

Glasgow Counts in our Playrooms Patterns and Relationships



LPA Year 2



Glasgow's Improvement Challenge (GIC) Health & Safety

“Distance Aware” Encouraging people to take care and respect the space of others






All participants should choose a seat on entry and use this space for the full training session. **Please wipe desks/communal tables before leaving.**

Doors and windows will be opened to increase natural ventilation where it is practical, safe and secure to do so while maintaining appropriate internal temperatures.

Tea and toilet facilities should be used at designated areas, following signage



Aims

-  To explore the GCIP framework, specifically pattern, with an emphasis on problem solving and digital enhancements
-  To explore developmental stages
-  To identify the 3 main types of pattern
-  To identify picture books to support pattern
-  To identify the learning and next steps in an observation (Learning Stories)





Reflection

- What is pattern?
- Where do you see pattern?
- How do we experience pattern every day?
- What do you think is the key message that children need to get about pattern?
- What opportunities do you provide for pattern in your establishment?

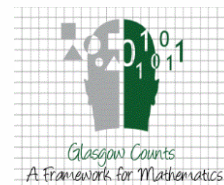




What is pattern?

‘Pattern can be described as a systematic arrangement of numbers or shapes which follows a given rule.’

*Smith and Price: (2012)
Mathematics in Early Years Education*



Everyday Experiences of Pattern

Daily Patterns:

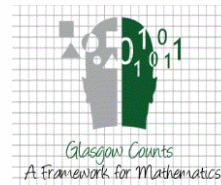
- Night follows day
- Wash hands/snack/toilet/wash hands
- Baby feeding/change/sleep
- Days of the week

Patterns in:

- Number names
- Songs/rhymes
- Symmetry
- Word patterns – rhyme
- Marking making – lines
- Nature/built environment – snowflakes, spiders web, plants, animals, windows, gates, fences
- Time – seasons, days, weeks
- Art – clothes, textiles
- Cultural – rangoli, festivals



Pattern in Nature



Predictors of later achievement

Counting out a number from a group

Subitising

Numeral meanings

Relative number sizes

Predicting adding one/taking one

Number combinations

Spontaneously focusing on numerosity

Finger gnosis!

Pattern awareness

Spatial reasoning

*Dr Sue Gifford,
Early Years Conference*



Pattern and maths

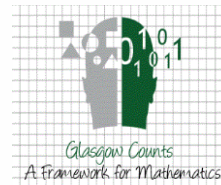


‘Pattern permeates the maths curriculum’

*Smith and Price: (2012)
Mathematics in Early Years Education*



Glasgow Counts Framework



Pattern and Relationships

Early Level E's and O's

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





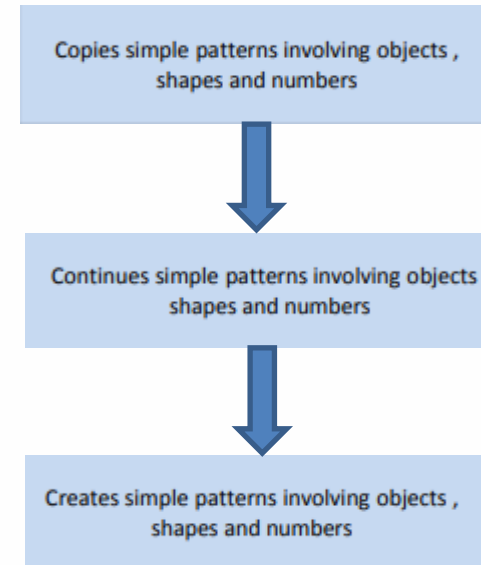
Money	<p>Handles money and recognises a few coins up to the value of £2 through play and in real life and relevant contexts (using real and plastic money)</p> <p>Identifies (names) 1p, 2p, 5p and 10p coins and pays the exact value for items to 10p e.g. if the price is 5p; can use a 5p coin to pay for it</p>		<p>Apply addition and subtraction skills to money contexts.</p>		<p>Use 1p, 2p, 5p and 10p coins to pay the exact value for items to 10p.</p>		
	Time	<p>Links daily routines and personal events to time sequences and begins to use appropriate language including before, after, later, earlier</p> <p>Recognises and where appropriate engages with everyday devices used to measure or display time e.g. clocks, calendars, sand timers and visual timetables</p> <p>Identifies (names) the days of the week in sequence</p> <p>Recognises the months of the year and describes features of the four seasons in relevant contexts</p>		<p>Recognise, talk about and , where appropriate, engage with everyday devices used to measure or display time- including sand timers, clocks, calendars and visual timetables.</p>		<p>Use appropriate language when discussing time, including before, after, o'clock, hour hand and minute hand.</p> <p>Read analogue and digital o'clock times (12 hour only) and represent this to a digital display or clock face.</p>	
Measurement		Length	<p>Shares relevant experiences in which measurements of lengths, heights, mass and capacities are used, for example, in baking and other meaningful contexts</p>		<p>Compare and describe lengths, heights, mass and capacities using everyday language , including longer, shorter, taller, heavier, lighter, more and less.</p>		<p>Estimate then measure the length, height, mass and capacity of familiar objects using a range of appropriate non-standard units.</p>
	Mass	<p>Describes and compares common objects' lengths, heights, mass and capacities using everyday language, including long/longer, short/shorter, tall/taller, heavy/heavier, light/lighter, more/less/same</p>					
	Capacity	<p>Estimates, then measures, the length, height, mass and capacity of common objects using a range of appropriate non-standard units</p>					
Patterns and Relationships		<p>Copies, continues and creates simple patterns involving objects shapes and numbers.</p>		<p>Copies, continues and creates simple patterns involving objects, shapes and numbers.</p> <p>Find missing numbers on a number line within the range 0-20.</p>			



