Purpose

The purpose of this policy document is:

- to set out our school's agreed approach to the mathematics curriculum the intent and practice for the teaching and learning of mathematics within our school
- to ensure that everyone involved in the teaching of maths has a clear understanding of the agreed policy in order to provide consistency across the school
- to inform other stakeholders, eg. the governing body.

The Importance of Mathematics

Mathematics equips pupils with a uniquely powerful set of tools to understand and change the world. These tools include logical reasoning, problem-solving skills and the ability to think in abstract ways (National Curriculum Orders, 2000).

Mathematics provides a powerful universal language and intellectual toolkit for abstraction, generalisation and synthesis. It is the language of science and technology. It enables us to probe the natural universe and to develop new technologies that have helped us control and master our environment, and change societal expectations and standards of living. Mathematical skills are highly valued and sought after. Mathematical training disciplines the mind, develops logical and critical reasoning and develops analytical and problem-solving skills to a high degree (Smith 2004, Making Mathematics Count).

<u>Aims</u>

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

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

National Curriculum 2014

In addition to the aims above, we also endeavor to:

- promote enjoyment and enthusiasm for learning through practical activity, exploration and discussion
- develop every individual's potential in mathematics by becoming independent, confident and logical thinkers with flexibility
- develop a thorough knowledge and understanding of the numbers and the number system
- develop the importance of using mathematical language as a means of communicating ideas and concepts
- develop efficient mental methods accompanied by quick recall of basic facts ('Mental Methods Matter Most')

- develop efficient written methods, to be used when a mental method is inefficient or impractical
- develop an understanding of the importance of mathematical skills in everyday life.
- develop a belief that everyone can succeed in maths. Our maths mascot (our 'havea-go' hero) can be seen in various places such as our maths workbooks, and its superpowers all relate to having a growth mindset.

Maths in the Early Years

As with all learning within the Early Years Foundation Stage Maths teaching and learning opportunities are planned for and experienced in a variety of ways, balanced across each day and week including:

•Child Initiated Activities - children make choices from within the learning environment to meet his/her outcome for learning.

•Adult Initiated Activities- practitioners provide the resources to inspire, promote and consolidate learning.

•Adult Led Activities – Children engage in planned activities with a practitioner that are designed to meet specific learning outcomes; this includes whole class, large and small group teaching.

Continuous Provision for continuing children's learning and development, linked to each Area of Learning, within the environment are designed to engage children in practical, first-hand experiences which will support children to discover, explore, investigate, develop their personal interests and areas of curiosity, and help to make sense of the world around them as they begin to understand specific concepts. Play opportunities are also set up to provide children with opportunities to apply newly acquired knowledge, demonstrating their skills and level of understanding.

The Maths 'diet' in Early Years

Maths is one of the Specific Aspects of Learning within the Early Years Foundation Stage framework and is split into two distinct areas – Number and Shape, Space and Measure.

Every day specific Maths 'fluency' activities are planned for with all children being involved in specific activities to develop and embed key Maths skills and principles in relation to Number. Embedded routines within the day are also explicitly linked to key Maths concepts such as time and sequencing.

Specific objectives are planned for each week and taught as part of whole class and small group adult led activities. All planned activities are linked to Development Matters and the Early Learning Goals later in the year, children's stages of development and matched next steps in learning using detailed 'Objective Led Planning'. All adults use this planning document to annotate observations and feedback of children's learning which then feeds into planning their next steps in Maths.

In addition to this Maths opportunities are also planned into the continuous provision within the environment as part of the weekly planning process. Opportunities to explore, investigate, revisit, consolidate and practise Maths skills are embedded within all aspects of the learning environment both inside and outside using real, concrete resources as well as enhanced by specific resources added by practitioners linked to key objectives that have been taught or are needing to be embedded. These opportunities are open ended with no ceiling, linking to the Mastery approach where all children have to opportunity to experience and embed their understanding at a greater level and to experience a full range of Maths concepts.

