SBC Numeracy and Mathematics Progression Pathway & Guidance

Early Level

'Curriculum for Excellence gives prominence to play, particularly across the early level and the transition between ELC and primary school. This transition will likely be smoother for the child if play remains and continues as the main vehicle for their early learning in P1 and beyond. As practitioners across ELC settings and schools we need to work together to plan for progression in learning and for continuity across a child-centred play pedagogy and curriculum.' Realising the Ambition, Education Scotland 2020 p45

Maths and Numeracy Early Level Progression

The focus for all maths and numeracy experiences should be on developing these skills at an appropriate level. (Developed from the Numeracy and Mathematics Benchmarks selecting skills relevant to Early Level.)

Numeracy and Mathematical skill	Key features	Additional guidance.
Interpret questions	• selects the relevant information • interprets data • draws diagrams • chooses appropriate operations	Learners need to: • Understand questions and work out what they need to do to solve them • be supported to develop their skills of understanding questions by recognising the important words, using concrete apparatus or drawing pictures
Select and communicate processes and solutions	• explains choice of process • shares thinking • verbalises or demonstrates thought processes	Learners need to: • be able to talk about why they have chosen to do something a particular way • have frequent opportunities to talk about their thinking with their peers and teachers • have opportunities to explore a range of methods and representations and increasingly choose processes which are most efficient • discuss how they solve problems by explaining their thinking or demonstrating with concrete apparatus or pictorially • become more confident in their abilities to select from a growing range of strategies and be talk about their why they chose a particular one and begin to make greater use of specialised vocabulary
Justify choice of strategy used	• shows and talks though their thinking • explains their strategy • justifies choice of strategy compared to other approaches	Learners need to: • show and talk through their thinking to better understand and explain their own methods • regularly work in pairs and groups to learn with and from each other to refine their methods • say why they chose a particular method
Link mathematical concepts	• understands and applies links between mathematical concepts • transfers learning in one area to another • uses connections to solve problems	Learners need to: • be able to link mathematical concepts • use their knowledge and skills within numeracy and mathematics and across the curriculum to solve a range of problems.
Use mathematical vocabulary and notation	• uses correct mathematical vocabulary	Learners need to: • begin to use the correct mathematical vocabulary, notation and appropriate units in a range of contexts
Mental agility	• knowledge of number facts • manipulates numbers.	Learners need to: • begin to develop fluency in number facts • use strategies to manipulate an appropriate range of numbers and apply these to solve open-ended problems
Reason algebraically	• finds the unknown quantity • understands and uses the commutative, associative laws.	Learners need to: • understand that numbers can be replaced by pictures or symbols and use this to solve problems • explore and investigate commutative (3 + 4 = 4 + 3) and associative (3 + [4+ 5] = [3+4] +5) laws
Determine the reasonableness of a solution	• routinely uses estimation and rounding skills • selects the most appropriate degree of accuracy.	Learners need to: • use estimation and rounding to estimate and check if an answer is reasonable • begin to think about how accurate they need to be

Guiding Principles for Learning and Teaching of Number – Robert Wright et al.	
Inquiry-based learning	Learning is enquiry based. Children are routinely engaged in thinking hard to solve mathematical problems.
Initial and on-going assessment	Learning is informed by on-going assessment through teaching
Zone of Proximal Development	Learning is focused just beyond the cutting edge of children's current knowledge
Quality crafted lessons	Learning approaches are carefully selected to meet the needs of this child.
Developing more sophisticated strategies	The teacher understands the child's numerical strategies and deliberately engenders the development of more sophisticated strategies through mathematisation.
Observing and fine-tuning learning	Observation of learning informs micro-adjustments within lessons
Symbolising and notating	Children talk about their strategies and over time learn to notate their thinking and formalise this
Sustained thinking and reflection	Wait time is valued and given
Intrinsic satisfaction	Through distancing settings and self-checking their thinking, children understand they are making progress.

'We know it is important for settings to offer children interactions, experiences and spaces that are developmentally appropriate. One way to do this is to consult a list of typical milestones for given ages and stages and provide what might match these. An approach like this can take us so far, but of course, every child is different, and we have to take care to ensure that we do not miss some opportunities to support and extend their learning. This approach can also encourage a narrow 'tick box' focus that doesn't represent the repetitive and schematic nature of a young child's learning – young children often need to repeat experiences and actions to deepen their learning.'

'Observation can therefore be seen as noticing what it is that the children are finding interesting; noticing what they do and seeing how this might be changing over time. ***It is impossible to design a progression or tracker for everything a child might do or find interesting****, and for babies and toddlers this might feel very adult-centred and unnatural. But we can notice interest and, as adults, think about how we can make something even 'more interesting'.'* **Realising the Ambition, Education Scotland 2020 p65**

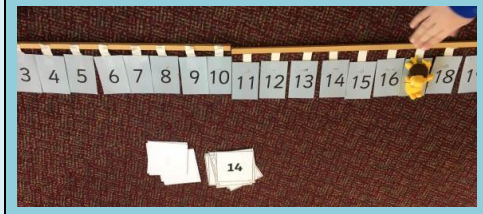
As it states above, it is impossible to design a progression or tracker to record everything a child might do or find interesting. However, this has been designed to support practitioners and teachers in identifying the learning taking place whilst making observations and to give developmentally appropriate ideas for how to deepen and progress the learning.

Although these skills and concepts are displayed as being a linear progression, children may not progress directly from one skill onto another and may acquire later skills before earlier skills. Do not assume that children understand earlier concepts if they have acquired later skills.

Key: White – approximately ELC3 in June
Pale blue – approximately ELC4 in June
Dark blue – approximately P1 in June
Statements in red are the Early Level Benchmarks

"These are the floor not the ceiling for assessment."
Kath Gullen SEYO Burnfoot

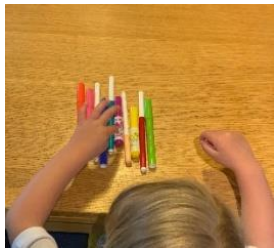
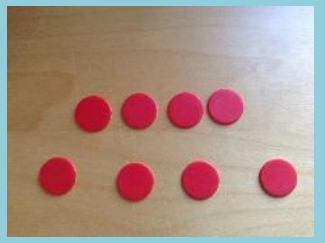
I am developing a sense of size and amount by **observing, exploring, using and communicating** with other about things in the world around me MNU 0-01a

Core aspect & skills focus	**Key vocabulary:** less, more, fewer, big, bigger, small, smaller, longer, shorter, about the same as?		**Key vocabulary:** Guess how many? Estimate, Roughly how many? Do you want to check how many? How many altogether? What is the total? Equal to…		
Estimation and Rounding MNU 0-01 Select and communicate processes and solutions Use mathematical vocabulary Determine the reasonableness of a solution Mental Agility	I recognise more and less in a range of practical context. 	I can represent or draw to show more, less or, fewer in relation to amount/quantity.	I can use the words 'more' and 'less' to describe and compare a group of items. *Children find identifying 'more' easy but find identifying and describing 'less' more challenging.* *Less refers to an amount which can't be counted .e.g. sugar, water, sand* *Fewer refers to an amount which can be counted e.g. cubes, blocks, beads.*	I can verbally find a number more or less than… 	I can make a reasonable estimate of quantities up to 10. E.g how many children in our group? **I can recognise the number of objects in a group without counting (subitising) and use this to help me estimate numbers of other objects.**  **(Guidance p.25)**
	I can describe something as big, little, small or the same size to compare size. 	I can represent or draw to show big, bigger, small, smaller etc. in relation to size.	**I can show estimation skills in the context of number and measure using the relevant vocabulary including less than, longer than and equal to.**	I can indicate if a number is closer to 0 or 10 using a number line or numeral track. I can indicate if a number is closer to 0,10 or 20 on a numeral track.	**I can check my estimates by counting.**

I have **explored** numbers, **understanding** that they represent quantities and can use them to **count, create sequences** and **describe order.** MNU 0-02a

Core aspect/skill focus	**Key vocabulary:** First , last , in the middle, in between , number names 0-10, backwards		**Key vocabulary:** Before, after, first, second, third, fourth number names 0- 30, what's the missing number? Next, one less, one more	
Number word Sequences **MNU 0-02a** Use mathematical vocabulary	**I can say forward number word sequences (FNWS) and backward number word sequences (BNWS):** To 5/from 5 To 10/from 10 To 15/from 15 To 20/from 20 **To 30** ***Forward and Backward Number word sequences should be explored and taught at the same time**. However, children take longer to be confident with BNWS and need longer to embed this.*	**I can say the number word sequence from any number up:** To 5 To 10 To 15 To 20 **To 30** I can say the number word sequence from any number to 0: within 5 within 10 within 15 within 20	**I can say the number word before (NWB), after (NWA) and missing numbers to 20**  *Can the child say the number before the bear and after the bear?*  	**I can use ordinal numbers in real life contexts. E.g. I am first in the line.**

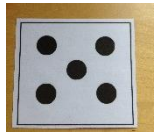
I have **explored** numbers, **understanding** that they represent quantities and can use them to **count, create sequences** and **describe order.** MNU 0-02a

