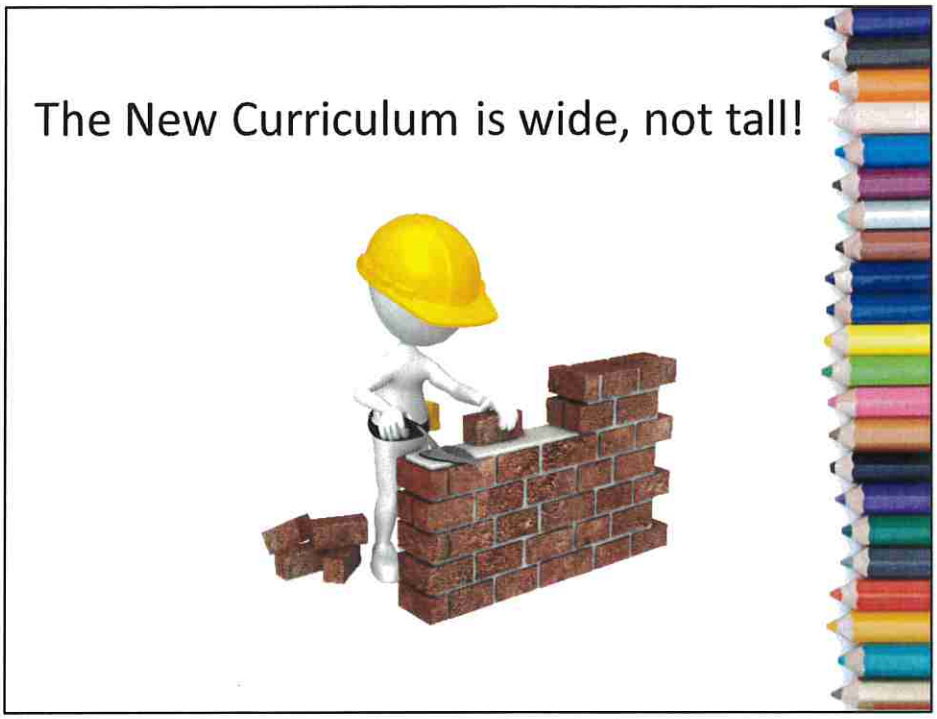
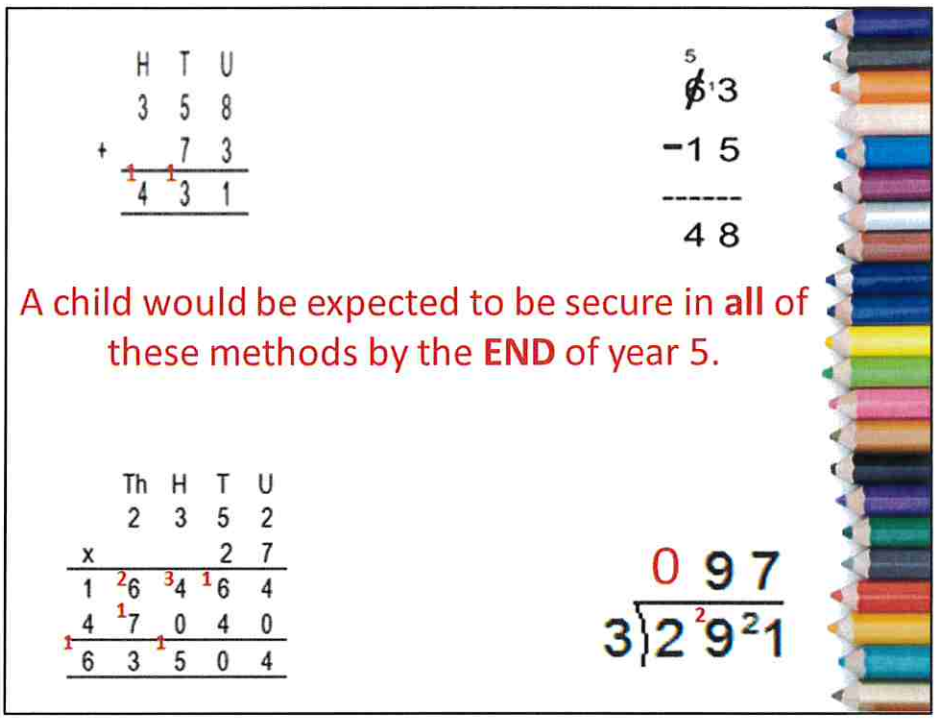
‘New Methods’: Everything you need to know to survive homework!

This presentation is for parents of pupils in Year 3 – 4 and focuses on the ‘new’ methods of addition, subtraction, multiplication and division.

