

# MATHEMATICS PROCEDURE AT EVERGREEN PRIMARY ACADEMY

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## Intent

At Evergreen, we develop a **love and enjoyment of mathematics**, based on meaningful, connected understanding of concepts and the development of mathematical **Habits of Mind**.

Children follow a **well-designed, progressive curriculum**, enabling them to build a **deep and sustained understanding of mathematical skills and knowledge**. Children become **fluent in the fundamentals, confidently reason** about their choices and ideas and become **flexible, resilient problem solvers** with the ability to reflect and improve.

Children at Evergreen will understand maths in the real world and will have a **growth mindset** that allows them to develop their mathematical understanding and skills through **challenge and perseverance**. Maths teaching at EPA is designed to enable all children to develop their **Mathematical Habits of Mind** within a culture of talk being valued.

Teachers therefore provide pupils with opportunities to develop their mathematical capabilities in multiple strands:

### *Natural Curiosity*

- All of us are naturally curious about mathematics.
- It is intrinsically satisfying to gain mathematical understanding.
- There are many ways of working mathematically.

### *Thinking Mathematically*

- Mathematics is a worthwhile and interesting activity in its own right.
- You can find out whether something is true in mathematics by deductive reasoning rather than empirical evidence or opinion.



- Mathematics has order and structure and can be beautiful.

*Working Collaboratively*

- Exchanging questions and ideas is an important part of working mathematically.
- We also learn by reflecting on our mistakes and misconceptions.

*Growth Mindset and Determination*

- Mathematical ability is not fixed: everyone can make progress in mathematics.
- Everyone should have the opportunity to grapple with problems that they do not yet know how to solve.
- Everyone should have the opportunity to succeed mathematically.

**This leads us to believe that all learners are entitled to:**

- a rich mathematical learning experience
- assessment criteria that offer them opportunities to succeed
- a challenging mathematical curriculum which offers them opportunities to struggle

## Implementation

### **Long-term lesson sequences**

Our long-term teaching sequences are designed around two key principles:

1. Areas of mathematics are given different time weightings according to priority. This helps teachers to confidently use the time they have available to have maximum impact, prioritising core areas of the mathematics curriculum over others.
2. Units of learning are sequenced with intent. This ensures that skills are learned progressively, helping students to be ready for each new concept and skill as it is taught.


Individual teachers have the right to adapt their own plans according to ongoing formative assessment. In the event that a teacher feels that a class would benefit from additional time on a particular focus, they can move away from the original long-term structure. This allows meaningful changes to be made in teaching and learning based on assessment for learning undertaken by staff.

The long-term plan for Years 1-6 can be seen in the appendix 1. The long-term plan for EYFS can be seen in the relevant chapter of this procedure.




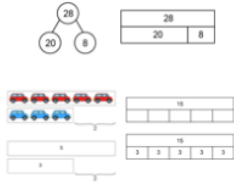
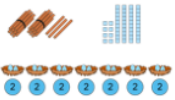
## **Models and representations**

In order to develop fluency and understanding of concepts, teachers employ a range of physical and pictorial representations across the curriculum in each year group. These are introduced as early as possible in each child's educational journey to maximise exposure and understanding of core representations. In this way, learners become more confident and familiar with each representation, allowing for greater generalisation and reasoning fluency.

The table below outlines the five core representations which sit at the heart of our mathematics teaching at EPA. The codes in each cell of the table refer to the specific, related strands of the *Ready to Progress* document.



### Core representations used in the guidance

Representation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
	Tens frame	1NPV-1 1AS-1 1NF-1	2AS-1 2AS-3	3NPV-1 3NF-1 3NF-3	4NPV-1 4NF-3	5NPV-1 5NF-2 5MD-1	6NPV-1
	Number line	1NPV-1 1NPV-2 1NF-2	2NPV-2 2AS-2	3NPV-3 3F-3 3F-4	4NPV-3 4F-1 4F-2 4F-3	5NPV-3 5F-2 5F-3	6NPV-3 6F-1
	<u>Gattegno chart</u>	1NPV-1 1NF-2			4MD-1	5NPV-2 5MD-1	6NPV-1
	Partitioning diagrams including bar models	1AS-1 1AS-2 1NF-1	2NPV-1 2AS-1 2AS-3 2AS-4	3NPV-2 3NPV4 3AS-1 3AS-2 3AS-3 3F-2 3F-4	4NPV-2 4NPV-4 4MD-2 4F-3	5NPV-2 5NPV-4 5F-1	6NPV-4 6AS/MD-4 6F-3
	Groups of units in addition to ones such as Dienes, PV counters		2NPV-1 2AS-3 2AS-4 2MD-1 2MD-2	3AS-2 3MD-1	4MD-2 4F-2	5 NPV-1 5MD-3 5MD-4	6NPV-2

