FENISCOWLES PRIMARY SCHOOL

STRIVING FOR EXCELLENCE

Early Maths @ Feniscowles

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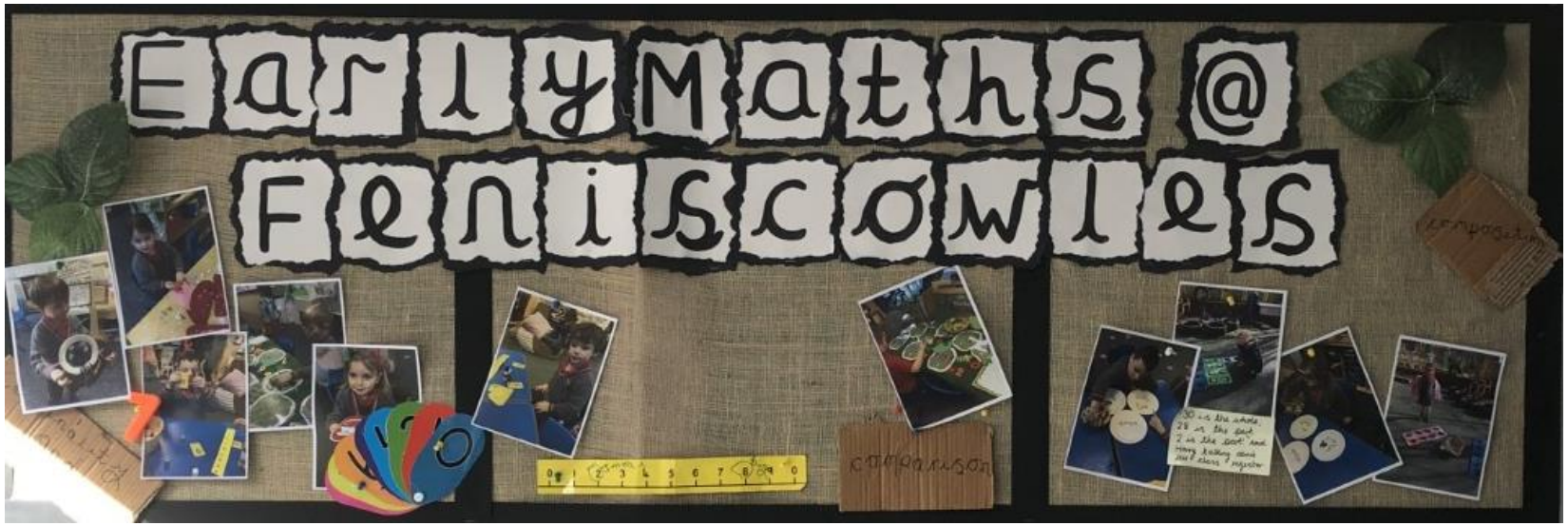

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Early Maths

The first few years of a child's life are especially important for mathematics development. Research shows that early mathematical knowledge predicts later reading ability and general education and social progress. Conversely, children who start behind in mathematics tend to stay behind throughout their whole educational journey.

The objective for those working in Early Years, then, is to ensure that all children develop firm mathematical foundations in a way that is engaging, and appropriate for their age.

There are six key areas of early mathematics learning, which collectively provide a platform for everything children will encounter as they progress through their maths learning at Feniscowles Primary School, and beyond.

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The Main Areas of Early Years Maths

There are six main areas that collectively underpin children's early mathematical learning, and which provide the firm foundations for the maths that children will encounter as they go up the years in primary school.
They are:
Cardinality and Counting: understanding that the cardinal value of a number refers to the quantity, or 'howmanyness' of things it represents
Comparison: understanding that comparing numbers involves knowing which numbers are worth more or less than each other
Composition: understanding that one number can be made up from (composed from) two or more smaller numbers
Pattern: looking for and finding patterns helps children notice and understand mathematical relationships
Shape and Space: understanding what happens when shapes move, or combine with other shapes, helps develop wider mathematical thinking
Measures: comparing different aspects such as length, weight and volume, as a preliminary to using units to compare later.

