

Primary Teaching for Mastery

Optional Online Sessions for Maths Leads – Spring Term 2022

Exploring the EYFS Reforms

Martin Tillbrook
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Tuesday 8th February 2022

(15:45-16:45)

Please have your name displayed on
Zoom.

Please mute your microphone.



Statutory Framework for the Early Years Foundation Stage

[Statutory framework for the early years foundation stage
\(publishing.service.gov.uk\)](https://publishing.service.gov.uk)



Educational Programme: Mathematics

Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

Early Learning Goals (ELGs)

ELG: Number

Children at the expected level of development will:

- Have a deep understanding of numbers to 10, including the composition of each number;
- Subitise (recognise quantities without counting) up to 5;
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

Early Learning Goals (ELGs)

ELG: Numerical Patterns

Children at the expected level of development will:

- Verbally count beyond 20, recognising the pattern of the counting system;
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

Learning and Development Considerations

This framework does not prescribe a particular teaching approach. Play is essential for children's development, building their confidence as they learn to explore, relate to others, set their own goals and solve problems. Children learn by leading their own play, and by taking part in play which is guided by adults. Practitioners need to decide what they want children in their setting to learn, and the most effective ways to teach it.

Practitioners must stimulate children's interests, responding to each child's emerging needs and guiding their development through warm, positive interactions coupled with secure routines for play and learning. As children grow older and move into the reception year, there should be a greater focus on teaching the essential skills and knowledge in the specific areas of learning. This will help children to prepare for year 1.

Characteristics of Effective Teaching and Learning

Characteristics of Effective Learning



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Assessment

Assessment plays an important part in helping parents, carers and practitioners to recognise children's progress, understand their needs, and to plan activities and support. Ongoing assessment (also known as formative assessment) is an integral part of the learning and development process. It involves practitioners knowing children's level of achievement and interests, and then shaping teaching and learning experiences for each child reflecting that knowledge. In their interactions with children, practitioners should respond to their own day-to-day observations about children's progress and observations that parents and carers share.

Assessment should not entail prolonged breaks from interaction with children, nor require excessive paperwork. When assessing whether an individual child is at the expected level of development, practitioners should draw on their knowledge of the child and their own expert professional judgement and should not be required to prove this through collection of physical evidence



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Non-Statutory Guidance

[Development Matters - Non-statutory curriculum guidance for the early years foundation stage \(publishing.service.gov.uk\)](#)

[Birthto5Matters-download.pdf](#)



Example page from Development Matters

|  Children in reception will be learning to: | Examples of how to support this: |
|--|---|
| Count beyond ten. | <p>Count verbally beyond 20, pausing at each multiple of 10 to draw out the structure, for instance when playing hide and seek, or to time children getting ready.</p> <p>Provide images such as number tracks, calendars and hundred squares indoors and out, including painted on the ground, so children become familiar with two-digit numbers and can start to spot patterns within them.</p> |
| Compare numbers. | <p>Provide collections to compare, starting with a very different number of things. Include more small things and fewer large things, spread them out and bunch them up, to draw attention to the number not the size of things or the space they take up. Include groups where the number of items is the same.</p> <p>Use vocabulary: 'more than', 'less than', 'fewer', 'the same as', 'equal to'. Encourage children to use these words as well.</p> <p>Distribute items evenly, for example: "Put 3 in each bag," or give the same number of pieces of fruit to each child. Make deliberate mistakes to provoke discussion.</p> <p>Tell a story about a character distributing snacks unfairly and invite children to make sure everyone has the same.</p> |
| Understand the 'one more than/one less than' relationship between consecutive numbers. | <p>Make predictions about what the outcome will be in stories, rhymes and songs if one is added, or if one is taken away.</p> <p>Provide 'staircase' patterns which show that the next counting number includes the previous number plus one.</p> |