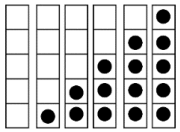
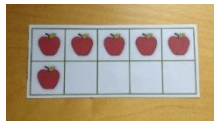
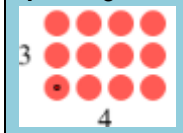
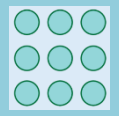
Core aspect/skill focus	**Key vocabulary:** First , last , in the middle, in between , number names 0-10, backwards		**Key vocabulary:** Before, after, first, second, third, fourth number names 0- 30, what's the missing number? Next, one less, one more		
Counting strategies **MNU 0-02a** **Perceptual Counting** **(Guidance p. 17)** Justifying choice of strategy Use mathematical vocabulary Mental agility	I can tag/touch count items in a row forwards:  To 5 To 10 To 15 To 20 I can accurately count out from a larger group:  Up to 5 items Up to 10 items up to15 items up to 20 items	**I know the number name of the last thing I count is the total number of things I have.**	I can organise items independently to count accurately. To 5 To 10 To 15 To 20  I can tag/touch count a random collection of items (not in a row) e.g. in a circle. ***Below 5 children should subitise.*** To 10 To 15 To 20  *Children need to recognise where they have started and where to stop.*	**I can explain that zero means there is none of a particular quantity and is represented by the numeral 0.** I can use a 20 Rekenrek frame and 20 bead strings to count out and count on.  ***(Always begin with all the beads on the right-hand side)*** ***See guidance on Early level Portal.***	**I understand that the number of things is the same whether they are big or small, spread out, or in a different order.**  I am beginning to count in 2s to 20 I am beginning to recognise if a quantity is odd or even. 0-10 0-20

I have **explored** numbers, **understanding** that they represent quantities and can use them to **count, create sequences** and **describe order.** MNU 0-02a

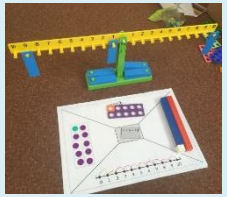
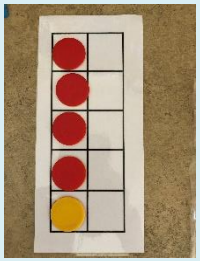
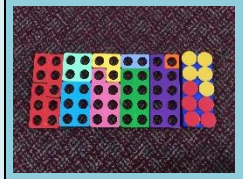
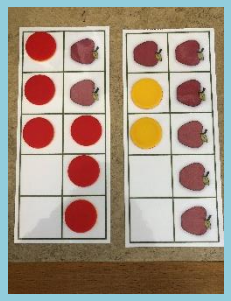
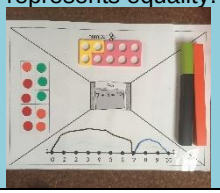
Core aspect/skills focus	**Key Vocabulary,** order, number cards,		**Key Vocabulary:** numeral, missing numbers , order numbers forwards and backwards	
	→	→	→	→
Numerals **MNU 0-02a** *A word or written representation of a number.* Use mathematical vocabulary and notation Mental agility Select and communicate processes and solutions	I make marks & draw pictures to record my ideas about numerals.  I can recognise the difference between numerals and letters.	**I can identify numerals:** 0 – 5 0 – 10 0 – 15 **0 – 20**  I can write the digits from 0-9 I can write the numerals 10-30.	**I can sequence numerals forwards and backwards:** 0 – 5 0 – 10  0 – 15 **0 – 20**  I can order non-consecutive numbers in the range of: E.g. order 3, 6, 10. 0 - 10 0 - 20	**I can work out the missing numbers on a number line. (see patterns benchmark)** 0 – 5 0 – 10 0 – 15 **0 – 20**  I am beginning to recognise number words from zero to ten.

I have **explored** numbers, **understanding** that they represent quantities and can use them to **count, create sequences** and **describe order.** MNU 0-02a

Core aspect/skill focus	**Key Vocabulary:** number words, finger patterns, dot patterns, growing fingers, throwing fingers, bunny ears, Numicon, five frame,			**Key Vocabulary:** Double, halve, equal, 10 frame, tally mark, Cuisenaire rods, partition, array		
Number Structures **MNU 0-02a** Justify choice of strategy used Link mathematical concepts Use mathematical vocabulary and notations Mental Agility	I can use finger patterns in number songs and rhymes. YMI Making Music Team on Glow YMI YouTube Channel for Videos YMI Blog https://www.bbc.co.uk/programmes/b03g64rd https://earlymath.erikson.edu/math-at-your-fingertips-songs-and-fingerplays-for-preschoolers/	**I can recognise visual amounts (subitise) e.g. arrays, dice, ten frames, Numicon by sight: (flashed – children don't have time to count) (Guidance p. 25)** **Dice patterns:** 0-3 4-6 **7-9** **10-12**   **Random Dot patterns/arrangement of objects** 0- 3 4-7 **8-10**    **Numicon:** 0 - 3 To 5 **To 10** 	I can make finger patterns (grow): **(Guidance p. 17)** To 5  I can make finger patterns (grow): Using 2 hands To 5 To 10 	I can make finger patterns without looking (throw): To 5 I can make finger patterns without looking (throw): using 2 hands To 5 	I use finger patterns to show doubles to 10  **I can double numbers mentally to 10.** 	I can demonstrate the possible partitions to equal 5 **I can demonstrate all possible partitions which equal 10** **e.g. 1 + 9 =10** **10 = 8 +2** **I can demonstrate all possible partitions of numbers to at least 10.** **E.g. 8 = 6 +2** **8 = 1 +3+1+1+ 2** **8 = 1 +5 + 2** **8 = 4 + 3 + 1** **8 = 1 + 1+2+3+1** **8 = 2 + 1+ 2 + 2+ 1**

Number Structures **MNU 0-02a** Justify choice of strategy used Link mathematical concepts Use mathematical vocabulary and notations Mental Agility		**5 frame:** 0 – 5   **10 frame:** 0 - 3 To 5 **To 10**   **Arrays:** **4 6 8 9 10 12**   		To 10 		

I **use practical materials** and can 'count on and back' to help me to **understand** addition and subtraction, **recording** my ideas and solutions in different ways. MNU 0-03a

Core aspect/skill focus	**Key vocabulary:** 1 more 1 less more, less, the same as,				**Key vocabulary:** Fewer, add , subtract, minus, equals, the same as, difference, plus, total, altogether, missing number, balances, bar model with real objects **Notation: + - =**			
Addition and Subtraction **MNU 0-03a** **Reason algebraically** **Mathematical notation** **Select and communicate processes and solutions** **Justify choice and strategy** **Interpret questions**	I can add one or take away one from a group verbally. To 5 To 10  I understand the concept of 1 more and 1 less verbally. To 5 To 10 *Ensure that children understand the concept of more and less before introducing it numerically.*	Using apparatus like Numicon or Cuisenaire rods, I understand that two or more smaller amounts can be the same as one larger amount.   	Using practical materials, I understand that when taking an amount from a larger amount that the amount will be fewer. 	**I can count on and back in ones to add and subtract**. (within 10)  *'I have 4 and 1 more is 5.'* *Use subitising skills to identify new quantities when one is added or subtracted*	I can use practical materials/ fingers to add and subtract numbers to 10.   **Adds and subtracts mentally to 10.**	**I can partition single digit numbers into two or more parts and understand that this does not affect the total. e.g. 3+2 = 5 1+1+2+1 =5**  	**I can record my understanding of addition and subtraction problems in different ways (not using mathematical symbols).**  *(2 flowers and 3 flowers is 5 flowers, or 5 flowers subtract 3 flowers is 2 flowers)* **I can correctly use the mathematical symbols +, − and =** I am beginning to understand that the equals symbol represents equality. 	**I can solve simple missing number problems e.g.** **3 + ? = 10** **7 = 4+?** **10 – 7 = ?** **8 = 10 - ?** Use 10 frames, Rekenrek or Bead Strings. *SEAL Perceptual Child - figurative counting strategies* I can position real objects to represent a bar model to solve addition and subtraction problems.

I can **share out** a group of items by making smaller groups and **can split** a whole object into smaller parts. MNU 0-07a

Core aspect/skill focus

Key Vocabulary: share, whole, all, same,not the same, fair, not fair, half, half-way, in the middle, pieces,

Key Vocaulary; fair and unfair, whole, half, halves, quarter , quarters, equal, not equal, groups, split, fraction, part/s, **Notation:** $\frac{1}{2}$ and $\frac{1}{4}$ (P1 only)

Fractions

MNU 0-07a

In real life situations

(Guidance p. 18)

Interpret questions

Mathematical vocabulary and notation

Linking concepts

Select and communicate processes and solutions

Justify choice and strategy

Determine the reasonableness of a solution

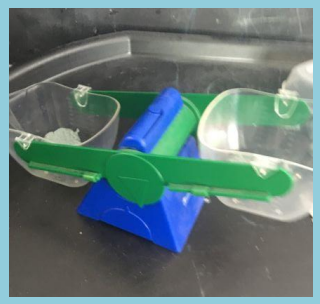
I know that a whole item/group can be shared into parts – not necessarily equal in real life situations.

I can share a whole item or group by cutting/splitting it into parts.

I can put smaller pieces back to make a whole

I understand the concept of fair and not fair in relation to quantities.

I understand the concept of equal and not equal.



I can use the word:(Not necessarily accurately.)

half

half and half again (quarter)

half way

(Linear model - on a number line)

I can split a whole into smaller equal parts and explain that each part is the same size.

I can use the vocabulary half accurately.

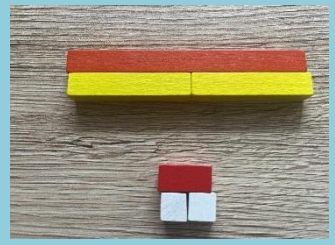
I can share out a group of items into equal smaller groups. (set model)

In practical situations, I can show with reasonable accuracy:

in the middle/halfway

(linear and area model) e.g. Piece of string or piece of paper.

Using Cuisaneaire Rods, I have explored the relationship between the different colours and can show half.



