Mathematics

Policy

Acre Rigg Infant School

Last reviewed in	September 2025
Next review due	September 2026

Acre Rigg Infant School

MATHEMATICS POLICY AND GUIDELINES

N.B. This policy will be reviewed and amended as changes arise.

Policy:

Guidelines:

Introduction

Mathematics is a creative and highly interconnected discipline that is essential to everyday life. A high quality mathematical education should foster a sense of enjoyment and curiosity about the subject and provide a foundation for understanding the world in which we live. This policy promotes the teaching and learning of mathematical skills in practical contexts enhanced by the use and understanding of mathematical language.

Aims

At Acre Rigg Infant School we aim to:

- foster an enjoyment and enthusiasm for learning in mathematics through practical activity, exploration and discussion
- develop procedural fluency by giving children varied and frequent practice of basic number skills
- develop conceptual fluency by providing children with a range of tactile, visual and virtual manipulatives to support their learning
- develop reasoning skills by giving children opportunities to discuss their mathematical thinking and understanding with others
- develop children's problem solving skills through rich practical tasks, including those related to real life contexts
- teach children ways in which mathematical information is gathered, presented and recorded
- scaffold and support children's next steps in learning to ensure 'gaps in learning' do not hinder mathematical development
- plan opportunities for children to engage in 'thoughtful practice' as revisiting learning in different contexts helps to ensure that children are secure in their understanding before moving on to next steps and challenges

Planning

Early Years Foundation Stage: Nursery

Planning in the Early Years Foundation Stage is based on our Early Years curriculum, providing an age related progression of skills, knowledge and concepts to inform planning and support children's next steps in learning.

Early Years Foundation Stage: Reception

Planning in Reception is based on our Early Years curriculum, ensuring progression towards the statutory Early Learning Goals (ELGs) for Mathematics. Our Early Years curriculum provides an age related progression of skills, knowledge and concepts to inform planning and support children's next steps in learning. The maths skills overview demonstrates the progressions of number skills and fluency across the year.

Key Stage 1

Planning in Key Stage 1 is based on the National Curriculum. Teachers use the school's scheme of work for arithmetic lessons and the White Rose Maths Hub Schemes of Work to plan for mathematics lessons. The schemes of learning provide children with a solid foundation in the basic building blocks of number and place value and the four operations of addition, subtraction, multiplication and division whilst incorporating the wider areas of mathematics of geometry, measurement and statistics.

Where possible, children will work through the schemes as a whole group at the level appropriate to them (with the aim being for the majority of children within each year group to be working at age appropriate levels as set out in the National Curriculum). Reasoning and problem solving elements will be built into lessons to promote mastery of the curriculum and challenge will be provided for more able pupils by giving them the opportunity to work at greater depth within their specific year group content.

Lessons

Early Years Foundation Stage: Nursery

Lessons in the Early Years Foundation Stage can vary depending on the focus of learning and the age of the children. In nursery, adult led 'planned learning opportunities' usually occur in key worker groups of no more than 13 children and include singing, counting and interactive activities, however, at times it may be appropriate for the teacher to lead learning for all children together with teaching assistants supporting identified children. Nursery staff also use the White Rose Maths overview and small steps to plan for coverage of the curriculum and specific learning opportunities.

Planned play activities linked to adult led lessons are available at all times within the environment for the children to access independently to consolidate understanding through repeated practice. Teachers and key workers use our Early Years Curriculum statements to assess children and identify next steps in teaching and learning. Teachers and key workers scaffold individual children's next steps of learning through supported play in all areas of the environment.

Throughout all activities, the language of mathematics will be modelled by the adult and children will be encouraged and supported to understand and use it correctly to promote mathematical understanding.

Early Years Foundation Stage: Reception

Lessons in Reception are very practical with very little recording, particularly in the first term. Children take part in a daily maths input session. During the first term this is highly focused on number. Children learn about the story of numbers and experience a range of activities to reinforce each number. Activities will then be available as enhancements which follow our continuous provision approach as well as adult led activities. Wider maths is covered through continuous provision enhancements and outdoor learning as well as in the daily maths lesson. Teachers use the White Rose Maths overview and small steps to plan for coverage of the curriculum and specific learning opportunities.