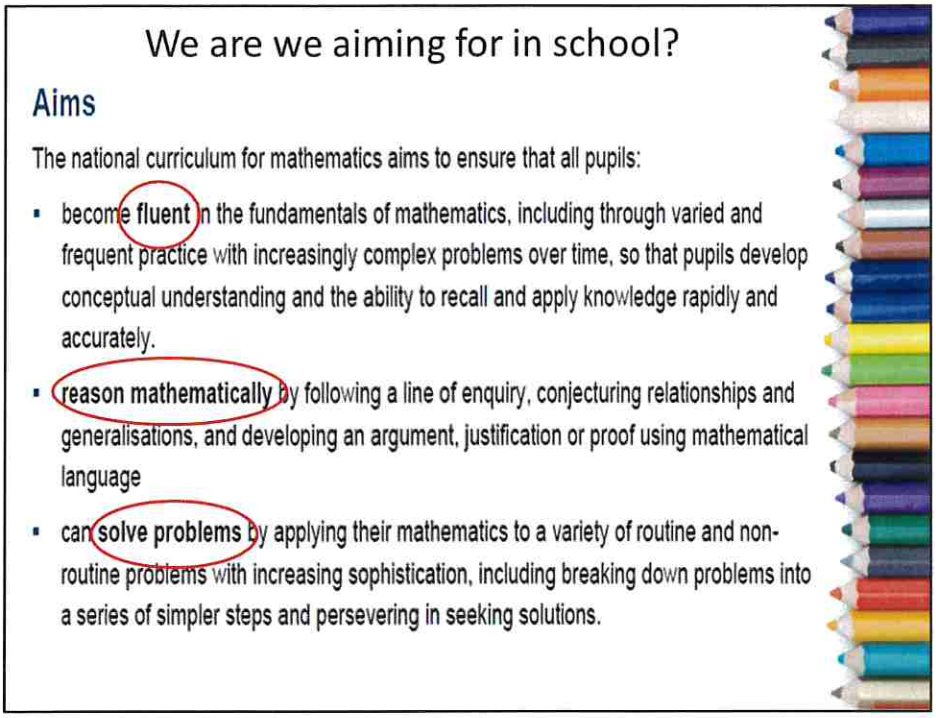


The curriculum which your child is now being taught, is not like the curriculum you were taught at school. Every year, there is a series of 'bricks' that each child has to learn to be assessed as reaching ARE (Age Related Expectations). The curriculum encourages and expects children to have a fluent, deep and secure understanding of each brick and does NOT allow schools to push children onto work which is considered 'ahead' of their age. With this in mind, think about your child's learning as building a wide, low wall. It is no longer the race it used to be to see how far and quickly your child could get.

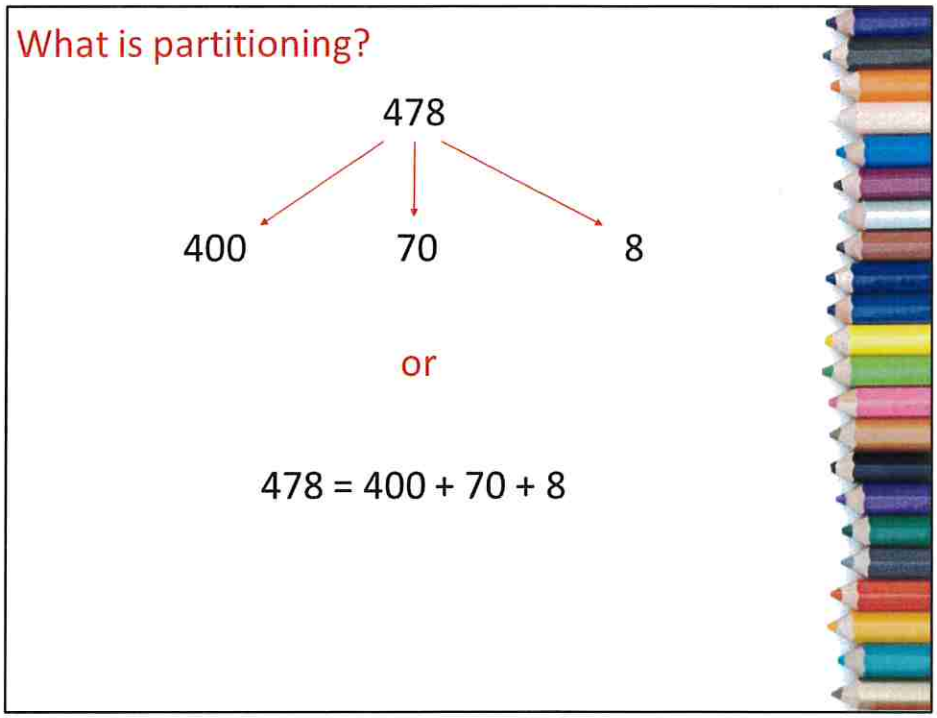


The methods displayed above will NOT be taught or covered in school until Year 4 and in some cases Year 5. By teaching your child these methods at home before they are taught in school, you run the risk of giving them a misconception about a number's place value and they will not develop the deep understanding of why we carry over, or score out and exchange. The new curriculum is all about why and how. Why does this work? Why do you do this? How could you unpick this idea? How does your knowledge help you solve this?

The new curriculum is no longer a race. Every child is taught the same objectives but they might be taught them in different ways to their peers. To achieve ARE, your child needs to secure every block, so don't compare your child to others in the playground. They might have different home learning, different reading books or different levels of support. That is because every child will excel in different areas of the curriculum and will receive the support they need as and when they need it. Being great at addition doesn't mean they will automatically be brilliant at shape or place value. The ordering of children and the pushing on of 'able' children doesn't happen any more.



