



# Universal Provision of Mathematics

2016 - 2017

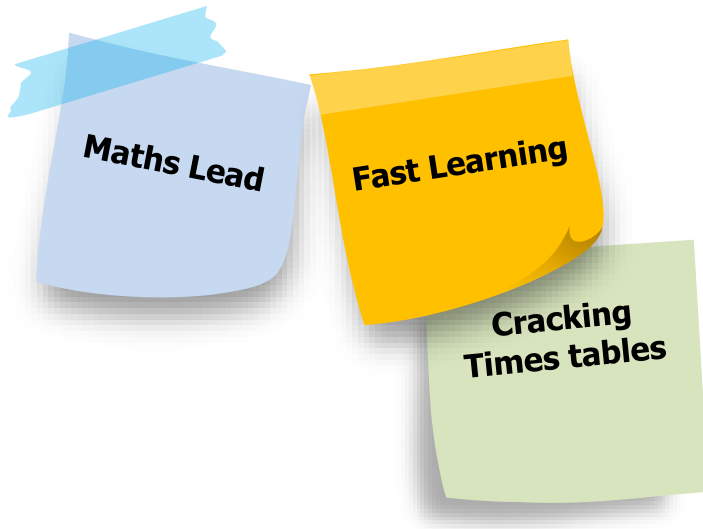
*Mathematics teaching at Barton Hill Academy is geared towards enabling each pupil to develop within their capabilities; not only the mathematical skills and understanding required for later life, but also an enthusiasm and fascination about maths itself. We aim to increase pupil confidence in mathematics so they are able to express themselves and their ideas using the language of maths with assurance.*

*This document is a key means to create consistency in the development of maths skills across the school provide guidance for teaching and support staff on the teaching, learning, assessment and pedagogy of maths that we offer all pupils at Barton Hill Academy.*

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**Maths team**



## Key Priorities from the School Development Plan for Mathematics include



### Purpose of study

Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. **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

## Aims

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

- ✓ become **fluent in the fundamentals of** 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

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

## Speaking and listening

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. At Barton Hill Academy we recognise the importance of spoken language in pupils' mathematical development. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. Children are assisted in making their thinking clear to themselves as well as others and teachers ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions. Talk Partners, Reasoning Questions and higher order questioning are some of the strategies used to develop speaking and listening skills in

mathematics. Regular use of Talk Partners should be planned for as well as tasks that lend themselves to discussion.

### **Programmes of Study**

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage, if appropriate. All schools are also

required to set out their school curriculum for mathematics on a year-by-year basis and make this information available online.

## **EYFS**

The Early Years are crucial for developing the initial building blocks for mathematical thinking, reasoning and problem solving with children. At Barton Hill we recognise how important these building blocks are to children's later success in mathematics.

Mathematics is broken down into 'Number' and 'Space, shape and measure'. However, mathematics is linked to the other areas of development and mathematics needs to be developed through all areas of the EYFS curriculum.

## **Key Stage 1**

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the 4 operations, including with practical resources [for example, concrete objects and measuring tools].

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

## **Lower Key Stage 2**

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the 4 operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their

properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word-reading knowledge and their knowledge of spelling.

## **Upper Key Stage 2**

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of year 6, pupils should be fluent in written methods for all 4 operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Pupils should read, spell and pronounce mathematical vocabulary correctly

## **Key documents in Mathematics**

For mathematics, teachers should refer to each year group's Achievement Statements. This incorporates the National Curriculum key objectives. Objectives are grouped by strand. It is the teacher's responsibility to build awareness and use the 4 modes of learning within sequences of work: foundational learning, conceptual learning, personal learning and collaborative learning (please see staff room).

- **Foundational learning:** automaticity in numeracy skills, confident recall of core curriculum knowledge
- **Conceptual learning:** connected knowledge and skills that enable comprehension, hypothesising, problem solving & synthesis

- **Collaborative learning:** collaboratively produced outputs that demonstrate application and extension of conceptual learning
- **Personal learning:** the basis for self-efficacy, reflective personal planning and value based decision making

Other important documents are the school guidelines on feedback and marking and the learning environment. It is important that all members of staff are familiar with these and adhere to the expectations they set out.

**All the documents and resources mentioned throughout this document, can be found on the TEACHERS drive under 'Maths'**

### **Mathematics at Barton Hill Academy**

Daily mathematics lessons take place within each class, differentiated to meet the needs of all learners. Mathematical proficiency requires a focus on core knowledge and procedural fluency so that pupils can carry out mathematical procedures flexibly, accurately, consistently and efficiently. There is no prioritisation between technical fluency and conceptual understanding: these two key aspects of mathematical learning are developed in parallel.



**Practical, hands-on experiences** of using, comparing and calculating with numbers and quantities are of crucial importance in establishing the best mathematical start. Manipulatives, such as Numicon, Dienes, number beads and place value counters, should be used regularly to enable children to visualise mathematical concepts and ideas, e.g. show me tasks. It is important to remember that manipulatives are used to ‘understand the maths, not do the maths’. Consistent use of meaningful and engaging **images** and models (representations) allow children to develop a robust understanding of the concepts underpinning the required calculation, number and measure strands. Agreed calculation strategies, models and images for each of the number operations are recorded in the **Barton Hill Academy Calculation Policy**.