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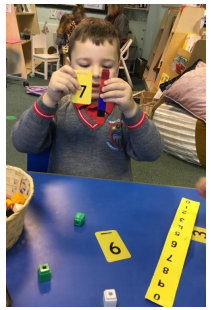
CARDINALITY AND COUNTING

Understanding that the cardinal value of a number refers to the quantity, or 'howmanyness' of things it represent.

The cardinal value of a number refers to the quantity of things it represents, e.g. the numerosity, 'howmanyness', or 'threeness' of three. When children understand the cardinality of numbers, they know what the numbers mean in terms of knowing how many things they refer to. Counting is one way of establishing how many things are in a group, because the last number you say tells you how many there are. Children enjoy learning the sequence of counting numbers long before they understand the cardinal values of the numbers. Subitising is another way of recognising how many there are, without counting.



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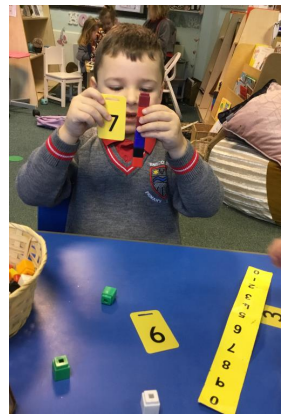
CARDINALITY AND COUNTING – COMMON MISCONCEPTIONS

- 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 trayful, 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’.



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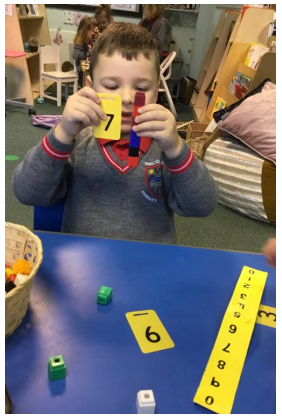

CARDINALITY AND COUNTING

CAN A PUPIL:

- 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,
- correct a puppet who thinks the amount has changed when their collection has been rearranged

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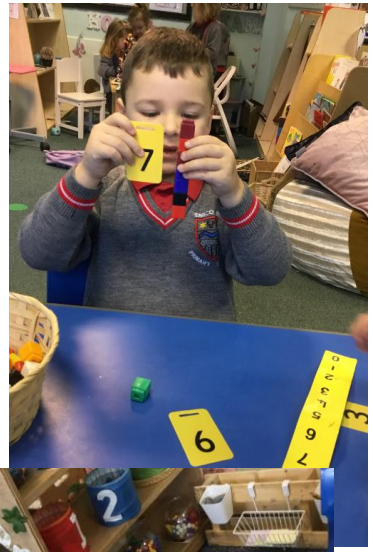
CARDINALITY AND COUNTING



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COMPARISON

Understanding that comparing numbers involves knowing which numbers are worth more or less than each other

Comparing numbers involves knowing which numbers are worth more or less than each other. This depends both on understanding cardinal values of numbers and also knowing that the later counting numbers are worth more (because the next number is always one more). This understanding underpins the mental number line which children will develop later, which represents the relative value of numbers, i.e. how much bigger or smaller they are than each other.

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COMPARISON – COMMON MISCONCEPTIONS

•children not comparing the numerosity of the group and considering more in terms of size

•children giving a response that does not match the context when estimating a number; e.g. when adding, giving as an answer a number that is smaller than the numbers given. Example: 'There are 7 cars in a garage and then 2 more go in.' The child guesses there are 4 cars in total inside.

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COMPARISON

CAN A PUPIL:

- state which group of objects has more? Can they do this with a large or small visual difference?
- compare two numbers and say which is the larger?
- predict how many there will be if you add or take away one?

