



Maths Policy

Creative. Curious. Caring.
We make every moment count.

Document Control

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A. Curriculum Intent

Mathematics is a journey and long-term goal, achieved through exploration, clarification, practice and application over time. Mathematics is taught with our school motto in mind:
Creative. Caring. Curious.

Children learn in three ways:

- **Shallow learning:** surface, temporary, often lost.
- **Deep learning (sticky learning):** It can be recalled and used.
- **Deepest learning:** Can be transferred and applied in different contexts.

At Wirksworth Junior School we intend to do this by:

- Ensuring that our children have access to a high-quality maths curriculum, that is both challenging and enjoyable.
- Providing the children with a variety of mathematical opportunities.
- Enabling confidence in children, so that they can become risk takers.
- Developing independent learners with curious minds.

B. Implementation

Our intent is developed through a secure understanding of the curriculum and subject area.

Planning:

- **Long term:** National Curriculum
- **Medium term:** Overviews, updated in response to needs, data and outcomes using the NCETM.
- **Short term:** Daily lessons to include clear intentions, in the form of a - WALT (we are learning today) and WILFs (what I'm looking for) using the NCETM, with planning in teacher guides.

These three concepts are used continually throughout learning: (CPA)

- **Concrete/ manipulatives-** real apparatus to help them visually understand abstract concepts.
- **Pictorial-** children then build on the concrete approach by using pictorial representations, which then can be used to help them reason and problem solve.
- **Abstract-** with foundations firmly laid, children can move to an abstract approach, using numbers and key concepts with confidence.

The National Curriculum for mathematics (2014) describes in detail what pupils must learn in each year group. Combined with our **Calculation Policy**, this ensures continuity, progression and high expectations for attainment in mathematics.

It is vital that a positive attitude towards mathematics is encouraged amongst all our pupils in order to foster confidence and achievement in a skill that is essential in our society. At Wirksworth we use the National Curriculum for Mathematics (2014) as the basis of our mathematics

programme. We are committed to ensuring that all pupils achieve mastery in the key concepts of mathematics, appropriate for their age group, in order that they make genuine progress and avoid gaps in their understanding that provide barriers to learning as they move through education; an emphasis on investigation, problem solving, the development of mathematical thinking and development of teacher subject knowledge are therefore essential components of the Wirksworth approach to this subject.

C. Aims

- To foster a positive attitude to mathematics as an interesting and attractive part of the curriculum.
- To develop the ability to think clearly and logically, with confidence, flexibility and independence of thought.
- To develop a deeper understanding of mathematics through a process of enquiry and investigation.
- To develop an understanding of the connectivity of patterns and relationships within mathematics.
- To develop the ability to apply knowledge, skills and ideas in real life contexts outside the classroom; becoming aware of the uses of mathematics in the wider world.
- To develop the ability to use mathematics as a means of communicating ideas.
- To develop an ability and inclination to work both alone and cooperatively to solve mathematical problems.
- To develop personal qualities such as perseverance, resilience, independent thinking, cooperation and self-confidence through a sense of achievement and success.
- To develop an appreciation of the creative aspects of mathematics and an awareness of its aesthetic appeal.

D. Principles of Teaching and Learning

The school uses a variety of teaching and learning styles in mathematics lessons.

Our teachers strive to:

- Build children's confidence and self esteem
- Develop children's independence
- Allow all children to experience regular success
- Contextualise mathematics
- Use practical approaches to mathematics (models and images)
- Encourage children to select independently resources to help them
- Challenge children of all abilities
- Encourage children to enjoy mathematics
- Develop a child's understanding of mathematical language
- Learn from teachers, peers and their own mistakes
- Allow children to ask questions as well as answer them

Our pupils should:

- Have a well-developed sense of the size of a number and where it fits into the number system (place value)
- Know by heart number facts such as number bonds, multiplication tables, doubles and halves
- Use what they know by heart to figure out numbers mentally