At Barton Hill, we recognise that mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are organised into apparently distinct domains, but through explicitly teaching and modelling pupils should be encouraged to make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.

Broadly speaking, pupil knowledge and understanding develop from the **concrete**, to the **pictorial** (and visual) through to the **abstract (symbolic)**. Children working within any one class may be working at different points of the spectrum. Teachers use their own assessments to differentiate classroom teaching accordingly. All children are expected to build firm foundations rather than be accelerated through content. Children who grasp concepts quickly should be challenged through rich and sophisticated problems before any acceleration through new content. Those children not sufficiently secure with earlier material should consolidate their understanding, including through additional support and intervention. Consolidation is given through additional practice, e.g. morning work, mental maths. Reasoning is integral to conceptual understanding and problem solving. As a result, **Problem solving** and **mathematical reasoning** should be embedded in maths lessons so children develop a deep understanding of the subject. Quality questioning is key to this. White Rose Planning, NRICH and NCETM provide links to a range of rich tasks that **all** children should access on a regular basis. Each unit of work should also contain an extended problem solving activity. **Children are taught to reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. Through (graphical) representation and planned questioning, children are taught how to demonstrate their understanding of mathematical concepts.

The agreed **problem solving framework** for Years 1 to 6 should be clearly visible in the classroom and referenced regularly.

## Mastery in mathematics

A mastery curriculum has certain underlying principles and features that characterise this approach:

- an expectation that all children can achieve highly in maths
- the large majority of pupils move through the curriculum at the same time. Differentiation is achieved by emphasising deep knowledge and through individual intervention and support
- teaching is underpinned by methodical curriculum design and supported by carefully crafted lessons and resources to achieve conceptual understanding and procedural fluency
- practice and consolidation play a key role. Carefully designed variation within this builds fluency
- teachers use precise questioning to test conceptual and procedural knowledge, and assess pupils regularly to identify those requiring intervention so all children keep up

*Adapted from 'Mastery approaches to mathematics and the new national curriculum' by NCETM,*

[https://www.ncetm.org.uk/public/files/19990433/Developing\\_mastery\\_in\\_mathematics\\_october\\_2014.pdf](https://www.ncetm.org.uk/public/files/19990433/Developing_mastery_in_mathematics_october_2014.pdf)

The '**Mastery in Maths: Questions, tasks and activities to support assessment**' document produced by NCETM, available on the T Drive, is an essential resource for planning - <https://www.ncetm.org.uk/resources/46689>.

To supplement this, the following resources should be used to aid planning, teaching, learning and assessment of mastery and greater depth in maths:

- Collins Busy Ant Maths textbooks (Y1 – 6)
- NCETM mastery and greater depth resources
- White Rose schemes of learning and lesson breakdowns (available on the shared drive, under maths, white rose.
- Target maths textbooks (Y1 – 6)
- Abacus textbooks and membership to the website (which includes planning, resources and mastery/greater depth checkpoints)  
<https://www.activelearnprimary.co.uk/login?c=0>

## Mathematics Planning

Before planning, teachers should refer to the **White Rose Curriculum Overviews** and use Achievement Statements to choose objectives from their current year to work on in the following weeks and ensure a balanced curriculum. Particular attention needs to be given to Key Performance Indicators (foundational learning objectives). It is expected that these objectives form the backbone to planning. These objectives should be planned into specific teaching time and practised by the children. At Barton Hill Academy, we recognise the need to build firm foundations, teach in more depth and revisit topics to revise and consolidate skills (for example, through mental maths).

When planning a teaching sequence in mathematics, careful consideration must be given to the end point of each 'sequence' and how each week will build on the preceding week. Having said this, teachers should monitor pupils' responses in lessons and adapt their approach accordingly as well as adapt planning after monitoring pupils' progress.

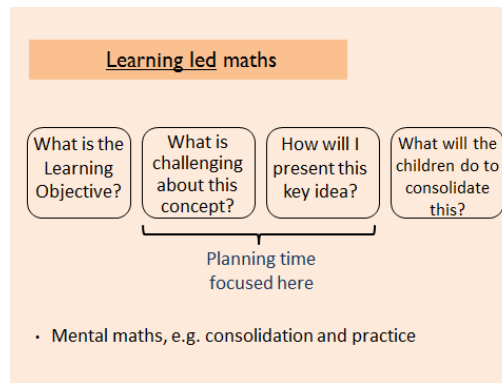
**All planning should be saved on the T drive on Monday morning by 9am.**

Planning should begin with knowing the children's abilities and using these to set pitch, challenge and differentiation. Achievement statements, as the learning outcome for a sequence of lessons, should be used to drive planning and assessment. The Achievement Statements are sequenced in terms of progression, and some are broken down into smaller steps where useful.