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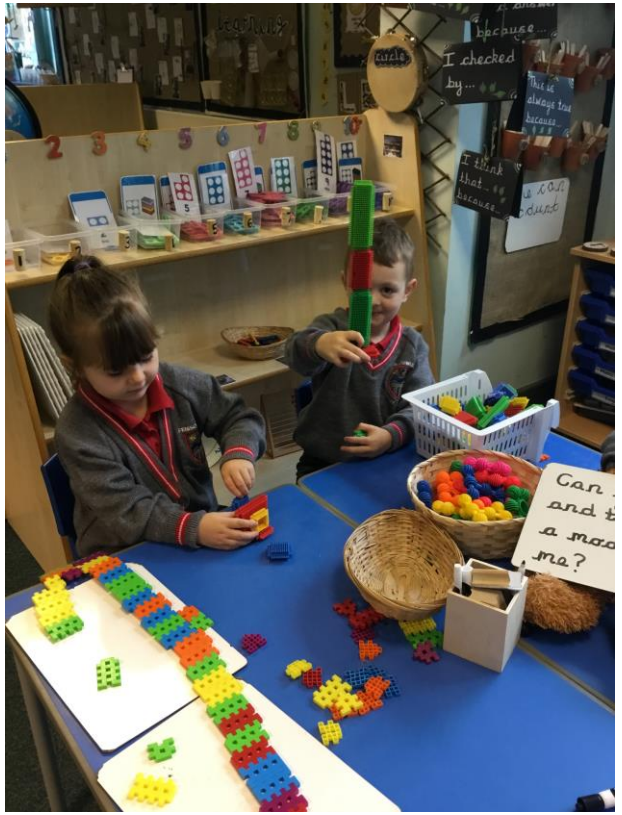
COMPARISON



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COMPOSITION

Understanding that one number can be made up from (composed from) two or more smaller numbers

Knowing numbers are made up of two or more other smaller numbers involves ‘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 underpins understanding of addition and subtraction as inverse operations

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COMPOSITION – COMMON MISCONCEPTIONS

- children suggesting that a larger number than the total are hidden

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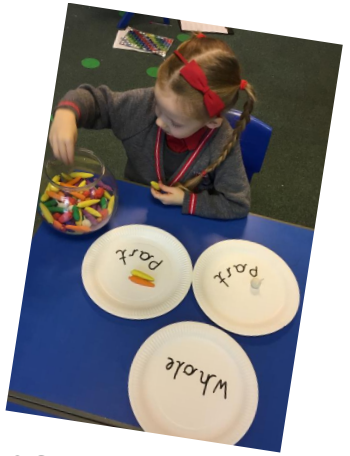
COMPOSITION



CAN A PUPIL:

- subitise small groups within a larger number?
- make a reasonable guess at a hidden number?
- in context, state two groups that make a larger amount? For example, how might the (six) bean bags land? You could have three with stripes up and three with spots up.

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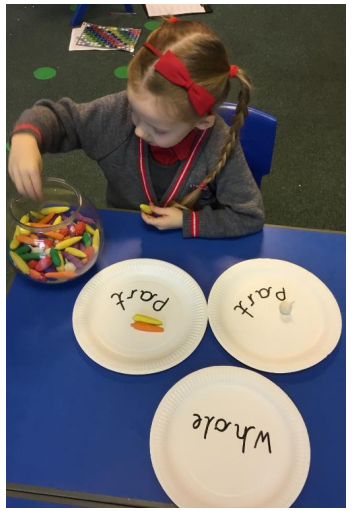
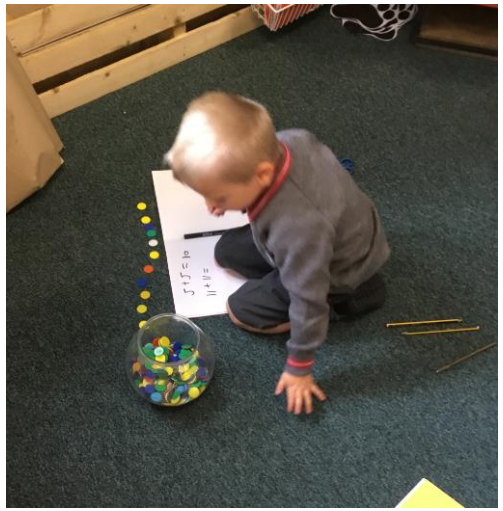
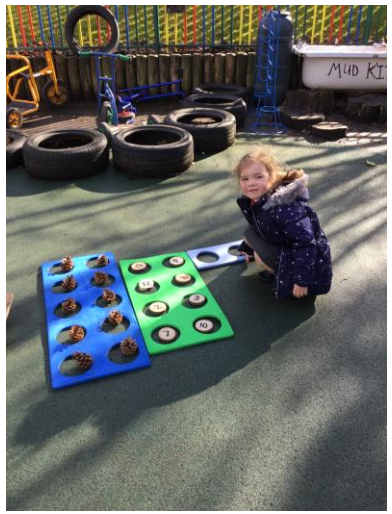
COMPOSITION