Key Stage 1

Lessons in Key Stage 1 have two distinct parts. The first part focuses on procedural and conceptual fluency in counting, number facts and recalling prior knowledge. The second part covers all mathematical domains and is based on the White Rose schemes of learning.

Planned learning opportunities in Key Stage 1 include whole class activities (eg rote counting, singing, interactive whiteboard games and activities), paired activities (eg games and practical tasks) and individual work (eg practical tasks and recorded work in exercise books). Throughout all activities, the language of mathematics is modelled by the adult and children are supported to understand and use it correctly to promote mathematical understanding.

Children are streamed into classes for mathematics to enable teachers to scaffold their next steps in learning appropriately. Less able children and those with Special Educational Needs are taught in small groups by teachers and teaching assistants (under the direction of the class teacher). Mathematical targets for SEN children are detailed on individual Support Plans. More able children are challenged with rich mathematical tasks to deepen their understanding of the mathematical concepts being taught.

NCETM Mastering Number Programme

All teachers in Reception and Key Stage 1 are trained in delivering the NCETM Mastering Number Programme. The programme aims to develop solid number sense, including fluency and flexibility with number facts, to enable children to explore relationships between numbers and see mathematical structure and reason in mathematics.

In Key Stage 1, children take part in a daily 15 minute session in addition to their daily maths lesson. The Maths Lead and class teachers continue to evaluate the need for both a daily arithmetic lesson and 'mastering number' lesson alongside the main maths lesson as the programme progresses.

In Reception, children take part in short, 5-10 minute sessions in addition to their daily maths lesson. The sessions focus primarily on number sense, and introduce learning aids such as learning with Numberblocks.

Recording of work

Early Years Foundation Stage: Nursery

- Much of the mathematical work children do in nursery is practical.
- In the process of collecting evidence across a range of curriculum areas, staff will document learning in mathematics through photographs or written notes for individual children.
- Children have opportunities to see numbers in context in a range of real life situations such as birthday cards, birthday cakes or telephones and telephone numbers.

- Children will begin to sort, match, order, or make sets of objects when provided with a wide range of materials, staff should endeavour to document children's independent learning to identify misconceptions and inform assessment.
- Writing materials will be available in all areas of the environment to allow children to begin to record amounts by making marks.

Early Years Foundation Stage: Reception

Maths will predominantly be of a very practical nature in Reception. Photographs and learning stories of maths activities will be added to floor books or workbooks as evidence. Children have books where any written work can be recorded, if and when appropriate. The work books will come into effect more during the Spring and Summer term.

Key Stage 1

We recognise that:

- recording in mathematics will take on differing forms depending on the nature of the activity
- much mathematical work is practical involving discussion and therefore will not be recorded in written forms
- children need opportunities to practise writing number symbols, mathematical signs and number sentences but practical experiences should inform written work
- children need to the practise pencil and paper methods but there should not be an over emphasis on mathematical work out of context

Although there is no official guideline on the amount of work that should be recorded in books, teachers are required to plan opportunities for children to record a range of their mathematical experiences across all mathematical domains throughout the year in order to evidence curriculum coverage and show pupil progress.

Children will work in A4 books with squared paper; 1.5 cm squares for Year 1 and less able Year 2 children and 1cm squares for Year 2 children. Children will be taught how to set out their work correctly and encouraged to take pride in the presentation of their work. Two-digit numbers will be written in one square unless children are recording algorithms.

Marking and Feedback

Early Years Foundation Stage: Nursery

Immediate verbal feedback is given to children when working in focus groups or at adult supported play activities.

Early Years Foundation Stage: Reception

As a large proportion of Reception maths will be recorded by the use of photographs and learning stories, Reception staff ensure that immediate verbal feedback is given whenever

possible. When children are ready to begin recording in books, correct work will be marked in green and incorrect work in orange.

Key Stage 1

Correct work will be marked in green and incorrect work in orange. Ticks can be used to symbolise correct answers and an orange dot will be used to represent an incorrect answer. Children will be encouraged to write the correct answer next to the dot. Time should be given to correct errors and discuss misconceptions.
Where possible, teachers should give verbal feedback by marking the work with the child present. Children will be given verbal next steps in their learning. This will depend on the activity and be appropriate to the individual child. A challenge will be added to some pieces of work (where appropriate) and time will be given for children to complete this.