	Money	Handles money and recognises a few coins up to the value of £2 through play and in real life and relevant contexts (using real and plastic money)			Identifies (names) 1p, 2p, 5p and 10p coins and pays the exact value for items to 10p e.g. if the price is 5p; can use a 5p coin to pay for it		
	Time	Links daily routines and personal events to time sequences and begins to use appropriate language including before, after, later, earlier	Recognises and where appropriate engages with everyday devices used to measure or display time e.g. clocks, calendars, sand timers and visual timetables		Identifies (names) the days of the week in sequence		Recognises the months of the year and describes features of the four seasons in relevant contexts
Measurement	Length	Shares relevant experiences in which measurements of lengths, heights, mass and capacities are used, for example, in baking and other meaningful contexts			Describes and compares common objects' lengths, heights, mass and capacities using everyday language, including long/longer, short/shorter, tall/taller, heavy/heavier, light/lighter, more/less/same		Estimates, then measures, the length, height, mass and capacity of common objects using a range of appropriate non-standard units
	Mass						
	Capacity						
Patterns & Relationships		Copies simple patterns involving objects, shapes and numbers		Continues simple patterns involving objects, shapes and numbers		Creates simple patterns involving objects, shapes and numbers	
Shape		Recognise and describe common 2D shapes and 3D objects by attribute e.g. straight, round, flat and curved			Sort common 2D shapes and 3D objects according to attribute e.g. shape, colour, size		
Angles, Symmetry and Transformation		Correctly uses some of the language of position e.g. in front, behind, above, below	Begins to correctly use some of the language of direction e.g. left right, forwards and backwards to solve simple problems in relevant contexts		Identifies and describes basic symmetrical pictures with one line of symmetry		Creates basic symmetrical pictures with one line of symmetry
Data Handling and Analysis		Uses knowledge of colour, shape, size and other properties to match and sort items in a variety of different ways	Collects and organises objects for a specific purpose	Asks simple questions to collect data for a specific purpose	Contributes to a concrete or pictorial display where one object or drawing represents on data value, using digital technologies as appropriate	With support interprets simple graphs, charts and signs and demonstrates how they support planning, choices and decision making	With support applies counting skills to ask and answer questions. Makes relevant choices and decisions based on the data

Progression

1. Copy a pattern
2. Continue a pattern
3. Create a pattern



Mathematical Language : Pattern, repeat, continue, describe, same, different, predict, next to, before, after, first, second, third...

CfE [MNU 0-13a](#)

Strategies and Approaches

Patterns and relationships should be explored across the different areas of the playroom and outdoors. Pattern is all around children; on their clothes, furniture, on wallpaper, in artwork, in nature etc. and this should provide the context for exploring pattern. Children also have a pattern to their day and week. Pattern can be felt, seen and heard. To be confident exploring pattern children need an understanding of before, after and between and will apply this knowledge to pattern recognition and creation. Children should be able to copy, continue and create a pattern or sequence and adults should look for regular and natural opportunities to do this, including [number patterns](#). Children will make patterns quite naturally during their play often with colours and shapes that are of interest; the first step for the adult is to commentate this for the child so they have the language to describe their creative choices and can begin to describe themselves what they are doing and why they are making their choices.

Arts and Crafts: Painting, printing, drawing, cutting and sticking, and using stampers all give opportunities to look at pattern. Children should have a range of media such as paint, chalk, pens and pencils of different thickness, and means of applying the paint such as hands, feet, brushes, vegetables, sponges, combs etc. Different sizes and shapes of paper and materials create interest to apply the patterns.

Sand: Add materials to the sand to encourage pattern work such as shells, feathers, stones, sticks, rakes, combs. Wet sand will make it easier for children to make patterns of sandcastles and shapes.