'Fluent' doesn't just mean speed and the rapid recall of number facts. It also means being able to manipulate knowledge to help solve problems. For example, 100 could be represented in the following ways: 60+40, 10x10, 100x1, 30+30+20+20, 50x2 etc. Like a language which can be written to express meaning or information, fluency in mathematics also implies a depth of knowledge and understanding which allows the pupil to manipulate situations to help them solve the problem they are facing. Reasoning digs down into the why and how of mathematics. The 'new' methods really do help to explain why we carry over for example, and being able to reason helps the children to solve problems, which is the final objective of the New Curriculum.



Partitioning simply means to split up. If you relate this to your memories of 'hundreds, tens and units' from primary school, you can't go wrong! Imagine you have to write the value under each heading, HTU. 478 is shown above. You can apply this concept to much larger numbers. For example, 123, 456 would become: 100,000 20,000 3,000 400 50 6.

568=			500	60	8
312=			300	10	2
409=			400	0	9
4872=		4000	800	70	2
7890=		7000	800	90	0
12,703=	10000	2000	700	0	3
	TTh	Th	H	T	U

If there is no value for a digit, you still need to put a 0 in as a place holder. See 409 for example. Don't forget to partition every number. This means you can't have 12,000 in the last example. You need to show the value in the tens of thousands (TTh) row, as well as the thousands (Th). I have retained the term 'units' or 'u' for this powerpoint as it is probably what you were taught at school. Currently, we refer to the digits in this row as 'ones'.

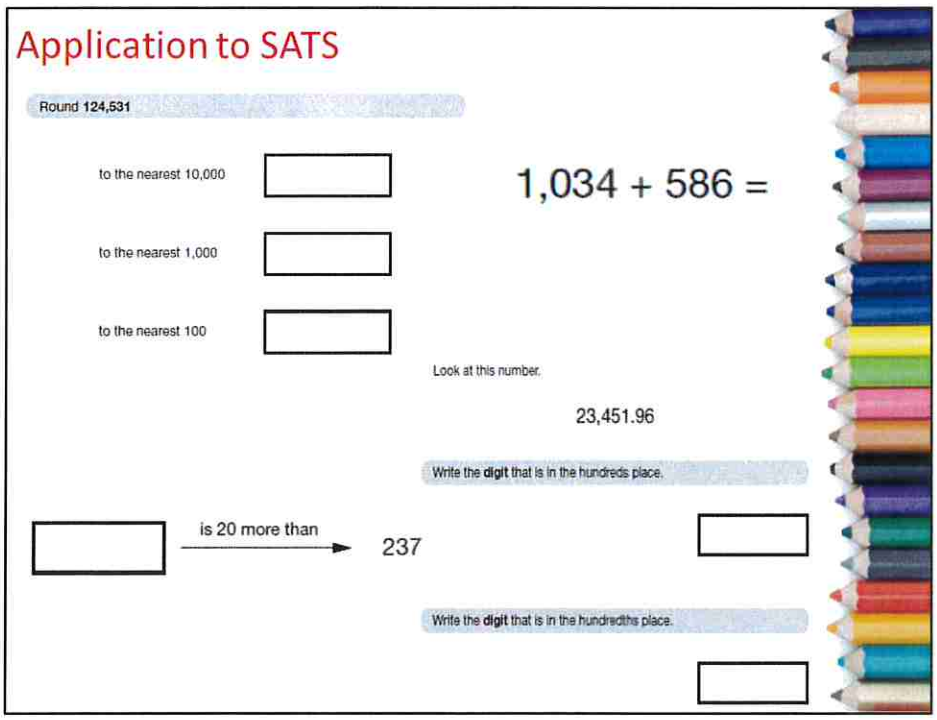
Why is partitioning important?

- Increases mental fluency
- Allows for easier manipulation of numbers
- Develops a deep understanding of place value

What is the digit 7 worth in these numbers?

• 4678	70
• 708	700
• 13,607	7

Partitioning really can be applied to nearly every area of mathematics. It is an excellent skill to have for mental problem solving as it highlights bonds to 10, 100 and 1000 etc so well. The digit question is an example of what might be asked in a SATS exam. The digit is worth something, it is not just a number!



These questions are all taken from the sample SATS papers for Year 6 children. Partitioning can be used to help calculate the answers, especially if the child decides to use a mental method to complete the problem.

Linking partitioning to addition and subtraction

423 + 364 =

1) Partition both numbers and arrange in columns

400	20	3
+300	60	4

2) Add each column, starting on the right

400		20		3	
+300		60		4	
700	+	80	+	7	= 787

3) Add the three totals to calculate the answer

This is called Expanded Column method. It is the link between number line work, mental calculations and the final, formal method we were taught in school which will be introduced to your child towards the end of Year 4 or early in Year 5. Although it takes longer to complete than the formal method, it reinforces that the child is adding 400+300, it is NOT 4+3 which is what we'd say if we were completing the formal method.

Have a go!

285 + 712 =

303 + 591 =

2482 + 3317 =

8931 + 1053 =

13,564 + 71,123 =

Try and complete these problems using the expanded method. You can check your answers by using a formal method or a calculator! If you would like to go over this method with some support or have a burning question about it, feel free to speak to Mr Gray.