Children identified as being at a much earlier stage of development with their Maths skills or who are experiencing challenges in developing particular mathematical skills or understanding are given additional opportunities with an adult to revisit and develop either through specific focus activities or within their play, however the child is most motivated and engaged to learn.

Assessment:

The main EYFS assessment method is through practitioners' observations of children in different teaching and learning contexts, including both adult led activities and child initiated play. All adults use the weekly objective led planning documents to annotate observations and feedback of children's learning which then feeds into planning their next steps in Maths.

Observations take place on a daily basis (both formally and informally). Practitioners make time to carry out planned observations of individuals and groups of children regularly. They also make spontaneous observations in order to capture significant moments of children's learning. These observations are captured and recorded by all adults using the Tapestry Learning Journey app

On entry to school and then at termly intervals a summative assessment in all Areas of Learning, including Number & Shape, Space and Measure is made using the Development Matters age related bands and entered into the school tracking system Insight. Class teachers and senior leaders then analyse the data to inform next steps at individual, group, class and cohort level.

In June of their Reception year children are assessed against the Early Learning using the statutory goals and guidance in place. Children will be assessed as meeting the ELG, Exceeding the ELG or Emerging against the ELG. Assessment against the ELG and ELG+ criteria uses a 'best fit' approach. Attainment is reported to the Local Authority and to parents in children's annual reports in July each year. School are regularly moderated to ensure the accuracy and validity of teachers' judgements. Nunnery Wood Primary School Early Years were moderated in May 2019.

Parental engagement and communication:

In the Spring and Summer terms bi-weekly 'Look and Learn' sessions are held where parents are invited into school for a half an hour session to join in with their child's learning in their class. Each week's session is linked to a specific area of learning or theme and both Number and Shape, Space and Measure are included in the Spring term. Parents are also information about what their child is learning, the mathematical skills and concepts they need to secure and ways in which they can support this at home with their child.

During the Summer term 'Maths Detectives' home learning challenges which are fun and practical are sent home regularly, linked to specific aspect of the Maths Early Learning Goal. Children and their families are encouraged to take part and either bring in or upload to their Tapestry Learning Journey what they have done at home to complete their challenge.

Maths in Years 1 to 6

The **mastery approach** is used in years 1 to 6. During lessons, the vast majority of pupil's progress through the curriculum content at the same pace. Differentiation is achieved by emphasising deep knowledge and through individual support and intervention. Teaching is supported by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge. Practice and consolidation play a central role. Carefully designed variation (Do it; Twist it; Deepen it) activities build fluency and understanding of mathematical concepts. Teachers and teaching assistants use questioning to test conceptual and procedural knowledge and they orally assess pupils regularly to identify those requiring

intervention, so that all pupils keep up. Children work with their learning partners in most lessons.

The CPA approach is central to maths mastery and classrooms are fully equipped with resources to support learning, such as Numicon, Diennes, number lines, 100 squares, place value counters, bead strings and digit cards. Children have the opportunity to use concrete objects and manipulatives to help them understand what they are doing. They also use pictorial representations, which can then be used to help reason and solve problems. Both concrete and pictorial representations support children's understanding of abstract methods.

PLANNING

The long term objectives for each year group are stated in the 2014 National Curriculum and are used as the basis for implementing the statutory requirements for mathematics. We also use the White Rose Maths Hub Yearly Overview for each year group, as a guide for the amount of time to be spent on each topic area.

Teachers work together in teams during weekly PPA sessions to create each sequence of learning. Lesson plans take the form of teaching and learning slides (on Active Inspire). These display the WALHT, expert vocabulary, key questions, resources, small steps and activities for each lesson. Slides can be accessed in the Staff Resources area of the school's network.

TEACHING AND LEARNING

The **mastery approach** is used from years 1 to 6. During lessons, the vast majority of pupil's progress through the curriculum content at the same pace. Differentiation is achieved by emphasising deep knowledge and through individual support and intervention. Teaching is supported by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge. Practice and consolidation play a central role. Carefully designed variation (Do it; Twist it; Deepen it) activities build fluency and understanding of mathematical concepts. Teachers and teaching assistants use questioning to test conceptual and procedural knowledge and they orally assess pupils regularly to identify those requiring intervention, so that all pupils keep up. Children work with their learning partners in most lessons.