Table top games and tinker tables: Lacing beads, fuzzy felt, pegs and peg boards, mosaic tiles, buttons

Festivals: For example Rangoli patterns for Divali



Questions to Enable Higher Order Thinking Skills

- What do you notice? (I see, I think, I wonder)
- What shapes can you see in the pattern?
- Can you continue the pattern?
- Can you think of a different pattern?
- What would you add to the pattern?
- What do you think will come next?
- Which number will come next?
- What is the same? What is different?
- Can you describe the pattern?
- Can you draw a picture of your pattern? Can your friend make your pattern?
- Can you think of a pattern for these socks?
- Can you create a pattern for your t-shirt?

Barriers to Learning

- Children need lots of experience and time to explore pattern making; with experience and opportunities to work with commentating adults they will develop the necessary vocabulary and skills.
- Confidence can be built through opportunities to copy and discuss what makes it a 'pattern'
- Children need an understanding of before, after and between
- Children need an understanding of the objects/ideas that make the pattern.
- No left to right coordination (develops for most by 6 years)

Digital Learning:

[Resources](#)

On Track at Transition Statement

- Copies, continues and creates simple patterns involving objects, shapes and numbers.



2	4	6	8								
---	---	---	---	--	--	--	--	--	--	--	--

1	3	5									
---	---	---	--	--	--	--	--	--	--	--	--

1	2	1	2	1	2						
---	---	---	---	---	---	--	--	--	--	--	--

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Can you spot the pattern?

Can you continue the pattern?

Can you make a pattern of your own?

What do you think will come next?

What do you notice about these numbers?

What do you notice about these numbers?

Can you see any patterns?

What number is next..?
 What number is before..?
 What number is after...?

Resources – Pattern and Relationships

Common Learning Resources

- Clothes
- Chalk
- Lacing beads
- Fuzzy felt
- Pegs and peg boards
- Mosaic tiles
- Buttons
- Printing and painting materials
- Sand
- Blocks
- Natural materials

Online Resources



Pattern Making

What is your pattern?



Collecting

Children often enjoy making collections of objects like leaves, pebbles or buttons, which they arrange in patterns or put into containers.

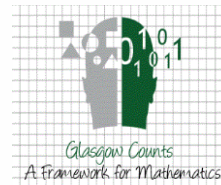
Sue Gifford – Developing pattern making with young children

<https://nrich.maths.org/13362>

Stories

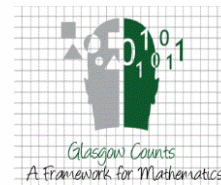
- *Pattern Fish* by Trudy Harris
- *Pattern Bugs* by Trudy Harris
- *The Rainbow Fish* by Marcus Pfister
- *Elmer and Wilbur* by David McKee
- *Rosie's Walk* by Pat Hutchins
- *The Very Quiet Cricket* by Eric Carle
- *Growing Patterns: Fibonacci Numbers in Nature* by Sarah C. Campbell
- *My First Book of Patterns* by Bobby George
- *Leaf Man* by Lois Ehlert
- *Pezzettino* by Leo Lionni

Problem Solving





What everyday opportunities for problem solving, relating to pattern, can you think of?



“Very young children are **natural problem solvers**. They learn to walk and talk by having a desire to attain their goal, by mimicking others, by **trying things out**, by **making** lots of **mistakes** and **adjusting strategies** accordingly, and by gradually gaining in confidence”

www.nrich.co.uk: (2018)



Opportunities come from:

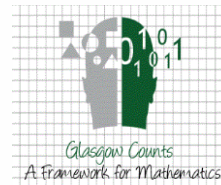
- providing resources
- giving children responsibility within everyday routines and activities
- identifying issues for discussion
e.g. through maths storytelling
- spontaneous questioning during play
e.g. “How can we make it big enough?”