Can you apply your new method to subtraction?

754 – 213 =
985 – 572 =
8712 – 4601 =
9397 – 7186 =
38,874 – 26,852 =

But what about 'carrying'?

?

Try to use your expanded column skills for subtraction. We'll cover the need to carry on the next slide.

Expanded Column Addition with 'carrying'

538 + 283 =

500		30		8
+200		80		3
		10		1
100		10		
700				
800	+	20	+	1 = 821

Once your child is secure adding and subtracting using the expanded method without carrying, we will introduce the carrying method.
1) 8+3 = 11. You put the 1 in the units row and then put the 10 into the tens row. You are carrying over 10 not 1, because we have partitioned the 11 to put them into the correct place value row.
2) Now add the 30+80 = 110. Again you partition your answer. The 10 goes below the 10 from the first answer (see the blue numbers) and you carry over the 100. Remember, because you have partitioned your answer they need to go into the correct place value row.
3) Now add 500+200 = 700. The answer doesn't need to be partitioned because it is a full hundred (no tens/units). This is placed in the answer section under the 100 from the 30+80 problem.
4) Now add down the columns in the answer section. 1+0 = 1. 10+10= 20 and 100+700 = 800. Once the columns have been added, you can re-combine the partitioned numbers to create your answer.

Whilst this seems like a very long method, it clearly shows why you have to carry over and it also highlights the place value of what is added and what is carried over. At no point did we carry over 1! This understanding is vital and must be secured before we move the children onto the formal method.

Expanded Column Subtraction with 'carrying'

538 - 283 =

	400				
	~~500~~		130		8
-	200		80		3
	200		50		5
	200	+	50	+	5 = 255

The subtraction method is very similar to the addition version. Again, you start in the red row. When you arrive at 30-80, it becomes clear we need to carry/borrow. Score out the 500 and make it 400. You then add the 100 you have borrowed to the 30, which make 130. Look carefully at where I have put the 1 of the 100 which I have borrowed. This reinforces the new value of the number I have created and that I have borrowed 100, not 1. You then complete the subtraction as normal: 130 – 80 = 50. Then 400 – 200 = 200.

Have a go!

285 + 758 =

843 - 591 =

2485 + 3867 =

8371 - 1591 =

Grid Multiplication

45 x 6 = 270

1) Partition the numbers
2) Add the grid lines
3) Put in the multiplier(s)
4) Multiply each number
5) Add the answers together

	40	5
6	240	30

This is very hard to explain in words! To begin, ignore the red numbers. You should be able to create the partitioned grid, with 45 becoming 40 and 5 on the top row and the multiplier, 6, going on the row below. Once the layout is correct, complete the multiplications: 40x6 (240) and 6x5 (30). Once these answers are in the grid (see the red numbers), you add them together in any suitable method to calculate the answer.

Grid Method for larger numbers

237 x 9 = 2133

	200	30	7
9	1800	270	63

Don't forget to add up the answers!

6219 x 5 = 31,095

	6000	200	10	9
5	30000	1000	50	45

Have a go!

285 x 3 =

843 x 5 =

2485 x 6 =

Can you apply your knowledge to long multiplication?