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PATTERN

Looking for and finding patterns helps children notice and understand mathematical relationships

Seeking and exploring patterns is at the heart of mathematics (Schoenfeld, 1992). Developing an awareness of pattern helps young children to notice and understand mathematical relationships.
Clements and Sarama (2007) identify that patterns may provide the foundations of algebraic thinking, since they provide the opportunity for young children to observe and verbalise generalisations.
Children need to recognise repeating patterns, progressing from children copying simple alternating AB patterns to identifying different structures in the 'unit of repeat', such as ABB or ABBC. Patterns can be made with objects like coloured cubes, small toys, buttons and keys, and with outdoor materials like pine cones, leaves or large blocks, as well as with movements and sounds, linking with music, dance, phonics and rhymes. Children can also spot and create patterns in a range of other contexts, such as printed patterns, timetables, numbers and stories.

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PATTERN – COMMON MISCONCEPTIONS

- not recognising a pattern such as ABBA (e.g. stating that patterns cannot have two of the same colour together)
- when copying or extending a pattern, changing it before making three repeats
- spotting that there is an error but not being able to describe it
- identifying an error but not being able to correct it
- correcting an error by making a 'local correction', which just moves the problem along (e.g. by adding an extra item when colours have been swapped)
- describing the whole pattern instead of identifying the part which repeats, or the unit of repeat.

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PATTERN

CAN A PUPIL:

- continue, copy and create an AB pattern?
- identify the pattern rule (unit of repeat) in an AB pattern?
- continue, copy and create ABB, ABBC (etc.) patterns?
- identify the pattern rule (unit of repeat) in an ABB, ABBC (etc.) patterns?
- spot an error and 'correct' a pattern?
- explain whether a circular pattern is continuous or not?

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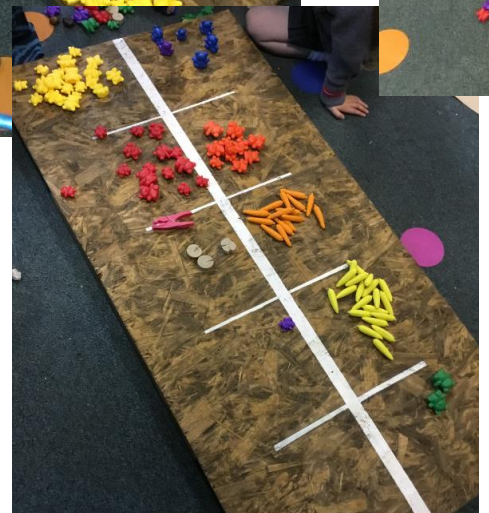
PATTERN



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SHAPE AND SPACE

Understanding what happens when shapes move, or combine with other shapes, helps develop wider mathematical Thinking.

Mathematically, the areas of shape and space are about developing visualising skills and understanding relationships, such as the effects of movement and combining shapes together, rather than just knowing vocabulary. Spatial skills are important for understanding other areas of maths and children need structured experiences to ensure they develop these. During Maths lessons, the focus is on actively exploring spatial relations and the properties of shapes, in order to develop mathematical thinking (rather than on shape classification, which requires prior knowledge of properties).

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SHAPE AND SPACE – COMMON MISCONCEPTIONS

•children thinking that only regular triangles are triangles, only brick-like rectangles are rectangles (i.e. shapes are defined by their image, not by their properties)
•children thinking that squares are only squares when the bottom is horizontal (i.e. shapes are defined by their orientation).