Dr Sue Gifford

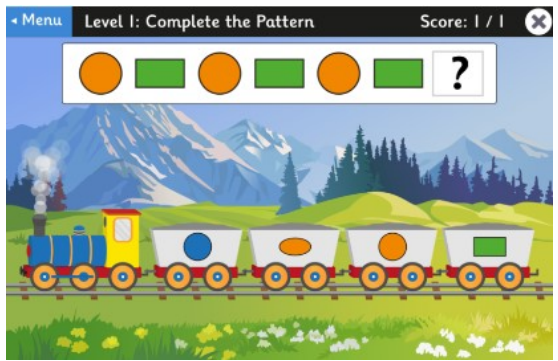
www.nrich.co.uk, 2018



Digital Enhancements



Digital Enhancements



www.topmarks.co.uk

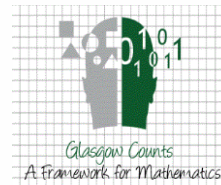






Digital Literacy	Using digital products and services in a variety of contexts to achieve a purposeful outcome	Recognises different types of digital technology	Uses digital technologies in a responsible way with appropriate care	Identifies different applications and programs by icon	Logs on to devices with a password/ passcode	Opens and closes a pre-saved file	Identifies and consistently uses the close icon
	Searching, processing and managing information responsibly	Identifies and uses images and key words when searching for specific information		Demonstrates an understanding of how information can be found on a website (text, audio, images, video)		Understands they should not use materials that belong to others without permission	
	Cyber resilience and internet safety	Demonstrates understanding of appropriate behaviour and language in the digital environment	Some awareness of what to do and who to ask for help if something inappropriate happens while using a device		Identifies where passwords and passcodes are used in school and at home		Understands the importance of having passwords and passcodes
Computing Science	Understanding the world through computational thinking	Classifies objects, and groups using simple categories	Identifies similarities and differences between objects	Begins to identify patterns (objects and information)		Identifies beginning and end of an everyday process and recognises there are steps in between	Can give a set of instructions or directions in correct sequence
	Understanding and analysing computing technology	Understands that computers follow a process and need precise instructions	Follows a simple set of instructions using visual representation (e.g. arrows)	Understands that devices can be controlled and respond to commands	Predicts what a device (or person) will do when given a simple set of instructions	Follows and designs simple algorithms for a programmable device (or person) to carry out a task (e.g. directions to a goal)	Identifies computing devices and everyday technology in the world around them and the impact it has on their daily life
	Designing, building and testing computing solutions	Uses directional language (e.g. forwards, backwards, turn)		Identifies and corrects errors in a simple set of instructions or algorithm			Uses key language of computational thinking

Developmental Stages



Realising the Ambition

“The more practice a baby gets in recognising similarities and patterns in the world around them, the more competent they will become as brain connections increase quickly as they begin to make sense of their world.”

Education Scotland: (2020)

Realising the Ambition

Page 19





Realising the Ambition

When I am a baby...

- 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.
- Encourage me to notice how numbers are evident in my environment.
- Give me time and space to explore toys and materials from different angles and move around freely to investigate my surroundings in terms of position and how my body works.
- Water and sand play are important for me, model pouring and measuring for me to experiment with.
- Provide materials such as paint and clay for me to explore, discussing with me categorising concepts such as hard, soft, wet, dry.
- Encourage me to sort and recognise and make patterns, supporting me to notice differences.
- Encourage my awareness of shape within natural contexts and environments.
- Enable me to play outdoors every day which includes discussing, for example, how the wind blows, the features of natural materials, exploring the textures, weight and size of items such as stones, twigs and plants.

When I am a toddler...

- 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.
- Encourage me to notice and use numbers as I explore my environment.
- Encourage me to have fun and play with numbers; investigating and experimenting with quantity, through comparing and contrasting a variety of objects using mathematical language such as less than, more than, same as.
- Continue to give time and space for me to explore toys and materials from different angles.
- Encourage me to move around freely to investigate my surroundings in terms of position and how my body works.
- Ensure my water and sand play is developing more specific language around pouring, measuring, volume, and capacity.
- Provide a variety of materials for me to explore, discussing with me categorising and sorting concepts such as hard, soft, wet and dry.
- Encourage me to sorting and play with patterns, supporting me to identify the characteristics of different objects.
- Encourage me to identify and explore shape within natural contexts and environments.
- Enable daily outdoor play which encourages me to explore natural materials through movement and to gain an understanding of textures, weights and sizes of items.



When I am a young child...

- 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.
- Encourage me to notice how numbers are evident in my environment and to enjoy using and writing numbers for a purpose.
- Continue to encourage me to play with numbers, having fun investigating and experimenting with quantity, through comparing and contrasting a variety of objects using mathematical language such as less than, more than, same as.
- Support my understanding and use of positional language within everyday experiences and through activities such as role-play, board games, digital technologies and programmable toys.
- Continue to include water and sand play to encourage me to explore, experiment, test and extend ideas developing more specific language and understanding around pouring, measuring, volume, and capacity.
- Provide a variety of materials which encourage my reasoning through experimentation, trial and error and prediction based on my developing understanding of mathematical concepts.
- Encourage me to create my own patterns and sets of objects, identifying and talking about the characteristics we notice together.
- Encourage me to identify and explore shape and symmetry, developing an understanding of characteristics within natural contexts and environments.
- Enable daily outdoor play which encourages me to explore size and perspective through my movements and by seeing familiar objects from a different angle, height or distance.



Development Matters



Birth to three – babies, toddlers and young children will be learning to:

Climb and squeeze themselves into different types of spaces.

