

# 5, 4, 3, 2, 1 .....

## The countdown to mathematical change!

By Sarah Wallace



knowledge      vocabulary  
dispositions      positive  
strong      manipulatives      spatial  
attitudes      deep mastery  
**understanding**  
reasoning      grounding      mathematics

### Reforms

From September 2021, the revised *EYFS Statutory Requirements* will instigate changes to both the *Early Learning Goals* for mathematics and the level of development children should be expected to have attained by the end of the EYFS. The new *Early Learning Goals* for mathematics will involve greater clarity in counting and comparing quantities through *Number* and *Numerical Patterns* and support children to focus upon a deeper understanding of numbers to ten. There will be no specific *Early Learning Goal* for shape, space, and measure, but practitioners will still be required to teach children this fundamental element of mathematics, as part of a well-rounded, holistic curriculum. These changes reflect a commitment to strengthen the teaching of early mathematics,

with the aim that all children, particularly those from disadvantaged backgrounds, can start Year 1 with a strong and confident foundation in number.

### Educational programmes

As settings begin to further explore the new materials and reflect as a team on how they will prepare for the forthcoming changes, a useful starting point is to unpick the *Educational Programmes* that are outlined in the new *2021 EYFS Statutory Framework*.

These statements are linked to each area of learning and development and provide the curriculum framework that settings will build upon as they decide what they intend children to learn and develop. The *Educational Programmes* also set out activities and experiences that providers must offer all children and

underpins the curriculum foundations for each setting.

When we begin to explore the new *Educational Programme* for mathematics, we notice the use of new terminology and vocabulary. The statement may include phrases and words we may have heard before, but not yet fully understood.

It is therefore vital that as we prepare for the revised EYFS from September 2021, we explore and define this language, so we can reflect upon how the terminology will influence our mathematical practice.

The word cloud image includes some of the new language or phrases and these are also highlighted below within the *Educational Programme* for 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**.*

*Mathematics Educational Programme, 2021 - Statutory framework for the EYFS (Published: 31 March 2021, p 10)*

## Terminology

### Developing a strong grounding in number/a secure base of knowledge

A central element of supporting young children to have a strong grounding in number is **number sense**. This is the ability to be flexible with numbers or to have a feeling for number (Gifford, 2019). It refers to a group of skills that enables children to explore the different reasons for using number and the relationships between these processes. These key mathematical skills include the ability to:

- Recognise relationships between counting and quantities
- Understand number words, symbols and vocabulary (for instance, 7 means the same thing as seven)
- Grasp concepts like more and less or larger and smaller
- Make number and quantity comparisons (for instance, 12 is greater than 10)

- Develop an awareness of number pattern and sequence.

Number sense helps children understand both how our number system works and how numbers relate to each other. Children who develop number sense have a range of mathematical strategies at their disposal. They know when to use them and how to adapt them to meet different situations.

Sue Gifford further breaks down number sense into four key concepts, sometimes referred to as the 4C's of number: counting, comparison, composition and cardinality.

These four concepts have also been reflected within the new *Birth to 5 Matters: Non-statutory guidance for the Early Years Foundation Stage*. It is important that all practitioners have a shared understanding of these terms.

## Definitions:

**Counting** - Counting is one way of establishing how many things are in a group. It involves sequence and pattern, linking the numeral name with the items counted in a set of objects. **Subitising** is another way of recognising how many is in a group, this time, without counting. In this way, Subitising is the ability to 'see' or visualise a small group of objects and immediately know how many there are without counting them. It is counting with your eyes!





**Comparison** – This looks at comparing different amounts or quantities, being able to have a visual sense of an amount and seeing the differences between groups of items. It will also include comparing and recognising changes to the number of items, using words like more, lots or ‘same’ and progressing to 1 more and 1 less number operations. As children become more confident with this concept, they will also recognise which numbers are worth more or less than each other. This understanding underpins the mental number line which children develop as they recognise that the later counting numbers are worth more (because the next number is always one more).



**Composition** – Understanding that one number can be made up from (composed from) two or more smaller numbers. This involves a ‘part-whole’ understanding. Learning to ‘see’ a whole number and its parts at the same time is a key development in children’s

number understanding. Partitioning numbers into other numbers and putting them back together again, often underpins an understanding of addition and subtraction.



**Cardinality** – The cardinal value of a number refers to the quantity of things it represents, e.g. the ‘threeness’ of three. This means that when children count out a set of objects, they understand that the last number word used in the counting sequence, the stopping number, tells them the total quantity of the set.

**Use manipulatives - Provide frequent and varied opportunities to build and apply mathematical understanding**

A manipulative is an object that children or practitioners can interact with and move to represent mathematical ideas.



Manipulatives could include everyday objects such as pinecones, buttons or small toys, as well as specific mathematical resources such as interlocking cubes, Numicon, building blocks or a ten-frame and counters. These resources

## LET'S TALK MATHS

help children make sense of mathematical concepts using concrete materials and provide a bridge to abstract thinking. Manipulatives increase engagement and enjoyment and help practitioners to see what children already know and understand. When using manipulatives, it is important that practitioners help children to recognise the links between the resources and the mathematical ideas they represent.

**Mathematical vocabulary**

Using correct mathematical language is crucial for learning and communicating mathematically. From an early age, children need to learn how to talk about their work and how to explain their strategies and decisions they have made. Children build knowledge through remembering information that they hear, but it is only when they put these ideas into their own words, that it becomes clear whether concepts have been learned effectively. Adults therefore have a vital role in developing children’s use of language alongside mathematical concepts. Children need to hear every day mathematical words in meaningful contexts.