The school's planning pro forma for mathematics sets out clearly the WALT, mental maths focus, success criteria and starting point (input) for each lesson. Then, each lesson should be planned by what the teacher/TA are doing as well as what the children are doing/learning. This is to encourage all adults to think about what they are doing at all times of the lesson whether this is guided work, modelling, working with a group during the main input or observing.

Planning is set out horizontally in steps. The Pupil Starting Points indicate the initial start step for groups and link with the minimum intended destination step. Some pupils might exceed this. Each step may last a lesson, but may not. Where pupils can move on within a lesson they will, whilst others may need more than one lesson to secure a step. Teachers may prefer to use the days of the week, as long as progress is limited by this. This is to encourage teachers to carefully consider the teaching sequence of a lesson and plan flexible and adaptable lesson structures according to the needs, abilities and interests of the pupils.

Planning should be focused on 'what is challenging about this concept?' and 'how will I present this idea?'



Teachers are expected to consider how a flexible lesson structure, moving away from the three part lesson, could support our whole school development priorities particularly in supporting Pupil Premium children, pupils with SEN or EAL needs and higher ability pupils. It might be appropriate to start the lesson with a task and then follow this up with a plenary and then input informed by children’s knowledge and misconceptions. It might be appropriate to start the higher ability pupils off on a task that applies knowledge learned in the previous lesson at a higher level whilst the rest of the class have their input or it might be appropriate for lessons to be structured in regular chunks particularly when supporting pupils with SEN who might need chunks modelling, practice, modelling, practice and so on.

***Ofsted does not favour any particular teaching style. School leaders and teachers should decide for themselves how best to teach, and be given the opportunity, through questioning by inspectors, to explain why they have made the decisions they have and provide evidence of the effectiveness of their choices. They should not make the assumption that a particular way of working is always necessary or desirable. Its effectiveness depends on the **impact** of the quality and challenge of the work set. **When observing teaching, inspectors should be ‘looking at’ and reflecting on the effectiveness of what is being done to promote learning, not ‘looking for’ specific or particular things. Inspectors should gather robust evidence to judge and report on how well pupils acquire knowledge, learn well and engage with lessons.*****

***School inspection handbook, September 2014, No. 120101, and pp.57-58***

While the planning pro forma for each lesson is open for teachers to plan lessons how they feel is appropriate, key information should still be included in each lesson plan including mental maths focus, key questions, differentiation, adult support, models and images, and assessment opportunities. Modelling must be used in every lesson.

All children individually or in groups along with their targets should be listed. Each lesson plan should show what the children with EAL and children with SEN are doing in the lesson and who the teacher and teaching assistant are working with.

Planning should be shared with TA's. It is their responsibility to be prepared for the lesson knowing who it is the teacher wants them to work with throughout the lesson, including in the input, and what the children are expected to achieve.

Can I's should specify what the children are learning to do by the end of the lesson. These should have a clear focus and should directly relate to learning objectives found on school pupil tracker online. These should be tight and taken from year group expectations

**Planning Pro forma**

<b>Core Learning Strand: I can do it myself</b>		<b>CLS I can.....</b>	
<b>Maths</b>	<b>Date:</b>	<b>Term:</b>	<b>Unit:</b>
<b>Fast Learning</b>		<b>Main Teaching</b>	
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities
<b>Can I _____</b>  <b>Key Vocabulary:</b>  <b>Resources:</b>	<hr style="border: 1px dashed red;"/> <hr style="border: 1px dashed red;"/> <hr style="border: 1px dashed yellow;"/> <hr style="border: 1px dashed yellow;"/> <hr style="border: 1px dashed green;"/> <hr style="border: 1px dashed green;"/> <hr style="border: 1px dashed blue;"/> <hr style="border: 1px dashed blue;"/>	<b>Can I _____</b>  <b>Key Vocabulary:</b>  <b>Resources:</b>	<p>Create success criteria together (where possible)</p> <p>To be successful:</p> <ul style="list-style-type: none"> <li>• Main Input and starter activity</li> </ul> <p>Use cups to differentiate understanding.</p> <p>Green to access immediately</p> <p>Amber _____</p> <p>Red _____</p> <p>Challenge _____.</p> <p>Review (for precision teaching) Can you.....?</p> <p>Peer mark</p> <p>Green/pink/ next steps</p>

## **Mental Maths**

It is important to maintain key maths fundamentals, such as times tables and number facts, through varied and repeated practice so children can solve progressively complex problems. Teachers use assessment procedures to explicitly plan **mental maths** objectives for the following term, for example revising skills taught in the previous term to consolidate knowledge and understanding.