FLUENCY

We believe that children need to be fluent in the fundamentals of mathematics. They need varied and frequent practice, so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. Throughout each week, teachers provide children with a range of activities to develop their mental recall and fluency levels appropriate to the year group. Activities may include counting, chanting, timed quizzes, use of resources, singing and games.

INTERVENTIONS

'Plug the gap' interventions take place on a very regular basis, where the aim is 'keep up', rather than 'catch up'. Where possible, these are run by the teachers or teaching assistants who have worked with the children that day or that week. Individuals or very small groups of children have the opportunity to practice further, which then allows them to continue with their learning in subsequent lessons.

ASSESSMENT AND REPORTING

ASSESSMENT is an ongoing process that informs next steps in planning, teaching and learning. In this way, assessment is *for* learning. We assess children's work in maths in a variety of ways:

<u>Short term</u>: ongoing daily teacher assessment is used to inform our short-term planning. Teachers can make use of a range of assessment tasks to start and end a sequence of learning. These help to find out where the gaps in knowledge are and to assess progress made at the end of the learning sequence.

<u>Medium term</u>: we make use of assessment tasks and tests to measure children's progress against key objectives covered. We use tracking grids on our schools assessment system (INSIGHT) to track progress of groups and individuals. Class teachers and senior leaders then analyze the data to inform next steps at individual, group, class, cohort, key stage and whole school level.

<u>Long term</u>: towards the end of the school year assessment activities are undertaken at the end of both key stages. In year 2, tests are currently used by teachers to assess children's performance and to help inform the assessment level awarded at the end of the key stage. They take place in May and June and the results are used diagnostically. Teacher assessment is moderated internally and it is also moderated periodically by the authority to ensure the consistency of judgments.

In year 6, Statutory Standard Assessment Tests (SATs) are taken by all year 6 children in May. The papers are externally marked and the results are sent back to the school in July. Results are evaluated and strengths and areas for development are identified to inform future teaching. The results are sent out to parents and the relevant high schools.

REPORTING

Parents are informed in writing of the progress their child has made and their attainment compared with national expectations for the year group in an annual progress report issued during the latter part of the summer term. Termly parents' consultations are offered, when teachers report verbally on progress, attitude and attainment.

PUPIL PROGRESS MEETINGS

Pupil progress meetings (PPMs) are held every term to discuss the progress of children who have been identified as vulnerable to underachievement. These meetings are attended by members of the SLT, the class teacher and the SEND manager. Individual children's specific learning difficulties are discussed and interventions and next steps are identified to ensure at least satisfactory progress is made over the course of each term.

PUPILS WITH SEND AND INDIVIDUAL PROVISION MAPS (IPMS)

Teachers aim to include all pupils fully in their mathematics lessons. All children benefit from the emphasis on oral, mental and practical work, however, a pupil whose difficulties are severe or complex may need to be supported with an individualised provision map (IPM) which is tailored with specific targets to meet their individual needs.

MORE ABLE AND GIFTED PUPILS

More able and gifted pupils are taught with their own class and challenged through quality first teaching, matched activities and open-ended challenges. We greatly value any opportunities to participate in external events such as STEM workshops and inter-schools competitions and quizzes.

MATHEMATICS ACROSS THE CURRICULUM

All children are provided with a range of learning opportunities in order to extend and develop their mathematical skills. These opportunities occur across the curriculum, where links between mathematics and other subjects are made. ICT is used in various ways to support teaching and to motivate children's learning; it involves using computers, calculators, programmable robots and a range of software and audio-visual aids.