I am **developing my awareness** of how money is used and **can recognise** and **use** a range of coins. MNU 0-09a

Core aspect/skill focus	**Key Vocabulary:** penny, pennies, cost, money, change, how much? coin, buy, bank card, phone		**Key Vocabulary:** pence, pound, names of coins, notes, price, value, total **Notation** - £ and p	
Money **MNU 0-09a** **(Guidance p. 20 and progression for money through snack on the Early Level Portal.)** **Reason algebraically** **Mathematical notation** **Select and communicate processes and solutions** **Mental agility** **Justify choice and strategy**	I know that money is used to buy things in real life. I can use a bank card or phone to pay for thinkgs in real life. I use appropriate language when talking about money e.g penny, pound, cost, change. I can use coins/bank cards in role play. – experience giving and receiving change. 	I can sort all the coins to £2 by shape and colour. *Where possible use real coins with the children and ensure there is a mixture of new and old styles.*  I can match coins to their photographs. 	**I can identify all the coins to:** 10p 50p £1 **£2**  I can order the coins according to their value. 	**I can apply addition and subtraction skills and use 1p, 2p, 5p and 10p coins to pay the exact value for items to 10p.**  I can explore the different ways to make the same total up to 10p 

I am **aware of** how routines and events in my world link with times and seasons and have **explored** ways to record and display these using clocks, calendars and other methods. MNU 0-10a

Core aspect/skill focus	**Key Vocabulary:** Morning, lunchtime, home time, snack time afternoon, evening, night, today, yesterday,tomorrow, weekend.Spring, summer, autumn, winter, time, calendar, birthday, timer, how long does it take? Clock, watch, time, , now, next, then, later, soon, first				**Key Vocabulary:** days of the week in sequence, months of the year, o'clock, hands (clock hands) season , week, month, day minute, hour, second, what time is it? digital, analogue			
Time **MNU 0-10a** **(Guidance p. 26 & 27)** **Mathematical vocabulary & notation** **Interpret questions**	I can talk about different times of the day. I know there are different activities which happen at different times of the day.	I can use the vocabulary: Morning, lunchtime, afternoon, evening, night Today, yesterday and tomorrow. **I know clocks, watches, and timers help us measure time.**	**I can link events to particular days. E.g Swimming on Monday.** I am aware there are different months of the year and name some.	I can use a calendar to record the passage of time.  **I can say the days of the week in order.** I can say the months of the year in order and link events to particular months. E.g birthday	I can name the seasons. I know each season has its own features. I can order of the seasons of the year.	**I can measure time using a sand timer/digital timer/app and in relation to activities or tasks.** *(tooth brushing)* I have praticipated in a range of experiences to develop my understanding of a minute/second. I can use a calendar to tell when and event has been/will b correctly e.g. it's 3 days until my birthday	I can identify the hour 'house' using just the hour hand. **Reads analogue o'clock times (12 hour only) and represents this on a clock face.** **Reads digital o'clock times (12 hour only) and represents this on a digital display.**	I know the hour hand is the short hand and the minute hand is the long hand. **Uses appropriate language when discussing time, including before, after, o'clock, hour hand and minute hand.**
	Visual schedule 	Birthday display/seasons  						

Time in the Early Level should be taught through daily routines and through interactions with the children talking about the different times and routines of the day, week and year. Please read the guidance on teaching reading an analogue clock before teaching children to tell the time.

I have **experimented** with everyday items as units of measure to **investigat**e and **compare** sizes and amounts in my environment, **sharing** my findings with others. MNU 0-11a

Core aspect/ skill focus	**Key Vocabulary:** weigh, measure, tall, long, short, wide, narrow, full, empty, half full, overflowing, heavy, light, spoonful, cups,height. Weight, scales, jugs, rulers, measuring tapes, balance		**Key Vocabulary:** taller, shorter, wider,narrower, heavier, lighter, narrower, thick, thin, grams, killograms, centimetres, metres, litres, millilitres,dial scales, estimate		
Measurement MNU 0-11a **Use mathematical vocabulary and notation** **Select and communicate processes and solutions** **Justify choice of strategy used** **Link mathematical concepts** **Determine the reasonableness of a solution**	I have had a wide range of experiences using non standard units of meausre e.g cubes, hands, feet, sticks, stones, pine cones. **I have participated in experiences where measurements of length, heights, mass and capacities is needed. E.g. baking**	I have explored the use of measuring tools: Scales Measuring tape  Measuring Jugs Rulers  Measuring spoons/ cups	**I can use and understand the vocabulary of length. E.g. long, short, tall, wide.**  **I can understand and use the vocabulary of capacity e.g. full, empty, overflows.** 	**I can understand and use the vocabulary of mass e.g. heavy, light, balance.**  **I can place 2 or more objects in order of:** **Mass (weight)**  **length/height** **capacity.**	**I can use the language of comparison e.g. taller, longer, heavier, shortest.**  **I can estimate and use non standard units to measure familiar objects.**  I have had a wide range of experiences finding things to compare against a 30cm ruler, metres stick, Kg weight, 1litres measuring jug.

I have **spotted** and **explored** patterns in my own and the wider environment and can **copy** and **continue** these and **create** my own patterns. MTH 0-13a

Core aspect/ skill focus

Key Vocabulary: pattern, repeat, the same, match, stripe/s, spot/s, zig-zag, colour, size, shape, carry on, 'What is the pattern?' 'What comes next?' 'What do you notice?'

Key Vocabulary: sequence, continue, number pattern, 'what is the rule?' mistake , forwards, backwards, 'What do you notice?'

Pattern
MTH 0-13a
Children need experiences making patterns with objects shapes and numbers

Mathematical vocabulary

Select and communicate processes and solutions

Justify choice of strategy used

Link mathematical concepts

Determine the reasonableness of a solution

I can recognise simple patterns and sequences.

I can match things with the same patterns.

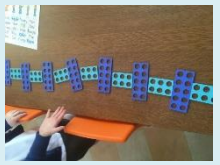
I can tell you a pattern is something which is repeated/ happens over and over again/.

I can verbalise the pattern.

I can recognise simple number patterns.

I can copy simple patterns or sequences.

I can continue a simple patterns or sequence



I can continue simple number patterns or sequences.
e.g.
17, 16,15,14 …..
20, 17, 14, 11,…

I can repair or fix a pattern with a mistake.

I can repair or fix a simple number pattern with a mistake

e.g. 2,4,5,6,8…

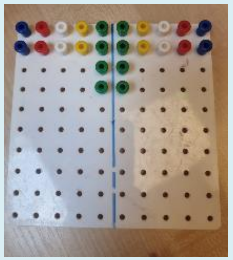
I can create patterns and sequences.

I can create simple number patterns or sequences.

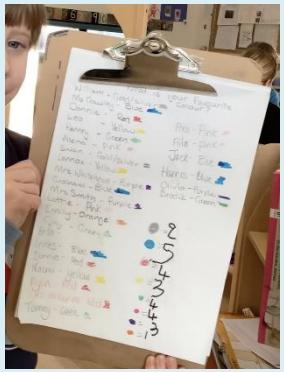
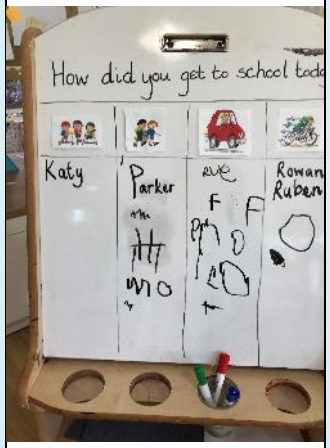
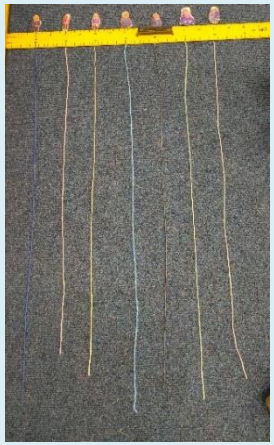
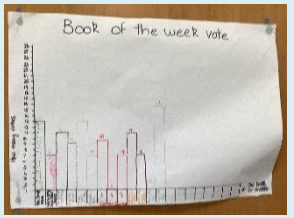
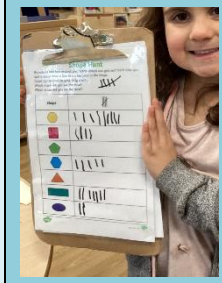
e.g. 7, 9, 11 …..

I **enjoy investigating** objects and shapes and can **sort, describe** and be **creative** with them. MTH 0-16a

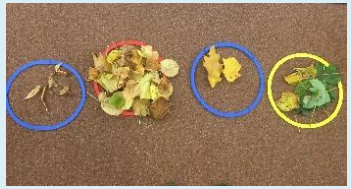
Core aspect/ skill focus	**Key Vocabulary:** match, turn, fit, shape, side/s, corners, straight, curved, triangle, square, rectangle, circle, long, short,		**Key Vocabulary:** 2d shapes (ones drawn) 3d shapes (physical representations), hexagon, pentagon, octagon, cone, cylinder, cube, cuboid, pyramid, face, corner, edge, equal, rolling, stacking,	
Shape MTH 0-16a Use shapes in the environment **(Guidance p. 25)** **Use mathematical vocabulary** **Select and communicate processes and solutions** **Justify choice of strategy used** **Determine the reasonableness of a solution**	I can match shapes one to one, placing it exactly on top to check.  I can create or copy pictures using shapes. 	I can choose the correct shape and turn it to fit a space.  I can use the vocabulary of corner, side, long, short, equal, straight and curved to describe 2d shapes	I can use the attributes of shapes to create models. I can describe shapes: e.g. good for fitting together, rolling, not good for stacking.  I can use the vocabulary of face, corner, edge, straight, curved, long, short, equal to describe properties of 3D shapes. 	**I can recognise, describe and sort common 2d and 3d shapes according to criteria e.g. number of sides, number of corners, straight, and curved.** **I can identify and name 2D shapes.** (e.g. triangle, rectangle, square, circle, hexagon, pentagon) *There is no such shape as a diamond: it is either a rotated square or a rhombus.* **I can sort shapes according to given criteria.** 	**I can identify and name simple 3D shapes using physical representations.** (e.g.cone, cylinder, cube, cuboid, pyramid)  I can copy 2d shapes with a degree of mathematical accuracy.  I can draw and make 2d shapes from an oral description.