Build with a range of resources.

Complete inset puzzles.

Compare sizes, weights etc. using gesture and language - 'bigger/little/smaller', 'high/low', 'tall', 'heavy'.

Notice patterns and arrange things in patterns.

Examples of how to support this:

Describe children's climbing, tunnelling and hiding using spatial words like 'on top of', 'up', 'down' and 'through'.

Provide blocks and boxes to play freely with and build with, indoors and outside.

Provide inset puzzles and jigsaws at different levels of difficulty.

Use the language of size and weight in everyday contexts.

Provide objects with marked differences in size to play freely with. Suggestions: dolls' and adult chairs, tiny and big bears, shoes, cups and bowls, blocks and containers.

Provide patterned material – gingham, polka dots, stripes etc. – and small objects to arrange in patterns. Use words like 'repeated' and 'the same' over and over.



Development Matters



3 and 4-year-olds will be learning to:

Examples of how to support this:

Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs', etc.

Extend and create ABAB patterns – stick, leaf, stick, leaf.

Notice and correct an error in a repeating pattern.

Begin to describe a sequence of events, real or fictional, using words such as 'first', 'then...'

Provide patterns from different cultures, such as fabrics.

Provide a range of natural and everyday objects and materials, as well as blocks and shapes, for children to play with freely and to make patterns with. When appropriate, encourage children to continue patterns and spot mistakes.

Engage children in following and inventing movement and music patterns, such as clap, clap, stamp.

Talk about patterns of events, in cooking, gardening, sewing or getting dressed. Suggestions:

- 'First', 'then', 'after', 'before'
- "Every day we..."
- "Every evening we..."

Talk about the sequence of events in stories.

Use vocabulary like 'morning', 'afternoon', 'evening' and 'night-time', 'earlier', 'later', 'too late', 'too soon', 'in a minute'.

Count down to forthcoming events on the calendar in terms of number of days or sleeps. Refer to the days of the week, and the day before or day after, 'yesterday' and 'tomorrow'.



Development Matters



Children in reception will be learning to:

Select, rotate and manipulate shapes to develop spatial reasoning skills.

Examples of how to support this:

Provide high-quality pattern and building sets, including pattern blocks, tangrams, building blocks and magnetic construction tiles, as well as found materials.

Challenge children to copy increasingly complex 2D pictures and patterns with these 3D resources, guided by knowledge of learning trajectories: "I bet you can't add an arch to that," or "Maybe tomorrow someone will build a staircase."

Teach children to solve a range of jigsaws of increasing challenge.

Compose and decompose shapes so that children recognise a shape can have other shapes *within* it, just as numbers can.

Investigate how shapes can be combined to make new shapes: for example, two triangles can be put together to make a square. Encourage children to predict what shapes they will make when paper is folded. Wonder aloud how many ways there are to make a hexagon with pattern blocks.

Find 2D shapes within 3D shapes, including through printing or shadow play.

Continue, copy and create repeating patterns.

Make patterns with varying rules (including AB, ABB and ABBC) and objects and invite children to continue the pattern.

Make a deliberate mistake and discuss how to fix it.

Compare length, weight and capacity.

Model comparative language using 'than' and encourage children to use this vocabulary. For example: "This is heavier than that."

Ask children to make and test predictions. "What if we pour the jugful into the teapot? Which holds more?"



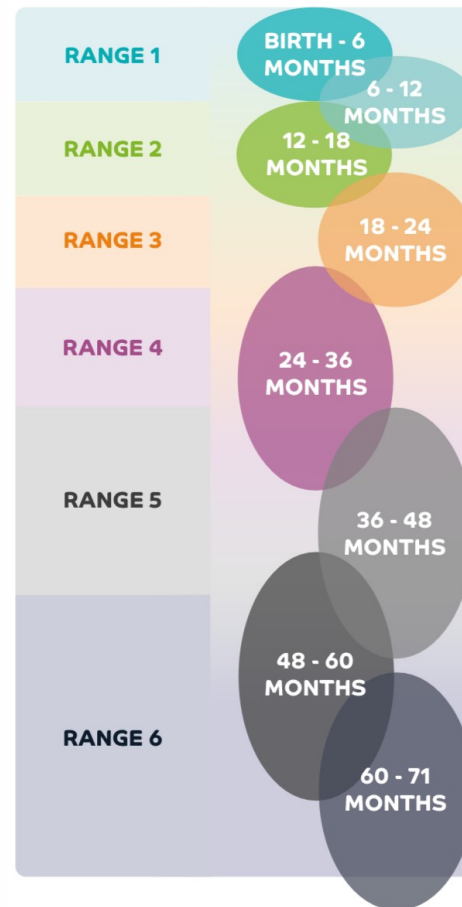
Birth to 5 Matters

BIRTH TO 5 MATTERS Guidance by the sector, for the sector

Birth to 5 Matters:
Non-statutory guidance for the Early Years Foundation Stage

From the Early Years Coalition
www.birthto5matters.org.uk

Key to understanding the age ranges:



Birth to 5 Matters

Mathematics

A Unique Child: what a child might be doing



Number

- Reacts to changes of amount when those amounts are significant (more than double)

Spatial awareness

- Explores space when they are free to move, roll and stretch
- Developing an awareness of their own bodies, that their body has different parts and where these are in relation to each other

Shape

- Explores differently sized and shaped objects
- Beginning to put objects of similar shapes inside others and take them out again

Pattern

- Shows interest in patterned songs and rhymes, perhaps with repeated actions
- Experiences patterned objects and images
- Begins to predict what happens next in predictable situations

Measures

- Responds to size, reacting to very big or very small items that they see or try to pick up

Positive Relationships: what adults might do

- Notice and mirror children's reactions to changes in amount.
- Add to objects & draw attention to the change in amount, using words like *more*.
- When feeding babies comment on whether they would like more after being winded, e.g. *Oh, you want more*.
- Use feeding, changing and bathing times for finger-play with young babies

- Support babies' developing awareness of their own bodies e.g. through baby massage and singing songs
- During floor play sometimes place objects that are just in or just out of reach, including small objects on cloths that babies can pull towards themselves.

- Encourage babies' explorations of the characteristics of objects, e.g. by rolling a ball or sliding a block.
- Demonstrate putting items inside others of similar shape

- Sing patterned songs and rhymes with predictable movements or actions (including from children's families).
- Move with babies to the rhythm patterns in familiar songs. Encourage older babies to join in tapping and clapping along to simple rhythms.
- Use repeated noises, movements and activities.
- Play simple "to and fro" games, passing and rolling between the adult and child so they begin to predict which comes next.

- Comment on the size and weight of objects when babies grasp objects that are *big* or *heavy*.
- During water play and bathing routines, show filling and emptying containers.
- At the end of mealtimes show and comment on the empty bowl, cup or bottle: *All gone!*

Enabling Environments: what adults might provide

- Provide small groups of the same objects in treasure baskets, as well as single items.

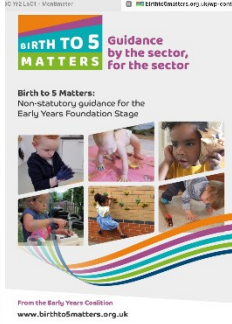
- Provide opportunities for babies to move freely on carpets, grass etc. Observe and sensitively support babies' play and give them long stretches of uninterrupted time to explore.
- Provide low mirrors to support babies to develop a body awareness.

- Provide interestingly shaped objects to explore.
- Make towers for children to knock down using objects that stack.

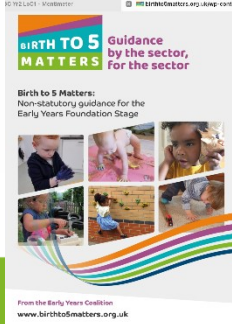
- Plan for adults to have time to enjoy repetitive activities with babies.
- Provide resources with high-contrast patterns.

- Provide a range of objects of various lengths and weights in treasure baskets to excite and encourage babies' interests including larger and smaller items.