- Calculate accurately and efficiently, both mentally and in writing and paper,
- Draw on a range of calculation strategies
- Recognise when it is appropriate to use a calculator and be able to do so effectively
- Make sense of number problems, including non-routine/'real' problems and identify the operations needed to solve them
- Explain their methods and reasoning, using correct mathematical terms
- Judge whether their answers are reasonable and have strategies for checking them where necessary
- Suggest suitable units for measuring and make sensible estimates of measurements
- Explain and make predictions from the numbers in graphs, diagrams, charts and tables
- Develop spatial awareness and an understanding of the properties of 2D and 3D shapes

To provide adequate time for developing mathematics, maths is taught daily and discretely. However, applications of skills are linked across the curriculum where appropriate.

E. Maths Curriculum Planning

Mathematics is a core subject in the National Curriculum, and we use the objectives from this to support planning and to assess children's progress. Staff use long term planning to ensure coverage of all areas of the National Curriculum and medium-term planning to differentiate objectives according to the set which they teach. Planning is collaborative but completed by a member of staff from the LKS and UKS. Using the NCETM, a teaching guide is followed for each lesson, which details each aspect of the lesson and the teacher will add notes to the bottom of each slide to indicate what will be done at each stage of the lesson.

F. Marking

Marking of children's work is essential to ensure they make progress:

- All work is marked against the daily WALT and WILF criteria, in line with the school marking policy.
- As much as possible, work is to be marked whilst the children are working, so that timely interventions can be implemented.
- A small dot will be placed next to an incorrect calculation and the children will be expected to correct the problem in purple pen, which the teacher will tick if correct.
- Children are encouraged to self-assess their work and given time to read teachers' comments and make corrections, 'Fix it times' are provided at the start of each lesson.
- Children are also encouraged to self-mark throughout the lesson with purple pen, which enables them to move on swiftly onto reasoning and problem-solving activities.

NB: For further information see the school **marking and feedback policy**.

G. Assessment

This section details the various assessment methods and practices used in Wirksworth through which we ensure that children are making appropriate progress and that the activities they take part in are suitably matched to their ability and level of development.

Children will undertake a pre-block assessment; to assess their prior knowledge and inform future planning. This should ensure, that children who are confident and secure in the mathematical concept can access higher level learning immediately.

At the end of the block children will be re-assessed to establish progress and interventions put in place if necessary.

Formative Assessment (AfL) - (monitoring children's learning) Assessment is an integral and continuous part of the teaching and learning process at Wirksworth and much of it is done informally as part of each teacher's day to day work. Teachers integrate the use of formative assessment strategies such as: effective questioning, clear learning objectives, the use of success criteria, effective feedback and response in their teaching and marking and observing children participating in activities. Findings from these types of assessment are used to inform future planning.

Summative Assessment – (evaluating children's learning)

More formal methods are used to determine the levels of achievement of children at various times during the school year:

Standardised Testing: Standardised tests are used three times a year. They allow the school to measure each child's attainment in all areas of mathematics and compare this with an "average" for children of that age. The results are used to monitor individual's progress year on year, to rank order a class and to identify those children who have Special Needs in mathematics. These tests are used to aid planning and teaching needs.

Statutory End of Key Stage Assessment.

The National Curriculum requires that each child is assessed and assigned a Level of attainment for each of the 5 Attainment Targets in Mathematics. This is to be carried out at the end of Key Stage One and at the end of Key Stage Two. The majority of children will be working at the expected level for their age.

In 2022 a statutory times tables test has been introduced for children at the end of year 4. To ensure our children are prepared for this in September the Year 3/4 children will use ICT as a means of developing their tables knowledge.

H. Resources

A bank of essential mathematics resources is kept in each classroom. Information and Communication Technology Teachers should use their judgement about when ICT tools should be used, including the use of calculators.