### **Language and mathematical vocabulary**

Teachers understand that it is important for pupils to understand mathematical vocabulary if they are to gain the most out of mathematics lessons. Such understanding allows learners to:

- Understand questions
- Ask their own questions
- Understand explanations clearly
- Explain their own thinking clearly
- Form the generalisations needed to think deeply and make mathematical connections
- Solve problems – you need language to think with

With this in mind, Evergreen Primary Academy has a list of mathematical terms which are taught between Reception and Year 6. This mathematical vocabulary list can be found in appendix 2.

When planning a new mathematics topic, teachers first identify any mathematical vocabulary which the pupils need to be successful. This vocabulary is explicitly taught: each lesson features a vocabulary focus slot where the words are explored in a variety of ways to establish and develop understanding.

Teachers are encouraged to record new mathematical vocabulary on their maths learning walls alongside definitions or representations that assist understanding. Furthermore, key mathematical vocabulary for the current unit is displayed in each classroom, along with definitions (created by teachers or pupils) to assist pupil understanding.

Ideas for games which can be played in the classroom to support the teaching of mathematical vocabulary are included in appendix 3.

### **Lesson structure**

At EPA, maths is taught daily in all year groups.

### **Lesson design – see appendix 4.**

Teachers are not expected to produce written plans for individual lessons. Rather, staff should create lesson designs – using either flipchart or Powerpoint – which contain all of the resources required for the lesson. This has several advantages:

- Staff workload is reduced by avoiding duplication of ideas
- The similar structure of each lesson allows teachers to devote time to the content rather than the structure of each lesson
- Lessons contain similar, important elements across all year groups, ensuring consistency for pupils in mathematics lessons

The lesson designs should be simple and contain only important information so as to avoid cognitive overload in learners and maximise pupil focus on mathematically important information.

Template lesson designs are available to assist teachers in creating their own lessons efficiently. Each lesson design should contain the following elements:

- Starter
- Learning objective
- How and why? Including connections to the real world.
- Vocabulary
- Conceptual exploration, including:
  - Using representations and manipulatives to expose the structure
  - Opportunities for discussion
  - Using standard and non-standard examples
  - Using what it is? What is also is? And what it isn't?
- Clear modelling, including the following in any order or quantity:
  - I do
  - We do
- You do/hinge question to allow AfL and progress of the pupils to be demonstrated.
- Independent/guided practice session allow the children to apply these skills and knowledge to mathematical problems independently. The session will include:

- A guided group of learners working with an adult. These will be the children who got the hinge question incorrect.
- Independent learners working through a progressive sheet of show it, solve it, prove it.
- Answer stations evident in KS2 for children to self-assess their learning.

## **Feedback**

Teachers understand that feedback is a crucial element of the learning journey in mathematics. We believe the following about feedback:

- All work should receive timely feedback
- Feedback is not designed to elicit an emotional response
- Feedback is designed to make pupils think and provides something to be acted on
- Feedback requires pupils to do more work than the adult giving it

Assessment for learning (AFL) is at the heart of our approach to feedback. Teachers use questioning to assess pupil understanding between and within lessons. Through discussion, teachers are able to provide pupils with feedback during the learning.

Since we are developing independent mathematicians, pupils in KS2 are encouraged to assess their own learning using answers prepared by the teacher at an answer station. As well as reducing dependence on the adult, it gives pupils great ownership over their own learning. When marking their own work, children use a simple code:

Tick - 'My answer is correct.'

Dot - 'My answer is incorrect.'

If children get an incorrect answer, they will attempt the question again in a purple pen. If this answer is also incorrect, the child will seek support from an adult.

Teachers are expected to provide feedback on every piece of learning. Where possible, teachers give feedback within the lesson itself; verbal feedback does not need to be recorded. After a lesson, teachers should acknowledge work: this is particularly important until pupils develop intrinsic motivation. Teachers should use the same code to mark thinking using a green pen:

Tick – 'Your answer is correct.'

Dot - 'Your answer is incorrect. Please have another go.'

Teachers will highlight the learning statement green if the learning has been fully met or orange if it has not been met or only partially met. Teachers will indicate what level of support had been given to the child using a code next to the learning statement. **I** for independent, **S** for adult support or **G** for guided group.

