April 2018

Dear Parents/Carers

This year at St Ursula's E-ACT Academy we have been developing Maths Mastery, in particular focusing on the 3 aims of the new National Curriculum: Fluency, Reasoning and Problem Solving. They play an essential role in helping pupils to gain a deeper understanding of a topic.

There have been many changes to how maths is taught in schools, particularly with the new curriculum, which was introduced by the Conservative government in 2014. It takes key elements from the successful curriculums used in Singapore and Shanghai, where children learn through a 'mastery' approach, rather than developing a superficial understanding. The new Curriculum set out three main aims (see below);

Aims:

The national curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

- can **solve problems** by **applying** their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/425601/PRIMARY_national_curriculum.pdf

Fluency:

Fluency is the pupil's ability to be efficient, accurate, flexible when recalling mathematical facts.An important part of being 'Fluent' is the children's ability to recall number facts quickly and easily so that they no longer need to 'work out' facts every time they attempt to answer a mathematical problem.

To be fluent in mathematics children should be able to...
-grasp the fundamentals of mathematics
- practise arithmetic skills
- make connections
- become more confident with written and mental methods
- be confident with what they are doing and why
- recall and apply their knowledge rapidly and accurately

Year 1 & 2 examples:
•Times tables
•Division facts
•Doubles and halves
•Number bonds to 10, 20, 100 and 1000
•Addition and subtraction of one digit numbers
•Addition and subtraction of two digit numbers
•Knowing when and how to apply these facts and many more to solve problems

Year 3 & 4 examples:

- Continue the pattern: 50, 100, 150, 200, _, _,_
- - 3 x ? = 24
- 7m + ? = 810cm
- Round 3.2 to the nearest whole number
- Find 2/5 of 45
- 2 hours = ? minutes

Year 5/6 examples:
- Write 283 in Roman Numerals
- 740 + ? = 1039
- Find 5 equivalent fractions of 3⁄4
- - 200 x ? = 750 + ?
- 4/7 ÷ 5
- 75% of £1340

<u>Reasoning:</u>
Reasoning is when pupils are able to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. Reasoning demonstrates that pupils understand the maths. Talk is an integral part of mastery as it encourages students to reason, justify and explain their thinking. It is important for young learners to voice their thought processes.

Through reasoning problems children should:
- be able to explain why an answer is right or wrong
- follow a line of enquiry to a logical conclusion - prove theories using mathematical language
Can be thought of as the 'glue' that helps maths makes sense.

Example questions to develop reasoning:
• What's the same and different?
• What's the question?
• What do you notice?
• Is it always true/false?
• Can you use what you know already?
• What if...?
• Prove it! Explain how you did it.
• Can you do it another way?

Year 1/2 examples:

- Coco thinks that when she counts 30 in 5s there are more than when she counts 30 in 10s. Do you agree with Coco?
- Colin says,
"After every number that is 9 the tens change." Is this always true? Sometimes true? Never true?
- Colin says, "When you add 9 to a two digit number the tens get bigger." Can you find 5 examples when this is not true? Can you find 5 examples when this is true?

Year 3/4 examples:
- Tom says 'I can use my 4 times table to help me work out my 8 times table'. Is he correct? Convince me.
- Which would you rather have, three quarters of £2.40 or one quarter of £6? Explain your reasoning.
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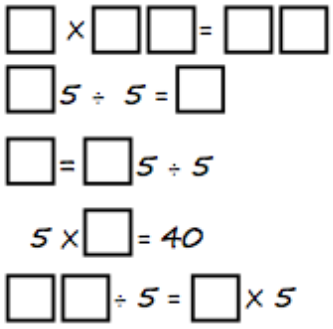
Year 5/6 examples:
- Sophie thinks 1.007 is bigger than 1.01 because7 is bigger than 1. Do you agree? Explain why.
- Jenny travels 652 miles to go on holiday. Abbie thinks she travels further because she travels 1412 kilometres. Is Abbie right? Explain why

<u>Problem Solving</u>
Problem Solving is at the heart of mastering maths. Problem-solving questions are often open-ended, with more than one right answer. Problem solving is an important skill for all ages and abilities and, as such, needs to be taught explicitly.