I. Role of the Subject Leader:

- Ensures teachers understand the requirements of the National Curriculum and helps them to plan lessons.
- Endeavours to lead by example by setting high standards in their own teaching.
- Prepares, organises and leads CPD and joint professional development.
- Works with the SENCO and SLT.
- Team teaches with colleagues with a view to identifying the support they need and sharing good practise.
- Discusses regularly with the Head teacher and the mathematics governor the progress of implementing National Curriculum for Mathematics in school.
- Monitors and evaluates mathematics provision in the school by conducting regular work scrutiny and assessment data analysis.

J. Moderating and review.

Moderating of the standards of children's work and of the quality teaching in mathematics is the responsibility of the mathematics subject leader alongside members of the senior leadership team.

The work of the mathematics subject leader also involves supporting colleagues in the teaching of mathematics, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school. A named member of the school's governing body is briefed to oversee the teaching of numeracy. This governor meets regularly with the subject leader to review progress.

K. Mastery approaches to mathematics and the new national curriculum

a. Curriculum design

A detailed, structured curriculum is mapped out across all phases (predominately 'NCTEM' and associated resources), ensuring continuity and supporting transition. Effective mastery curricula in mathematics are designed in relatively small carefully sequenced steps, which must each be mastered before pupils move to the next stage. Fundamental skills and knowledge are secured first. This often entails focusing on curriculum content in considerable depth at early stages.

b. Teaching resources.

A coherent programme of high-quality curriculum materials is used to support classroom teaching. Concrete and pictorial representations of mathematics are chosen carefully to help build procedural and conceptual knowledge together. Exercises are structured with great care to build deep conceptual knowledge alongside developing procedural fluency. The focus is on the development of deep structural knowledge and the ability to make connections. Making connections in mathematics deepens knowledge of concepts and procedures, ensures what is learnt is sustained over time, and cuts down the time required to assimilate and master later concepts and techniques.

c. Lesson design

Lessons are crafted with similar care and are often perfected over time with input from other teachers, drawing on evidence from observations of pupils in class. Lesson designs set out in detail well-tested methods to teach a given mathematical topic. They include a variety of representations needed to introduce and explore a concept effectively and also set out related teacher explanations and questions to pupils.

d. Teaching methods

Teachers are clear that their role is to teach in a precise way which makes it possible for all pupils to engage successfully with tasks at the expected level of challenge. Pupils work on the same tasks and engage in common discussions. Concepts are often explored together to make mathematical relationships explicit and strengthen pupils' understanding of mathematical connectivity. Precise questioning during lessons ensures that pupils develop fluent technical proficiency and think deeply about the underpinning mathematical concepts. There is no prioritisation between technical proficiency and conceptual understanding; in successful classrooms these two key aspects of mathematical learning are developed in parallel.

e. Pupil support and differentiation

Taking a mastery approach, differentiation occurs in the support and intervention provided to different pupils, not in the topics taught, particularly at earlier stages. There is no differentiation in content taught, but the questioning and scaffolding individual pupils receive in class as they work through problems will differ, with higher attainers challenged through more demanding problems which deepen their knowledge of the same content. Preteaching is used to support some pupils in the maths learning. Pupils' difficulties and misconceptions are identified through immediate formative assessment and addressed with rapid intervention – commonly through individual or small group support later the same day.

f. Productivity and practice

Fluency comes from deep knowledge and practice. Pupils work hard and are productive. At early stages, explicit learning of multiplication tables is important in the journey towards fluency and contributes to quick and efficient mental calculation. Practice leads to other number facts becoming second nature. The ability to recall facts from long term memory and manipulate them to work out other facts is also important.

Appendix 1

What does Greater Depth look like in mathematics?

Greater depth learning in mathematics is open to all, it involves thinking more deeply about the how and why; generating questions and seeking the answers and being able to explain the how and why mathematics works.

A pupil really understands a mathematical concept, idea or technique if they can:

- Describe it in their own words
- Represent it in a variety of ways (e.g. using concrete materials, pictures and symbols).
- Explain it to someone else.
- Make up their own examples (and non-examples) of it
- See connections between it and other facts or ideas.
- Recognise it in a new situation and context.
- Make use of it in various ways, including in new situations.