RANGE
1



Birth to 5 Matters




Mathematics

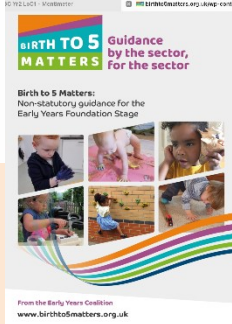
	A Unique Child: what a child might be doing	Positive Relationships: what adults might do	Enabling Environments: what adults might provide
RANGE 2	Number <ul style="list-style-type: none"> • May be aware of number names through their enjoyment of action rhymes and songs that relate to numbers • Looks for things which have moved out of sight 	<ul style="list-style-type: none"> • Take opportunities during play to sing number rhymes. • During personal care routines make a point of using numbers. • Play peek-a-boo hiding games with toys and people. 	<ul style="list-style-type: none"> • Plan to sing number rhymes with actions. Involve families in sharing number rhymes from home cultures.
	Spatial awareness <ul style="list-style-type: none"> • Explores space around them and engages with position and direction, such as pointing to where they would like to go 	<ul style="list-style-type: none"> • Use spatial words during everyday play and routines, or one-word comments e.g. as you get children <i>in</i> and <i>out</i> of a highchair. • Take opportunities to play hide and reveal games with objects in boxes and under cups. • Support babies' physical experience of positions and direction, e.g. describing <i>up</i> and <i>down</i>. 	<ul style="list-style-type: none"> • Play games that involve curling and stretching, popping <i>up</i> and bobbing <i>down</i>. • Provide boxes, cloths and bags for children to store, hide and transport items. • Provide nested boxes, cups and toys of different sizes that fit inside each other. • Share books that provide opportunities to use spatial language and describe movement
	Shape <ul style="list-style-type: none"> • Stacks objects using flat surfaces • Responds to changes of shape • Attempts, sometimes successfully, to match shapes with spaces on inset puzzles 	<ul style="list-style-type: none"> • When playing with malleable materials draw attention to shapes as they are created and changed. 	<ul style="list-style-type: none"> • Provide blocks and boxes to stack, build and solve problems with. • Provide a range of inset puzzles and support children as they explore matching shapes with spaces.
	Pattern <ul style="list-style-type: none"> • Joins in with repeated actions in songs and stories • Initiates and continues repeated actions 	<ul style="list-style-type: none"> • Talk about patterns in the environment e.g. spots and stripes on clothing or bumps in the pavement. • Spot opportunities to play "back and forth" and repetitive "again" games. 	<ul style="list-style-type: none"> • Sing familiar songs with repeated actions, jig to and tap out simple beats, encouraging children to join in. • Provide items for children to make repetitive sounds.
	Measures <ul style="list-style-type: none"> • Shows an interest in objects of contrasting sizes in meaningful contexts • Gets to know and enjoys daily routine • Shows an interest in emptying containers 	<ul style="list-style-type: none"> • During play and everyday contexts, comment on the sizes and weights of objects using a range of language such as <i>big</i>, <i>huge</i>, <i>enormous</i>, <i>long</i>, <i>tall</i>, <i>heavy</i>. • Talk about what is going to happen and what has happened during the day using <i>first</i>, <i>next</i> and <i>then</i>. 	<ul style="list-style-type: none"> • Provide big and little versions of objects for children to play with and compare. • Share picture books showing objects of contrasting sizes.



Birth to 5 Matters

Mathematics

	A Unique Child: what a child might be doing	Positive Relationships: what adults might do	Enabling Environments: what adults might provide
RANGE 3	 <p>Comparison</p> <ul style="list-style-type: none"> Responds to words like <i>lots</i> or <i>more</i> <p>Counting</p> <ul style="list-style-type: none"> Says some counting words May engage in counting-like behaviour, making sounds and pointing or saying some numbers in sequence <p>Cardinality</p> <ul style="list-style-type: none"> Uses number words, like <i>one</i> or <i>two</i> and sometimes responds accurately when asked to give one or two things 	<ul style="list-style-type: none"> Talk with young children about <i>lots</i>, <i>more</i> and <i>not many</i> and <i>not enough</i> as they play. Draw attention to contrasting differences and changes in amounts e.g. adding more bricks to a tower or eating things up. Model counting things in everyday situations and routines. Take opportunities to say number words in order with children as they play, e.g. 1,2,3 go! Use number words in meaningful contexts, e.g. <i>Here is your other mitten. Now we have two.</i> 	<ul style="list-style-type: none"> Play hiding games so children notice that something has <i>gone</i>. Provide varied sets of objects for playful opportunities for children to independently explore <i>lots</i>, <i>more</i>, <i>not many</i> and <i>not enough</i>. Count while engaging in everyday tasks and while moving around. Sing songs with counting strings.
	<p>Spatial Awareness</p> <ul style="list-style-type: none"> Enjoys filling and emptying containers Investigates fitting themselves inside and moving through spaces 	<ul style="list-style-type: none"> Model thinking during tidy up routines to promote logic and reasoning about where things fit in or are kept. Support children's interest in body-sized spaces and provide commentary on the child going <i>inside</i>, <i>under</i>, <i>over</i>, <i>between</i> and <i>squeezing through</i>. Look for opportunities to use spatial language during play activities. 	<ul style="list-style-type: none"> Designate specific places or spaces for items to be kept and fitted into for tidying. Respect children's urge to explore spaces, to get inside and move between. Build towers <i>up</i> for the child to knock <i>down</i>. Provide shape sorters and packaging where children can hide, enclose or post items through holes.
	<p>Shape</p> <ul style="list-style-type: none"> Pushes objects through different shaped holes, and attempts to fit shapes into spaces on inset boards or puzzles Beginning to select a shape for a specific space Enjoys using blocks to create their own simple structures and arrangements 	<ul style="list-style-type: none"> Model thinking about the properties of shapes when selecting them to fit into spaces, e.g. <i>Oh look, we need a round one.</i> When playing alongside children who are building, provide commentary about the shapes you are using. 	<ul style="list-style-type: none"> Provide a range of inset board and puzzles with large pieces. Provide a range of construction materials for independent play. Organise storage by their shape, with photos or silhouettes to show where things are kept.
	<p>Pattern</p> <ul style="list-style-type: none"> Becoming familiar with patterns in daily routines Joins in with and predicts what comes next in a story or rhyme Beginning to arrange items in their own patterns, e.g. lining up toys 	<ul style="list-style-type: none"> Highlight different times of the day and talk about what comes next within the pattern of the day. Leave a space for children to do the next action or word in familiar songs and stories with repeating elements. Comment on what is <i>the same</i> and what is <i>over and over again</i> in patterns found in the environment. 	<ul style="list-style-type: none"> Plan to share stories and songs that contain repeated elements which help children to anticipate what might come next.