Example page from Birth to 5 Matters

Mathematics

| | A Unique Child: what a child might be doing | Positive Relationships: what adults might do | Enabling Environments: what adults might provide |
|--------------------|---|--|---|
| RANGE 6 (cont.) | Spatial Awareness <ul style="list-style-type: none"> • Uses spatial language, including following and giving directions, using relative terms and describing what they see from different viewpoints • Investigates turning and flipping objects in order to make shapes fit and create models; predicting and visualising how they will look (spatial reasoning) • May enjoy making simple maps of familiar and imaginative environments, with landmarks | <ul style="list-style-type: none"> • Encourage the use of relative terms (in front of, behind, before and after, in a line, next to and between). • Encourage children to explore what can be seen from different viewpoints. • Encourage children to describe position and give directions in play and in everyday routines. • Encourage children to create scaled-down models such as in small world play. • When children are fitting shapes into an outline or making a model from a 2D picture, help them to select more spatially challenging activities. • Encourage children to make maps of routes they have walked or travelled in some way. | <ul style="list-style-type: none"> • Play barrier games (where players have an identical set of objects which are hidden from each other; one player makes an arrangement of objects and gives instructions to the other to try to make the same arrangement). • Plan opportunities for children to describe and recall familiar routes. • Engage families in taking photos of familiar things from different viewpoints. |
| | Shape <ul style="list-style-type: none"> • Uses informal language and analogies, (e.g. heart-shaped and hand-shaped leaves), as well as mathematical terms to describe shapes • Enjoys composing and decomposing shapes, learning which shapes combine to make other shapes • Uses own ideas to make models of increasing complexity, selecting blocks needed, solving problems and visualising what they will build | <ul style="list-style-type: none"> • Encourage children to use the names of shapes and their properties (e.g. straight, curved, edge) and prompt them to say what shapes remind them of. • Discuss different examples of the same shape (e.g. equilateral and right-angled triangles) in a variety of orientations. • Take opportunities to discuss the shapes that children paint, draw and collage and shapes noticed in their local environment using regular shapes and shapes with no name. • When acting out their own stories encourage children to make the shapes involved on their own or with others. • When constructing, sensitively discuss which shapes make other shapes (e.g. triangles making rectangles and hexagons with pattern blocks or mosaic tiles). • Challenge children to make more complex constructions such as towers of arches, a window or a staircase. | <ul style="list-style-type: none"> • Provide resources for shape play including unit blocks, pattern blocks, mosaic tiles and jigsaw puzzles with different levels of challenge. • Teach strategies for solving shape and jigsaw puzzles, describing shape properties and modelling the mathematical vocabulary such as straight, corner, edges. • Play games focussing on the properties of shapes, such as hiding and partially revealing a shape, asking children to say what different shapes it could be or not, and why. |
| | Pattern <ul style="list-style-type: none"> • Spots patterns in the environment, beginning to identify the pattern "rule" • Chooses familiar objects to create and recreate repeating patterns beyond AB patterns and begins to identify the unit of repeat | <ul style="list-style-type: none"> • Encourage children to notice and appreciate a range of patterns involving repetition and symmetry in the environment, including traditional patterns from a range of cultures. • Model using symbols to represent a pattern in other ways (e.g. using a spot/cross/dash pattern of symbols and doing a swirl/jump/glide in response). • Make deliberate mistakes when creating patterns alongside children and playfully challenge them to fix the problem. • Make border patterns where the repeating pattern continues around an object or frame. | <ul style="list-style-type: none"> • Provide opportunities for printing patterns using a variety of objects. • Using photos, challenge children to copy and continue patterns. • Invite children to create a pattern with the same structure using different objects (e.g. instead of a red/blue/blue pattern, create a sheep/cow/cow pattern). |



NCETM Progression Maps

[Early Years | NCETM](#)