Adapted from NCTEM article 2015

Below is a more detailed understanding of what greater depth should look like with examples for each heading below:

Deep, rich, vigorous and challenging experiences

- Identifying and explaining errors
- Finding, representing and applying the structural understanding
- Reasoning to agree and disagree
- Analysing and creating 'tricks' that use understanding of structure
- Generating questions and following self-selected lines of enquiry
- Supporting generalisations-taking it further

Identifying and explaining errors

Jasmine and Kamal have been asked to work out $5748 + 893$ and $5748 - 893$.

Jasmine says: 893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the addition by adding on 1000 and then taking away 100 and then taking away 7.

What answer does Jasmine get, and is she correct?

Kamal says: 893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the subtraction by taking away 1000 and then taking away 100 and then taking away 7. What answer does Kamal get, and is he correct?

If you disagree with either Jasmine or Kamal, can you correct their reasoning?

- Finding, representing and applying the structural understanding

Understanding and interpreting

$$648 \div 24$$

Reasoning to agree and disagree

Captain Conjecture says, 'If you keep subtracting 3 from 397 you will eventually reach 0.'

Do you agree?
Explain your reasoning.



Teaching for Mastery: Year 5 NCETM 2015

- Can you reason to agree with Captain Conjecture and reason to disagree with Captain Conjecture?
- Can you create another example where both agreeing and disagreeing can be reasoned?

Analysing and creating 'tricks' that use understanding of structure.

My sister Helen is 3.5kg heavier than me.

I am 2.5 kg heavier than my sister Katy.

How heavy could we be?

Come up with three possible solutions and three that are not possible solutions with different reasons for each one.

Supporting generalisation-taking it further.

- Write down a two- digit number (different numerals)
- Write down a second two-digit number, using the same two numerals
- Subtract the smaller number from the larger number
- Add the digits of the new number together (if it is a two-digit number)
- Now subtract 5

- Match the result to a letter of the alphabet, where A=1, B=2 and so on
- Think of a country in Europe that begins with that letter

Look at this problem:

Which is longer:

2 long bricks or 3 short bricks?

3 long bricks or 5 short bricks?



Teaching for Mastery: Year 1 NCETM 2015

Take it further:

- How would you know if they were the same?
- How could you make sure the short bricks made a longer line than the long bricks?

Generating questions and following self -selected lines of inquiry.

- Write down two fractions where the denominator of one is a multiple of the denominator of the other.
- Which is the largest fraction?
- Explain your reasoning.

Teaching for Mastery Year 5 NCETM 2015

Take it further:

- How can you make sure the fraction with the larger denominator is bigger?
- How can you make sure the fraction with the smaller denominator is bigger?

Greater depth questions we use in all lessons:

- Greater depth thinking bubbles are used within all lessons, which encourage the children to think about the math more deeply, these can be used in any lessons/adapted for each year group:

Year 6 examples:



- Diagnostic questions are also used which involve a question and 4 answers. The pupils' role is to explain why each answer is correct/incorrect, using representations to prove this.

Example of some diagnostic questions:

Y4 U1 Post-Unit DQ1: To recognise the value of each digit in a 4-digit number.
Which number is represented here?
A Four thousand, six hundred and thirty two
B Two thousand, three hundred and sixty four
C Two thousand, three hundred and forty six
D Twenty-three thousand and sixty four

Y4 U1 Post-Unit DQ2: To use place value to compare 4-digit numbers.
Use the two correct symbols in the blank spaces to compare the three mountains: > < =
Mount Everest (Nepal) 5642 m ?
Monte Rosa (Switzerland) 4634 m ?
Monte Blanc (France, Italy) 4810 m
A > > B < > C > = D > <

Greater depth is open to all and involves thinking more deeply about the how and why of the mathematics, generating questions and seeking to answer these questions in a way that explains how and why mathematics works.