weight, capacity or money.

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 pupils 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.

Some examples of reasoning are:

- true and false statements
- Spotting and explaining errors

- Always, Sometimes, Never statements
- Explaining understanding eg
  "How would you check your answer is correct in another way? How would that help?"
- Explaining how concepts connect: *"What is different? What is the same? What has changed? What do you notice? Which representation matches the question?"*

What is Teaching for Mastery?

Our Definition

At Saltaire primary 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 6

This is what most pupils in Year 5 are expected to be able to do by the end of their school year.

Number - number and place value

- Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.
- Solve number and practical problems that involve large numbers, rounding and negative numbers.

Number – Four operations

- Perform mental calculations, including with mixed operations and large numbers.
- Use their knowledge of the order of operations to carry out calculations involving the four operations
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- Solve problems involving addition, subtraction, multiplication and division.
- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole
- number remainders, fractions, or by rounding, as appropriate for the context.
- Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.

Reasoning about numbers using facts they already know

Pupils reason about maths using facts they already know, such as recognising links between multiples eg

"I know 48 is a multiple of 8 so it must also be a multiple of 4 and of 2"

These links are often not immediately apparent to pupils and need to be specifically taught, using questioning such as 'What do you notice?' or 'What is the same? What is different? What has changed?"

Knowing and Understanding Times Tables

Having a good understanding of times tables is extremely useful in teaching for mastery. Problems are easier to solve if pupils don't have to interrupt their thinking to work out multiplication calculations.

A good knowledge of times tables also helps with spotting patterns, for example 164 ÷ 4 can quickly be calculated mentally if pupils know 16 is a multiple of 4 so therefore 160 is also a multiple of 4. Using this knowledge there is no need for a written calculation as: "*4 goes into 16 four times so 4 goes into 160 40 times. 4 goes into 4 once. 40 + 1 = 41.*"

Without a good knowledge of times tables, this pattern wouldn't be recognised as quickly and would need to be calculated by a written method. Teaching for mastery aims to improve accuracy and efficiency and pausing to use a written calculation ca sometimes detract from the initial problem.

Knowing and understanding times tables is not necessarily the same as memorisation of times tables. Rote memorisation of tables without understanding may not allow pupils to make connections. Pupils need to be able to notice connections such as the connections between 2x, 4x and 8x tables, connections between multiples of 50 and 100 and about the commutivity of tables, so for example 4 x 8 = 32 so 8 x 4 = 32.

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 pupils and need to be shown to them in many ways.

+	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 above number bonds should all be known fluently by the end of Year 2 so pupils in Year 6 should now be proficient in using all known facts to generalise about numbers and to work out related facts.

Having a good knowledge of number bonds also helps with mental calculations when crossing the tens boundary, for example, adding

347 + 8

Having a fast recollection of number bonds allows pupils to partition the 8 and to quickly work out the calculation using

347 + 3 + 5

"I know I need three more to make 350 then there are 5 left out of the 8 so 350 plus 5 equals 355"

Equally, it allows for fast calculations when adding tens or hundreds to a three digit number as pupils can apply their knowledge of single digit number bonds to add tens or hundreds mentally.

Spotting connections and patterns

Pupils need to be taught to spot connections and patterns to improve their fluency. If they understand how numbers connect they often will not need to do a calculation to solve a problem.

Number - fractions

Pupils should be taught to:

- Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.
- Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.
- Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, 1/4 × 1/2 = 1/8].
- Divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6].
- Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8].
- Multiply one-digit numbers with up to two decimal places by whole numbers.

- Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison.

Measurement

  - Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.
  - Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure
  - to a larger unit, and vice versa, using decimal notation to up to three decimal places.

Geometry, algebra and statistics

- Use simple formulae.
- Find pairs of numbers that satisfy an equation with two unknowns.
- Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

How do we teach for Mastery in Year 4?

Fluency

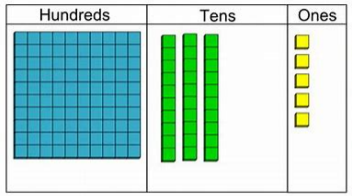
In Year 6, we aim to teach to build on previous learning so so that pupils have a deep understanding of number.

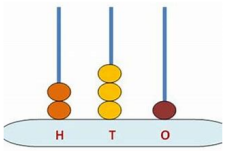
Representing Numbers

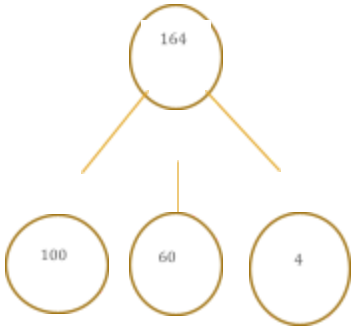
We want to develop pupils's number sense so that they understand the number rather than just recognising the numeral. Pupils need to understand that numbers can be represented in many ways, not just as a written numeral. We use many different objects and pictures to show that numbers can be represented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

Some ways to represent 3 digit numbers

196		
100	90	6







Pupils 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.