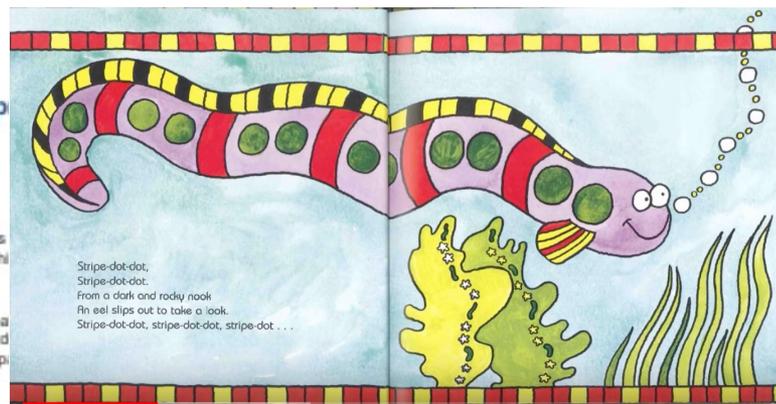
Early Years Typical Progression Chart: Pattern

Early Years Typical Progression Chart with additional guidance for p

Pattern

Seeking and exploring patterns is at the heart of mathematics (Schoenfeld, 1992). Developing an awareness of relationships. Clements and Sarama (2007) identify that patterns may provide the foundations of algebraic thinking and verbalise generalisations.

The focus in this section is on repeating patterns, progressing from children copying simple alternating AB patterns to ABBC. Patterns can be made with objects like coloured cubes, small toys, buttons and keys, and with outdoor movements and sounds, linking with music, dance, phonics and rhymes. Children can also spot and create patterns in numbers and stories.



| | Activities and opportunities | Practitioner notes |
|---|--|--------------------|
| <p>Continuing an AB pattern</p> <p>Children need the opportunity to see a pattern, to talk about what they can see, and to continue a pattern. At first, they will do this one item at a time, e.g. red cube, blue cube, red cube...verbalising the pattern helps. Children may then be asked to say what they would add next to continue it.</p> | <ul style="list-style-type: none"> building towers or trains of different-coloured cubes (continuing patterns horizontally and vertically) extending patterns using a wide range of identical objects in different colours, e.g. beads; small plastic toys such as bears, dinosaurs, vehicles. Try to avoid interlocking cubes or bead-threading so children can focus on the pattern rather than their coordination skills. | |
| <p>Copying an AB pattern</p> <p>Copying a pattern can be difficult for children if they have to keep comparing item by item. AB patterns are easiest – when presented to children, these should contain several repeats, to ensure that the pattern unit is evident. Discuss the nature of the pattern: how has the pattern been made? Patterns can have a range of features such as varying objects, size or orientation.</p> | <ul style="list-style-type: none"> accessing a range of patterns to copy. For example, using the plastic bears: big, small, big, small, big... footwear: shoe, welly, shoe, welly..., actions and sounds: jump, swirl, jump, swirl, jump... or clap, stamp, clap, stamp... collecting things in the outdoors environment: leaf, stick, leaf, stick... | |



Ready to Progress Criteria

[Mathematics guidance: key stages 1 and 2 \(covers years 1 to 6\)](https://publishing.service.gov.uk)
publishing.service.gov.uk

Example: Year 1

| Previous experience | Year 1 ready-to-progress criteria | Future applications |
|---|--|---|
| <p>Begin to develop a sense of the number system by verbally counting forward to and beyond 20, pausing at each multiple of 10.</p> | <p><u>1NPV-1</u> Count within 100, forwards and backwards, starting with any number.</p> | <p>Count through the number system. Place value within 100. Compare and order numbers. Add and subtract within 100.</p> |
| <p>Play games that involve moving along a numbered track, and understand that larger numbers are further along the track.</p> | <p><u>1NPV-2</u> Reason about the location of numbers to 20 within the linear number system, including comparing using $<$ $>$ and $=$</p> | <p>Reason about the location of larger numbers within the linear number system. Compare and order numbers. Read scales.</p> |



