

Intent

What are we trying to achieve by teaching maths?

Key Stage Expectations

The following expectations relate to the National Curriculum for schools in England. While they apply to most pupils at our school, we make reasonable adjustments for pupils with Special Educational Needs or Disability and for pupils who have only just begun education in England and whose first language is not English. Any adjustments in our expectations are agreed with senior leaders and the SENDCO who continually monitor to ensure they are serving the individual pupils' needs.

Early Years Foundation Stage Pupils (F1 and F2)

The principle focus of mathematics teaching in the Foundation Stage is to ensure that pupils develop confidence counting and using numbers up to 10. At this stage, teaching involves a wide range of activities to develop understanding of number, including singing, stories, games and use of practical resources. Pupils' growing experience enables them to instantly recognise small amounts (up to 5), to double quantities, to share quantities equally, to explore patterns (for example, odd and even) and recall some number bonds within 10 (including subtraction facts). Pupils understand when and how to use numbers in communicating with others.

Key Stage 1 Pupils (Year 1 and Year 2)

The principle 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 up to 100. This involves working with numerals, words and the four operations (addition, subtraction, multiplication and division), including working with practical resources (for example, counters and measuring tools). At this stage, pupils develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching also involves using a wide 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 know the number bonds to 20 and are precise in using and understanding place value, when working with numbers up to 100. An emphasis on practice, at this early stage, aids fluency. Pupils read and spell mathematical vocabulary, at a level consistent with their increasing reading and spelling knowledge.

Lower Key Stage 2 (Year 3 and Year 4)

The principle focus of mathematics teaching in lower Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value (beyond 100). This ensures that pupils develop efficient

mental and written methods and perform calculations accurately with increasingly large whole numbers (thousands). At this stage, pupils develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching also ensures 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 ensures that they can use measuring instruments with accuracy and make connections between measure and number. By the end of Year 4, pupils have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work. Pupils read and spell mathematical vocabulary correctly and confidently, using their growing words reading knowledge and their knowledge of spelling.

Upper Key Stage 2 (Year 5 and 6)

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 develops the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. At this stage, pupils develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient mental and written 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 consolidates and extends knowledge developed in number. Teaching also ensures that pupils classify shapes with increasingly complex geometric properties and they learn the vocabulary they need to describe them. By the end of Year 6, pupils are fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages. Pupils read, spell and pronounce mathematical vocabulary correctly.

How do we organize the maths curriculum?

Whole School Long Term Plan

The whole school long term plan is an overview of what we teach in each term of each year. Teachers have ensured that all aspects of the National Curriculum for their year group are included. We don't follow a commercial scheme, though we are appreciative of the work of reputable organisations, such as NCETM and White Rose, and teachers are free to adopt ideas they judge to be useful. The rationale for not following a commercial scheme is that we want our maths curriculum to be delivered by teachers who have developed their own expertise and are agile in their thinking; we want our curriculum to be responsive to pupils' abilities and interests; and we want it to be relevant to topics we are teaching.

See the National Curriculum for Mathematics on a separate tab

See long term plan on a separate tab

Progression from year to year

We want all children to make gradual progress in their maths knowledge, understanding and skills, from term to term and from year to year. Medway teachers refer to a 'progression map' when planning for their year group. Lessons are generally pitched at a

level that is appropriate to the children's age (though at the point of delivery there can be minor adjustments, including recapping content that has been previously taught or accelerating learning by introducing content earlier than anticipated). Knowing what pupils of a given age are typically supposed to know and learn next helps teachers assess and evaluate pupils' progress in maths. Teachers at our school also use this information to evaluate the efficacy of their teaching.

NCETM, White Rose and Lancashire County Council have produced detailed progression maps that are valued documents at Medway.

See an example of a progression map on a separate tab

Cross Curricular Maths

Teachers are aware that the application of maths is what makes maths meaningful to many pupils. Therefore, maths is used within a variety of other subjects. When it is used, teachers are explicit in making its usefulness known to pupils. Cross Curricular maths plans have been drawn up to show when key opportunities arise across each school year.

Implementation

How do we deliver the curriculum we have planned?

Whole Class Teaching, Sets and Intervention Groups

In principle, we feel that every child should have the opportunity to learn alongside children in their class. This is how we usually work at Medway. However, we know there can be circumstances when teaching and learning is more effective by creating sets. For example, there might be a set for pupils who need to work in a more supported way to reach the expected standard for their age and a set for pupils who are able to work at a faster pace. What's important to know is that we are flexible in our approach. Setting doesn't have to be for the whole academic year or for every maths lesson in a week. Also, individual children can move into a different set at any point, depending on their changing needs.

It is not unusual, at Medway, for a few pupils identified as working well below the expectations for their age group to be taught maths in a small 'intervention groups'. This is to ensure they are not overwhelmed by whole class/set teaching and their needs are not neglected. Teachers and Higher Level Teaching Assistants (HLTAs) plan to ensure their progress takes place at a more reasonable pace.

Teaching Methods

-Didactic – We show children how to solve a problem and they follow a given method to practise solving several similar examples.

-Deductive – We ask children to work through several examples and ask them whilst working or afterwards to figure out the pattern or rule.

-Inductive – Children are given a problem to solve and we ask them to use their pre-existing knowledge, understanding and skills to figure out how to approach and solve it.

-Calculation Methods – Children are gradually introduced to different methods of calculation, both mental and written, that allow them to work with increasingly larger or decimal numbers. Children are given chance to practise using new methods. More efficient methods are ultimately desirable, but not at the expense of understanding and accuracy.

-Concrete (objects), Pictorial and Abstract – We use these interchangeably so children can identify and use the relationships between real objects or situations, visual representations that may be real or abstract and mathematical forms of recording, including using various symbols.