In movement, games and using technology I can **use** simple directions and **describe** positions MTH 017a						
Core aspect/ skill focus	**Key Vocabulary:** forwards, backwards, in front, behind, under, above, turn, sideways, change, start, stop, up, down. →			**Key Vocabulary:** left, right, direction, start, stop, opposite, diagonal, $\frac{1}{2}$ turn, whole turn, change, round, straight/on, →		
Direction and position	I can move in response to directions: Forward and back Right and left.	I can use the language of position correctly: in front behind under above 	**I can use my knowledge of position and direction to solve simple problems in movement games**.	I can walk out shapes and routes following directions.	I can make a programmable toy go backwards and forwards, left and right.e.g. Indi cars or Beebot. 	**I understand and correctly use the language of position and direction.**
I have had fun **creating** a range of symmetrical pictures and patterns using a range of media MTH 0-19a						
Core aspect/ skill focus	**Key Vocabulary:** pattern, shape, colour, size, same, both sides, half, symmetircal, in the middle, fold, 'What do you notice?' →			**Key Vocabulary:** 'What do you notice?' direction, position, line of symmetry, match, →		
Symmetry	I can create symmetrical pictures by folding. 	I have used technology to create symmetrical images.  *Symmetry Painter . Games . peg + cat | PBS KIDS is one website for children to explore.* *SketchesSchool on the iPad*	I can use a fold line / drawn line to help create symmetrical pictures or cut symmetrical shapes. 	**I can create symmetrical patterns/pictures with one line of symmetry.** 	**I can identify and describe symmetrical patterns with one line of symmeytry.**	

I can **collect** objects and **ask questions** to **gather** information, **organising** and **displaying** my findings in different ways. MNU 0-20a

Core aspect/ skill focus	**Key Vocabulary:** collect , sort, most, least, favourite, least favourite, display, fewer, more, ask, question : how many…? What is your favourite….? answer			**Key Vocabulary:** block graph, pictogram, bar graph, data, information, tally mark, table, predict, how many more…?, how many fewer…? popular		
Information Handling MNU 0-20a	**I can ask simple questions to collect data. E,g. what's your favourite colour?**  I can make predicitions related to familiar things e.g. dogs are people's favourite pets. (Not based on any data collected.)	I can collect information about : familiar objects, myself and others, the weather.  	I can display information by using real objects.  *(Lengths of string the same length as children's heights)* I can draw a picture as a record of my results.	**I can create questions to ask about my data.** **I can interpret displays by locating and counting how many.**  I can use vocabulary such as most, more, less than, fewer to describe data. 	**I can collect and organise objects for a specific purpose.** I can make block graphs using real data e.g. number of children having yellow or blue choice or packed lunches using Unifix or Multilink cubes.	**I have contributed to concrete or pictorial displays where one object represents one data value using digital technologies as appropriate.** **e.g. block graph pictogram.**   I can make tally charts to show information. 

I can **match** objects and **sor**t using my own and other's criteria **sharing** my ideas with others. MNU 0-20b

Core aspect/ skill focus	**Key Vocabulary:** sort, same, different, match, difference, colour, shape, size, likeness		**Key Vocabulary:** organise, texture, similar, similarity, criteria	
	→	→	→	→
Information Handling	I can describe likeness –e.g. some of these are red and some are not.	I can match using one criteria e.g. red dionosaur on red spot. 	I can sort things using my own criteria and say how I have sorted them. 	I can sort objects using a given criteria and explain why the objects belong/don't belong in the group. 	**I can sort and match by:** **Colour shape** **size texture** **number** 

I can **use** the signs and charts around me for information, helping me **plan** and **make choices** and **decisions** in my daily life. MNU 0-20c

Core aspect/ skill focus	**Key Vocabulary:** sign, label, picture, now, next, after, What does the picture/sign tell you to do?		**Key Vocabulary:** instruction, poster, sequence, order, timetable
	→	→	→
Information Handling	I use simple signs/labels in everyday life e.g. signs for clearing up at lunch. 	I can use a visual timetable/schedule to help me know what is happening now and next.  	**I can interpret signs and demonstrate how they support planning, choices and decision making.** (playdough instructions, handwashing poster, group tasks, tidying up)

Glossary and Guidance

BAR MODELLING P1

Block Play

Education Scotland – Block Building in the Early Years PowerPoint
https://education.gov.scot/improvement/learning-resources/schematic-play/

At Early Level, the Curriculum for Excellence gives prominence to play. In terms of developing rich mathematical understanding, quality block play provision is a core component of a play-based maths curriculum.

What do children gain from playing with blocks? Apart from social, physical and emotional development, these cognitive aspects are developed and supported by block play:

- Identifying attributes, sorting into sets, matching, comparison, ordering , sequencing
- Shape including form, angles, symmetry
- Position including rotation and transformation
- Part-whole relationships between blocks, ie fractions- units, doubles, halves, quarters
- Patterns
- Measurement including length, height, weight, space, mass
- Properties- balance, fit, support, stability, structure, design, problem solving, testing out a solution

A wealth of research from the 1940s to the present indicates that children who have had block play experience absorb maths concepts more readily and attain higher in mathematics in later years. 'Block building can improve children's spatial skills that in turn support complex mathematical problem solving' (Verdine et al, 2013). Sophisticated pre-school block play is noted as a reliable predictor of a mathematical achievement at 7th grade (S1) (Wolfgang et al, 2001).

Wooden blocks have been an important source of learning for young children for over two centuries. First referred to in educational literature in 1898 (Edgeworth, M and R. L.), blocks were noted for their value in teaching children about spatial and part-whole relationships.

Wooden block play was used by Friedrich Froebel as one of the building blocks of kindergarten play. He included sets of blocks in his original 'gifts', as he believed that understanding the relationships between the blocks developed children's ability to move from the concrete to the abstract, 'making the inner outer and the outer inner'. Later he employed the use of a large box of blocks for free play.

Block play was further developed by Patti Smith Hill in 1905 with larger blocks to encourage collaboration between children. Maria Montessori contributed sensory blocks and later Caroline Pratt developed unit blocks, which support children's conceptual development of proportional relationships between the blocks as multiples or fractions.

Stage *ages are approximate	What you will see	Mathematical concepts
Stage 1: Carrying (under two years of age)	Blocks are carried but not used for construction.	Attributes (colour, size, shape, orientation, texture) Measurement Comparison
Stage 2: Stacking (2-3 years)	Blocks are placed in rows on the floor, horizontally or vertically (in stacks)	Ordering, seriation Equivalence and ratio of length Corners, edges, surfaces Weight 1:1 correspondence
Stage 3: Bridging	Blocks are used to bridge the space between other blocks.	Balance Spatial concepts- positional language, relationships, maps/directions. Geometrical- recognising

		shapes, rotation, and transformation.
Stage 4: Enclosing	Blocks are used to enclose a space	Perimeter and area Part-whole relationships Number of openings, number awareness Problem solving/computation
Stage 5: Complex Structures (3-4 years)	Blocks are placed in patterns or symmetrically when building.	Patterns and symmetry Equality Classification
Stage 6: Early representational (4-5 years)	Buildings are not generally based on a particular building, but on an idea of a type of building, eg a farm, a zoo. Accessories are often used. The play becomes more artistic and structures become more sophisticated.	Refinement of the above concepts
Stage 7: Advanced representational (from age 5)	Building often represents actual structures known to children eg. Kelso High, a building in a photograph on the wall. May stimulate dramatic play activities.	

Counting

Counting is obviously an important part of numeracy and maths but great care needs to be taken that it does not become **the** most important part and the only part that the Early Years focus on. There is a difference between children being able to recite the **forwards number word sequences (FNWS) and backwards number word sequences (BNWS)** and being able to count. Children learn that the order of the number words is fixed through repetition and learning by rote. Learning to recite the words backwards is trickier and can be supported by always counting the stairs up forwards and counting backwards when going downstairs.
(For more information, refer to column 5.1 Emergent Child SEAL sheet - #SBCway Padlet)

After this, children begin to match a word to a physical movement – tagging or touch counting. At the start, children may need to put the items into a line in order to count accurately and know only to touch each item once before being able to count items in a circle or heap. Alongside this, children need the opportunity to count out a given number from a large number of items. They will find this much easier if they have something to count into such as a pot or hand.

Other skills that need to be developed in order to be a competent counter:

- knowing that the last number counted is the number of items in the group **(cardinal principle)**
- it doesn't matter what you are counting, 7 is always 7 and it will have that numeral and name assigned to it **(abstraction principle)**
- it doesn't matter the order which you count the items in, the number will always remain the same **(conservation of number)**

Children need meaningful opportunities to count things, as counting can only be learned through interaction with others, such as counting out the number of cake cases needed for the muffin tin or counting out the number of likes or dislikes for snack.

In P1 children need opportunities to explore counting through using Rekenreks (*see Early Level Portal for further guidance*) and bead strings.

Finger Discrimination

It is now believed by experts in education and cognition that using your fingers to help you calculate will help your development mathematically.

For many years, teachers and parents have discouraged children from using their fingers when doing maths and number activities. It has always been a goal to move children away from this reliance on their fingers. However, recent research has suggested that this is not a good thing. When children use their fingers, they are making a concrete representation of an abstract idea which will support their understanding. Scientist have discovered that the brain 'sees' our fingers even when we are not using them.

There is a particular part of the brain which is activated when we use each given finger. This area lights up when we use our fingers to count but

researchers have discovered that the same area of the brain 'lights up' when we use don't use our fingers when counting. This has led to researchers finding a correlation to children who have developed this area of their brain and mathematical achievement.