## **Calculation Policy**

The **Calculation Policy**, available to all staff on the T Drive, contains the agreed whole-school methods for teaching the different mathematic operations. It has been written to ensure consistency and progression throughout the school and is used by staff to inform teaching and learning. It is important to recognise though that the ability to calculate mentally lies at the heart of mathematics. Mental calculation is not at the exclusion of written recording and should be seen as complementary to and not as separate from it. In every written method there is an element of mental processing. Written recording will help pupils clarify their thinking and support and extend the development of more fluent and sophisticated mental strategies. Although each method will be taught in the year group specified, children should not be discouraged from using previously taught methods with which they are secure, while the new concepts are becoming embedded. The long-term aim is for children to be able to select an efficient method of their choice that is appropriate for a given task. They should do this by always asking themselves: 'Can I do this in my head?'; 'Can I do this in my head using drawings or jottings?' & 'Do I need to use a written method?' Skills in calculation are strengthened through solving a wide range of problems.

## **Living in a Levels-Free World**

*Below is an extract on assessment from Tim Oates who chaired the panel who informed the review of the National Curriculum.*

The research for the review of the National Curriculum showed that it should focus on **'fewer things in greater depth'**, in secure learning which persists, rather than relentless, over-rapid progression. The new primary curriculum is stated in year-by-year blocks, which helps

teachers trace lines of development through key areas of subjects, yet still focusing on the necessary detail of each subject.

We have no problem with the idea of practice in sports and music. Practice is, however, equally important in maths and English, and in really good education systems, **practice is varied, rich, challenging and engaging**. Focusing on fewer things in greater depth enables pupils to **learn and apply things in a much wider range of contexts, developing secure, deep understanding and skills**. In the old system of levels and undue pace, doing something once was enough to encourage swift moving on to the block of material. Now, the focus is on **secure learning of the real content of the curriculum**.

Children readily grasping material can stay on the same key elements rather than rapidly moving on, expanding and consolidating their understanding. Challenge does not always come from being moved on, but by **being presented with new application of core ideas**.

[http://community.tes.co.uk/national\\_curriculum\\_2014/b/assessment\\_without\\_levels/archive/2014/10/06/living-in-a-levels-free-world-by-tim-oates.aspx](http://community.tes.co.uk/national_curriculum_2014/b/assessment_without_levels/archive/2014/10/06/living-in-a-levels-free-world-by-tim-oates.aspx)

## **Assessment**

We are continually aiming to raise the standards of achievement at Barton Hill Academy.

We see assessment as an integral part of the teaching process and aim to make our assessment purposeful, allowing us to match the correct level of work to the needs of the pupils, benefitting the pupils and ensuring progress. The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. It is not a matter of seeing children meeting an objective a certain number of times. It is about seeing evidence of an objective being met across a range of contexts and at a deeper level. Age related expectation is that each child has mastery at the end of the academic year.

Pupils who grasp concepts rapidly should be challenged through rich, **Low Threshold High Ceiling** tasks (**LTHC**). Pupils will be expected to build firm foundations and not be accelerated through content. Teachers therefore, do not move on to teaching children the objectives from the year above they are currently in. Instead they deepen their understanding and application of skills from their year group. Of course, those children below their academic year group should be accelerated to be in line with year group expectation. Those who are not sufficiently fluent with earlier material will be given opportunity to consolidate their understanding, including through additional practice and support, before moving on, e.g. intervention groups, focus groups.



## **Mathematics is assessed using Target Tracker.**

Dates for inputting assessment data onto Target Tracker can be found on the school Assessment Calendar. It is important for teachers to consider these questions when assessing against key objectives:

- Are children able to use this skill on their own?
- Are they applying it in other contexts such as in topic?
- Can they use it for different audiences and purposes?
- Can they support their peers in using this skill?
- Do they have a deep and secure understanding of how, why and when this skill should be used?
- Have I got evidence?

Because of this, teachers should make their judgements based on clear evidence in **Maths AND Theme books**. This requires there to be appropriate maths work in theme books. Teachers should therefore give children regular opportunities to write across a range of subjects. They will plan for pupils to practise and apply the skills, knowledge and understanding acquired through mathematics lessons in other areas of the curriculum.

**The expectation is that children, from year 1 – 6, should do maths every day and there should be at least one maths task in topic books each term.** Topic lessons will not require lengthy chunks of time to teach maths skills. They should develop what children already know. Medium term plans should show planned cross curricular opportunities. The standards expected in cross-curricular work should match those expected in mathematics lessons.

If there is not enough evidence of independent work, teachers cannot say that a child has achieved a specific target. It is not enough to have taught an objective and therefore say a child is working towards it. There needs to be clear evidence of the child beginning to use it independently.

## **Knowing your children**

A major benefit is that teachers will know much more clearly what their children can and cannot do. This informs teaching as well as groupings in class. For example, teachers will no longer group children according to a common level but rather group them according to a common area of weakness. Through set moderation meetings, key stage meetings as well as informal dialogue, teachers should make consistent judgements and share these with each other. When moderating, staff should look for evidence against specific key objectives. For some objectives, this might require speaking directly with a child to assess their ability.

## **Making judgements**

Evidence for making judgements should come from children's' Maths books, Distance From Learning (DfL) activities, PUMA tests and problem solving/ reasoning tasks.