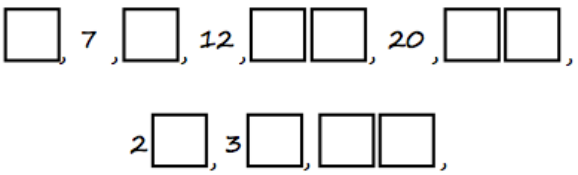
Children should be able to:
- apply their mathematics to a variety of routine and non-routine situations
- put maths into context
- break down problems into a series of manageable steps

This is fundamental to the mathematical development of all children

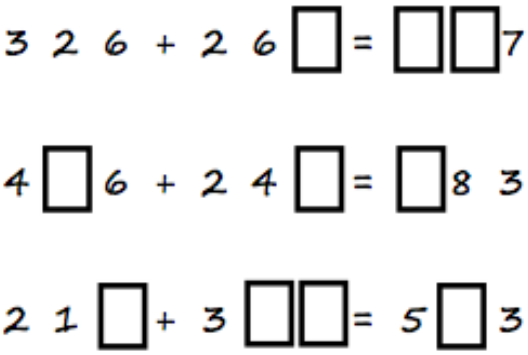
Year 1/2 examples:
- Put a digit in each box to make the statements true:



- Put a digit into each box to make a list of numbers in order from smallest to largest.

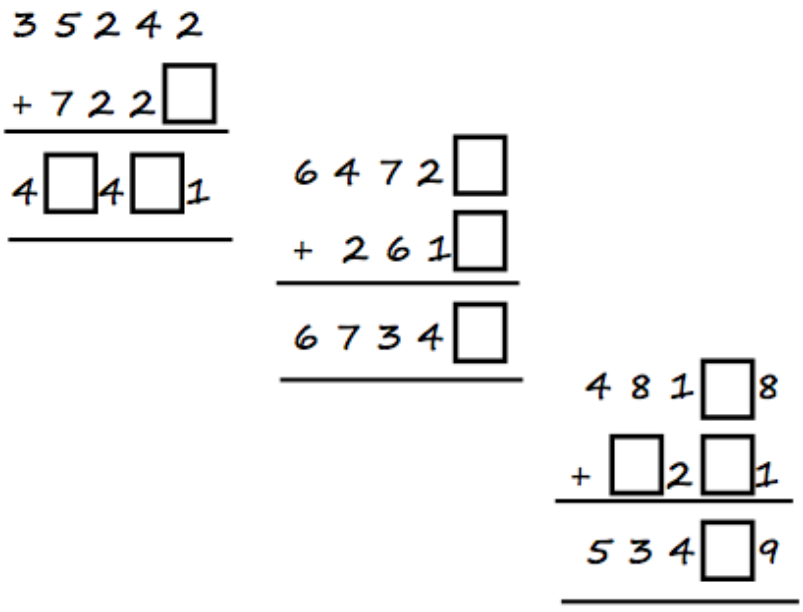


Year 3/4 examples:
- A group of aliens live on Planet Xert. Tinions have three legs, Quinions have four legs. The group has 22 legs altogether. How many Tinions and Quinions might there be? Is there more than one solution?
- Does the number 4 appear more or less on a 12 hour digital clock than a 24 hour digital clock?
- Use the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 once each, to make all the statements true.



Year 5/6 examples:
- Temperature falls by about 1oC for every 100 metres height gain. Abigail is standing on top of a mountain at 900 metres above sea level. The temperature is – 3oC. Abigail walks down the mountain to sea level. What should she expect the temperature to be?
- Find the smallest number that can be added to
92.7 to make it exactly divisible by 7.

- Using the digits 0 – 9 once each, complete these statements: Is there only one way to solve this problem?



If you have any questions, comments or queries, please bring them to your child's class teacher, or myself.

Many Thanks,

Mrs Simpson
Maths Lead