Please see the Marking and Feedback Policy and Guidelines for additional information.

Cross Curricular Links

Mathematics has links with a wide range of curriculum subjects. Planning opportunities for children to use mathematics across other subjects will enable them to use and apply their skills in a meaningful context. Cross curricular opportunities linked to mathematics are identified specifically at the medium term planning stage when teachers plan topics for each year group. More generally, approaches to cross curricular work within each subject could include:

- position and directional work in computing
- measuring and data handling in science
- shape and pattern in art
- position and directional work in PE
- sequences and pattern in dance
- counting and patterns or rhythm in music

Acre Rigg Infant School has achieved the Level 1 UNCRC **Rights Respecting** School Award. We teach children about their rights and model rights and respect in all relationships in school. In relation to Mathematics, children are taught a curriculum which meets their individual needs to enable them to make secure progress in the subject. Children are encouraged to recognise and achieve their next steps in learning in order to be 'the best they can be.' Reference is made to specific Rights related activities on medium term topic plans.

Assessment

Early Years Foundation Stage: Nursery

Teachers and key workers collect a range of evidence throughout the year to document children's learning in mathematics. Assessments are recorded through our Early Years Curriculum statements and are evidenced within each child's individual learning journal. Maths is assessed each term and entered into the school assessment system. Assessments are used to plan next steps in teaching and learning.

Early Years Foundation Stage: Reception

Evidence of the children's maths development is collected throughout the year in the form of photographs, annotations, learning stories and recorded work. These become part of each child's learning journey and are used to inform judgements towards the Early Learning Goals in maths. Our curriculum statements are assessed on a termly basis and entered into the school assessment system. Assessments are used to both plan next steps in teaching for the following half term and share targets with parents to enable them to support their child's learning at home.

Key Stage 1

At the end of each term, teachers use the school's levelled assessment sheets alongside their knowledge of the child's performance in lessons to make teacher judgements. These are supported by the completion of 'end of block' assessments linked to the small steps and modules that have been completed during the term. Assessments are used to both plan next steps in teaching for the following half term and share targets with parents to enable them to support their child's learning at home. This data is inputted into the schools assessment system for analysis by senior leaders, the Mathematics subject leader and individual class teachers.

End of Key Stage 1 Assessment

At the end of Key Stage 1, teacher assessment is informed by the statutory Interim Teacher Assessment Framework. Teachers will base their teacher assessment judgement on a broad range of evidence from across the curriculum for each pupil. The three standards for mathematics are: 'working towards the expected standard,' 'working at the expected standard' and 'working at greater depth within the expected standard.' To demonstrate that that pupils have met a standard, teachers will have evidence that a pupil demonstrates attainment of the statements within that standard and the statements in the preceding standard(s).

Roles and Responsibilities

Mathematics Subject Leader

- keep abreast of new developments in the teaching and learning of mathematics through appropriate in-service training, attending County and Peterlee Partnership network meetings and self-study
- prioritise improvements for the teaching and learning of mathematics across the school and contribute to the school improvement plan
- audit, organise and deliver in service training for staff in mathematics
- audit, purchase and organise resources to support curriculum delivery
- lead by example and provide 'expertise' to assist staff in the delivery of the curriculum

- provide support for ECTs and teaching students
- monitor the teaching and learning of mathematics across the school in conjunction with the Head Teacher
- support staff with assessment procedures and the tracking of progress in mathematics
- evaluate the policy and scheme of work for mathematics
- liaise with the Foundation Stage Co-Ordinator and Nursery Lead Practitioner to ensure smooth transitions between each Year Group and Key Stage
- liaise with the Governor for Mathematics
- keep a subject leaders file which is informative and relevant

Mathematics Governor

- liaise with the Mathematics Subject Leader
- visit planned mathematics events in and/or join maths lessons in school and report back to the Governing Body
- monitor standards across the school in mathematics and report back to the Governing Body
- attend any County training for governors on mathematics

Head Teacher

- analyse assessment data to track the progress of identified groups
- hold pupil progress meetings with class teachers
- lead, manage and monitor teaching and learning in mathematics across the school
- ensure mathematics remains a high profile in the school improvement plan

Policy Updated: September 2025 **Review Date: September 2026**

GUIDELINES

Introduction

These Guidelines:

1. set out a range of key teaching and learning principles to support a mastery approach to the teaching and learning of mathematics, and
2. outline progressive steps for counting, number facts, number and place value, addition, subtraction, multiplication and division in line with the National Curriculum.

