The Colleton Maths Calculation Policy

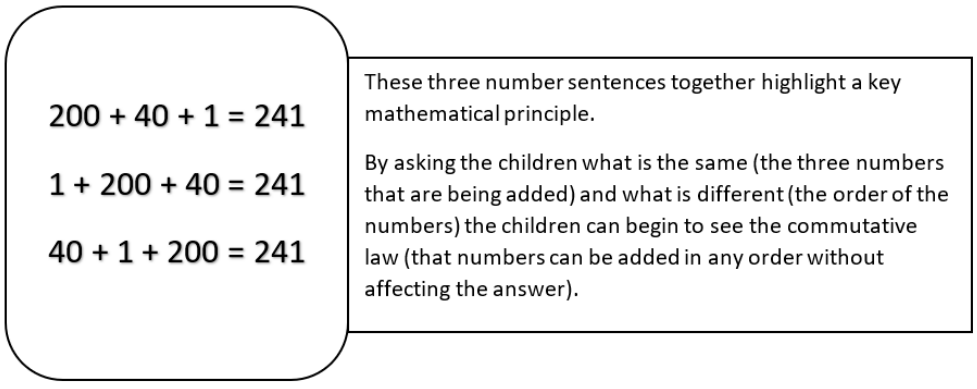
This policy outlines our core values and beliefs about how maths should be taught at The Colleton, throughout the school and to all children. It underpins the National Curriculum 2014 with the eleven points that we, as educators, believe to be vitally important in helping our children to become capable and confident mathematicians. It explains why these fundamental beliefs lie at the heart of our teaching, alongside the curriculum guidance of "what" is taught. It shows our thinking behind every lesson we plan and deliver, as part of our desire to create mathematically literate children.

We develop children's fluency with basic number facts through mental calculation

Fluent computational skills are dependent on accurate and rapid recall of basic number bonds to 20 and times-tables facts. Spending a short time every day on these basic facts quickly leads to improved fluency. Our maths lessons always include a short session on chanting tables, mental maths, quick fire arithmetic or reviewing bonds. This is an important step to developing conceptual understanding through identifying patterns and relationships between numbers (for example, that the products in the 6× table are double the products in the 3× table). Efficiency in calculation requires having a variety of mental strategies eg. emphasising the importance of 10 and partitioning numbers to bridge through 10.

We look for patterns and make connections

We get children to form good habits from Year 1 by encouraging them to develop their reasoning skills and looking for patterns and connections in maths. The question "What's the same, what's different?" is used frequently to make comparisons. For example, "What's the same, what's different between the three times table and the six times table?" or "What's the same, what's different between multiplying by 10 and multiplying by 100?" When different representations are used it allows children to find a visualisation method which truly clarifies their understanding.



We contextualise the mathematics so it has meaning and value

A lesson about addition and subtraction could start with this contextual story: "There are 11 people on a bus. At the next stop 4 people get on. At the next stop 6 people get off. How many are now on the bus?" This helps children develop their understanding of the concepts of addition and subtraction. During the lesson the teacher should keep returning to the story. For example, if the children are thinking about this calculation 14 – 8 then the teacher should ask the children: "What does the 14 mean? What does the 8 mean?", expecting that children will answer: "There were 14 people on the bus, and 8 is the number who got off." Our children might use a real-life situation of a holiday budget to base their maths on for more purposeful learning, linking the concrete, pictorial and abstract. This helps children to understand how they can apply maths in real life and see the relevance of it.

We use questioning to develop mathematical reasoning

Teachers' questions in mathematics lessons are often asked in order to find out whether children can give the right answer to a calculation or a problem. There should also be a strong and consistent focus on use of questioning which encourages and develops their mathematical reasoning. This can be done by asking children to explain how they worked out a calculation or solved a problem, and to compare and contrast different methods that are described. This way children quickly realise that they need to explain and justify their mathematical reasoning; and learn to do so automatically and enthusiastically.

Rich questioning strategies include:

- What's the same, what's different?
- Which is the odd one out?
- Here is the answer, what could the question have been?
- Identify the correct question to match the answer given
- True or false?

We differentiate through our language when questioning and encourage children to confidently articulate their methods.

We develop children's understanding of the = symbol and teach equality and inequality alongside this

The symbol = is an assertion of equivalence. If we write: 3 + 4 = 6 + 1 then we are saying that what is on the left of the = symbol is necessarily equivalent to what is on the right of the symbol. However, many children interpret = as simply meaning "work out the answer to this calculation". Therefore, they can get confused by missing number questions or when balancing two equations. If we vary the position of the = symbol in questions set from Year 2 onwards, this will help children to better understand. To help young children develop their understanding of equality, they also need to develop understanding of inequality, through using the symbols of ≤ and ≥, discussions on more/less and seeing pictorial representations

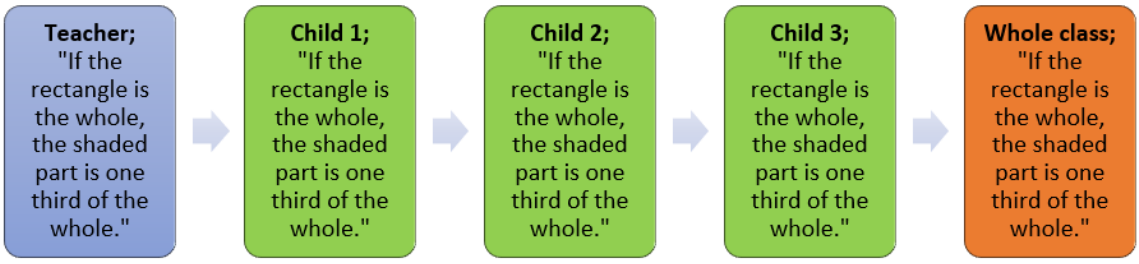
to show these ideas. They then have the background knowledge to confidently approach questions with the = in various positions.