76 x 35 =

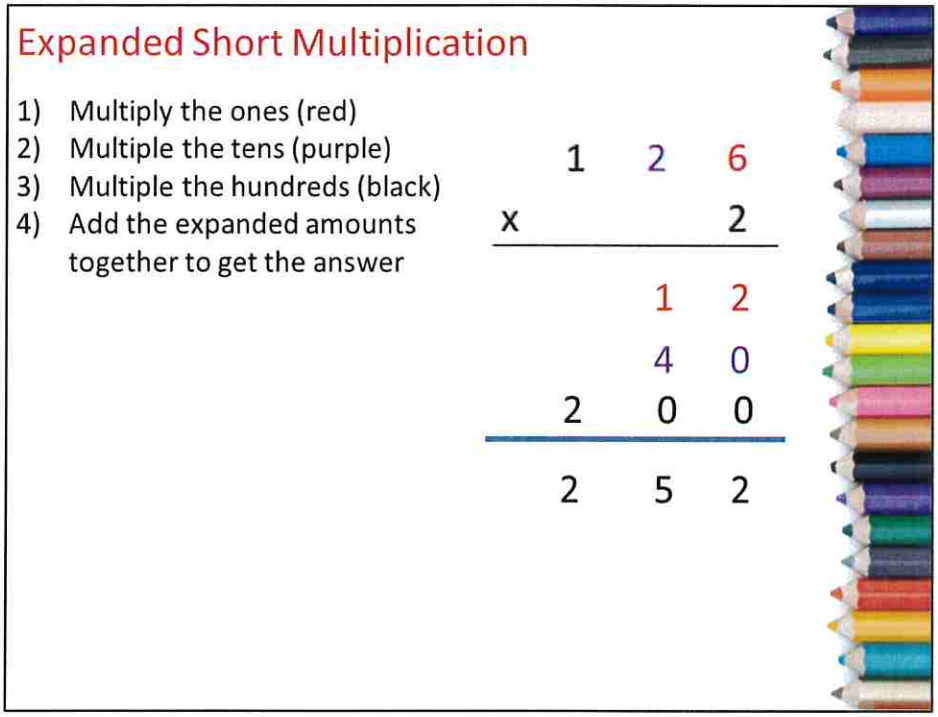
312 x 98 =

To apply this method to long multiplication, you need to partition 76 and 35. Your grid will have 2 rows going across and 2 columns going down. Each number then multiplies the rest, i.e., 70x30 and 70x5, 6x30 and 6x5. Add together the 4 answers to calculate the final answer. I have written out this problem below.
Again, this is a long method but, it highlights very clearly the value of every number and the way 70 x 30. It is not 7 x 3 which is what we would say if you used the formal long method.

Expanded Short Multiplication and the Introduction to short division

The journey through to 'normal' short method has the potential to be quite long but it is incredibly powerful and successful! We strongly recommend that you do NOT push your child on further than the work they are being set for their homework.

Whilst it might be really tempting to show your child how to do the short methods as you were taught them, doing this often gives the children a misconception about the method and the reasoning behind why certain things happen and when. The children soon progress to using the method as we were taught in school so please be patient and allow your child the time they need to secure each step. It is more than worth it in the long run.



Now that the children can partition and have already experienced the expanded method of addition and subtraction, this method comes to them quite quickly. By completing each step in the order listed on the slide above, the children see why the 12 is split into the tens and ones columns, which in turn, helps them to understand what they are carrying and why. When we went to school, we were told to carry the '1' over. This method clearly shows the children that they are carrying over '10'. Once this method is secure, it is very easy to move the children onto the version of the short method we were taught in school.

Have a go!

135 x 2 = 270

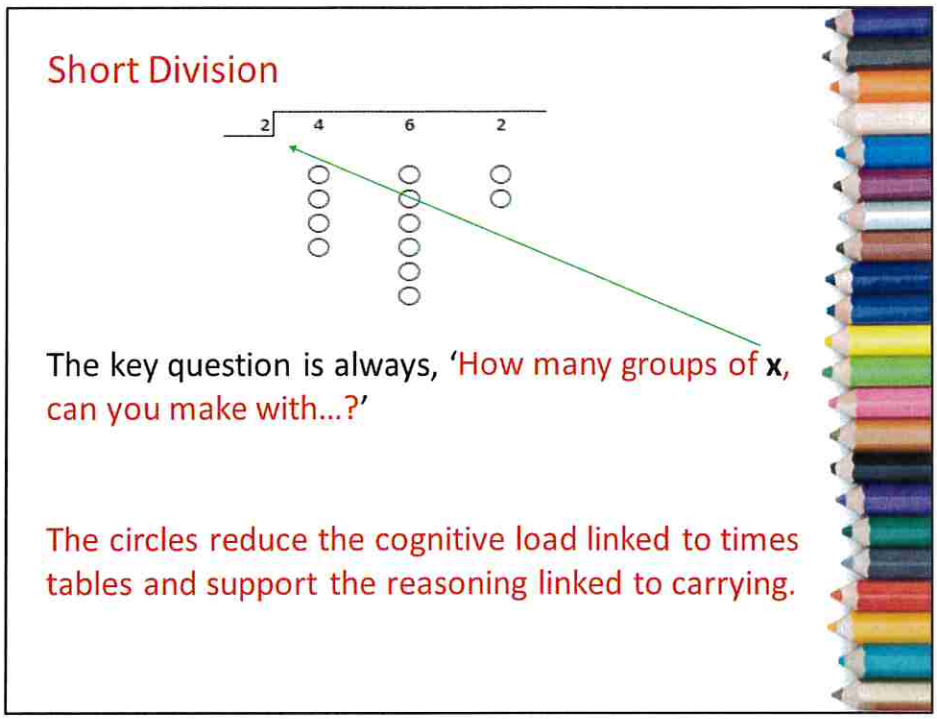
327 x 3 = 981

219 x 4 = 876

Can you apply your knowledge to larger numbers?

2974 x 5 = 14870

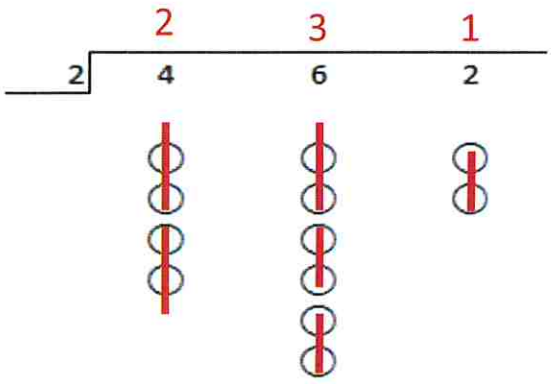
5327 x 8 = 42616



When the children move onto the short method of division, they start by drawing circles underneath the numbers that are inside the 'bus stop'. The use of the circles enables all children to access this method without adding to their cognitive load by expecting them to process their times tables as well.