These Guidelines aim to ensure consistency of approach, enabling children to progress stage by stage through the mathematical content, models and representations and formal recordings they recognise from previous teaching, allowing for deeper conceptual understanding and fluency.

KEY TEACHING AND LEARNING PRINCIPLES

(*NCETM recommendations in italic text* and **school practice in bold text**)

Develop children's fluency with number facts

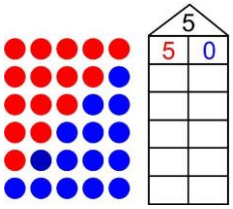
Fluent computational skills are dependent on accurate and rapid recall of basic number bonds to 20 and times-tables facts. Spending a short time everyday on these basic facts quickly leads to improved fluency. This can be done using simple whole class chorus chanting. This is not meaningless rote learning; rather, this is an important step to developing conceptual understanding through identifying patterns and relationships between numbers which is an important prerequisite for procedural fluency.

Children will learn to:

- **count on and back in 1s, 2s, 5s and 10s**
- **investigate and recall addition and subtraction facts for numbers to 5, the number 10, numbers 6-9 and then 11-20**
- **investigate and recall doubles of numbers to 5, then 10 and halves of numbers to 10, then 20**

Expose mathematical structure and work systematically

Developing instant recall alongside conceptual understanding of number bonds to 10 is important. This can be supported through the use of images such as the example illustrated below:

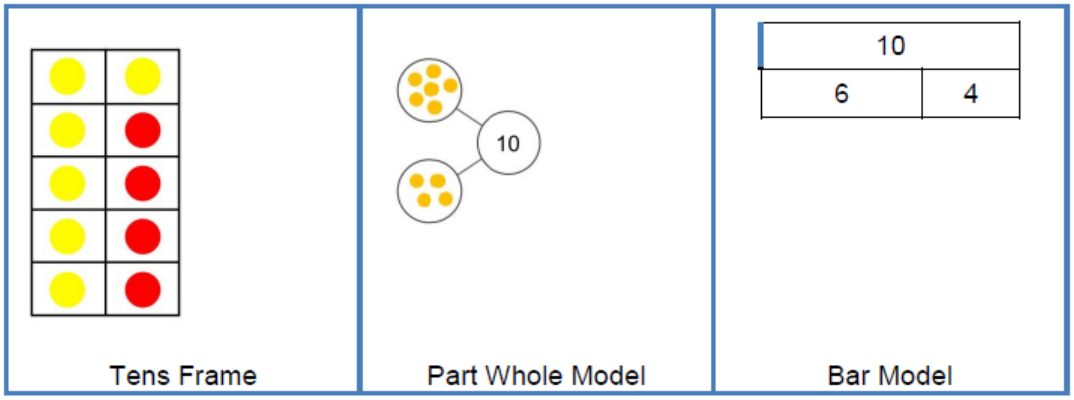


The image lends itself to seeing pattern and working systematically and children can connect one number fact to another and be certain when they have found all the bonds to 5.

Children will investigate and learn to recall number facts by working systematically with various manipulatives, eg. two colour counters, multilink, beadstrings pegs on a coat hanger etc. They will record corresponding number facts systematically and talk about the number patterns generated, eg:

5 + 0 = 5	**5 = 5 + 0**	**5 – 0 = 5**	**5 = 5 - 0**
4 + 1 = 5	**5 = 4 + 1**	**5 – 1 = 4**	**4 = 5 - 1**
3 + 2 = 5	**5 = 3 + 2**	**5 – 2 = 3**	**3 = 5 - 2**
2 + 3 = 5	**5 = 2 + 3**	**5 – 3 = 2**	**2 = 5 - 3**
1 + 4 = 5	**5 = 1 + 4**	**5 – 4 = 1**	**1 = 5 - 4**
0 + 5 = 5	**5 = 0 + 5**	**5 – 5 = 0**	**0 = 5 - 5**

Using other structured models such as tens frames, part whole models or bar models can help children to reason about mathematical relationships.
Connections between these models should be made, so that children understand the same mathematics is represented in different ways. Asking the question "What's the same what's different?" has the potential for children to draw out the connections. Illustrating that the same structure can be applied to any numbers helps children to generalise mathematical ideas and build from the simple to more complex numbers, recognising that the structure stays the same; it is only the numbers that change.