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SHAPE AND SPACE

CAN A PUPIL:

- select and rotate shapes to fit into a given space?
- use positional vocabulary, including relative terms, to describe where things are in small-world play?
- show intentionality in selecting shapes for a purpose, such as cylinders to roll?
- make a range of constructions, including enclosures, and talk about the decisions they have made?
- see shapes in different orientations and recognise that they are still that shape?
- recognise a range of triangles and say how they know what they are?

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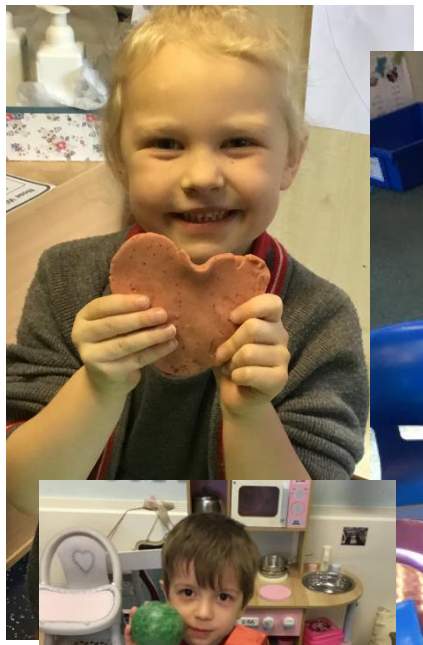
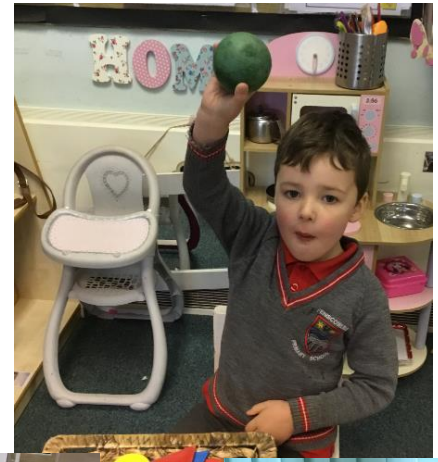
SHAPE AND SPACE





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MEASURES

Comparing different aspects such as length, weight and volume, as a preliminary to using units to compare later

Mathematically, measuring is based on the idea of using numbers of units in order to compare attributes, such as length or capacity. Although young children engage with using rulers and experience being measured in centimetres, kilos – and years! – the measuring units themselves are hard to understand.

Children need to realise which attribute is being measured, e.g. weight as opposed to size, and the idea of conservation: that the amount stays the same, even if the appearance alters, e.g. if dough is stretched out or in bits. In order to understand units, they need to realise that two items can be compared using a third item, or 'go between', such as a stick.

Finally, children need to understand how equal size units are used repeatedly to express an amount as a number.

While our young children can engage actively in making comparisons and exploring equivalence of length, volume, capacity and weight in different ways, some of these ideas are challenging and will develop later in primary school. For instance, weight (mass or density) is difficult to distinguish from size since it is invisible, and the concept of conservation is harder to understand for weight and capacity. Measuring with non-standard units of different sizes in order to appreciate the need for equal units is less effective with younger children, so centimetre cubes are recommended as accessible units. While time is also elusive to measure, young children can sequence events and, for example, count 'sleeps'.

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MEASURES – COMMON MISCONCEPTIONS

•keeping track of events, e.g. 'Have I had my lunch yet?'
•positional language associated with time; muddling the relative terms 'yesterday' and' tomorrow'
•using 'long' to describe the shape of something (e.g. a block that is much longer than it is wide) rather than to compare lengths
•not taking into account both ends as the starting and stopping point
•not being able to say 'than' in the phrase, 'this is longer than that'
•not understanding that units must cover a complete length, with no gaps or overlaps, demonstrated by thinking that measuring is about counting units placed along something, or putting a ruler alongside and saying a number
•not understanding that units must be equal.

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MEASURES

CAN A PUPIL:

- find something that is longer, shorter, heavier, lighter (etc.) than a reference item?
- find an appropriate container for a specific item?
- describe the location of something using positional language?
- accurately use the relative terms 'yesterday' and 'tomorrow'?
- order a short sequence of events?

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MEASURES