We calculate, not count

Young children benefit from being helped at an early stage to start calculating, rather than relying on 'counting on'. For example, with a sum such as: 4 + 7 = Rather than starting at 4 and counting on 7, children could use their knowledge of bonds and bridge to 10 to deduce that because 4 + 6 = 10, so 4 + 7 must equal 11. Our children become independent in using these strategies and similar to calculate mentally.

We expect children to use correct mathematical terminology and to speak in full sentences

We believe that the quality of children's mathematical reasoning and conceptual understanding is significantly enhanced if they are consistently expected to use correct mathematical vocabulary (e.g. saying 'digit' rather than 'number') and to explain their mathematical thinking in complete sentences. Where necessary we demonstrate this process ourselves, this technique enables our staff to provide a sentence stem for children to communicate their ideas with mathematical precision and clarity. These sentence structures often express key conceptual ideas or generalities and provide a framework to embed conceptual knowledge and build understanding. For example: If the rectangle is the whole, the shaded part is one third of the whole. Having modelled the sentence, the teacher then asks individual children to repeat this, before asking the whole class to chorus chant the sentence. This provides children with a valuable sentence for talking about fractions. Repeated use helps to embed key conceptual knowledge.



We do Maths Investigations and use these as a key part of learning how to work systematically

Working systematically is a key skill in most aspects of life and one that The Colleton is passionate about helping our pupils develop through all of our STEM subjects. In maths we support the development of this skill by modelling systematic methods of recording and working with core principles (such as number bonds) and highlighting the ways in which this makes life easier ie not missing any out, can see patterns, better organisation, etc. We then further develop this by regularly providing the children with open-ended maths investigation tasks; when talking them through afterwards we discuss how the methods and

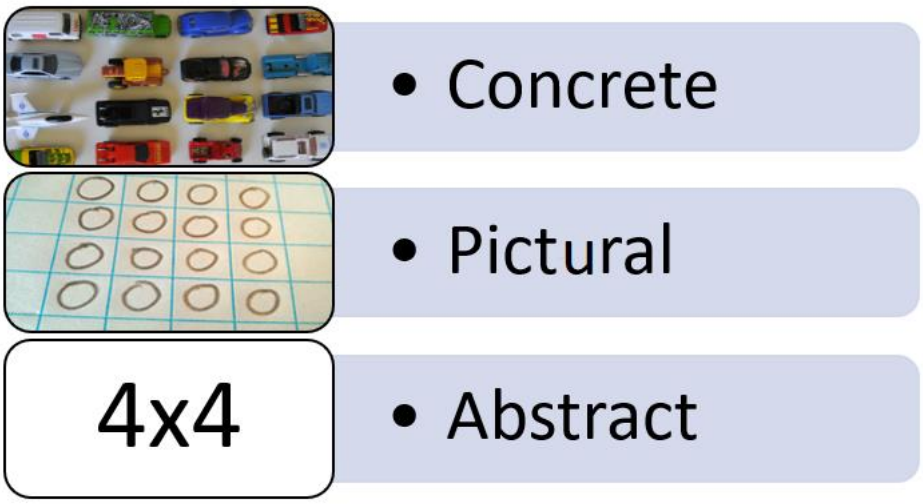
approaches that provide the answers can actually be the most important part of the learning.

We read in Maths

Maths is a subject with some clear, procedural elements but it's application in the real world is certainly not a procedural thing. At The Colleton, we believe it is vital that children learn to interpret problems and that reading within maths sessions is a key element of this. We ensure that reading takes place regularly in maths sessions for all children, (not just as an extension task) to help the children practise visualising and interpreting mathematical problems.

We use a CPA (Concrete, Pictural, Abstract) approach

To fully facilitate a child's conceptual understanding of a subject and fluency within it we believe it is vital that they experience concrete, visual and abstract representations of a concept as part of the teaching sequence. Moving between the concrete and the abstract helps children to connect abstract symbols with familiar contexts, thus providing the opportunity to make sense of, and develop fluency in the use of, abstract symbols. For example, in a lesson about addition of fractions children could be asked to draw a picture to represent the sum. Alternatively, or in a subsequent lesson, they could be asked to discuss which of three visual images correctly represents the sum, and to explain their reasoning. Another example would be the use of bar modelling to clarify a maths problem – when modelled from year one upwards this representation should help children to clearly see how different parts of a maths problem relate to each other and aid problem solving.



We always aim to anticipate roadblocks within learning

Every child will find aspects of a particular topic or lesson difficult and will make mistakes on their path to developing understanding. Whilst each time something is taught there will be some new difficulties, many roadblocks are the same each time a topic is taught and so can pre-empted and planned for. At The Colleton these are identified and anticipated when lessons are planned and are utilised as an explicit part of the teaching, rather than just

responding if they happen to arise in the lesson. Our staff actively seek to uncover possible difficulties or misconceptions because if one child has a difficulty it is likely that others will have a similar difficulty. Difficult points also provide an opportunity to reinforce that we learn most by working on and through ideas with which we are not fully secure or confident. Discussion about difficult points can be stimulated by asking children to share thoughts about their own examples when these show errors arising from insufficient understanding or showing adult modelled work with deliberate mistakes. This also helps develop resilience and perseverance with problem solving.

This policy should be read in conjunction with 'How we teach maths at The Colleton'.