When the learning has not been achieved and the learning statement is highlighted orange, children will either receive verbal feedback or 'Keep up' prior to the next lesson. If a child receives verbal feedback, the adult will indicate this in the child's book with a **V**. If the child is in 'keep up', the adult will indicate this in the child's book with a **KU**.

The teacher will use the Next Step Form for learning as mathematicians (see appendix 5) to record individual and whole class misconceptions and how these will be addressed.

### **Adaptation**

To ensure that progress can be made by all in a lesson, at EPA we use a tiered structure to independent tasks from Y2-Y6. This enables pupils to make an active choice in the selection of independent tasks. However, this is a guided choice: teachers use their expert knowledge of pupils' current understanding – drawn from AFL both before and during the lesson – to steer learners towards the most appropriate learning task.

Independent learning tasks are organised into three tiers:

1. Show it
2. Solve it
3. Prove it

The names have been chosen to reflect a broad progression of understanding as learners move from novice to expert in that domain. 'Show it' tasks will support learners in becoming familiar with the structures, models and processes of a mathematical idea. 'Solve it' tasks provide an opportunity for learners to engage in intelligent practice through independent application of the new skill to solve novel problems. 'Prove it' tasks are more open-ended and develop deeper thinking around mathematical concepts through reasoning and justification tasks.

### **Calculation Procedure**

It is important that all learners are given the tools to explore and understand mathematics. To this end, teachers at EPA ensure that concepts are taught and experienced, wherever possible, in three modes: concrete, pictorial and abstract. All learners, regardless of age and current mathematical ability (against Age-Related Expectations) benefit from experiencing mathematics in different modes: it is not the case that learners begin with concrete before moving onto pictorial models and finally working only with abstract, formal written methods. Rather, the use of all three modes as widely as possible allows pupils to conceptualise and generalise their mathematical thinking as deeply as possible.



Pupils at EPA are exposed to a range of different models and methods for thinking about mathematical problems as they move through the school. As learners progress through school, these models and methods develop and deepen their understanding. Where learners are judged as not yet having requisite foundational knowledge and skills, teachers meet learners 'where they are', adapting teaching and providing intervention activities which enable learners to secure foundational knowledge before being introduced to more sophisticated methods.

In order to ensure consistency and progress in mathematical modelling throughout the school, teachers refer to the two calculation policies. These documents outline the key concrete, pictorial and abstract methods which pupils experience in each year group as their mathematical abilities grow.

### **Ready to Progress**

We want pupils at EPA to be confident in core areas of mathematics and ready to begin each new school year with the necessary fundamental knowledge to be successful. The *Ready to Progress* (RtP) criteria are useful in identifying core areas of the curriculum and the skills which pupils need by the end of the year.

Assessments are used throughout the year to check that pupils have acquired the expected level of understanding: the timetable for these assessments can be found in appendix 6. Scores for these assessments are recorded on a tracker, allowing class teachers to see which students have successfully reached the expected standard and which students require further support during the year.

These assessments are designed to check for deep conceptual understanding using varied models and representations. This is in line with our aim for all learners to develop a deep understanding of mathematics. By being familiar with the content of these assessments, teachers can ensure that they are providing sufficient opportunities in class for pupils to become familiar with these models and representations.