## **Maths Books, Journals and Presentation**

Every child in Key Stage 1 and 2 should use their **journal** as a way of planning for problems and investigations. They can also act as a space to collect and record ideas. These books need to be available for children to easily access at all times. Journals only require lighter marking. **Mathematics books** should be used to record children's maths work on a daily basis. All work needs to be presented neatly with the date and WALT underlined. Children should use the number date. Clear expectations for the presentation of work need to be shared, modelled and continually reinforced with children. Improvement in the presentation of work is a key goal for the school.

Marking should be in line with the school's marking and feedback policy.

## **Distance from Learning**

Children are continually assessed and their progress recorded. On a regular basis, children will have an opportunity to demonstrate mathematical skills and understanding independently in **Distance from Learning (DfL)** tasks. Distance from Learning forms part of the evidence for assessment. These are kept in a lever arch folder alongside the PUMS tests by the class teacher.

The school subscribes to Testbase where staff can gain access to test like questions - <http://www.testbase.co.uk> .

Individual questions from the White Rose Assessments can also be used as dfl assessments.

## **Progress in Understanding Maths Assessments (PUMA)**

At the beginning of the year all children will take part in the Progress in Understanding Maths Assessments (PUMA). They provide comprehensive information on each pupil - including their Mathematics Age and a diagnostic profile across all of the strands of the new curriculum – and help to monitor small increments of progress. These tests offer a reliable basis for predicting future progress and supporting the setting of targets. They also support a whole-

school assessment approach - with termly tests available from summer in Reception to the end of Year 6.

### Mathematics Targets

Individual maths targets should be set for each child. Targets should be derived from the Key Performance Indicators (foundational learning objectives). These are targets that children need to be fluent in. Once these have been achieved, children’s learning in more difficult tasks will become a lot easier. If a child is secure with this, then they should work on the conceptual targets from their year group.

Once a child has become secure in these foundational targets, teachers should set conceptual targets. These are linked to learning about more complicated ideas.

Foundational Targets	Conceptual Targets
<p><b>Accurate (Beginning)</b></p> <ul style="list-style-type: none"> <li>•Ideally accuracy in excess of 90%</li> <li>•First focus</li> </ul>	<p><b>With support (Beginning)</b></p> <ul style="list-style-type: none"> <li>•Can be from adult or peer</li> <li>•Support, not “doing it for them”</li> </ul>
<p><b>Quick (Secure, if also accurate)</b></p> <ul style="list-style-type: none"> <li>•Ideally responses within a second</li> </ul>	<p><b>By myself (Secure)</b></p> <ul style="list-style-type: none"> <li>•What it says on the tin!</li> </ul>
<p><b>Apply (Mastery)</b></p> <ul style="list-style-type: none"> <li>•Accurate and quick</li> <li>•Applied in other questions or contexts</li> </ul>	<p><b>Supporting someone else (Mastery)</b></p> <ul style="list-style-type: none"> <li>•Providing accurate support for someone else in class</li> <li>•Explaining thinking correctly to an adult</li> </ul>

Individual maths targets should be displayed on a flip up target sheet at the front of each Maths book so they can act as a prompt. Targets can be layered underneath each other ensuring that the child, whilst moving onto a new target, remembers previous achieved targets and continues to show this in their work. Targets should reference the year group they have been taken from and whether it is foundational or conceptual (F/C). When marking, teachers should identify when a child have met their target by highlighting the evidence in a pink pen/highlighter.

Evidence of children meeting their target should be found in Maths and Theme books. When targets are put into books, the date should be written on the sheet.

Targets should be changed when teachers are confident that a child has confidently met the target, can apply it across a range of contexts and evidence is present in books. Teachers should use their professional judgement to do this. Children should be involved in self-

assessment and be encouraged to find evidence in their work of where they have met their target.

Children should not only know their targets but also understand how to improve their work to meet them. Guided work with the teacher or TA might focus on these targets during a lesson or at other points in the day, perhaps interventions in the afternoon. It is therefore important that TAs are also familiar with children's targets.

### **Tuition**

Through data analysis and achievement team meetings, children who have been identified as slow movers might be put forward for one to one or small group tuition. It is expected that tutors and class teachers keep in constant and clear communication regarding known weaknesses, key objectives taught and progress. It is also expected that targets, focused on during tuition, are relayed and evident in class work.

### **Celebration**

Teachers should use displays within their classroom to celebrate progress and outstanding pieces of work. During class assemblies teachers should pass out certificates to celebrate good **progress/effort in Maths**. Good teaching should develop a culture and ethos of scholastic excellence, where the highest achievement in academic work is recognised, especially in supporting the achievement of the most able.

### **Working Wall and the Learning Environment**

A child's learning environment should promote confident and purposeful learning and should be continuously adapted to match the learning needs of the child. Working walls are to be used to display key methods and models, representations and vocabulary. They should illustrate the sequence of learning at that particular time so that children can refer to these throughout their work. Displays should be relevant to current learning as well as celebrate prior work and thinking. The learning environment beyond the classroom should be utilised to give opportunities for maximised learning.