Short Division

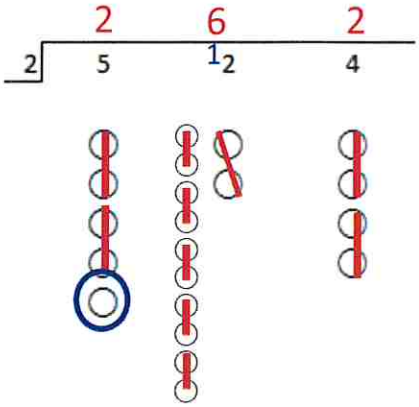
Ask the key question for each step. Join the circles into appropriate groups to get the answer.



The circles allow the children to 'see' the groups they are making and it often leads them to making links to their times tables without being prompted by the teacher. Although this might seem like an onerous task to you, the digits used are carefully controlled and securing speed and fluency here makes using remainders, carrying over and transitioning through 0 much easier. The children stop using the circles at different times and when their times tables allow it.

Short Division with Carrying

The method is identical but you ring any of the circles you didn't use and then carry them over.



The key point to note here is that the circle in the blue ring hasn't been used. This shows the children that they need to carry it over as it is a remainder. This is why the digit 1 have been placed next to the digit 2 in blue. Now that the question becomes, 'How many groups of 2 can I make from 12?', the children need to draw 10 more circles to convert the two they already have into 12. Then the grouping process begins again. When the children are learning this step, we try to be very careful to only get the children to carry over a 1 or 2 – nobody wants the children to be drawing 60 circles! By the time the children are ready for carrying larger digits, they are fully fluent with the method and their cognitive load then has the capacity to focus more on the times tables facts.

Have a go!

342 ÷ 2 = 171

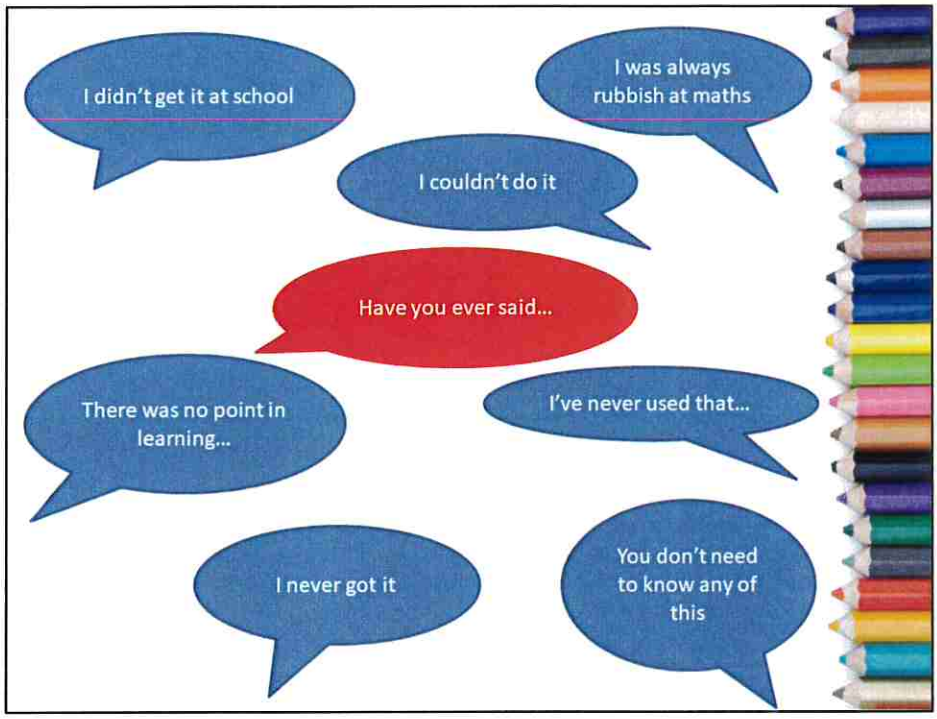
678 ÷ 3 = 226

870 ÷ 2 = 435

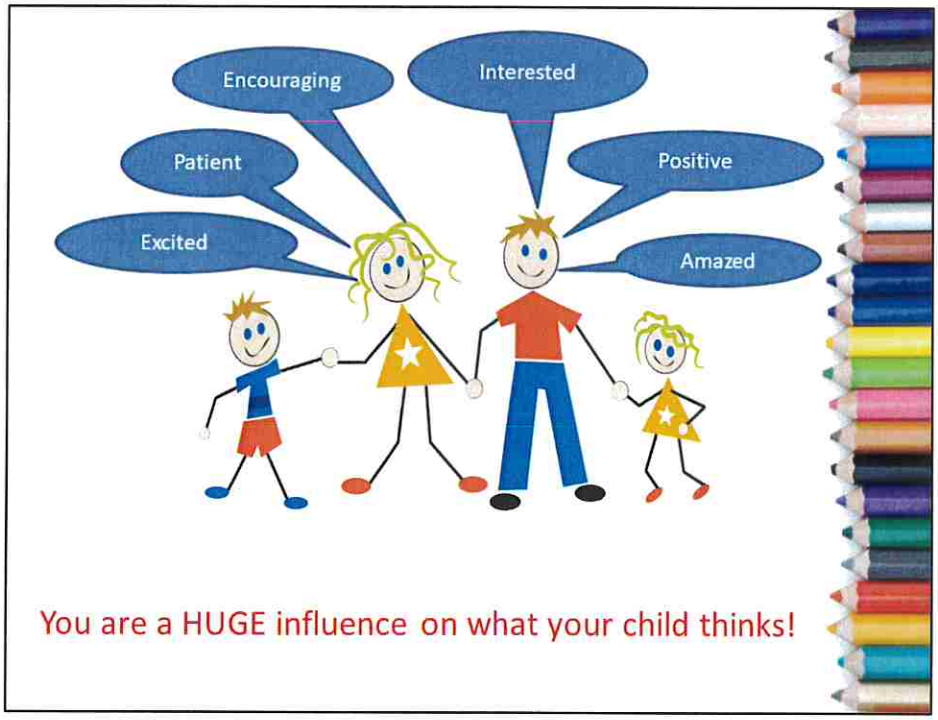
Can you apply your knowledge
to larger numbers and multiple carrying?