## Mathematics in EYFS

### Mastering Number: Overview of content – Reception

Strand/ Half-term	Subitising	Cardinality, ordinality and counting	Composition	Comparison
1 <b>Children will:</b>	<ul style="list-style-type: none"> <li>perceptually subitise within 3</li> <li>identify sub-groups in larger arrangements</li> <li>create their own patterns for numbers within 4</li> <li>practise using their fingers to represent quantities which they can subitise</li> <li>experience subitising in a range of contexts, including temporal patterns made by sounds.</li> </ul>	<ul style="list-style-type: none"> <li>relate the counting sequence to cardinality, seeing that the last number spoken gives the number in the entire set</li> <li>have a wide range of opportunities to develop their knowledge of the counting sequence, including through rhyme and song</li> <li>have a wide range of opportunities to develop 1:1 correspondence, including by coordinating movement and counting</li> <li>have opportunities to develop an understanding that anything can be counted, including actions and sounds</li> <li>explore a range of strategies which support accurate counting.</li> </ul>	<ul style="list-style-type: none"> <li>see that all numbers can be made of 1s</li> <li>compose their own collections within 4.</li> </ul>	<ul style="list-style-type: none"> <li>understand that sets can be compared according to a range of attributes, including by their numerosity</li> <li>use the language of comparison, including 'more than' and 'fewer than'</li> <li>compare sets 'just by looking'.</li> </ul>
2 <b>Children will:</b>	<ul style="list-style-type: none"> <li>continue from first half-term</li> <li>subitise within 5, perceptually and conceptually, depending on the arrangements.</li> </ul>	<ul style="list-style-type: none"> <li>continue to develop their counting skills</li> <li>explore the cardinality of 5, linking this to dice patterns and 5 fingers on 1 hand</li> <li>begin to count beyond 5</li> <li>begin to recognise numerals, relating these to quantities they can subitise and count.</li> </ul>	<ul style="list-style-type: none"> <li>explore the concept of 'wholes' and 'parts' by looking at a range of objects that are composed of parts, some of which can be taken apart and some of which cannot</li> <li>explore the composition of numbers within 5.</li> </ul>	<ul style="list-style-type: none"> <li>compare sets using a variety of strategies, including 'just by looking', by subitising and by matching</li> <li>compare sets by matching, seeing that when every object in a set can be matched to one in the other set, they contain the same number and are equal amounts.</li> </ul>
3 <b>Children will:</b>	<ul style="list-style-type: none"> <li>increase confidence in subitising by continuing to explore patterns within 5, including structured and random arrangements</li> </ul>	<ul style="list-style-type: none"> <li>continue to develop verbal counting to 20 and beyond</li> <li>continue to develop object counting skills, using a range of strategies to develop accuracy</li> </ul>	<ul style="list-style-type: none"> <li>continue to explore the composition of 5 and practise recalling 'missing' or 'hidden' parts for 5</li> </ul>	<ul style="list-style-type: none"> <li>continue to compare sets using the language of comparison, and play games which involve comparing sets</li> </ul>

	<ul style="list-style-type: none"> <li>explore a range of patterns made by some numbers greater than 5, including structured patterns in which 5 is a clear part</li> <li>experience patterns which show a small group and '1 more'</li> <li>continue to match arrangements to finger patterns.</li> </ul>	<ul style="list-style-type: none"> <li>continue to link counting to cardinality, including using their fingers to represent quantities between 5 and 10</li> <li>order numbers, linking cardinal and ordinal representations of number.</li> </ul>	<ul style="list-style-type: none"> <li>explore the composition of 6, linking this to familiar patterns, including symmetrical patterns</li> <li>begin to see that numbers within 10 can be composed of '5 and a bit'.</li> </ul>	<ul style="list-style-type: none"> <li>continue to compare sets by matching, identifying when sets are equal</li> <li>explore ways of making unequal sets equal.</li> </ul>
4 <b>Children will:</b>	<ul style="list-style-type: none"> <li>explore symmetrical patterns, in which each side is a familiar pattern, linking this to 'doubles'.</li> </ul>	<ul style="list-style-type: none"> <li>continue to consolidate their understanding of cardinality, working with larger numbers within 10</li> <li>become more familiar with the counting pattern beyond 20.</li> </ul>	<ul style="list-style-type: none"> <li>explore the composition of odd and even numbers, looking at the 'shape' of these numbers</li> <li>begin to link even numbers to doubles</li> <li>begin to explore the composition of numbers within 10.</li> </ul>	<ul style="list-style-type: none"> <li>compare numbers, reasoning about which is more, using both an understanding of the 'howmanyness' of a number, and its position in the number system.</li> </ul>
5 <b>Children will:</b>	<ul style="list-style-type: none"> <li>continue to practise increasingly familiar subitising arrangements, including those which expose '1 more' or 'doubles' patterns</li> <li>use subitising skills to enable them to identify when patterns show the same number but in a different arrangement, or when patterns are similar but have a different number</li> <li>subitise structured and unstructured patterns, including those which show numbers within 10, in relation to 5 and 10</li> <li>be encouraged to identify when it is appropriate to count and when groups can be subitised.</li> </ul>	<ul style="list-style-type: none"> <li>continue to develop verbal counting to 20 and beyond, including counting from different starting numbers</li> <li>continue to develop confidence and accuracy in both verbal and object counting.</li> </ul>	<ul style="list-style-type: none"> <li>explore the composition of 10.</li> </ul>	<ul style="list-style-type: none"> <li>order sets of objects, linking this to their understanding of the ordinal number system.</li> </ul>
6	In this half-term, the children will consolidate their understanding of concepts previously taught through working in a variety of contexts and with different numbers.			

