

Haytor View Community Primary School & Nursery

Statement on the Teaching of Maths – Number & Calculation



Learning together - enjoying success - aiming high - celebrating difference – enriching community

Principles underpinning our consideration of maths learning and related assessment/moderation

Maths inside the black box – Hodgen & William (2006):-

- 'Mathematics is a connected body of knowledge'
- 'Mathematical literacy requires understanding of the meaning, use and justifications of mathematical ideas'
- 'To be successful pupils need to build up what Skemp(1976) calls a *relational* understanding of how ideas interrelate'

Commission on Assessment without Levels (2015); The benefits of assessment without levels:-

- 'support more informative and productive conversations with pupils'
- 'enable pupils to take more responsibility for their achievements'

Maths Provision – Foundations of Provision

Maths provision at Haytor View, whilst firmly guided by statutory guidelines and expectations at from the Early Years and Foundation Stage Framework (EYFS) and National Curriculum is committed to developing maths understanding over process. In doing so we must acknowledge that current testing practices at the end of Key Stage 2 currently maintain a significant focus upon process and as a result all this fact must be bridged in a way that allows children to demonstrate their learning and skills effectively at this point.

The recognised and shared challenge across the school is to acknowledge the complexities of statements presented in EYFS and National Curriculum, and to get underneath these in a manner that supports us in recognising what children *really* understand and what we as practitioners might be missing as we consider our own provision and children's next steps.

It is our aim to ensure that all children have a sound understanding of the number system, the role of maths in real life and an awareness of themselves as maths learners which ultimately enables them to develop elegance and efficiency in their approach to mathematical problem solving.

Moderation and ARE

ARE definitions sit at the heart of moderation processes – they allow a coherent approach and ensure that our understanding of progression throughout the school is consistent

ARE definitions impact upon our provision as they guide us as to the experiences we need to be offering our children to support their progress

ARE definitions are not published for each year group in the National Curriculum – whilst there are commercial 'models' that have been produced following the introduction of the National Curriculum they do not reflect our own thinking and awareness of our context, our children or necessarily our understanding of maths.

Programme of Assessment & Moderation of Maths

Recorded and shared assessment of maths takes place half termly in Years 1-6, termly in the Foundation Stage.

Moderation takes place regularly at phase level and periodically in line at cross-phase (whole school) level in line with current moderation arrangements which seek both to inform assessment and develop the awareness and understanding of learning leaders.

External moderation links continue to develop and are being explored using a range of partners.

Tools to support half termly assessment and moderation

The documents listed below represent an agreed list of tools which can be used to inform half termly assessment and support moderation opportunities. They provide a range of levels of focus upon outcomes

and their potential links to understanding. The documents do not represent the sole sources of support for planning provision or assessment on a within-sequence basis.

The following documents may be used :-

Haytor View Calculation Policy

incorporating Addition; Subtraction; Multiplication; Division; Number and Place Value – this is detailed in an Appendix to this document, updated February 2018

National Curriculum Statements & Interim Framework Statements at Year 2

Programmes of Study & Statements published by the DfE – providing scope and detail as to what children should understand

Babcock LDP Key Understandings

Narrative of joined up understanding making links between different parts of the curriculum – extracted, fundamental 'bigger statements'

Rising Stars Guidance

Support for consideration of key skills and concepts

NAHT Key Performance Indicators

Manageable stepping stones of key understandings sitting between the depth of national curriculum and narrative of Babcock Key Understandings

Early Years and Foundation Stage Document

DfE published non-statutory curriculum for Early Years education

Aspects of In-School Provision that Support Children's use of Phonics to Support Understanding of Maths, 'Number and Calculation – February 2018

Teachers will:

