

MATHEMATICS IN THE EARLY YEARS

St. Columba's School

Mathematics in the Early Years consists of taught episodes alongside observations of children's self-directed play. Research has found that mathematics is very unlikely to happen unless adult-initiated episodes are organised, alongside planned mathematical environments.

Currently (2014), Foundation Stage pupils are aiming to achieve two Early Learning Goals in Mathematics:

- (ELG 11 - Number): Children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.
- (ELG 12 - Shape, space and measure): Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.

Changes to the ELGs (proposed statutory) for 2021 may also need to be considered:

Number

- Have an understanding of number to 10, linking names of numbers, numerals, their value, and their position in the counting order;
- Subitise (recognise quantities without counting) up to 5;
- Automatically recall number bonds for numbers 0-5 and for 10, including corresponding partitioning facts.

Numerical Patterns

- Automatically recall double facts up to 5+5;
- Compare sets of objects up to 10 in different contexts, considering size and difference;
- Explore patterns of numbers within numbers up to 10, including evens and odds.

The proposed changes place more emphasis on early number sense and quantity, improved mental strategies, more use of recall and exploration, plus increased knowledge of spatial reasoning (it must be noted that number and quantity are not the same thing). There is less emphasis on shape, space and measure with a greater degree of shared, adult-led learning and discussion.

How will we achieve this?

At St. Columba's, we will provide opportunities for our pupils to use the five counting principles:

- **One-to-one** - children assigning one number name to each object being counted.
- **Stable-order** (including ordinal)- children understand the numbers have to be said in a certain order when counting.
- **Cardinal** - children understand that the number name assigned to the final object in a group is the total number of objects in that group.
- **Abstraction** (including subitising)- children understand that anything can be counted, including things that cannot be seen. They can know how many without counting.
- **Order-irrelevance** - children understand that the order we count a group of objects is irrelevant.

We will provide everyday objects and real-life experiences both inside and outside the classroom. Teachers lead the learning and encourage meaningful discussions to further knowledge and induce questioning and reasoning thoughts. We will provide plentiful and varied opportunities to organise, estimate, count, compare, share out and label different objects, in many different contexts and for different purposes.

Alongside this, we will support children in counting through the 'tricky teens' - the numbers from 11 to 19. By seeing as well as hearing the numbers from 20 to 100, where it all begins to regularise, we can also help children to see the patterns in the number sequence, ready for the Year 1 curriculum.

Teaching ideas could include:

- Counting real objects that can be moved, rather than pictures of objects or 'objects' on a screen. 'Estimation stations' with a box for self-written estimates.
- Counting into a container to draw attention to the seven individual items becoming one group of seven etc.

- Drawing attention to the cardinal principle by saying *before* the count begins: 'It looks like we've got about seven here - let's count to find out.'
- *Counting out* from a larger collection, by asking, 'Can you fetch me nine buttons from that jarful?'
- Rearranging the order of objects in a group and asking the child 'how many now'? If they re-count, they have not grasped the order-relevance principle.
- Encouraging counting of abstract things - jumps, claps etc.
- Partitioning objects in a set - socks, counters etc
- Encouraging subitising without counting - dots on a dice/ domino etc

The importance of spatial reasoning

"The neural circuitry used to build up a child's understanding of their external environment, the way they orientate themselves spatially... is also used to process numbers and more abstract thinking." (Mon-Williams, 2018)

Spatial reasoning develops from static to dynamic and incorporates the following elements:

- **understanding relationships** - how things fit together, how moving parts work
- **language** - hearing, describing, directing; position, direction
- **spatial memory** - where things are
- **sense of direction** - finding your way back
- **spatial representations** - creating mental images, composing and deconstructing; perspective and movement; understanding models, maps, diagrams.

In addition to organised mathematical teaching and learning, our Early Years provision will provide several opportunities to contribute positively to children's early number sense throughout the school day. This will include the following: routines - snack time, making number labels, 'stock taking'; games - outdoor tracks, skittles, keeping score; number rhymes and books - ensure that at least some include symbols; simple problem-solving - e.g. sharing gold coins amongst pirates; playfulness - correcting mistakes, testing ideas; and 'sustained shared thinking' with adults. Having a treasure hunt would be a meaningful way of combining spatial elements in the EYFS. In particular, high-quality jigsaw-play with an adult aids spatial skills.