The LTP for mathematics in EYFS can be seen above. This follows the Mastering Number programme 4 days a week. The fifth learning day is focused on pattern, shape and space.

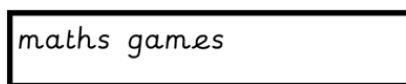
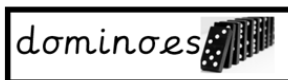
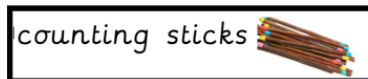
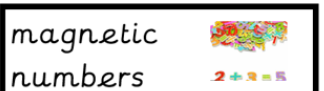
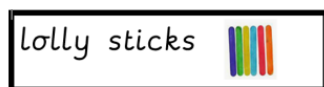
Mathematics is taught through whole class sessions each day, with adult-initiated learning opportunities alongside. Mathematics is available and encouraged throughout our daily provision through sorting, counting and number patterns and is accessible during child-led learning. Our maths area is carefully designed to encourage the development of maths concepts taught and encourage children to explore a range of maths concepts and skills independently.

### Recording in Mathematics

In Term 1, all evidence against the Numeracy statements will be recorded through observations in Learning Journeys.

Learning Journeys will continue to be the primary method for recording our children's independent Mathematics learning and mathematical understanding. Adult initiated groups will be evidenced and recorded in folders.

Here are some of the resources we use in Reception to support the teaching of maths



## **Active and independent Learners**

At EPA, we are developing learners to be active participants in their learning. By this, we mean that students should know the learning objective for the lesson and be able to describe their current progress against the objective. A range of AFL techniques are used by teachers to provide feedback to pupils so that they have a clear idea of their current progress against objectives and what they need to do to improve further. Through each mathematics lesson, pupils are provided with information to help them gauge their own progress and understanding. Where possible, answers are provided so that pupils can self-assess.

Resilience is an important factor in developing assessment capable learners and teachers use mathematics lessons as an opportunity to develop resilience by creating an atmosphere where mistakes are celebrated and viewed by learners as an integral part of the learning process.

## **Supplementary Mathematics sessions:**

### **Keep-up/pre-teach sessions**

Keep-up/pre-teach sessions will happen daily in KS2 to allow the children to have further input/support from an adult on the concept from the previous day or on the concept that will be explored that day.

### **Year 1: Numbersense**

In Year 1, the Numbersense Programme will be followed to ensure that the children have a solid understanding of number. Ready Progress will be followed to cover non-number concepts. The Numbersense Year 1 overview is shown below:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Autumn 1	Stage 1 Book 1	Stage 1 Book 2	Stage 1 Book 3	Stage 1	Stage 2 Book 1	Stage 2 Book 2	Stage 2 Book 3
	Subitising 1 - 5	Subitising 6 - 10	Subitising on tens frames	Gap teaching and consolidation	Make and Break 5	Make and Break 4, 3 & 2	Make and Break 10
Autumn 2	Stage 2 Book 4	Stage 2 Book 5	Stage 2 Book 6	Stage 2 Book 7	Stage 2	Stage 2	
	Make and Break 6	Make and Break 7	Make and Break 8	Make and Break 9	Gap teaching and consolidation	Gap teaching and consolidation	
Spring 1	Stage 3 Book 1	Stage 3 Book 1	Stage 3 Book 2	Stage 3 Book 2	Stage 3 Book 3	Stage 3 Book 3	
	One More, One Less	One More, One Less	Two More, Two Less	Two More, Two Less	Number 10 Fact Families	Number 10 Fact Families	
Spring 2	Stage 3 Book 4	Stage 3 Book 4	Stage 3 Book 5	Stage 3 Book 6	Stage 3 Book 6	Stage 3	
	Five and A Bit	Five and A Bit	Know About Zero	Doubles and Near Doubles	Doubles and Near Doubles	Gap teaching and consolidation	
Summer 1	Stage 3 Book 7	Stage 3 Book 7	Stage 3 Book 8	Stage 3 Book 9	Stage 3 Book 9	Stage 3 Book 9	
	Number Neighbours	Number Neighbours	7 Tree & 9 Square	Strategy Selection	Strategy Selection	Strategy Selection	
Summer 2	Stage 4 Book 1	Stage 4 Book 1	Stage 4 Book 1	Stages 3&4	Stages 3&4	Stages 3&4	Stages 3&4
	Ten and A Bit	Ten and A Bit	Ten and A Bit	Gap teaching and consolidation	Gap teaching and consolidation	Gap teaching and consolidation	Gap teaching and consolidation