TIMES TABLES

Children begin to learn their tables by counting in steps of 2s, using concrete manipulatives such as shoes, socks, hands etc. They then move on to using manipulatives such as counters or multilink cubes and pictorial representations of objects, forming arrays. Children learn that multiplication is commutative by turning the arrays around to show that 5 groups of 4 and 4 groups of 5 both total 20. This is linked to recalling multiplication facts, i.e. if they know their 5 times table as facts but not their 4 times table, they can use 4×5 to work out 5×4 . They also learn that multiplication is the inverse of division.

Resources such as numicon, counters, games, Number Fun songs and various internet games and apps are used to develop knowledge of tables and division facts. Peer tutoring is also very successful. Times Tables Rockstars (TTRS) is used to develop rapid recall of times tables and division facts by all children from year 1 upwards and children find this very motivating.

School certificates are awarded as tables and division facts are learnt. Ultimate Bombardment certificates 1 and 2 are given out in key stage assemblies to celebrate the demonstration of rapid recall of all tables and division facts to 12x12.

In key stage 2, a weekly Times Table challenge is completed. The winning class keeps 'Times Table Ted' for the week and this promotes a healthy level of competition between both classes in each year group. In preparation for this, a weekly set of times tables and division fact questions is sent home for children to practise. Teachers may also set times table activities as part of weekly home learning.

FEEDBACK AND MARKING – see separate policy

MONITORING

Monitoring of teaching and learning in maths is undertaken by the members of the Senior Leadership Team on a regular basis as part of regular school self-evaluation strategies. Monitoring activities include:

- data analysis
- book looks with staff
- discussions with staff
- discussions with pupils
- lesson visits and learning walks
- intervention evaluations
- planning scrutinies

PUPIL VOICE Y4 Maths Mastery interviews March 2019

- I really like it we do different activities which get harder (do it, twist it, deepen it)
- It's my favourite subject

- We learn lots of different methods
- We do things step by step and if you get it there is always another challenge to do
- I like working with my LP because we help each other and explain things to each other
- We use lots of apparatus like place value counters which is really helpful when we solve problems
- Children always use the apparatus sensibly
- Sometimes I don't need to use the apparatus because I can do it mentally
- We draw more pictures and diagrams than we did in year 3
- When it's hard we use a different method
- We use each other as teachers (RF explains things to us very clearly)
- We learn how to do compact methods
- Its great fun
- It's easy, but not too easy
- We use apparatus and do drawings and solve problems all in one lesson
- This school is brilliant at maths.

STRUCTURE OF MATHS MASTERY LESSONS AT NUNNERY WOOD PRIMARY SCHOOL

(45-50 minutes + 15 minutes fluency)

- Everyone working together.
- Children usually sit with their Learning Partner.
- Planning starts from NC objectives.
- Small steps created using White Rose to support the process.
- Planning is on the lesson flipchart itself.

<u>DO IT</u> (20-30 minutes)

- Main teaching part of lesson.
- Clear learning objective is shared.
- What is it? What is it also? What is it not? Show me one that no-one else will get. Show me a hard one, show me an easy one.
- four-six examples maximum
- Fluency basic skill can they do it?

TWIST IT (15 minutes)

- One or possibly two examples with oral/written reasoning.
- Teacher modelling of explanation skills do a twist it similar to one they will try (APE)
- What might they get wrong? Address any misconceptions.
- Range of different activities eg. Spot the Mistake. Do you agree? Prove it. T/f? Show, draw, explain, prove; what is the same, what's different?; odd one out and why?

DEEPEN IT (5-10 minutes)

- No new concepts.
- Extra challenge low threshold, high ceiling activities.
- Problem solving to get children to think a bit more.
- Link to other areas of maths.
- How many ways can you...? (open-ended tasks).
- Always, sometimes, never? Tell me more...Here's the answer, what's the question; how many possibilities? Find the correct solution which one is it not; sort it.

<u>REVIEW</u> (5 mins)

- Go through TWIST IT and DEEPEN IT tasks.
- Revisit the learning objective shared at the start. Have they got it?
- If so, they are ready to move on to tomorrow's lesson.
- Plug the gap will follow before next lesson for any who have not go it.