- Assess carefully to identify exact next steps for children
- Provide opportunities based upon assessments that will support the development of children's understanding
- Think 'What am I missing?' 'What opportunities can I provide to reveal true understanding?'
- Use verbal questions to analyse children's use of language and terminology in relation to number and calculation
- Use the 'Connective Model' as a fundamental guide/prompt – considering links between the language; concrete; pictorial; abstract aspects of number and calculation
- Have a particular focus upon exploring depth of understanding through providing opportunities for children to demonstrate their understanding
- Consider the growth mindset when supporting children's mathematical development
- Recognise and value, through their provision, the importance of the fundamentals of number
- Recognise and value, through their provision, the role and value of mathematical fluency
- Bring practical opportunities to children to support connections being made between concrete and abstract understanding
- Allow children the time and space required to explore number and calculation and support the development towards concepts becoming embedded and accessible tools to use in the future
- Have meta-learning based discussions that model the development of awareness

Support of children's development in number and calculation will see learning leaders:

- Talking to parents who 'can't do maths' in a positive, encouraging and supportive manner about how they could.....still...learn
- Being available to parents with doubts around maths
- Using Time to Think as an opportunity to model approaches to maths in a relaxed environment
- Encouraging parents to get on board where they can support their children
- Displaying information to support parents and children around the importance of links between concrete, abstract, pictorial, linguistic aspects of maths
- Using concrete resources and opportunities eg. teen boards to support development
- Sharing stories to create vivid pictorial and abstract links
- Singing number rhymes and using props, including themselves, to link physical and abstract understanding
- Encouraging the questioning of 'what's the point of this maths that we're learning?'

- Creating learning walls as a tool and a point of reference for demonstrating links and providing reminders
- Maintaining accessible images of all learning opportunities in the past that remains relevant in the present
- Using photos of learning walls in children's books as points of reference
- Talking to children about Maths (Primary Maths Paper 4)
- Having high expectations that all can achieve
- Celebrating children's ideas through use of display to demonstrate value, be a source of pride and to bring interest in ideas
- Use pre-teaching opportunities based upon review and celebration
- Provide open-ended school-based and home learning opportunities
- Encouraging children to share their successes with other adults around the school
- Developing awareness through use of NCETM Subject Knowledge Tools
- Accessing NCETM and NRich websites to support thinking around opportunities for assessment and provision
- Planning together to support provision development
- Extending concrete opportunities to engage with number
- Supporting children in being positive about assessment processes through an understanding of their role in learning

Moving forward learning leaders will be seeking to develop their approaches through their commitment to developing provision in the following areas:

- Linking different maths models together
- Creating a 'Why are we doing this?' display
- Looking for physical, oral and written experiences to show understanding
- Displaying concrete maths tools
- Engaging parents during Time to Think in pre-teach experiences
- Developing display – a counting zone – that children use to practice and enjoy number
- Supporting parents understanding and interpretation of maths being used in school
- Ensuring basics are embedded appropriately before building upon these
- Using Time to Think to revisit fundamentals or pre-teach
- Developing video clips to explain maths thinking to be uploaded to the website to support wider understanding
- Developing maths display demonstrating Abstract – Pictorial – Concrete and the planning of tiny next steps that link these aspects together.

Characteristics of ARE and Approaches Used to Support Progress
Phase Feedback & Guidance for Assessment
February 2018

Foundation Stage

Key Stage 1

Characteristics of an ARE mathematician at year 1	Opportunities	Year 2 Characteristics (from Current Interim framework statements -To be updated)
<p>ADDITION</p> <p>To explain describe and model what + means</p> <p>Select and use concrete models to support or demonstrate addition.</p>	<p>Experience of a Range of models and contexts</p> <p>Money, measure, concrete object</p>	<p>add 2 two-digit numbers within 100 (e.g. 48 + 35) and can demonstrate their method using concrete apparatus or pictorial representations.</p>