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| | | |
|---|---|--|
| <p>Begin to experience partitioning and combining numbers within 10.</p> | <p><u>1NF-1</u> Develop fluency in addition and subtraction facts within 10.</p> | <p>Add and subtract across 10.</p> <p>All future additive calculation.</p> <p>Add within a column during columnar addition when the column sums to less than 10 (no regrouping).</p> <p>Subtract within a column during columnar subtraction when the minuend of the column is larger than the subtrahend (no exchanging).</p> |
| <p>Distribute items fairly, for example, put 3 marbles in each bag.</p> <p>Recognise when items are distributed unfairly.</p> | <p><u>1NF-2</u> Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers.</p> | <p>Recall the 2, 5 and 10 multiplication tables.</p> <p>Carry out repeated addition and multiplication of 2, 5, and 10, and divide by 2, 5 and 10.</p> <p>Identify multiples of 2, 5 and 10.</p> <p>Unitise in tens.</p> <p>Identify odd and even numbers.</p> |

Example: Year 1

Understand the cardinal value of number words, for example understanding that 'four' relates to 4 objects.
Subitise for up to to 5 items.
Automatically show a given number using fingers.

1AS-1 Compose numbers to 10 from 2 parts, and partition numbers to 10 into parts, including recognising odd and even numbers.

Add and subtract within 10.

Devise and record number stories, using pictures, numbers and symbols (such as arrows).

1AS-2 Read, write and interpret equations containing addition (+), subtraction (−) and equals (=) symbols, and relate additive expressions and equations to real-life contexts.

Represent composition and decomposition of numbers using equations.

See, explore and discuss models of common 2D and 3D shapes with varied dimensions and presented in different orientations (for example, triangles not always presented on their base).

1G-1 Recognise common 2D and 3D shapes presented in different orientations, and know that rectangles, triangles, cuboids and pyramids are not always similar to one another.

Describe properties of shape.
Categorise shapes.
Identify similar shapes.



Example: Year 1

Select, rotate and manipulate shapes for a particular purpose, for example:

- rotating a cylinder so it can be used to build a tower
- rotating a puzzle piece to fit in its place

1G-2 Compose 2D and 3D shapes from smaller shapes to match an example, including manipulating shapes to place them in particular orientations.

Find the area or volume of a compound shape by decomposing into constituent shapes.

Rotate, translate and reflect 2D shapes.

Identify congruent shapes.



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Early Years Pedagogy

Education Endowment Foundation



IMPROVING MATHEMATICS IN THE EARLY YEARS AND KEY STAGE 1

Summary of recommendations

1

Develop practitioners' understanding of how children learn mathematics



- Professional development should be used to raise the quality of practitioners' knowledge of mathematics, of children's mathematical development and of effective mathematical pedagogy.
- Developmental progressions show us how children typically learn mathematical concepts and can inform teaching.
- Practitioners should be aware that developing a secure grasp of early mathematical ideas takes time, and specific skills may emerge in different orders.
- The development of self-regulation and metacognitive skills are linked to successful learning in early mathematics.

2

Dedicate time for children to learn mathematics and integrate mathematics throughout the day



- Dedicate time to focus on mathematics each day.
- Explore mathematics through different contexts, including storybooks, puzzles, songs, rhymes, puppet play, and games.
- Make the most of moments throughout the day to highlight and use mathematics, for example, in daily routines, play activities, and other curriculum areas.
- Seize chances to reinforce mathematical vocabulary.
- Create opportunities for extended discussion of mathematical ideas with children.

3

Use manipulatives and representations to develop understanding



- Manipulatives and representations can be powerful tools for supporting young children to engage with mathematical ideas.
- Ensure that children understand the links between the manipulatives and the mathematical ideas they represent.
- Ensure that there is a clear rationale for using a particular manipulative or representation to teach a specific mathematical concept.
- Encourage children to represent problems in their own way, for example with drawings and marks.
- Use manipulatives and representations to encourage discussion about mathematics.
- Encourage children to use their fingers—an important manipulative for children.

4

Ensure that teaching builds on what children already know



- It is important to assess what children do, and do not, know in order to extend learning for all children.
- A variety of methods should be used to assess children's mathematical understanding, and practitioners should check what children know in a variety of contexts.
- Carefully listen to children's responses and consider the right questions to ask to reveal understanding.
- Information collected should be used to inform next steps for teaching. Developmental progressions can be useful in informing decisions around what a child should learn next.