<u>Addition and subtraction</u>
Children will use picture stories and mathematical models, like those pictured above, to generate 'families' of calculations.

***Addition* Family: consists of four number sentences**

- **part + part = whole 3 + 2 = 5**
- **part + part = whole 2 + 3 = 5**
- **whole = part + part 5 = 2 + 3**
- **whole = part + part 5 = 3 + 2**

***Subtraction* Family: consists of four number sentences**

- **whole – part = part 5 – 2 = 3**

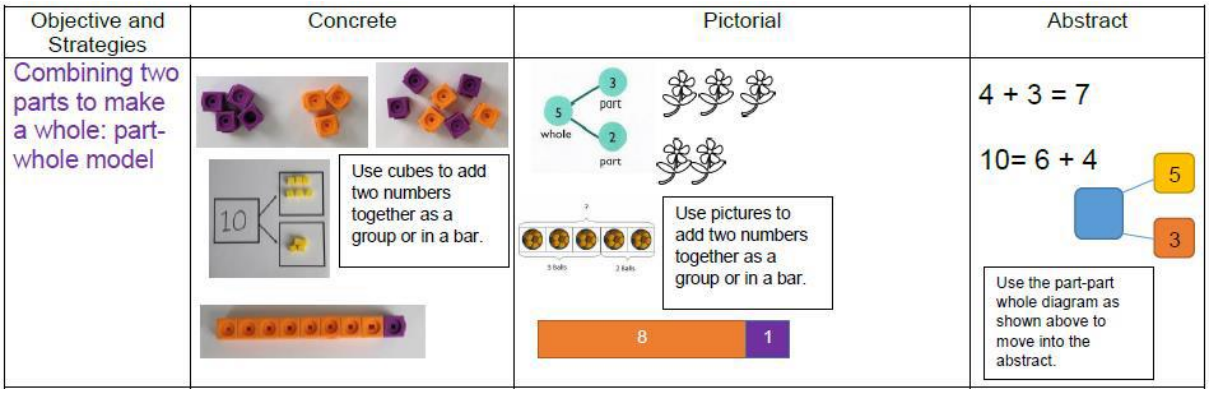
- **whole – part = part 5 – 3 = 2**
- **part = whole – part 2 = 5 – 3**
- **part = whole – part 3 = 5 – 2**

***Fact* Family: consists of all eight statements**

Children will transfer these structures to generalise about the relationships between higher numbers as they progress through the curriculum.

Move between the concrete, visual and abstract

Children's conceptual understanding and fluency is strengthened if they experience concrete, visual and abstract representations of a concept during a lesson. Moving between the concrete and the abstract helps children to connect abstract symbols with familiar contexts, thus providing the opportunity to make sense of, and develop fluency in the use of, abstract symbols.



Children will experience concrete, visual and abstract representations of mathematical concepts during a lesson. Planning will detail opportunities for each representation within each 'unit' of work covered.

Contextualise the mathematics

A lesson about addition and subtraction could start with this contextual story:
"There are 11 people on a bus. At the next stop 4 people get on. At the next stop 6 people get off. How many are now on the bus?"
This helps children develop their understanding of the concepts of addition and subtraction and their ability to link the concrete and abstract representations of mathematics.
Children will be given the opportunity to both represent a number story as a number sentence and invent a number story to match a specific calculation when they are investigating and practising number facts and working on calculations more widely.
For example, if the children are thinking about this calculation: 4 – 8, then the teacher should ask the children: "What does the 14 represent? What does the 8 represent?", expecting that children will answer: "The 14 represents the people on the bus, and the 8 represents the number of people who got off."