Practitioners and teachers need to be encouraging children to use their fingers and to develop finger discrimination (the ability to tell which finger is which) rather than discouraging their use.

"Telling students not to use their fingers to count or represent quantities is akin to halting their mathematical development," says Jo Boaler, PhD, a professor of math education at Stanford University.

The researchers at Stanford offer an interesting anecdotal hypothesis: "The need for and importance of finger perception could even be the reason that pianists and other musicians often display higher mathematical understanding than people who don't learn a musical instrument." "" Jo Boaler 'Mathematical Mindsets.'

F**inger patterns**: 'Growing finger patterns' is when the child can see their fingers and counts each one as they raise it. They can do this copying an adult and then begin to do this independently. The next step is to be able to do this without looking. The child can put their hands on the top of their head like 'bunny ears' to grow their fingers.

'Throwing finger patterns' is when children are able to bring their hands from behind their back with the correct number of fingers up or put up the right number of fingers all at once. To begin, the child can mirror the adult but then progress to being able to do this independently when given a number.

(For more information refer to column 5.5 Emergent Child SEAL sheet- #SBCWay Padlet.)

Fractions

The word fractions comes from the word 'fragment.' Ensure that children have opportunities to experience this fragmenting through play. They may well have experienced fragmenting having dropped a plate or mug and this is a great opportunity of exploring the idea that the whole mug is now lots of pieces which could be put back together to make the mug again (with a lot of glue and patience!) Children can also experience this fragmentation through activities like baking - using the whole cake mixture and fragmenting it into the paper cases. This is an ideal opportunity to explore the concept of needing equal shares so everyone gets a similar size cake. Children should be exploring the concept of fractions through play with a wide variety of opportunities to share whole items (a group of individual objects like glass jewels or a playdough cake) between others. It is important that children share 'between' rather than 'with' as this helps them include themselves in the sharing.

Piaget et al says that to build the idea of fractions, children must:

1. Be able to understand the idea of a 'whole' and be able to break this apart and reassemble it. To support this adults need to use the language of 'the whole' - 'the whole apple' and 'the whole class'. Support children understanding that there is a difference between 'whole' and 'hole',
2. Be aware that all parts should be equal. Children quickly know whether something is 'fair or unfair' which builds into the idea of things being equal. Adults can support this through offering up the items against each other to see if they are equal or by using scales to check they balance.
3. Be able to use the appropriate number of parts. E.g. the whole is divided into 6 parts for 6 people. Adults can support this understanding through asking if everyone is getting a piece, if everyone's piece is the same size and if the 'whole' is all used up.
4. Be able to see the parts in relation to each other and the parts in relation to the whole. E.g. the whole can be made up of many parts – the whole is made of 6 equal parts and these parts can be arranged into a group of 2 and a group of 4. (see subitising)

Through practical opportunities, children should have opportunities to explore the 3 models of fractions: the area model using shapes; the set model using numbers and the linear model using number lines. As children move into P1, dice patterns e.g 6 and random dot cards are an ideal starting point for children developing the concept of fractions as part of

early division and multiplication. 10 frames are one way of beginning to build this concept as well as using concrete objects like egg boxes and sweet boxes with row and columns of indentations. Children can then move on to noticing arrays in the environment such as row of windows.

Learning through Play

Practitioners are not expected to set up specific focused activities to work with children in ELC as a result of reading the progression, the guidance and using the SEAL sheets, but rather use this guidance to build their knowledge and understanding of how children learn mathematics. By developing practitioner and teacher knowledge and understanding, children's understanding can be explored and developed through interactions as they engage with a rich mathematical and numerical environment that supports children's learning.

Children should be accessing rich mathematical experiences both inside and outdoors and practitioners should be looking for the way maths is integrated through our daily lives. The progression deliberately features no worksheets because it is vital that children have the opportunity to explore concepts using real physical things (concrete apparatus) before investigating pictorial representations before using abstract representations such as 3 + 4 = 7.

(Please refer to Realising the Ambition p74 – 77 for further guidance on playful numeracy.)

Loose Parts

Loose parts are an ideal resource for children to use to develop their mathematical understanding. They can be used in a wide variety of ways such as for counting, sorting, building, creating shapes and pictures, symmetry, patterns, measuring and subitising.

Maths through Stories and Rhymes

- Provide a range of richly illustrated books for me. Discuss the illustrations with me using language such as bigger, smaller, up, down, under, over.
- Involve me in simple counting songs with repetition of rhyme and rhythm.
  Realising the Ambition: 'When I am a baby'

- Provide richly illustrated books with representations of number, shape and pattern to support conversations with me around these concepts.
- Sing and recite counting songs and rhymes with me, linking to visual representations using rhyme and rhythm.
  Realising the Ambition: 'When I am a Toddler'

- Continue to provide me with richly illustrated story books with representations of number, shape and pattern to support conversations around these concepts.
- Continue to sing and recite counting songs and rhymes linking to visual representations of numbers that involve counting, ordering and recognising number.

Realising the Ambition: 'When I am a young child'
(Realising the Ambition Education Scotland, 2020 p.75 &76)

Realising the Ambition talks about how we need to provide children with books and rhymes to support their mathematical learning.
Books are a wonderful way of introducing and developing concepts with learners in a meaningful way. Of course they can be used for 1:1 counting but also they can be used for subitising. 'Oh look there are 3 fish under the rock' giving the child the concept of 3 as a whole.

They can also be used to look for the patterns. For example in Ten in the Bed, 1 more is in the bed each time so there is one fewer out of bed supporting children's understanding of 1 more and 1 less but also giving a context for the number bonds to 10.

Exploring the vocabulary of time can be done through Kipper's Birthday where he gets in such a muddle as he doesn't understand today, tomorrow or yesterday.

There is a richness in books and stories which we can use and capture the learners' imaginations.

'Children understood addition more easily if the mathematics was part of a story which related to either their real world or an imagined world than if it was demonstrated with cubes. Children could see the reason for numbers changing in the story such as the cows going to another field where the grass looked nicer but found it hard to see why the number of cubes should move around. Stories also importantly offer children relevant mathematical language and the language to talk about maths in addition to the opportunity to use mathematical language when retelling the story.'

('Mathematics in Early Years Education' Montague-Smith, Cotton, Hansen and Price, 2018 p. 16.)

Rhymes such as '2 little Dickie Birds sitting on a wall' explore 2 being a1 and a 1, but when Peter flies away there is one fewer so only 1 remains. E.g.2 -1 =1. Once Paul flies away we have zero. As the 2 birds fly back we have 0 +1 = 1 and 1 + 1 =2 subsequently follows. In addition rhymes support forward and backward number word sequences as well as finger discrimination.

Songs and rhymes are integral to children's development of both mathematical language and development of concepts. The SBC YMI team have worked with the EYT to produce a section of their blog about music and early numeracy as well as recording a variety of number song videos for use in settings and schools.

https://blogs.glowscotland.org.uk/sb/youthmusicinitiative/

https://www.youtube.com/channel/UCwqMhUNFsLXFQaM91gRnrYw/playlists

QR code for the Early Level Maths through Rhymes and Stories Padlet.

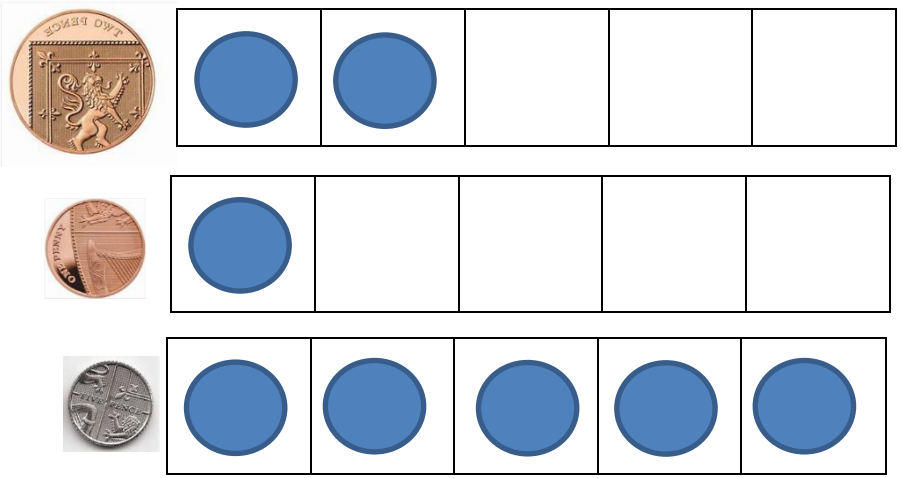
Money

Money is all to do with the exchange of something – a coin, note or swipe of a card – for an item. It is important that this concept is made meaningful for the children in Early Years.

The ideal place for children to develop this concept is in the role-play area as this is the place which should reflect their real-life experiences. Because there is the move towards a cashless society, children have very little experience of using coins and notes nowadays. Rather than children experimenting with coins in the role-play area, which are meaningless to most children, they should be provided with scanners, bar codes and cards as this is what they will be experiencing in their everyday life. Prices too should reflect real life prices whether it is in the outdoor petrol station or mud kitchen café.

In order for children to develop the very difficult knowledge and understanding around coins in an adult led activity. To begin with, give children the opportunity to notice what is the same and what is different about a selection of real coins. Make sure that you have both the new and the old coins represented. This gives children the opportunity to talk about what they can see and for you to begin to introduce the idea that these are 'tokens' of different sizes, shapes and colours which can be exchanged for something else.