5

Use high quality targeted support to help all children learn mathematics



- High quality targeted support can provide effective extra support for children.
- Small-group support is more likely to be effective where:
 - children with the greatest needs are supported by the most experienced staff;
 - training, support and resources are provided for staff using targeted activities;
 - sessions are brief and regular; and
 - explicit connections are made between targeted support and everyday activities or teaching.
- Using an approach or programme that is evidence-based and has been independently evaluated is a good starting point.



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Stories, Rhymes Routines and Games

Pedagogies used in the teaching of early maths should be used to provide a meaningful context for the maths to occur, but this should not be forced, there should also be an inter-connectivity between what occurs in child initiated play and adult led activities, as well as opportunities for the children to their develop characteristics of effective learning.

The role of the adult is crucial

A balanced teaching approach



Planning your EY Maths Curriculum

Delivery of your EY Maths Curriculum

- **Daily intentional instruction?**
 - Adult directed teaching (exposure, bringing attention to the mathematics)
 - Maybe utilising stories & rhymes, games & puzzles and routines
- **Mathematising the everyday?**
 - Routines (bringing attention to the mathematics)
- **Continuous Provision?**
 - Child-initiated play (adults support learning through an enabling environment and quality interactions)
 - Focused learning (adults guide learning with playful, goal orientated, experiences)



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Early Years Typical Progression Chart: additional guidance for practitioners – Cardinality and Counting

Common errors in this area may include:

- missing out an object or counting an object twice
- when asked how many cars are in a group of four, simply recounting '1, 2, 3, 4,' without concluding that 'there are four cars in the group'
- when asked to 'get five oranges' from a tray, a child just grabs some, or carries on counting past five
- when objects in a group are rearranged, the child (unnecessarily) recounts them to find how many there are
- difficulties in counting back
- confusion over the 'teen' numbers – they are hard to learn
- missing a number like 15 (13 or 15 are commonly missed out) or confusing 'thirteen' and 'thirty'.

What to look for

Can a child:

- consistently recite the correct sequence of numbers and cross decade boundaries?
- collect nine from a large pile, e.g. nine pencils from a pot?
- subitise (instantly recognise) a group that contains up to four, then five, in a range of ways, e.g. fingers, dice, random arrangement?
- select a numeral to represent a quantity in a range of fonts, e.g. **4**, 4, 4?
- correct a puppet who thinks the amount has changed when their collection has been rearranged?



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What next?

Head teacher surgery Tuesday 8th March 14:00-15:00
(Zoom)

<https://www.emsmathshub.org.uk/work-groups/early-years-sktm-number-patterns-and-structures/>

<https://www.emsmathshub.org.uk/work-groups/early-years-sktm-pattern-shape-space-and-measures/>

Q&A



Links to further information

- Early Maths Resources for Teacher Educators (Stanford)

<http://prek-math-te.stanford.edu/user/register>

- Learning trajectories based on the text

<https://www.learningtrajectories.org/>

- Early Math Collaborative (Erikson)

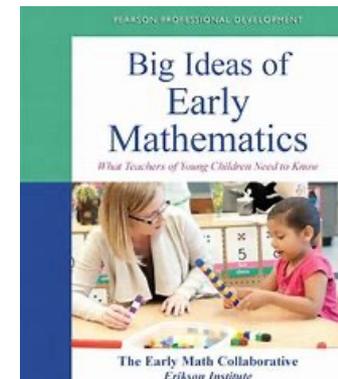
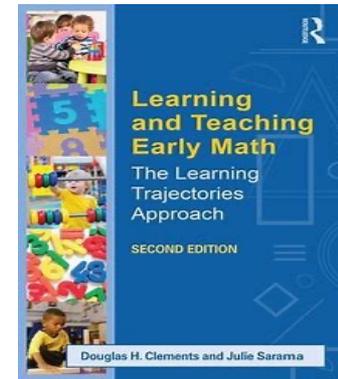
<https://earlymath.erikson.edu/>

- NCETM Typical progression charts

<https://www.ncetm.org.uk/resources/52500>

- Early Childhood Maths Group

- [Home - ECMG \(earlymaths.org\)](http://earlymaths.org)





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