Develop children's fluency with mental calculation

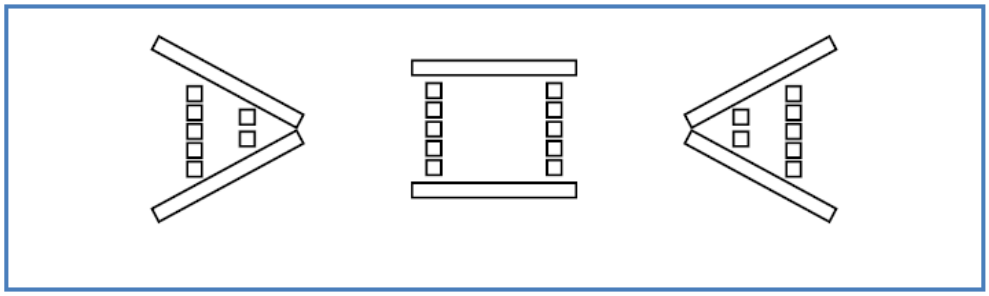
Young children benefit from being helped at an early stage to start calculating, rather than relying on 'counting on' as a way of calculating. For example, with a sum such as:
4 + 7 =__ Rather than starting at 4 and counting on 7, children could use their knowledge and bridge to 10 to deduce that because 4 + 6 = 10, so 4 + 7 must equal 11.
Referred to "magic 10" - it is helpful to make a 10 as this makes the calculation easier.
Children will be taught 'Magic 10' when they have a sound understanding of addition facts to 10 and they are learning to add two single digit to 20. (See Magic 10 Planning Guidance)

Develop fluency in the use of formal written methods

Teaching column methods for calculation provides the opportunity to develop both procedural and conceptual fluency. Teachers need to ensure that children understand the structure of the mathematics presented in the algorithms, with a particular emphasis on place value. Base ten apparatus should be used to support the development of fluency and understanding.
Informal methods of recording calculations are an important stage to help children develop fluency with formal methods of recording. However, they should only used for a short period, to help children understand the internal logic of formal methods of recording calculations. They are stepping stones to formal written methods.
Children will record calculations informally and then formally alongside the use of base 10 apparatus to support their understanding.

Teach inequality alongside teaching equality

To help young children develop their understanding of equality, they also need to develop understanding of inequality. One way to introduce the signs is to use rods and cubes to make a concrete and visual representation such as: to show that 5 is greater than 2 (5 ≥ 2), 5 is equal to 5 (5 = 5), and 2 is less than 5 (2 ≤ 5).



Incorporating both equality and inequality into examples and exercises can help children develop their conceptual understanding. 5 + 7 □ 5 + 6 An activity like this also encourages children to develop their mathematical reasoning: "I know that 7 is greater than 6, so 5 plus 7 must be greater than 5 plus 6".

Children will be introduced to the inequality signs in Year 1 Autumn Term as detailed in the White Rose Scheme of Work. They will use the signs to compare numbers before progressing on to missing symbol number sentences.

Look for pattern and make connections

Even when a great many visual representations of the mathematics and some concrete resources are used in lessons, understanding, however, does not happen automatically, children need to reason by and with themselves and make their own connections. The question "What's the same, what's different?" can be used frequently to make comparisons. For example "What's the same, what's different between addition facts for 10 and addition facts for 20?"

Teachers will plan opportunities for children to talk about patterns and make connections in mathematics.

Use intelligent practice

Teachers should avoid practice which involves mechanical repetition and create opportunities for children to engage in exercises where they are required to reason and make connections between calculations. This will develop both their procedural and conceptual fluency. For example:

2 × 3 =

2 × 30 =

2 × 300 =

Teachers will plan opportunities for children to engage in intelligent practice and talk about what they notice.

Use empty box problems

Empty box problems are a powerful way to help children develop a strong sense of number through intelligent practice. They provide the opportunity for reasoning and finding easy ways to calculate. They enable children to practise procedures, whilst at the same time thinking about conceptual connections. A sequence of examples such as

3 + □ = 8
3 + □ = 9
3 + □ = 10
3 + □ = 11

helps children develop their understanding that the = symbol is an assertion of equivalence, and invites children to spot the pattern and use this to work out the answers.