An ideal opportunity to develop children's understanding of money is through using coins to 'buy' snack. Make sure that you use real coins not plastic ones. Begin simply with children exchanging a coin e.g. a 1p or 2p for their snack - it doesn't need to be a specific coin. This can then be extended by asking for a specific coin e.g. a 1p or 2p. Have a visual representation of the coin with a 5 frame to support them developing a visual image of the value of the coin. Develop this to use the range of coins from 1p to 20p.



It is important that the experiences we provide are developmentally appropriate so in ELC this may be as far as you need to go. However, you may have some children who are ready to move their learning forward and so are able to be provided with a different price for each item of snack and to exchange a number of coins for their snack. When introducing this, start with amounts which can be made with a single coin.

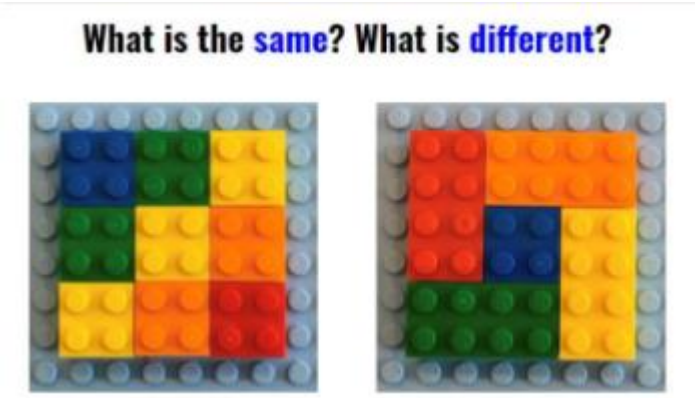
Gradually though P1 children can develop their understanding how combinations of coins can be used to pay for amounts which need multiple coins. The use of 5 frames will support the children's conceptual understanding.

Noticing what is the same and what is different

Mathematics is about being able to notice what is the same (equivalence) and what is different (transformation). Confident mathematicians will be able to see what is the same and what is different.

As practitioners, we need to support and encourage children to notice what is the same and what is different or changed in the experiences we offer. Regular practice is needed and needs to be supported as an integral part of daily interactions. Children often find it easier to identify what is different or what has changed rather than what has remained the same so practise is needed to develop this skill.

Same and Different – for other examples search twitter #samediffmath



For example, when exploring shapes, ask children what is the same about a square and rectangle. Challenge them to notice what has happened to the square to transform it into a rectangle. Can they describe how the two shapes are different?

Another example would be to look at a variety of clocks showing o'clock times. Challenge the children to notice what is the same about all of them and then, how are they different?

This leads to children being able to identify which one out of a 4 group of items does not belong/different. Each of the items could be right so children are challenged to justify their answers developing their justification skills and maths talk.

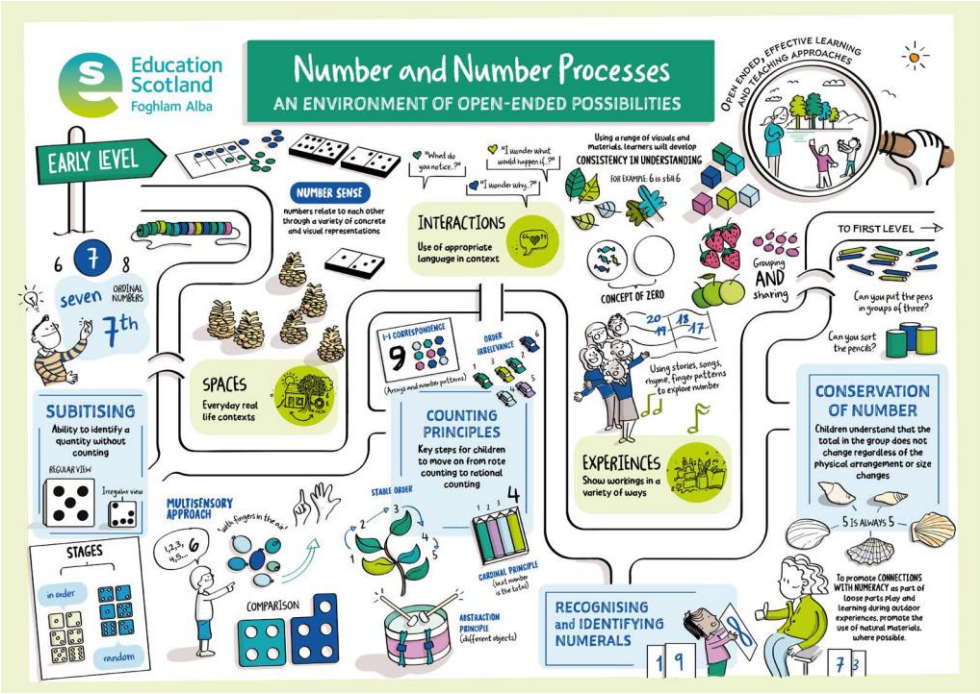
Which one doesn't belong? for other examples search twitter #WODB

Number Sense

'Numeracy is not just about being able to count. It is about developing number sense which encourages creativity of thought and it allows children to interact with the world around them. Number sense can be used to understand everyday activities. Being able to recognise that symbols have different meaning in different contexts and the ability to quantify e.g. understand the two-ness of 2, is an important life skill.'

(Realising the Ambition, Education Scotland 2020 p 74)

Just in the same way that learning to read and write is the combination of a progressive range of skills like phonological awareness, an understanding of the concepts of print, pre-writing skills and oral language, developing **number sense** is a combination of a range of progressive skills. In the same way the emerging literacy skills are all interconnected and need to be developed in a holistic way, the same principle should be applied to the development of number sense.



mathematics_numeracy_early_years.pdf (education.gov.scot) to download the Education Scotland Number and Number processes Early Level Sketchnote.

Based on Karen Wilding's, an early years maths expert, 'True Mastery in Number Sense document', the following infographic demonstrates how subitising is central to the development of the different skills which children need to develop in order to obtain 'Number Sense'. Research shows that children who struggle with numeracy often lack this number sense so are not able to see that to find 76 add 9 , you can use 4 of the 9 to add to the 76 to equal 80 and then you can add the remaining 5 to equal 85. If children are still counting on or back in ones, this shows they are not able to manipulate numbers and it is this counting on and back in ones which leads to mistakes.

Counting
Definition: find out the total number of a collection of items
Concepts developed: How many (cardinality)
Number order (ordinality)
Touch counting/tagging: touching each item as counted
1:1 counting: giving a number name to each object.
Counting out: counting a given number from a larger group
What does counting support?

- Learning the forwards and backwards number word sequences
- Knowing the last number counted is the total number there. (cardinality)
- Understanding number order – counting in equal amounts 1s, 2s, 5s
- Numbers used for position e.g. first, second, third etc.

Subitising

Definition: knowing at glance how many without counting.
Concepts developed: How many?
Comparison
Perceptual Subitising: seeing the whole amount instantly – usually small amounts or using dice patterns.
Conceptual Subitising: putting together small amounts perceptually subitised to make a large amount.
What does subitising support?

- Understanding that a group of things has a label e.g. a number
- That a whole can be made up of parts
- Developing a visual image – Numicon or dice patterns
- Understanding that the arrangement of the objects does not change the amount (conservation of number)

Reading and Writing Digits
Concepts developed: being able to match a number name with a numeral and a visual image of a quantity.
Digits: 0,1,2,3,4,5,6,7,8,9
Numerals: digits put together to represent larger quantities e.g. 45, 327
What does reading and writing numerals support?

- Learning number names
- Recognising digits and numerals
- Formation of digits
- Orientation of digits
- Matching a visual image with a numeral name and written numeral.
- Understanding and knowing number order forwards and backwards including skip counting in 2s, 5s, etc
- Beginning to make a connection with place value.

Part/whole
Concepts being developed: a group of items is the whole and this can be made up of parts. E.g 10 is the whole and it is made up of parts – 5, 2 and 3.
What part/whole experiences develop:

- Parts can be equal and unequal e.g. 5 & 5 (equal) or 4 & 6 (unequal)
- Parts can be the whole itself e.g 10 or many parts e.g. 1, 5, 2 and 2
- Learning number bonds (the pairs of numbers which make another number (usually up to 10)
- Beginnings of addition and subtraction.

Unitising
Concept being developed: making a finished group of a given size. E.g. groups of 4 or groups of 5. Each group is a 'unit'.
What unitising supports:

- Noticing the same and different
- Equality
- Patterns – each repeat is a unit
- Place value – each group of 10 is a unit.
- Multiplication – repeated addition of same size groups
- Division – repeated subtraction of same size groups.

Outdoor learning

Outdoor spaces provide many opportunities for children to develop and use their mathematical skills, knowledge and understanding to solve problems. For example mark making with chalks to make maps and routes to follow; comparing lengths, heights and weights of leaves, stones and sticks found on walks; noticing similarities and differences between seeds or fruit; comparing capacities in the mud kitchen as well as the miriad of counting opportunities.

Walks around the local area are an ideal opportunity for children to see mathematics and numeracy in the wider environment and being used for a purpose. For example: a shape hunt looking at the different shapes of signs or manhole covers. Can they children talk about the properties of these shapes? Maybe go a number hunt. What numbers can the children spot and what are they used for? Or maybe go for a subitising walk. What groups of objects can children see of a similar shape, colour and size? Do they need to count or do they just know how many? This can be developed by asking the children how they see the group e.g. 4 wheelie bins – 1 blue top and 3 grey tops.

Ideas for Maths and Numeracy Learning Outdoors are avaliable to download from the Early Level Portal in the Mathematics and Numeracy section.

REKENREK (P1)

Rekenrek were esigned by a Dutch man called Adrian Treffers to support children's development of number sense. They are not an abacus and should be used for calculation and counting. Remember always to support children's subitising skills first. A rekenrek is ideal as children quickly learn to regocnise quanitities larger than 6 because of the arrangement of the beads.