6105 ÷ 5 = 1221

1696 ÷ 8 = 212



Many parents (and teachers!) have a phobia of maths as a result of a bad experience at school. I often hear comments like this during meetings with parents and many have told me this prior to our workshop! Never, ever say this to your child! In their subconscious, they will link that mum and dad are successful and they didn't like or couldn't do maths, so they don't need to do it either. They will also pick up on your negative feelings and they will take these on board. If you are positive about maths (even if you have to act!), they will be more positive about it too. Many people say negative things about themselves mathematically, but wouldn't dream of saying they couldn't write or read well!

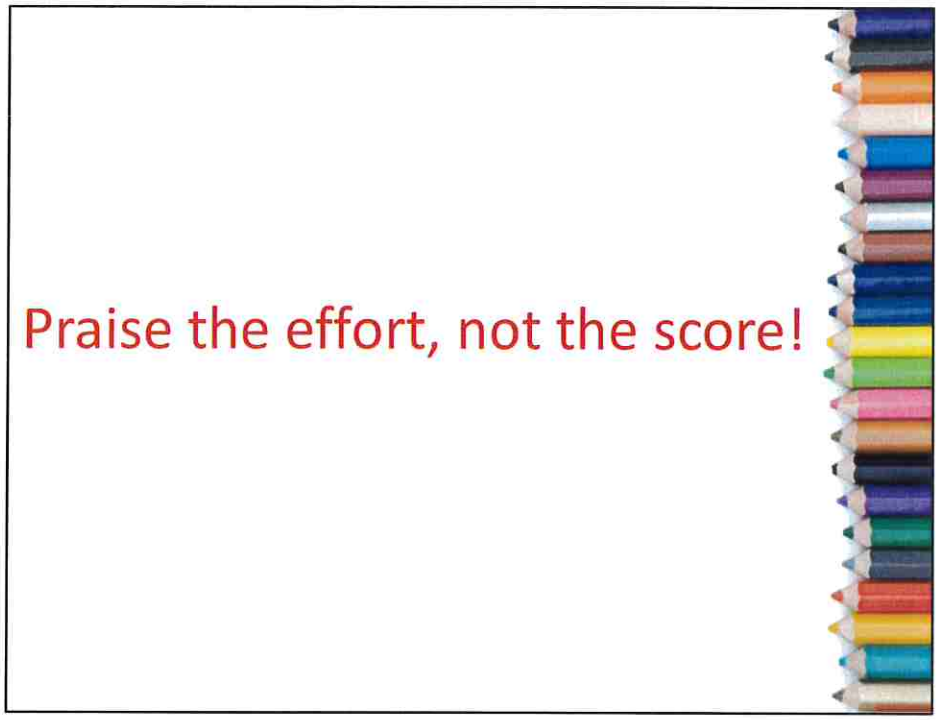


With the previous slide in mind, try to be all these things about maths!

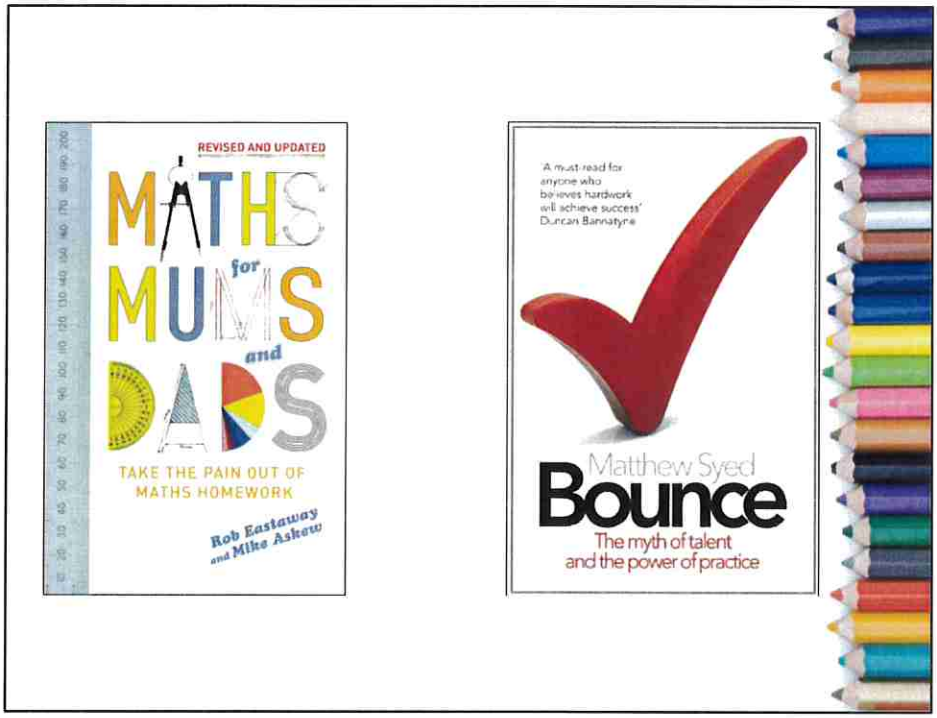
What **NOT** to say (or do)!