Children should also be given examples where the empty box represents the operation, for example:
4 × 5 = 10 □ 10
6 □ 5 = 15 + 15
Children will be introduced to empty box problems when working with known number facts and then progress to solving number problems with increasingly bigger numbers – in line with curriculum year group requirements. Empty box problems should be solved by helping the children to determine which numbers, including the missing number, are the parts and which is the whole.

Use questioning to develop mathematical reasoning
Teachers' questions in mathematics lessons are often asked in order to find out whether children can give the right answer to a calculation or a problem. However, in order to develop children's conceptual understanding and fluency, there needs to be a strong and consistent focus on questioning that encourages and develops their mathematical reasoning. This can be done simply by asking children to explain how they worked out a calculation or solved a problem, and to compare and contrast different methods that are described. Children quickly come to expect that they need to explain and justify their mathematical reasoning, and they soon start to do so automatically – and enthusiastically. Some calculation strategies are more efficient and teachers should scaffolded children's thinking to guide them to the most efficient methods, whilst at the same time valuing their own ideas.
Teachers will use the following rich questioning strategies in lessons:
What's the same and what's different? True or false? Which is the odd one out and why? Here's the answer, what could the question have been?

Rich questioning can also be used alongside intelligent practice exercises to further develop children's procedural fluency, conceptual understanding and mathematical reasoning:

In this sequence of expressions, what stays the same each time and what's different?
23 + 10
23 + 20
23 + 30
23 + 40
Discussion of the variation in these examples can help children to identify the relationship between the calculations and hence to use the pattern to calculate the answers.

Which is the odd one out in this list of numbers: 24, 15, 16 and 22?
This encourages children to apply their existing conceptual understanding.
Possible answers could be:
"15 is the odd one out because it's the only odd number in the list."
"16 is the odd one out because it's the only square number in the list."
"22 is the odd one out because it's the only number in the list with exactly four factors."

Children are given a series of equations are asked whether they are true or false:
4 × 6 = 23
4 × 6 = 6 × 4
12 ÷ 2 = 24 ÷ 4
12 × 2 = 24 × 4
Children are expected to reason about the relationships within the calculations rather than calculate.

Expect children to use correct mathematical terminology and to express their reasoning in complete sentences

The quality of children's mathematical reasoning and conceptual understanding is significantly enhanced if they are consistently expected to use correct mathematical terminology (e.g. saying 'digit' rather than 'number') and to explain their mathematical thinking in complete sentences.

I say, you say, you say, you say, we all say

This technique enables the teacher to provide a sentence stem for children to communicate their ideas with mathematical precision and clarity. These sentence structures often express key conceptual ideas or generalities and provide a framework to embed conceptual knowledge and build understanding.

Example 1:

If the rectangle is the whole, the shaded part is one third of the whole.

Having modelled the sentence, the teacher then asks individual children to repeat this, before asking the whole class to chorus chant the sentence. This provides children with a valuable sentence for talking about fractions. Repeated use helps to embed key conceptual knowledge.

Example 2:

Children fill in the missing parts of a sentence; varying the parts but keeping the sentence stem the same

There are 12 stars. ½ of the stars is equal to 6 stars.
There are 12 stars. ¼ of the stars is equal to 3 stars.

Example 3:

A mathematical generalisation or "rule" emerges within a lesson.

When adding 10 to a number, the ones digit stays the same

This is repeated in chorus using the same sentence, which helps to embed the concept.

Children will be taught to use correct mathematical vocabulary. Sentence stems will be modelled and used to help children to explain their mathematical thinking in complete sentences.

Agreed vocabulary to use includes:

- **"number sentence" alongside "number story"**
- **"is equal to" as opposed to "equals"**
- **the terms "parts" and "whole" when talking about addition and subtraction to support transition from concrete/visual strategies to abstract**
- **"number bonds" to denote a "family of numbers" which can be used to generate:**
    - **"addition facts"**
    - **"subtraction facts"**
    - **"addition family," and**
    - **"subtraction family"**
- **"addition family" (4 number sentences), "subtraction family" (4 number sentences) and "fact family" (all eight number sentences)**
- **"ones" as opposed to "units" when discussing place value, eg. 23 is two tens and three ones**
- **"digit" rather than "number" 0**