For firther informtaion please see the guidance on The Mathematics and Numeracy page of the Early level Portal.

SEAL

SEAL stands for 'Stages of Early Arithmetical Learning' and was devised as a recovery or intervention programme to support children who were experiencing difficulty with numeracy and to aid the raising of attainment. It can be used to systematically using diagnostic assessments Diagnostic Assessments | Highland Numeracy Blog (wordpress.com) to identify children's misconceptions or gaps in knowledge or understanding so that support can be targeted specifically to address these.

However over the years, the SEAL approach has been adopted by many regions and schools as it develops children's conceptual understanding in small incremental steps to ensure there are no gaps or misunderstanding. In order to do this children are assessed at each step and not allowed to move onwards until they have achieved it. This makes it a very prescriptive programme to follow which is not recommended in the Early Level especially in ELC.

However, the small steps which children need to be able to do in order to develop a sound conceptual understanding of number are clearly set out and are very useful to deepend practitoner knowledge and understanding. They also provide ideas of ways practitioners can support children to develop their conceptual understanding. These ideas can be easily adapted to make them more play based for use in ELC or used in P1 working with small groups. Many of the advocated resources throughout the progression have been incorporated from the SEAL approach e.g. 10 frames, double sided counters, numeral tracks and random dot patterns.

The SEAL Learning and Teaching sheets are referenced through the guidance and are available to download from the Early Level Portal in the Mathematics and Numeracy section. These sheets can be used to provide

informaton and ideas but in order to follow the SEAL approach schools should undertake training.

Shape

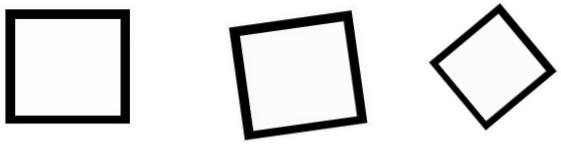
When exploring shape with children, we need to bear in mind that in CfE Properties of 2D shapes and 3D objects, the Experience and Outcome and O states: I enjoy investigating objects and shapes and can sort, describe and be creative with them. (MTH 0-16a) In fact the benchmarks do not ask children to name shapes at all!

Recognises, describes and sorts common 2d shapes and 3d objects according to various criteria, for example, straight, round, flat and curved. (Maths and Numeracy Benchmarks, Education Scotland, 2017)

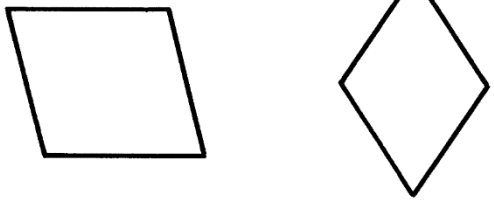
The emphasis is not on children being able to name shapes but rather than on them developing the language to describe them, sorting according to their properties and being creative with them. Rather than spending time naming shapes, spend time talking about their properties, encourage children to explore and notice object's properties. For example, find a stone with a straight side, find a shape with a curved side, find a leaf with more than 5 points. Use artists such as James Brunt and Jon Foreman as inspiration for the children and as a discussion point about the properties of the shapes of the objects used and the patterns created.

(Photos included with kind permission of Jon Foreman Sculpt the World)

When exploring shapes,support children's knowledge by creating shapes of different sizes from huge ones outside using large sticks to small ones suing matchsticks. It is vital to remember that shapes can be turned round and children need to be given lots of experiences seeing shapes in different orientations. For example these are all sqaures!



This is not a diamond. This is a sqaure which has been turned.



These are not diamonds either! They are rhombus.

If a child can name dinosaurs like velociraptor or stegasaurus they can say rhombus!

Spatial Skills

Good spatial skills are the ability to cognitively visualise things inside your head. This means that you can visualise how things fit together and are spatially related. e.g. being able to rotate objects to match shadowing, fit blocks together and estimate measurements. They support children to be able to remember mutiple part instructions, copy from the board and most importantly the ability to move things from the short term memory to the working memory and then long term memory – basically learning!

The better your spatial skills, the better your ability to hold complex representations in your head, chunk information and recall complex information.

Spatial skills are connected with success in many fields espcially STEM (Science, Technology, Engineering, Maths). People with better spatial skills tend to do better in STEM study and work. Through our provision of practical experiences in Early Level, we can ensure all children are able to develop these skills espcially focusing on closing the gender/poverty gap. Not all children have the same opportunities to play with construction toys like Lego, K'nex or blocks or engage in sports e.g. football, cycling or dancing which are important for developing these skills. It is important that we provide rich experiences, regardless of gender, for children to develop these skills.

We can also support the development of these skills through questions which promote spatial thinking e.g.'Do you think this block will fit here?' 'Will this bed fit in the dolls house?' 'Will the baby fit in the clothes?'' Will you fit through this space on the bike?'. The CPA (concrete, pictorial and abstract) approach as we begin developing children's conceptual understanding supports the development of children's spatial thinking skills.

Subitising

Subitising is the ability to 'know the number of items' without counting. Babies and very young children instincitively subitise up to 3 items but we need to give children lots of practise subitising quantities before we move on towards formal counting of items. This helps children to understand the concept of the number e.g. the fourness of four.

Children need practice of recognising regular dot patterns like dice patterns and domino patterns.However, this is not the be all and end all of subitising. Children need to expereience subitising using a variety of situations with a variety of resources. In order to keep the cognitive load low, use items which have similar shapes, colours and sizes e.g. flower pots, trees and buttons. Begin with working with numbers to 3 and asking the question, '3 or not 3?' to help children understand that they don't need to count each item. Rather than counting 1,2,3 talk to the children about here's 1 and another 1 and another one and there are 3 alltogether.

Once they have this conceptual subitising, children need to progress to flexible subitising. This is when the items are not arranged in a standard pattern like dice or dominoes.

'What do you see?'

'I see 6.'

'How do you see it?'

'I see a 2 and a 2 and a 1 and a 1.'

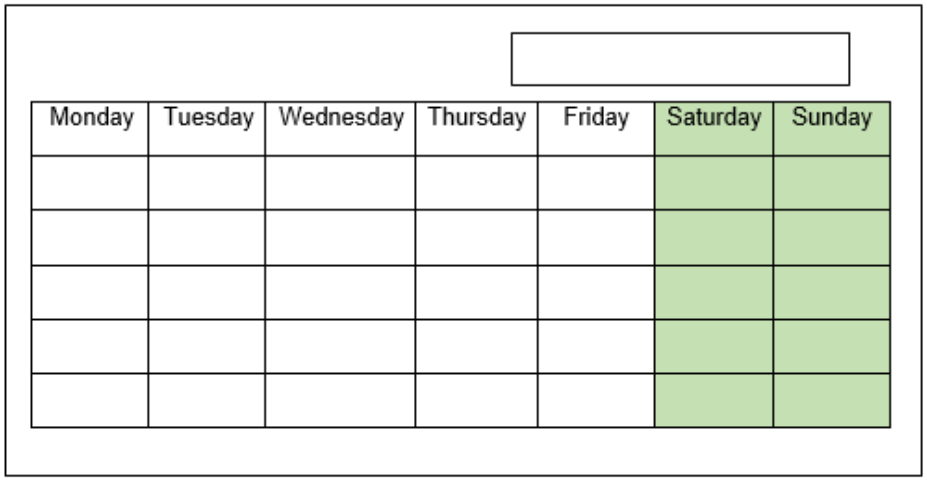
I see a 3 and a 3."

When reading stories, rather than asking children to count the number of items on a page e,g, number of fish, ask how many they see. It can always be checked after with counting but children need to practise identifying quanities in different arrangements.

(For more information refer to column 5.4 Emergent Child SEAL sheet.)

Teaching Telling the Time

It is very important that when helping children to learn about time that their experiences are meaningfully linked to different times of the day, month or year. Birthday displays are a great place to start but the months should be displayed in a circle to show the cyclic nature of the calendar year. There should be an arrow which points to the current month to help children identify the month they are in.

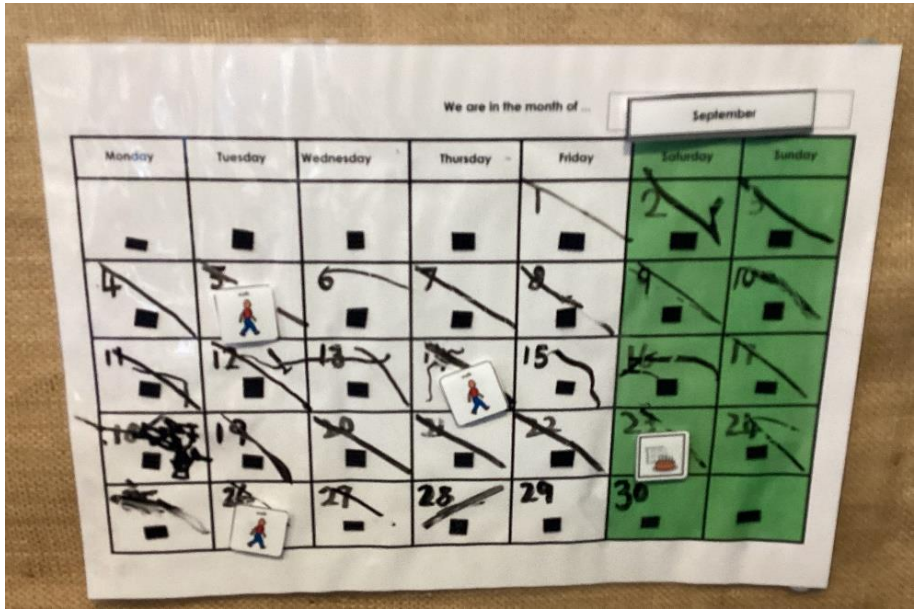


Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

This is laminated so that it can be written on every month. The month is written in the space at the top of the planner and the children involved in writing in the dates on the right days of the week. (Leave enough space to write in events.) This supports their understanding that the month does not always start on a Monday and that the months follow on from each other.