### **Year 2: Numbersense**

In addition to following the Ready to Progress criteria, in year 2 children will also have daily Numbersense sessions to further secure their number understanding. They will follow the following sequence of learning for their Numbersense learning:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Autumn 1	Stage 1 Books 1 & 2	Stage 1 Books 2 & 3	Stage 2 Books 3 - 7	Stage 3 Book 1	Stage 3 Book 2	Stage 3 Book 2	Stage 3 Book 3
	Subitising 1 – 5 Subitising 6 – 10	Subitising 6 – 10 Subitising on tens frames	Make and Break 10, 6, 7, 8 and 9	One More, One Less	Two More, Two Less	Two More, Two Less	Number 10 Fact Families
Autumn 2	Stage 3 Book 4	Stage 3 Books 4 & 5	Stage 3 Book 6	Stage 3 Book 6	Stage 3 Book 7	Stage 3 Books 7 & 8	
	Five and A Bit	Five and A Bit Know about Zero	Doubles and Near Doubles	Doubles and Near Doubles	Number Neighbours	Number Neighbours 7 Tree & 9 Square	
Spring 1	Stage 3 Book 9	Stage 4 Book 1	Stage 4 Book 1	Stage 5 Book 1	Stage 5 Book 1	Stage 5 Book 1	
	Strategy Selection	Ten and A Bit	Ten and A Bit	Make Ten and Then: Addition	Make Ten and Then: Addition	Make Ten and Then: Addition	
Spring 2	Stage 5 Book 2	Stage 5 Book 2	Stage 5 Book 2	Stage 5 Book More Doubles and Near Doubles	Stage 5 More Doubles and Near Doubles	Stage 5 More Doubles and Near Doubles	
	Make Ten and Then: Subtraction	Make Ten and Then: Subtraction	Make Ten and Then: Subtraction				
Summer 1	Stage 5 Adjusting	Stage 5 Adjusting	Stage 5 Adjusting	Stage 5 Strategy Selection	Stage 5 Strategy Selection	Stage 5 Strategy Selection	
Summer 2	Stage 6 Calculating with Multiples of 10	Stage 6 Two-Digit Numbers: Calculating with Ones	Stage 6 Two-Digit Numbers: Calculating with Tens	Stage 6 Make the Next Ten and Then	Stage 6 Make the Previous Ten and Then	Stages 5 & 6 Gap teaching and consolidation	Stages 5 & 6 Gap teaching and consolidation

## Number Sense intervention across KS2

Number Sense sessions can be used as whole class intervention or small group/individual intervention to support children to gain a solid understanding of Number.

## Times table Rock Stars

All children from Y2-Y6 have a Times Table Rocks Stars (TTRS) account to use to practice their times table skills. Children access TTRS as part of their weekly homework. Teachers can provide an opportunity for children to practice their times tables on TTRS in school when appropriate.

## Discreet times table sessions

In Year 4, times tables are taught and practiced in a discreet session daily. The session follows a programme which relies on children storing the facts using sound patterns. See appendix 7 for the programme overview.



## **Assessment**

Both formative and summative assessment are integral to the teaching and learning of mathematics at EPA. Assessment data supports teachers and leaders in making judgements about pupil attainment and progress throughout the school. Data is also used to inform next steps in teaching and learning, both within lessons and between lessons. In addition, informal pre-assessments will be undertaken to inform planning prior to starting a unit of learning to ensure the teacher pitches the learning for the learners.



## Impact

The impact will be that all children at Evergreen see themselves as mathematicians and love maths. They are fluent mathematicians who are able to recall mathematical facts and move fluently between strategies and procedures to solve a problem in the most efficient way. They are confident to talk about their mathematical understanding and have the perseverance and resilience to learn from their mistakes and challenge themselves within mathematical ideas.