All classes should have vocabulary banks related to the four operations on display as well as the agreed problem solving framework. There should also be a Cracking Times Tables display evident. See the Learning Environment Non-Negotiables for further guidance on learning environment expectations.

## **Stamina Exercises**

In connection with the school priority on raising the attainment in maths, teachers should aim to develop and improve children's stamina in mathematics. Stamina exercises are challenges for learners against the clock. Learners are asked to do as much as possible of a task within an allotted time. This builds accuracy and fluency, since learners improve their performance by becoming less reliant on the supports that have been provided. It offers great opportunities for learners to self-assess and compete against themselves in setting successive personal bests.

Teachers should bear in mind that these are Foundational Learning exercises that help to ensure that learners gain essential accuracy and fluency in underlying knowledge and skills using minimal amounts of time, so as to prime learners and liberate learning time for higher order Conceptual Learning.

*Adapted from NAHT Aspire, 2014, Precision Pedagogy Teacher Handbook, p.35*

## **Fast Learning**

Mathematical proficiency requires a focus on core knowledge and procedural fluency so that pupils can carry out mathematical procedures flexibly, accurately, consistently, and appropriately. Procedures and understanding are developed in tandem. Children 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.

Fast Learning is based on research on learning - particularly Foundational Learning that is designed to ensure children achieve high levels of fluency in fundamental maths and writing skills. Teachers should dedicate time to Foundational Learning within the Fast Learning Sessions to enable children to develop the skills they need and release more curriculum time for Conceptual and Collaborative learning opportunities that lead to deeper understanding and real life application. The Fast Learning Handbook produced by NAHT Aspire provides information and detail on how these sessions should be run.

## **Cracking Times Tables**

Each week, children will participate in Cracking Timetables.

## **Homework**

Regular, differentiated homework should be set that challenges all pupils. This might practise, consolidate or extend skills taught within the classroom. All children should be set maths homework on a weekly basis. These may be consolidation exercises or work towards personal targets.

## **Information and communication technology (ICT)**

Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. Teachers should use their judgement about when ICT tools should be used

## **Maths Websites & Resources**

### **NCETM**

The aims of the National Centre for Excellence in the Teaching of Mathematics (NCETM) are to raise levels of achievement in maths, and to increase appreciation of the power and wonder of maths, across schools. Registering on the portal costs nothing, and is very easy to do. All staff are encouraged to create their own accounts.

Once registered, staff will have full access to all information on the portal. Through the website, teachers can check and refine their subject knowledge and pedagogy, view exemplification materials, access an archive of classroom based research and resources to support teaching and learning, and view videos of key concepts being taught by other practitioners. Registered users will also have access to the Personalised Learning Space (PLS) which includes Self-Evaluation Tools (SET) - <https://www.ncetm.org.uk/>.

### **NRICH**

NRICH promotes the learning of mathematics through problem solving. Problems and resources linked to the Primary Curriculum, with support for teachers, can be found on the site - <http://nrich.maths.org> produced by the Millennium Mathematics Project at the University of Cambridge.

### **Wild Maths**

Wild Maths is a collection of mathematical games, activities and stories encouraging children to think creatively <http://wild.maths.org/> . It is aimed at 7 to 16 year olds exploring maths. Wild Maths provides rich and open-ended resources, designed to encourage exploration and discovery,

### **Testbase**

Testbase offers Sat questions and teaching resources linked to the National Curriculum – [www.testbase.co.uk](http://www.testbase.co.uk)

## Check the universal offer – Mathematics

Review the checklist below in relation to a typical day in your classroom and identify any areas that you could develop to provide a great context for more focused mathematics

Reflections on the Learning Environment for Mathematics	
Focus area	RAG rating
Foundational learning strategies are used regularly to build and maintain fluency in number facts (addition, subtraction, multiplication, division and equivalences between fractions and decimals)	
Mathematical thinking is taught directly, displayed in the classroom and represented in children's books in graphic organisers	
Teacher's mathematical thinking is articulated aloud when working on examples and emphasised in pupil feedback	
Regular and explicit links are made between maths in the classroom and the real world	
Teach guided maths to help pupils to develop a range of mental calculation strategies and enable them to select the most effective strategy for any situation.	
Teacher and pupils consistently record their working and thinking with their solutions or accounts of their work.	
Pupils sometimes work in mixed ability pairs so that more able pupils can model how they explore and talk about mathematics.	
Practical equipment is available and used whenever possible to create an image or model to draw upon	
Clear formative feedback is provided with next steps (e.g. 2 stars and a wish) and ensure pupils have time to respond and improve their work in lessons	
Pupils regularly self and peer assess against 'I can' statements at the appropriate levels.	

development.