A display like this could help children to learn that they spent 5 days in setting and the order of the days of the week. It provides practitioners with the opportunity to talk to children about the days of the week linking them to the meaningful experiences of lunch and snack. Talking to children about the language of tomorrow, today and yesterday will enable them to being to develop a sense of time. This could further be supported by removing the pictures once the children have had their lunch or snack for the day.

Another way that children can be enabled to develop a sense of events happening in order as well as the language of first and next is to use a large blank planner such as this in both ELC and P1:



Once this has been done, important events can be written on such as children's birthdays, setting holidays, events happening in the setting or

such things as festivals. The children can be involved in daily 'crossing off' the days which provides a meaningful opportunity to discuss 'how long until…' or 'how many days…' as well as supporting the development of the language of tomorrow, today and yesterday.

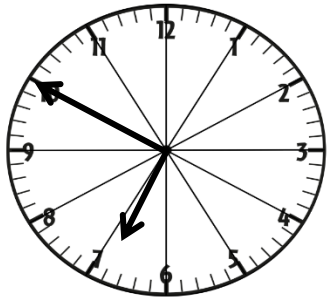
The arrangement of the days on the blank planner, gives the opportunity to explore the concept of the weekend – why are those days not crossed off? It also links to the children's concepts of print with the passing of time moving from left to right and up and down the page.

Visual schedules and timetables also facilitate the development of a sense of time and the ordering of events. Photographs of the different activities or Boardmaker pictures can be used and their order discussed with the children: 'what happens first?' 'What is happening now?' 'What happened before?' 'What happens after?' The pictures need either to be displayed in a linear way vertically or horizontally in one line or displayed around the clock with a photographs of the time these events happen displayed with the picture. In order for this to be effective, the clock and the picture must be at a height accessible to the children. The photos of the clock times allows children to link/match the time on the photo to the time being shown on the clock face.

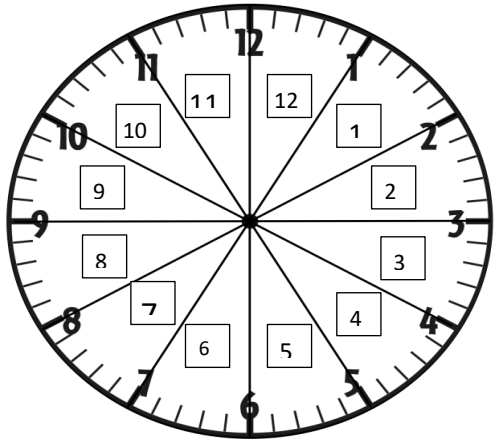
In P1, traditionally teaching the time always begins with o'clock saying that when the long hand is at the 12 and the little hand is pointing to the 4 it is 4 o'clock. Unfortunately, this means that children are very confused when the hour hand moves and is not pointing to a number at all. For example not knowing if it is half past 4 or half past 5 when the little hand is between those 2 numbers.

To avoid this confusion, spend time working with children on **identifying the hour.** Teach that every hour has a 'house' after the number and whenever the hour hand is in that house that is the hour. Talk about when the hour hand is pointing directly to a number that it is on the doorstep just about to go into that hour's house.

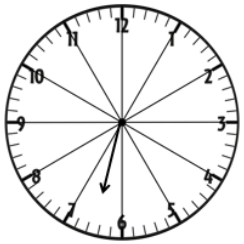
This really supports children's understanding of digital time and why this is 6:50 and not 7:50.

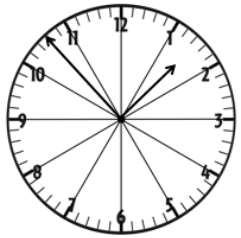


Step 1: Children need to be able to identify the different hour 'houses.'
You can see the clock has been divided into the different 'houses' and labelled.

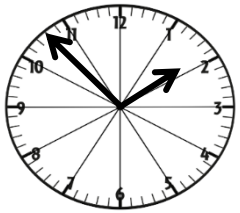


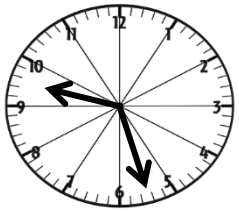
Step 2: Spend time identifying the hour 'house' with only the hour hand present. Children can spend colour the 'hour house' where the hour hand is initially when only the hour hand present and then when both hands are present



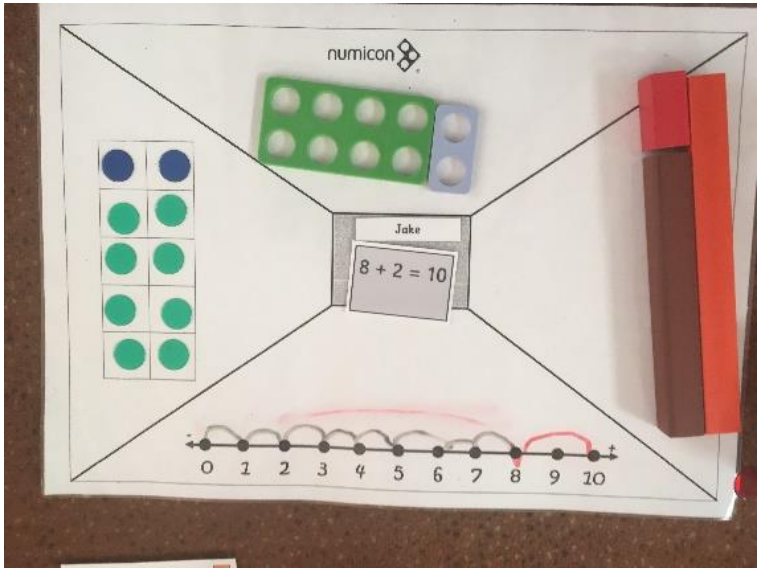


Step 3: Next, spend time working with the children to identify the hour house whereever the hour hand is within the ‘house’.





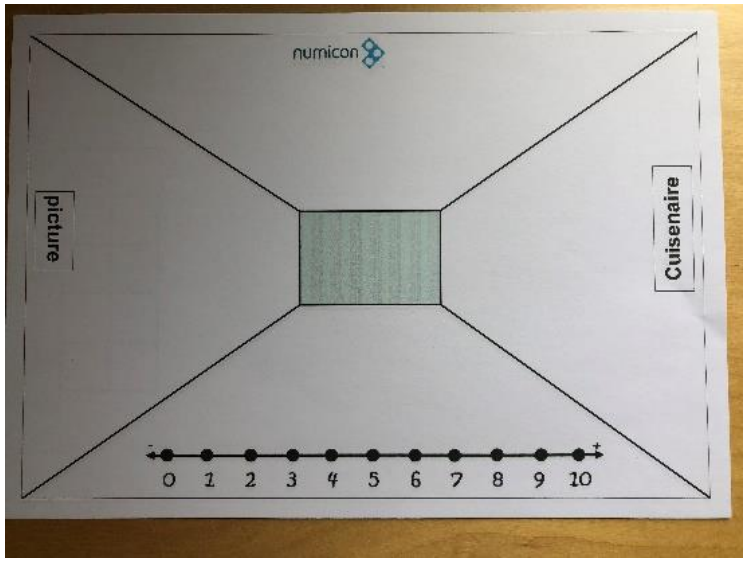
Step 4. Then begin to introduce the idea of when the minute hand is at the 12 we are just about to go into the hour house. We are on the doorstep and this is when we say o’clock.



Step 5: Introducing half past should be easy as the children already know the hour because they are used to identifying the hour ‘house’ so it is teaching children to recognise that when the minute hand is pointing to the 6 and the hour hand is in the middle of the house, it is half past the hour.

Think Mats

Think mats in P1 are a great way of exploring children’s understanding of number. They show one concept e.g. a number, or a calulation in a variety of ways which show a depth of understanding. They can be used with concrete aparatus as shown or with children beginning to create their own drawings or word problems to illustrate their understanding of a calcualtion



Glossary

Cardinal – how many in a group. For example 3 apples

Digits – these are 0,1,2,3,4,5,6,7,8,9,

Equals - 'is the same as' or balances. For example 65 is the same as 60 add 5 or balances 72 subtract 7. Equals does NOT mean 'makes' and we should avoid using the word 'makes.

Nominal – the name given to a thing using a numeral. For example the number 78 bus.

Numerals – these are when digits have been combined to show a larger number e.g. 24 or 764

Ordinal – the third one in a line or 3 on a numberline.

Further Reading:

Big Ideas of Early Mathematics: The Early Math Collaborative Erikson Institute

Understanding Mathematics for Young Children: Haylock and Cockburn

Mathematics in Early Years Education: Montague-Smith, Cotton, Hansen and Price

Teaching Number: Wright, Stanger, Stafford and Martland (SEAL)

Teaching Number in the Classroom with 4-8 year olds: Wright, Stanger, Stafford, Martland. (SEAL)

Maths Makes the World Go Round: Kirstine Beeley

Playful Mathematics for children 3-7: Helen J Williams

Messy Maths: Juliet Robertson

Useful Links:

Mathematics & Numeracy – Early Level Portal (glowscotland.org.uk)

National Counting Series (padlet.com) (Education Scotland)

Karen Wilding https://www.eymaths.co.uk EY Maths 3-5 with Karen Wilding Community – Facebook Group Subscribe to Karen Wilding eymaths on YouTube

Juliet Robertson www.creativestarlearning.co.uk

Erikson Institute https://earlymath.erikson.edu/

Maths through Stories https://www.mathsthroughstories.org/

Scottish Book Trust Numeracy

Nrich EYFS Home Page (maths.org)

White Rose Maths | Free Maths Teaching Resources | CPD Training