FLUENCY FUN AT NWPS

<u>RATIONALE</u>

The National Curriculum states that pupils should become fluent in the fundamentals of mathematics through varied and frequent practice. Fluency is also one of NCETM's 'Five Big Ideas of Teaching for Mastery,' where it is defined as, "quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics".



To ensure children don't forget the basics as they move from one unit of Maths to another we have added in some 'Fluency Fun' time every day to enable children to simply practise essential skills, such as rapid recall of number bonds and tables facts that they have already been taught.

WHAT DOES A FLUENCY FUN SESSION LOOK LIKE?

- There is a clear, pre-planned focus for the 'Fluency Fun' session in line with the school's weekly structure
- All children are active for the majority of each session (10-20mins)
- Children are working in pairs talking, playing, sharing strategies, singing, chanting, jotting, etc
- *Key skills and facts that have been already taught are being practised no new learning*
- Appropriate expert vocabulary is always used

RESOURCES USED MAY INCLUDE:

- counters
- dice
- games

- playing cards
- ipads
- wipeboards
- jotters
- songs and rhymes
- number lines
- speedy tables
- speedy pairs
- TTRS
- number of the week sheet (see below)



WEEKLY FLUENCY FUN PLAN

Mon: addition and subtraction

Tues: multiplication and division

Wed: clever counting and fabulous facts

Thurs: class challenge (KS2 timestables, number bonds)

Fri: use it, don't lose it!

MATHS FEEDBACK POLICY

By providing effective feedback to children and actively involving them in this process we give opportunities for learners to improve upon their work and hence, make progress.

EFFECTIVE FEEDBACK

- focuses on the learning objectives/success criteria
- lets the child know how well they've achieved
- lets the child know what they need to do to improve or extend learning
- lets the child carry out improvement on the work or revisit the skill or apply their learning

FEEDBACK:

- is linked to the mathematical learning objective
- takes account of the success criteria, where appropriate
- should be both verbal and written
- can take many written forms e.g. mathematical questions to answer; comments from teacher and child's responses; symbols to indicate suggested developments (see over)
- highlights good features of learning (specific to the mathematics so that the child knows what aspects of their work has earned this praise), as well as identifying areas for development
- provides next steps to move learner forward
- is a two way process. Children should be encouraged to reflect on their work during a lesson and write a plenary sentence/draw a symbol at the end of a piece of work
- response is essential for development: opportunities should always be provided for children to respond to the teacher's feedback in relation to their own work

REFLECT ON YOUR OWN PRACTICE

- Does the feedback (both oral and written from appropriate adults and peers) to children, focus on the learning?
- Does the feedback make children aware of the achievements they have made in relation to learning objectives?
- Does feedback provide clear pointers for next steps to move the learner forward?
- Do you use a range of strategies for feedback marking?
- Do the children understand/use the feedback to improve their work?
- Are children given time to respond to feedback?
- Is there evidence that children act upon the feedback to improve their work?
- Is this feedback given regularly (at least twice each week)?

'It would be impossible, impractical and unmanageable for every piece of work to be used for formative assessment and 'quality marked'. Teachers will need to decide which pieces of work to give detailed attention and which they are simply going to acknowledge.' Shirley Clarke – 2001

WHAT COULD FEEDBACK LOOK LIKE IN MATHS?

KEY STAGE 1 <u>Number formation:</u> Reversals need to be corrected (at the time, whenever possible) <u>Rewrite or remodel an example:</u> 37 + 5

Child recorded

37 + 5+3 +2

37 40 42

Corrected recording

Now try this one...

Self-correcting:

- Can you see where you have made your mistake?
- Check your place value in question 5
- I make the answer to this question... Check that I'm right
- 2 of your answers are wrong, spot which ones they are and correct them

Remember... to count on from the larger number.

Using a symbol or code:

$\odot \checkmark \checkmark$	achieved
•••	achieveu

•	please check this
VF	verbal feedback

(T) target achieved

TA/initials marked by TA/other adult

KEY STAGE 2

Rewrite or remodel an example:

52 - 38 =

50 - 30 = 20

8-2 = 6

52 - 38 = 26 Child recorded

.....