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<https://asdn.org/wp-content/uploads/EL-ACVL.pdf>

*Walkthrus*, Tom Sherrington and Oliver Caviglioli

## Appendices

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1. Example long-term plan
2. List of mathematical vocabulary
3. Suggested activities for the teaching of mathematical vocabulary
4. Example lesson input slide deck
5. Next Step for Mathematical learning form
6. Times table teaching overview

## 1. Example long-term plans (Years 3)

	WK 1	WK 2	WK 3	WK 4	WK 5	WK 6	WK 7	PPA (fortnightly)
T1	Adding and subtracting across 10	Adding and subtracting across 10	Numbers to 1000	Numbers to 1000	Numbers to 1000	Numbers to 1000	Numbers to 1000	Right angles
T2	Numbers to 1000	Numbers to 1000	Numbers to 1000	Numbers to 1000	Summative assessment week	Numbers to 1000	Manipulating the additive relationship and securing mental calculation	Right angles
T3	Manipulating the additive relationship and securing mental calculation	Manipulating the additive relationship and securing mental calculation	Manipulating the additive relationship and securing mental calculation	Column addition	Column addition	Column subtraction		Parallel & perpendicular sides in polygons
T4	Column subtraction	<a href="#">2, 4 and 8 times table</a>	<a href="#">2, 4 and 8 times table</a>	<a href="#">2, 4 and 8 times table</a>	Summative assessment week	<a href="#">2, 4 and 8 times table</a>		Parallel & perpendicular sides in polygons
T5	Unit fractions	Unit fractions	Unit fractions	Unit fractions	Unit fractions	Non-unit fractions		Time
T6	Non-unit fractions	Non-unit fractions	Non-unit fractions	Summative assessment week	Consolidation	Consolidation	Consolidation	Time

## 2. Mathematical vocabulary

Acute, Adjacent, Alternate, Angle, Area, Ascending order, Average, Axis of symmetry, Baker's dozen, Base, Base angles, Bisect, Breadth, Capacity, Cardinal number, Carroll Diagram, Circumference, Composite number, Congruent, Consecutive, Coordinates, Denominator, Descending order, Diagonal, Difference, Digit, Digital root, Dimensions, Dodecagon, Edge, Equation, Equilateral triangle, Even number, Exterior, Face, Face value, Factor, Greater than, Gross, Hendecagon, Heptagon, Hexagon, Horizontal, Improper fraction, Integer, Interior, Intersection, Irregular shapes, Isosceles triangle, Kite, Less than, Line of symmetry, Lozenge, Mean, Median, Mode, Multiple, Numerator, Oblique, Oblong, Obtuse angle, Octagon, Odd number, Ordinal number, Parallel lines, Parallelogram, Perimeter, Perpendicular line, Place value, Polyhedron, Prime number, Product, Quadrant, Quindecagon, Quotient, Rectangle, Reflex angle, Rhombus, Roman numerals, Rotational symmetry, Rounding, Scalene triangle, Score, Square number, Squared, Sum, Symmetrical, Tally, Tessellation, Tetragon, Translation, Trapezium, Triangular number, Trigon, Vertex, Vertical line.

### 3. Activities to develop mathematical vocabulary



Call my bluff (three definitions; find the real one)



Give us a clue (guess the word from its definition)



Speechless (define a word without speaking or writing)



Crosswords (design and make)



Countdown (give anagrams and definitions)



Maths Attack (create a poster with as many examples of the term as they can)



Hangman



Yes/No (aka 20 questions or Animal, Mineral, Vegetable)

## 4. Lesson input slide deck example

**Starter**

What's the connection?

17 23 29  
59 65

Which calculation below gives the greatest product?

35 x 42    43 x 52    25 x 34

1

**Learning:**

How? Why?

Connect it to the real world.

2

**Vocabulary check**

A fraction is..... an equal part of a whole.  
A mixed number has...a whole and a fraction part.

3

**Let's explore this concept!**

Triangle or Not a Triangle?

Explores the structure.

Explores not just the 'standard'.

5  
2 3

4

**Manipulatives/representations (CPA)**

What manipulatives do we need to explore with? What representations will expose the structure?

20  
23 = 20 + 3

5

**What it is? What it also is? What it isn't?**

Height of a triangle

"is" "is also" "is not"

6

Insert ETP slides where appropriate.

Choose two shapes that are identical. How many different ways can you find to fit these two shapes together to make a shape?

Now use a mirror to decide which of these have a line symmetry. Do any of your shapes have more than one line of symmetry?

Line of symmetry - splits the shape into two equal parts which are mirror images.

I know that \_\_\_\_\_ is the same because  
I also know that \_\_\_\_\_ is different because.

7

4G-3 Identify line symmetry in 2D shapes

Look at the lines of symmetry in the first two shapes. How many do they have?

Identify the lines of symmetry in the final three shapes.

8

**I do**

14, 15, \_\_\_\_, 17, \_\_\_\_, 19

\_\_\_\_, 25, 26, \_\_\_\_, 28

Teacher models the skill. Thinking out loud to the class.