**Red – this is rarely seen in my classroom**

**Amber – this is seen in my classroom, but is inconsistently implemented**

**Green – this is consistently implemented in my classroom**



## **Key foci in the teaching of Mathematics across the primary year groups**

### **EYFS**

- Provide practical, hands-on experiences of using, comparing and calculating with numbers and quantities.
- Promote the development of mental methods
- Begin to teach addition and subtraction together, as inverse operations.
- Make the most of everyday routines and spontaneous learning to develop mathematical skills and concepts
- Support, challenge and extend children's mathematical thinking and learning
- Use accurate mathematical language
- Give children opportunities to record their understanding and thoughts in early mathematical mark making

### **Y1**

- Provide practical, hands-on experiences of using, comparing and calculating with numbers and quantities.
- Promote the development of mental methods
- Finding related facts from known facts
- Application of number to problem solving on a regular basis
- Teach addition and subtraction together, as inverse operations.

### **Y2**

- Provide practical, hands-on experiences of using, comparing and calculating with numbers and quantities.
- Promote the development of mental methods
- Finding related facts from known facts
- Application of number to problem solving on a regular basis
- Prioritise the understanding of place value, fluency in mental methods, and good recall of number facts.
- Consolidate pupils' understanding of addition and subtraction as inverse operations.
- Begin to teach multiplication and division together, as inverse operations.

### **Y3**

- Provide opportunities for finding related facts from known facts
- Provide opportunities for pupils to apply number to problem solving on a regular basis
- Continue to value mental methods as first port of call above formal written methods
- Provide structured and guided opportunities to develop a range of mental calculation strategies
- Focus on selecting an efficient method for specific calculations.

- Prioritise the understanding of place value, fluency in mental methods, and good recall of number facts.
- Teach multiplication and division together, as inverse operations.

#### **Y4**

- Provide opportunities for finding related facts from known facts
- Provide opportunities for pupils to apply number to problem solving on a regular basis
- Continue to value mental methods as first port of call above formal written methods
- Provide structured and guided opportunities to develop a range of mental calculation strategies
- Focus on selecting an efficient method for specific calculations.
- Introduce traditional vertical algorithms(methods) for addition, subtraction, multiplication and division, for those pupils who are fluent in mental methods and have a good recall of number facts.
- Consolidate pupils' understanding of multiplication and division as inverse operations.

#### **Y5**

- Provide opportunities for finding related facts from known facts
- Provide opportunities for pupils to apply number to problem solving on a regular basis
- Continue to value mental methods as first port of call above formal written methods
- Provide structured and guided opportunities to consolidate a range of mental calculation strategies
- Focus on selecting an efficient method for specific calculations.
- Promote further understanding of traditional vertical algorithms (methods) for addition, subtraction, multiplication and division, for those pupils who are fluent in mental methods and have a good recall of number facts.

#### **Y6**

- Provide opportunities for finding related facts from known facts
- Plan opportunities for pupils to apply number to problem solving on a regular basis
- Continue to value mental methods as first port of call above formal written methods
- Provide structured and guided opportunities to consolidate a range of mental calculation strategies
- Consolidate traditional vertical algorithms (methods) for addition, subtraction, multiplication and division, for those pupils who are fluent in mental methods and have a good recall of number facts.

## White Rose Planning 2016 – 2017

Use the curriculum overview from the White Rose Planning as the MTP for Maths .

Year 1 Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value		Number: Addition and Subtraction			Country: Money	Number: Place Value		Number: Addition and Subtraction			
Spring	Time	Place Value		Number: Addition and Subtraction	Measures: Length and Height	Number: Multiplication and Division		Number: Fractions				
Summer	Number: Place Value		Number: Four Operations		Measurement: Money		Measurement: Weight and Volume					

The curriculum overviews will link to three schemes of learning (Autumn, Spring, Summer) detailing the objectives covered for each part of the year.

Year 1 - Autumn - Mastery (New Draft) V4.1.13.pdf

Term by Term Objectives

Year Group	Y1	Term	Autumn	Year 1							
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Number: Place Value	Number: Addition and Subtraction	Country: Money	Number: Place Value	Number: Addition and Subtraction	Number: Addition and Subtraction	Number: Addition and Subtraction	Number: Addition and Subtraction	Number: Addition and Subtraction	Number: Addition and Subtraction	Number: Addition and Subtraction	Number: Addition and Subtraction

Each scheme of learning provides exemplification for the objectives covered. The schemes are broken down into Fluency, Reasoning and Problem Solving sections which detail types of questions, activities and resources to be used when teaching the objectives.

Year 1 - Autumn - Mastery (New Draft) V4.1.13.pdf

Term by Term Objectives

Year Group	Y1	Term	Autumn	Year 1
Place Value	Fluency	Reasoning	Problem Solving	All students
Count, read and write numbers to 100 in numerals and words.	Using number lines to 100, 20, 10, 5	Find a number to read the value on the number line	Find a number to read the value on the number line	Find a number to read the value on the number line

Teachers plan maths teaching sequences which move children from the basic fluency questions they need to answer into problem solving and applying (all located in the schemes of learning). At the end of a teaching sequence all pupils will be able to problem solve and apply their learning. Units within the curriculum overviews of the White Rose planning last between 2-3 weeks ensuring children can confidently problem solve. Teaching sequences planned by teachers will match the time allocated within the curriculum overviews to embed and secure knowledge within pupils. When creating a learning sequence teachers plan how and when children will be assessed and the evidence that they will use to support their assessment judgements (recall of fluency questions/ answers to reasoning questions/application of knowledge in problem solving/dfi questions).