<p>Understand, model and describe the commutative nature of +</p> <p>use + to create number sentences which describe situations, models, images and stories.</p> <p>Count on and back from any number 0-100</p> <p>To successfully, independently add one and two digit numbers up to 20.</p> <p>To have practised, established and ascertained number bonds to 20 and then have practice to recall them..</p> <p>To identify the whole and the parts in any number sentence.</p> <p>To recognise that they can use known number facts to work out unknown and describe when they do this.</p> <p>SUBTRACTION</p> <p>To explain, describe and model what – means.</p> <p>Subtraction as the inverse of addition</p> <p>PaUse the language of part part whole to describe subtraction</p> <p>Understand, describe and model the term 'difference'.</p>	<p>Language of Part + part = whole, the whole is bigger)</p> <p>Investigation rather than practising process and answers.</p> <p>Practice and revisiting</p>	<p>use estimation to check that their answers to a calculation are reasonable (e.g. knowing that $48 + 35$ will be less than 100).</p> <p>subtract mentally a two-digit number from another two-digit number when there is no regrouping required (e.g. $74 - 33$).</p> <p>recognise the inverse relationships between addition and subtraction and use this to check calculations and work out missing number problems (e.g. $\Delta - 14 = 28$).</p>
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<p>MULTIPLICATION</p> <p>Understand, describe and record what x means - lots of, times, multiplication</p> <p>Use model to demonstrate x number sentences.</p> <p>Use number sentences to represent models showing multiplication situations for X 2, X 10 , X 5</p> <p>Recall of number patterns, describe, explain and present understanding of how those number patterns arise.</p> <p>Through investigation, develop understanding doubles to 20 leading to Recall of</p> <p>Understand, describe and record what 'doubling' is Link to $x2, 2x$</p>	<p>Experience of a Range of models and contexts Money, measure, concrete object</p> <p>Use models to explore, develop not just memorise procedures or patterns.</p>	<p>recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables to solve simple problems, demonstrating an understanding of commutativity as necessary</p>
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<p>DIVISION</p> <p>Understand describe record what division means. Division as sharing</p> <p>Understand, describe and record what a and 'halving' - Recall halves to 20</p> <p>Use halving to find quarters of objects, shapes, numbers or quantities.</p> <p>Investigating division by sharing</p> <p>Grouping</p> <p>Then link that there are lots of</p> <p>Link to known multiplication facts.</p>		
<p>NUMBER</p> <p>Represent their understanding of 2 digit numbers with a model Understand, describe and record what a model represents.</p> <p>Secure counting- number correspondence.</p> <p>given any number, identify one more and one less</p> <p>use the language of: equal to, more than, less than (fewer), most, least</p> <p>read and write numbers from 1 to 20 in numerals and words.</p>	<p>Experience of various models in a range of contexts.</p>	<p>partition two-digit numbers into different combinations of tens and ones.</p>

<p>Thoughts and Next Steps</p>
<p>Still need to think deeper and harder about what is involved in being able to 'do' elements of maths.- greater exploration on learning journey documents</p> <p>How can the environment further support children's confidence in using number?</p> <p>What opportunities are there across the curriculum to support maths?</p>

Key Stage 2 - Additional information and expectations for maths

Lots of thinking has been developed to consider 'What is age-appropriate learning?' when it comes to number awareness and calculation. In order to support our learners through Phase to become confident mathematicians with a range of embedded strategies to calculate with increasing efficiency, we believe that the national curriculum expectation of methodology needs to be better managed through the key stage to meet the needs of our learners. Nevertheless, it must be stressed that by the end of year 6, all statements will be at least met.

We have further developed our calculation policy (see appendix for details) by examining what children have when they come into Phase and what they need by the end of Phase. What order does understanding have to happen in, in order for children to develop a sound understanding of calculation, rather than us merely teaching 'methods'. We have seen children's ability to rely on these methods, slip away without controlled and managed development towards their use. When key precursive pedagogy is not embedded, children merely perform a routine, without being able to use and apply the skills in a range of contexts.

Challenges across the Phase

How do you know the children understand the learning you shared with them? Improving assessment in a more efficient way. We understand the importance of the connective model as well as John Holt's principles of understanding (1967!) and see value in the role of the Deeper Understanding Grid to support this in elicitation & assessment (mid-sequence as well as at end.) It helps us evaluate exactly where a child's misconceptions lie and allow us to determine next steps to develop learning.