- Don't get them to explain the wrong ones
  (They associate explaining with mistakes)
- Don't get frustrated
  (They will not get it right every time, even if they did yesterday!)
- Don't make maths (or homework) a chore
  (Be excited and interested in what they've been sent home!)
- Don't say negative things about yourself
  (It doesn't make then feel better! It associates success without maths)
- Don't show them a formal method
  (They will not have seen it, it doesn't support reasoning and it requires understanding they don't have yet.)

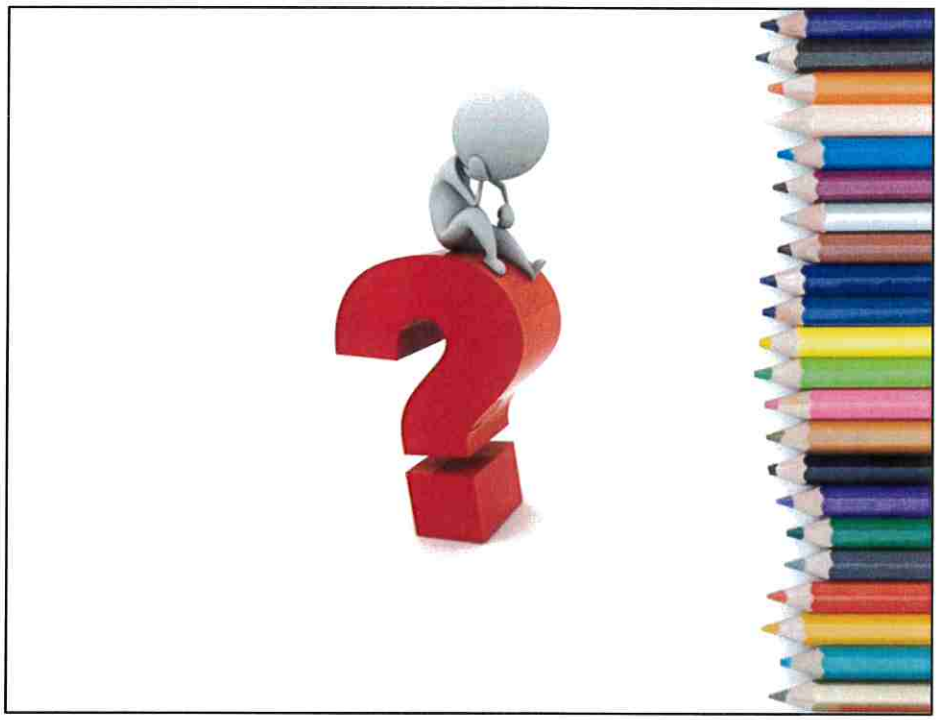
We often ask children to explain the problem or sum which is wrong so we can help them get better. They soon realise that they are only asked to explain when they are wrong. Because of this, they associate explanation with failure. Ask them to explain one that is correct. Be amazed at the answer and comment on things like, "I'd forgotten an odd+odd = even, that is so cool!" Then try things like, "I make that one 11, what have I done wrong?" and let them teach you by explaining why you're wrong. By building up these positive conversations, you will be able to help them fix errors when they do get one wrong without it being a negative event for your child.



There are lots of studies about praising effort rather than results and the impact it has on children's learning, effort and end result in terms of testing. If you would like to know more, feel free to talk to Mr Gray, or, search for Carol Dweck and effect of praise on Google. Please note, we have not checked any of the links which Google will produce. This is simply the area of her research.



These are excellent books and very easy to read and dip in and out of. Bounce investigates the idea that people are born with natural talent and therefore, some aren't and will not be as successful as others. There are sections of Carol Dweck's praising effort, not the score as well as lots of examples of how practice is linked to progress and results. Maths for Mums and Dads explains a lot of the new methods of maths which we were not taught as children. It explains why schools do not teach formal methods straight away and areas where your child might struggle. Do not buy Maths for Mums and Dads 2, it is for secondary school aged pupils.



Please don't struggle with these methods in silence! If you can't answer your question by asking your child or a friend on the playground, please do come and see Mr Gray! He will be more than happy to spend time with you to help you understand what your child is being taught in school. There is no such thing as a silly question!