52 - 38 = 52 - 30 = 22 22 - 2 - 6 = 14 Corrected recording

Now try this one...

Self-correcting:

- Can you see where you have made your mistake?
- Check your place value in question 5
- I make the answer to this question... Check that I'm right

• 2 of your answers are wrong, spot which ones they are and correct them

Remember... to count on from the larger number.

Using a symbol or code:

\checkmark	achieved
•	please check this
\searrow	verbal feedback
T	target achieved
M?	could you have used a mental method?
TA/initials	marked by TA/other adult

Peer/Self Marking:

Check by redoing; using the inverse operation; using another method or using a calculator

✓ achieved

Circle error then redo by the side

Ask a closed question...

- What number is 30 less than 64?
- What fraction is equivalent to 25%?
- What method would you choose to calculate 564 divided by 6?

Ask an open question...

- Tell me two two-digit numbers with a difference of 12
- What even numbers lie between 10 and 20?
- Find 3 ways of completing: ...% of ... = 30
- $\Box \times O = 20$: What could the missing numbers be?
- These numbers are in order, largest to smallest
 56 45 37 33

Think of a number that could go into each of the empty boxes

- Draw a triangle with a line of symmetry that does not have a right angle
- If $7 \times 8 = 56$ what is 0.07 x 8? Give some other decimal facts that are linked to this fact
- Give me 3 division questions that have a remainder of 1
- Suggest sensible units you might use to measure the height of you table
- Tell me two lengths that together make 1 metre
- Write what the missing digits could be:

 ¹ 10 = 3

Can you write down some multiples of 4?

I'll start → 4, 8, <u>12 16 20 24</u> ✓

4092 = 4000 and 0 and 90 and 2 ✓ 35 = 22 and 13 ✓

Can you find another way to partition? Read mine You try 35 = 23 and 1235 = 22 and 13 ✓ £1.00 10p 20p 10p 10p 10p 10p 10p 10p 10p Well done 😳

Can you write the coins you would use to make £1.07?



Finishing a sentence...

- 36 can be partitioned into and
- Two numbers < 200 are and
- All multiples of 5 end in and
- Two fractions equivalent to a half are and
- Capacity can be measured in or
- Acute angles are
- A pencil weighs about
- Squares have and
- 1.6 is between and
- 3 of the factors of 24 are, and

Ask for an explanation

- Would a chocolate lover rather have ¹/₂ or ³/₅ of a bar of chocolate? Explain your answer
- What tips would you give someone who is learning how to round numbers to the nearest 10 or 100?
- Explain why a number which ends in '3' cannot be a multiple of 4
- Explain why two of the three angles in my triangle can't be obtuse
- Explain why 16 is a square number
- How could you subtract 37 from 82?

• How could we test a number to see if it is divisible by 6?

Encouraging reflection

- Could there be a quicker way of doing this?
- Do you think that this would work with other numbers?
- When could you use this strategy?
- Have you thought of all the possibilities? How can you be sure?
- Why did you decide to use this method?
- Can you think of another method that might have worked?
- Why did you decide to use this method?

POINTS TO NOTE:

- Children self and peer mark in green biro (not felt tip pens)
- Adults use purple pen to mark work
- Where adults want children to make an improvement to their work or respond to a question/comment, this should be highlighted using an orange highlighter ("orange for action") and children should have time to respond, before starting their next piece of work. It is expected that all children will respond to their comments.
- Adults may highlight an error/errors made *during* a lesson in orange so that they stand out to the child.
- Where a child has done something well, eg. used a written method correctly, it can be highlighted in green by an adult ("green for good").
- Children in Key Stage 2 may be asked to write a "reflect and review" statement at the end of some of their lessons.
- As part of feedback to children, adults may find it necessary give reminders about presentation of work. If this is the case, comments will refer back to the agreed expectations which are stuck in children's books. Work may need to be repeated if it is not up to the expected standard.