As a school, we adopt a mastery approach to teaching & learning, including in the Foundation Stage. This means the following approaches will be undertaken:

- An underpinning belief in *every child* having a potential to succeed.
- Low-threshold/high-ceiling tasks that allow *every child* to make a start and that enable the adult to develop what is needed next.
- Focusing on key ideas and exploring these from all sides - exploring mathematical ideas.

Resources

Numicon - individual boxes, one per pupil

Numberblocks [Numberblocks - CBeebies](#) plus DVDs

NRICH Early Years [EYFS Home Page](#)

Which one doesn't belong: [Wodb](#)

Counting Songs [School Radio - Counting songs, Numbers up to 10](#)

Recommended texts

The Three Bears by Byron Barton

The Three Billy Goats Gruff by Stephen Carpenter

Washing Line by Jez Alborough

Anno's Counting Book by Mitsumasa Anno

How many legs by Jim Field

Five Little Ducks by Denise Fleming

Five Tiddly Widdly Tadpoles by Debbie Tarbett

Five Little Monkeys Jumping on the Bed by Eileen Christelow

Five Little Men in a Flying Saucer by Dan Crisp

Frog & Toad - A Lost Button by Arnold Lobel

The Button Box by M Reid

Mr Grumpy's Outing by John Burningham

The Very Hungry Caterpillar by Eric Carle

The Bad Tempered Ladybird by Eric Carle

A Second is a Hiccup by Hazel Hutchins

Peace at Last by Jill Murphy

Alfie at Nursery School by Shirley Hughes

Maisy Goes Camping by Lucy Cousins

The Three Little Pigs - traditional tale

The Gingerbread Man - traditional tale

The Enormous Turnip - traditional tale

Recommended songs, rhymes and games

One, Two, Three, Four Five...once I caught a fish alive

One, Two Buckle my Shoe

Three Blind Mice

Five Little Speckled Frogs

Five Currant Buns

Ten Green Bottles

Ten in the bed

Ten fat sausages

The Twelve Days of Christmas

Recently purchased items to aid number and spatial reasoning (April 2020):

Despatch No:
TT5967541

Despatch Date
23 Apr 2020

Qty	Item Code	Description	VAT Rate	Price Per Item	Discount Per Item	Nett Price Per Item	Total Nett Price
1	EY10092	Wooden Rustic Number Stacker 1-10	20%	£59.95	£0.00	£59.95	£59.95
1	EY11371	Fruitful Fractions	20%	£15.99	£0.00	£15.99	£15.99
3	EY03728	Large Chunky Wind Up Handle Tape Measure	20%	£10.99	£0.00	£10.99	£32.97
1	MGBS	Giant Outdoor 20 Bead Strings 200cm	20%	£10.99	£0.00	£10.99	£10.99
1	EY10757	Building Number Houses	20%	£54.95	£0.00	£54.95	£54.95
2	MA10323	Box of 1-10 Numicon Shapes 30pk	20%	£141.70	£0.00	£141.70	£283.40
1	EY06883	Wooden 2D Shapes and 5 Pattern Boards	20%	£29.95	£0.00	£29.95	£29.95
1	EY01242	Active World Tuff Tray Number Mat	20%	£19.50	£0.00	£19.50	£19.50
1	EY11537	Float & Find Number Bubbles	20%	£29.95	£0.00	£29.95	£29.95
2	MNTAB	Colourful Number Tabards 1-10	20%	£20.00	£0.00	£20.00	£40.00
1	EY01772	Fine Motor Tweezers Sorting Set	20%	£29.95	£0.00	£29.95	£29.95
2	EY10212	Ladybug Number Match Set	20%	£24.95	£0.00	£24.95	£49.90
1	EY07249	Stained Glass Shapes Kit 160pcs	20%	£38.95	£0.00	£38.95	£38.95
1	EY07491	Counting Cars	20%	£54.95	£0.00	£54.95	£54.95
1	EY04163	Outdoor Wooden Buckets and Scales Set	20%	£109.95	£0.00	£109.95	£109.95
1	EY04780	Wooden Wipe Clean Number Formation Set 1-20	20%	£37.95	£0.00	£37.95	£37.95
1	EY10814	Small Number Moulds 1-10	20%	£8.99	£0.00	£8.99	£8.99
VAT Exempt Total: £0.00						Nett Price	£908.29
						VAT	£181.66
						Total	£1,089.95