-Maths vocabulary acquisition – We use a wide variety of maths vocabulary and expect children to understand and use it too, when they are making suggestions, explaining, describing, hypothesising, generalising or categorising.

-Oracy – The ability to talk out loud about maths helps children to express their knowledge and it consolidates and deepens their understanding. Since Medway children often need support to speak in English, maths is also a vehicle for the use and development of high standards of oracy that impact the curriculum in general.

-Collaboration – Children are encouraged to work together in most lessons, for at least part of the lesson. We believe collaboration supports all learners: more able learners have the challenge of explaining to or guiding others, middle ability learners aren't shy about asking questions to clarify their understanding and less able learners have maths modelled to them by pupils their age (showing that it is possible).

-Individual work – In the adult world, maths is often used alone, rather than in collaboration with others, therefore we also provide opportunities for fostering independence and self-reliance in solving problems. We encourage individuals to recognise what they are capable of and how they might approach a problem confidently on their own. They are allowed to recall and choose methods of calculation or equipment that suit them, though efficient methods are encouraged. We teach ways to check answers.

-Tests – We use tests to check fluency of recall of maths facts, concepts and methods. It's recognised that speed of interpretation of problems as well as speed of calculation can be an advantage to children when they are faced with multi-step problems.

-Marking/teacher feedback – At least once a week, teachers help children to understand their progress and standard of work in relation to expectations. This can be through commenting verbally and/or through marking work. Teachers' ongoing assessment of attainment and progress relates to outcomes within each lesson, from one lesson to the next and across a maths topic. It can include maths used in a different context/subject. Teachers set specific targets, when necessary.

-Peer and self assessment – When children are sufficiently mature and able to mark their own or another child's work, they are given some opportunities to do so. This is to allow them to become more reflective about their progress.

-Developing metacognition – We make broad steps in their learning explicit to children. We encourage reflection on what they used to know compared with now. At a more focused level, we help children to retrace their steps through a problem to identify and error in thinking or presentation.

Impact

What are the outcomes for our children and what do we think about that?

Early Years Foundation Stage

The vast majority of our Early Years pupils start school with little or no spoken English. In some cases, the only time they will speak English is in school. This is reflected in the proportion of pupils attaining a Good Level of Development (GLD), including the Early Learning Goals for mathematics. Although our school's EYFS maths data is usually significantly lower than the national average, our pupils' introduction to maths is very positive and pupils enjoy their learning. They are keen to count and try to use maths by the time they start Year 1.

Key Stage 1

The shortfall of pupils attaining at the expected standard is not entirely overcome by the end of Key Stage 1. School leaders try to accelerate the progress of pupils by providing a high proportion of additional support for intervention across the key stage. Nevertheless, some of the children who didn't achieve the expected standard at the end of EYFS will be categorised as 'Working towards the Expected Standard' by the end of Key Stage 1 also, having just missed out. Speaking English as a second language prevents some pupils interpreting worded problems correctly, though their standard of arithmetic can be as expected for their age. It is typical also for there to be some turbulence as pupils leave and some newly arrive which inevitably affects data. Our new arrivals nearly always have no or limited spoken English. On the other hand, pupils who do achieve the expected standard by the end of EYFS usually maintain their excellent progress and are often working at Greater Depth in maths by the end of Key Stage 1. Nearly all pupils in Key Stage 1 enjoy maths lessons and talk enthusiastically about their progress. Many can see the relevance of maths and how they can use it practically in their lives e.g. measuring, using money and telling the time.

Key Stage 2

It is usual for pupils to make a significant amount of progress during KS2 at our school. The school has won DfE recognition for this. As pupils become more proficient in speaking English, they are able to rapidly build on the foundations of maths knowledge and calculation skills begun in EYFS and KS1. The momentum is not easy to sustain as there continues to be a good deal of pupil turbulence throughout key stage 2. However, especially for our core pupils, results reflect our high standards of teaching across the school with a high proportion attaining the expected standard or above by the end of Year 6.

Pupils attaining at Greater Depth by this stage can fully appreciate how maths is used in many aspects of life, both in school and the wider world. As examples: they know that being able to interpret and use data to support arguments in a debate can be powerful and using

maths logic and reasoning when solving puzzles can be lots of fun. Pupils working at the Expected Standard are confident they possess enough maths knowledge and skills to build on at high school, leading to a good job in the future.

What happens to ensure standards of teaching are always improving?

Quality of Teaching and Teachers' Professional Development

All teachers know they are individually and collectively accountable for the quality of maths teaching. Willingness to develop maths practice ensures maths continues to thrive and remains high profile. Professional discussions with teachers show that in many cases their subject knowledge is very good. Teachers' expectations of pupils is in line with national expectations. The standard of work produced by pupils is very good.

Our staff ranges from newly qualified teachers to teachers with more than 30 years of experience. All new members of staff and teachers new to a year group are fully supported by senior members of staff to ensure they make good progress from the start. Additionally, Early Career Teachers are supported for two years by a designated mentor.

The majority of maths lessons observed are at least good with some outstanding practice evident too. Teachers plan interesting lessons and pupils engage with them fully. Meetings are regularly convened so that teachers have the opportunity to present pupils' maths work and to discuss pupils' outcomes, resulting from their planning and implementation of the maths curriculum. Suggestions are made about possible ways to improve pupils' outcomes and any support needed is identified.

The subject leader identifies courses that are in line with school priorities and/or the professional development needs of teachers and teaching assistants. The subject leader also keeps up to date with national priorities by attending network meetings.

Local universities are reliant on Medway to provide placements for student teachers. Each year, staff host around a dozen students. Some of these are developing a maths specialism and conduct short research projects that Medway staff support. The maths subject leader provides demonstration lessons and advice to all of them.