The assessment papers linked to the White Rose Planning are to be used as dfl activities and as such only relevant parts of the test will be given 2-3 weeks after a teaching sequence has finished.

## Maths actions for 2016/2017

These actions have been developed by staff at Barton Hill Academy during 2015/2016 Achievement team meetings. The actions were implemented and their impact evaluated during 2015/16. Achievement team leader shared with SLT the actions which had the biggest impact on pupil progress. These actions are detailed below.

## Ninja maths

When teaching concepts of number, addition, subtraction, multiplication and division teachers will use a set of whole school agreed actions which will link together the abstract symbols and all words associated with them. These whole-school actions are available in the Maths folder, Ninja maths actions on the shared drive. These actions should be displayed as part of the maths learning wall to support the concepts that are taught as outlined in the White Rose Curriculum Overview.

## Modelling answers to higher order questions

Higher order questions allow opportunities for all pupils to be challenged throughout maths lessons. Higher order questions are also used to assess the conceptual understanding of pupils and therefore adjust lessons accordingly. Pupils are taught how to answer and reason through teacher modelling and scaffolding. Pupils are given sentence structures to support their reasoning e.g. 'I know the missing symbol has to be ..... because....'.

Teachers will focus on one type of question at a time in order to embed the skills needed to answer the questions e.g. one week of responding to always/sometimes/never questions before moving onto add/remove/replace questions. Different types of higher order questions can be found in The White Rose planning, Wiltshire 27 document and Progression in Reasoning document, all resources are in the maths folder on the shared drive.

Number: Number and Place Value with Reasoning

National Centre for Excellence in the Teaching of Mathematics

Year 3	Year 4	Year 5	Year 6	Year 7
count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number	count to and across 1000, forwards and backwards, beginning with 0 or 1, or from any given number	count to and across 1000, forwards and backwards, beginning with 0 or 1, or from any given number	count to and across 1000, forwards and backwards, beginning with 0 or 1, or from any given number	count to and across 1000, forwards and backwards, beginning with 0 or 1, or from any given number
count, read and write numbers to 100 in numerals, count in multiples of twos, fives and tens	count in steps of 2, 5, 10 and 1000, forwards and backwards	count in steps of 2, 5, 10 and 1000, forwards and backwards	count in steps of 2, 5, 10 and 1000, forwards and backwards	count in steps of 2, 5, 10 and 1000, forwards and backwards
Spot the mistake: 45-45=25 What is wrong with this sequence of numbers? True or False? 1 start at 2 and count in 1	Spot the mistake: 20,000,11,100 What is wrong with this sequence of numbers? True or False? 58 is a multiple of 8? 1 start at 3 and count in	Spot the mistake: 20,000,11,100 What is wrong with this sequence of numbers? True or False? 58 is a multiple of 8?	Spot the mistake: 900, 970, 8000, 1200 What is wrong with this sequence of numbers? True or False? 324 is a multiple of 9?	Spot the mistake: 177000, 187000, 197000, 217000 What is wrong with this sequence of numbers? True or False? When I count in 10's I will say

## Wiltshire 27 - Early Years Foundation Stage

Objective	Always/Sometimes/Never	Thinking questions	Add, Remove Replace
Say and use number names in order in familiar contexts.	A six follows a five.	Have two sets of numbers from 0 – 10 with different ones missing. Order the two sets of numbers. What's the same and what's different? What if we had another set of numbers with some missing?	Have a selection of baskets in a basket e.g. one red one, two blue ones, three yellow ones, five green ones, eight white ones. Sort them on a washing line. What do you notice? What if we had these other baskets?
Count reliably up to ten everyday objects.	When I count a pile of bricks there are 10. When I count objects 6 comes before 7.	Show several groups of nine objects. What's the same and what's different? Why? What if we put some more in each group? How do you know?	Take a pile of cubes and count them. Remove some and count the pile again. What happens? Put the cubes back. What do you notice? What if I started with a different pile of cubes?

### **Apparatus/manipulatives**

Apparatus and manipulatives are used to support understanding of the notions of numbers, the relationships between them and the ways in which they work in the number system. At Barton Hill Academy manipulatives will be used in order that children understand concepts before learning formal procedures. The calculation policy details how manipulatives will be used for the areas of addition, subtraction, multiplication and divisions and how the manipulatives are used in order to support progression as children move throughout Key Stage 1 and Key Stage 2.

### **Real life experiences**

At Barton Hill Academy maths will be made meaningful by providing pupils with problems and examples demonstrating its applications in everyday life. Pupils will learn to see the links between mathematics in own lives and real-world contexts. Problem solving will be linked to themes studied. Current events and issues and the local environment will be used to make mathematics meaningful and purposeful.