### ***Mastery of mathematics***

How do you know when a child has mastered something? Let's consider the process of learning to walk as a comparison, when a child takes their first wobbly steps independently as they progress from cruising around furniture, we would not yet say they had mastered the skill of walking. This achievement is celebrated when the child can walk proficiently forwards, backwards, up and down slopes, on different surfaces and holding someone's hand. As Dr Catherine Gripton highlights in her recent blog '*What is Maths Mastery in the Early years*', the same process of mastering can be applied to this aspect of mathematics.

**"A child has mastered counting to ten when they have a deep understanding of the numbers to ten. This means that they understand the sequence (order), quantities, properties and relationships between numbers 0–10, and they can play around with these and use them in different contexts". (Gripton, 2020)**

It takes time and repetition in meaningful contexts to develop this depth of understanding and it is important that children are provided with resources, adult support and a breadth of learning opportunities and experiences to enjoy number.

### ***Develop spatial reasoning skills across all areas of mathematics***

Spatial reasoning is how we understand how things (including ourselves) move and interact in relation to the physical space around them. It's a crucial skill for children to learn and can be used as a predicted indicator of children's future mathematical learning. In fact, Thom (2018) highlights that in some cases, children's spatial skills are a better gauge for later mathematics performance than vocabulary. The five core aspects of spatial reasoning include:

- Understanding relationships (how things fit together and how moving parts work)
- Language (hearing, describing, directing position and direction)
- Spatial memory: – Remembering where things are
- A sense of direction (noticing where you're going, and finding your way back) and
- Spatial representations (creating mental images, understanding perspective and movements, reading models and diagrams). (Williams, 2020)

Spatial reasoning is closely linked to children's learning within *shape, space and measure*.

### ***Have a go and make mistakes:***

For children to be successful mathematicians, they need to feel confident about talking through concepts and making their own mistakes. They need time to work things out and try

their ideas, which includes trying out what will not work as well as what will. To do this, they need a safe and secure learning environment, where adults acknowledge all contributions positively and value different ways of thinking. It is vital that early years practitioners foster a climate of growth mindset and use mistakes as a springboard to explore new knowledge and understanding. Practitioners can foster a positive mindset by promoting maths talk through open questions and by posing statements. When practitioners ask a closed question, a child is either right or wrong. However, if open-ended prompts are used, children can instead be invited to share and extend their mathematical thinking. Not only does this empower the child, but also helps to identify and address their conceptual misunderstandings.

### ***Develop positive attitudes and interests in mathematics***

Early years practitioners often see first-hand that a positive attitude can lead to positive outcomes. It is therefore essential that we support children to develop a love of maths! Practitioners with a passion for mathematics help children to question, challenge and think creatively. It is so important that adults ooze enthusiasm for mathematics and openly model these dispositions. Don't say things like 'I can't do maths,' or 'I hated mathematics at school', children may start to think like that themselves and be adversely influenced by these

negative views. Be alert to any children who explain that they 'can't do' maths and promote a culture of 'everyone is a mathematician'.

The revised EYFS materials will place greater emphasis and value upon practitioner's professional judgement and their awareness of child development. In mathematics, this essential knowledge will support practitioners to understand how each mathematical concept emerges and develops over time, recognises children's next steps in learning and addresses any misconceptions to build firm foundations in mathematics.

Remember, "The secret of getting ahead is getting started!" (Mark Twain)

#### Putting theory into practice - Follow up reflection points:

- Define and further reflect upon the new phrases and mathematical terms used within the 2021 revised EYFS Framework. Ensure all staff members have a shared understanding of the 'Educational Programme' for mathematics and how this will shape the curriculum on offer within your setting.
- Reflect upon practitioner's levels of confidence and understanding of child development for key mathematical concepts. Use this information to develop the team's ongoing professional development.
- Ensure all adults are clear about the mathematical vocabulary children need to

hear and use to support mathematical thinking. It is essential that everyone working with children uses the same mathematical language accurately and consistently.

- Consider carefully how the learning environment can act as a valuable context for mathematics, particularly through areas of continuous provision, core resources and within daily routines. Ensure that mathematical opportunities are purposeful and based in meaningful, real-life contexts.
- Support all children to develop and embed a growth mindset. Ensure adults use mistakes as a springboard to explore new knowledge and understanding. *Made a mistake? No worries! Learn from it and have another go. Something you tried hasn't worked? What could you try instead?*
- Consider how your current mathematical provision influences children's perception of mathematics? Consult with the children to gather their views and opinions about the uses and purposes of mathematics in your setting.

#### References:

- Education Endowment Foundation (2020) *Improving Mathematics in the Early Years and Key Stage 1*
- *Five recommendations to support practitioners in developing the maths skills of 3-7 year-olds*

Gifford, Sue (2020) Keynote speaker: 'Early years maths - where are we going?' Boolean Maths Hub Conference 18<sup>th</sup> January 2020,

Gripton, Catherine (2020) 'What is Maths Mastery in the Early years', <https://www.yellow-door.net/blog/what-is-maths-mastery-in-the-early-years/>

Statutory framework for the EYFS (Published: 31 March 2021,)

Williams, Helen (2020) *What Is Spatial Reasoning in Early Maths and Why Is It Important?* <https://www.famly.co/blog/helen-williams-spatial-reasoning>