Developing reasoning through Number Talks – sharing children's ideas in class and allowing time to describe how they represented ideas. The importance of reasoning / explaining externally (convince yourself, a partner, me) then appreciating the methods of others and reaching an outcome of developing a more efficient way of recording mathematical thinking. Careful planning ensures maximum benefit here: what are the children doing wrongly? What is the misconception? Plan the numbers you will use carefully then present them to the children – after discussion, have you supported them in not making the same misconception again?

What are the big ideas in each year group to ensure consistent and sustainable progress?

Y3

Our biggest challenge is getting children to really understand number bonds to 10 to a point where the concept is embedded and can be used in a variety of contexts then extended into derivation. We are currently not able to extend to bonds to 20 or 100 securely until children are able to use quick recall of their bonds to 10 to successfully support the new skill. Children are reminded consistently to use what they already know to help reason about new challenges. This ongoing support is successful in encouraging children to develop independence of reasoning skills. It is essential to explore new calculation learning through use of manipulatives to support children's learning through the concrete to the pictorial and into the abstract.

Year 3 target

Focus on moving from the concrete to the pictorial. How do we move children from using manipulatives into being able to represent their thinking using a pictorial image to ensure basic facts can be relied upon. Support needed with how to successfully move from the concrete to the pictorial so all children continue to understand and also how to select the most suitable image to support understanding please.

Y4

Our children over-rely on counting in ones rather than using what they already know and deriving from that known fact. A consistent, regular approach to revisit known number facts and a specific focus by all adults to asking children to explain how they know, ensures children make better progress in this area. Regular number talk sessions outside of the Maths lesson, where children share methods openly and these different ways are clearly recorded and explained, makes sure children discover more efficient ways of thinking about mathematical structures.

We need to be explicit enough with maths teaching to show how different areas of maths are linked together. If I know this, then I also know... This helps children build reasoning skills for the future.

Year 4 target

Focus on moving from the concrete to the pictorial. How do we move children from using manipulatives into being able to represent their thinking using a pictorial image to ensure basic facts can be relied upon. Support needed with how to successfully move from the concrete to the pictorial so all children continue to understand and also how to select the most suitable image to support understanding please.

Y5

Our children have exhibited challenge understanding decimal and negative numbers. Their understanding is limited by the lack of clarity around the number system they have already explored. In every area of number and calculation it is completely appropriate to use manipulatives, or physical resources, to support their understanding and they certainly all need to experience concrete resources to introduce an idea, through the pictorial and into the abstract. We need to expose the children systematically to concrete resources, then focus attention on how small steps can lead us to develop a pictorial representation of those concrete resources. They need to see how the pictorial representation has been developed to use it successfully. We cannot assume that children understand a concept unless they can successfully complete the Deeper Understanding Grid and show their full understanding of that concept – whether it is a specific mathematical problem, or a statement that they are asked to explore. This is supported by regular, stand-alone Number Talks, where we set time aside as a class to talk about the ways we do maths. We talk about which methods

are more efficient and why and we reason about what we knew already to help us access the problem more successfully. When these concepts are embedded, children are more able to successfully choose and use the most efficient, appropriate method to calculate.

Year 5 target

Taking time through the concrete to pictorial to abstract continuum, ensuring that each part of the sequence is planned for and addressed attentively in turn.

Using opportunities outside of the maths session to arrange Number Talks, where I carefully plan the number sentences we need to discuss to elicit common misconceptions. Never assume they understand something! When children aren't ready to move on, don't!

Y6

Fluency of choosing and using methods to calculate more efficiently has proved a challenge. For instance, when children are asked to 'find the difference' between two numbers, they will automatically draw a number line and count on, even when that isn't the most efficient, elegant method. They need to experience lots of number problems where the numbers have been carefully selected to elicit the misconceptions I want them to exhibit. By experiencing these opportunities to make errors through orchestrated Number Talks, then subsequently learning from them and getting the chance to demonstrate how they successfully manoeuvre the challenge next time, ensures the children make progress in this area.

Year 6 target

To explore the use of bar models to support children in developing understanding. Children need to be able to represent the information from a word problem into a suitable pictorial representation that will support them in developing an appropriate calculation.