9

**We do**

3, 5, \_\_\_\_, \_\_\_\_, 11

25, \_\_\_\_, 17, 13, \_\_\_\_

Children have a go at the skill with their learning partner. This example is shared and modelled with the whole class.

10

4G-3 Identify line symmetry in 2D shapes

**I do**

Can you reflect this shape in the mirror line? What is your strategy?

Take one of the points, count how far this is from the mirror line, then reflect on the other side of the mirror line by counting the same. Repeat for the other points.

Name the polygon you have completed.

Progress to diagonal lines of symmetry.

11

**We do**

4G-3 Identify line symmetry in 2D shapes

Reflect both shapes in the mirror line by counting the position of each vertex and making a mark. Now join the marks to make your reflected shape.

How could you check your answer?

Repeat the above for other shapes using horizontal, vertical and diagonal mirror lines.

12

**You do (hinge question)**

343 - 163 =

A. 222  
B. 182  
C. 282  
D. Not sure yet

Which one is a right angle?

A.   
B.   
C. A and B   
D. Not sure yet

Hinge questions are carefully designed questions that enable teachers to have rapid AfL (Assessment for Learning) during a lesson. They are a multiple choice question which will take children approximately two minutes to answer. The multiple choice answers will be thoughtfully crafted to have one correct answer, one not sure yet option and two answers which address common misconceptions. Learners record their answer on a slip and then once all the learners have finished they hold their slips up. Teacher identifies the learners who need further support according to their answer.

13

## 5. Next step form for learning as mathematicians

EPA next steps form for learning as Mathematicians

Unit:

Date: Term \_\_ Week \_\_

Class:

A	Y	O2	O1	D	Absent children
					M: T: W: T: F:
Key: <b>GM</b> , PP* and (SEND)					

	Monday Learning:	Tuesday Learning:	Wednesday Learning:	Thursday Learning:	Friday Learning:
Notes on common misconceptions for class					
Notes on common misconceptions for individual children					

To be covered in the next lesson					
Children in 'keep up'					
Notes for future provision:					

## 6. Times table teaching overview

### Times Tables

36 facts to take us up to  $9 \times 9$  – the building block facts

Year 3	Year 3	Year 3	Year 4	Year 4	Year 4	Year 4	Year 4
2 tt	5tt	3tt	4tt	6tt	7tt	8tt	9tt
$2 \times 2$							
$3 \times 2$	$3 \times 5$	$3 \times 3$					
$4 \times 2$	$4 \times 5$	$4 \times 3$	$4 \times 4$				
$5 \times 2$	$5 \times 5$						
$6 \times 2$	$6 \times 5$	$6 \times 3$	$6 \times 4$	$6 \times 6$			
$7 \times 2$	$7 \times 5$	$7 \times 3$	$7 \times 4$	$7 \times 6$	$7 \times 7$		
$8 \times 2$	$8 \times 5$	$8 \times 3$	$8 \times 4$	$8 \times 6$	$8 \times 7$	$8 \times 8$	
$9 \times 2$	$9 \times 5$	$9 \times 3$	$9 \times 4$	$9 \times 6$	$9 \times 7$	$9 \times 8$	$9 \times 9$
<b>8 facts</b>	<b>7 facts</b>	<b>6 facts</b>	<b>5 facts</b>	<b>4 facts</b>	<b>3 facts</b>	<b>2 facts</b>	<b>1 fact</b>
<b>By end of Y3:</b> 21 facts learnt 15 facts still to learn			<b>By end of Y4</b> 15 facts learnt to complete building blocks 21 more facts for times table check (see below)				

### Year 4: 21 more facts

11 x	11 x	11 x	11 x	11 x	11 x	11 x	11 x	11 x	11 x	
2	3	4	5	6	7	8	9	10	11	
12 x	12 x	12 x	12 x	12 x	12 x	12 x	12 x	12 x	12 x	12 x
2	3	4	5	6	7	8	9	10	11	12

### Principles

1. Learn as a memorised phrase by repeating sound pattern out loud. Don't try to derive. If you don't know – copy down then learn later.
2. Learn each fact one way round only, then get confident at switching factors.
3. Don't think! (about the only time in maths when thinking is unhelpful!) When trying to recall a fact, say the WHOLE number sentence out loud and see if the answer trips off your tongue. If not, try the commutative and see if it comes then.
4. Learn one new fact at a time. Don't try to learn the whole times table at once.