Birth to 5 Matters

Mathematics

A Unique Child: what a child might be doing



Shape

- Chooses puzzle pieces and tries to fit them in
- Recognises that two objects have the same shape
- Makes simple constructions

Positive Relationships: what adults might do

- Chat about the shape of the pieces and the holes when fitting pieces into inset puzzles.
- Model comparing two objects to see if they have the same shape in purposeful contexts.
- Suggest choosing a particular shaped item for a purpose.
- Model your thinking when building.

Enabling Environments: what adults might provide

- Provide a range of inset and jigsaw puzzles of increasing complexity for children to choose.
- Provide a variety of construction materials including some with identical pieces so that children freely explore *same* and *different*.

RANGE 4
(cont.)

Pattern

- Joins in and anticipates repeated sound and action patterns
- Is interested in what happens next using the pattern of everyday routines

- Talk with children about the patterns you notice around you.
- Comment on and help children to recognise the patterns they make in their mark making, loose parts and construction.
- Draw children's attention to the patterns in their routines by asking what comes next.

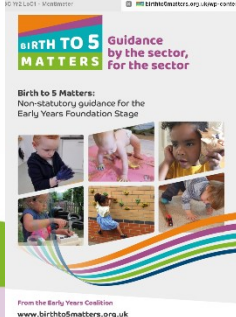
- Provide a range of natural and everyday materials, as well as blocks and shapes, with which to make patterns.
- Plan opportunities for children to experience pattern such as percussion, music and action games that involve repeated sounds or actions.

Measures

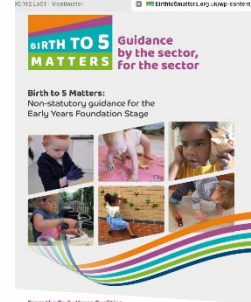
- Explores differences in size, length, weight and capacity
- Beginning to understand some talk about immediate past and future
- Beginning to anticipate times of the day such as mealtimes or home time

- Use everyday opportunities to describe everyday items and contexts using informal language of size (*giant, teeny, big, little, huge, small*), length (*long, tall, short*), weight (*heavy, light*) and capacity (*full, empty*).
- Observe children's problem-solving when ordering things by size, e.g. stacking cups, sensitively supporting by offering one if they are really struggling.
- Look out for opportunities to compare things purposefully such as finding out whether a teddy will fit in a bed.
- When children talk about their experiences at home and in the setting, use some language of time (*before, later, soon, next, after, morning, afternoon, evening, night-time*).
- In everyday activities, make a commentary about the sequence of events.
- When sharing stories and books, draw attention to routines and time sequences within them.

- Provide similar items of contrasting sizes so that children have many opportunities to encounter the language of size.
- Provide resources with clearly different weights to support direct comparison, and something to carry them in.
- Provide equipment with varied capacities and shapes in the sand, water, mud kitchen and role play areas.



Birth to 5 Matters



01 120

Mathematics

A Unique Child: what a child might be doing	Positive Relationships: what adults might do	Enabling Environments: what adults might provide
<p>Pattern</p> <ul style="list-style-type: none"> Creates their own spatial patterns showing some organisation or regularity Explores and adds to simple linear patterns of two or three repeating items, e.g. stick, leaf (AB) or stick, leaf, stone (ABC) Joins in with simple patterns in sounds, objects, games and stories dance and movement, predicting what comes next 	<ul style="list-style-type: none"> Whilst playing alongside children, model simple repeating patterns of two or three items and encourage children to create and continue patterns. Demonstrate arranging objects in spatial patterns when building, collaging or playing with loose parts. Draw children's attention to patterns around them including from a range of cultures. When making patterns, help children to solve problems. 	<ul style="list-style-type: none"> Provide a range of items for free exploration of patterning indoors and outdoors including natural materials, pattern blocks, loose parts, mats, trays and strips. Encourage children to join in with body patterns or repeating sections of songs. Pause to encourage prediction when enjoying stories and rhymes with repeating elements, sometimes using props. Emphasise the repeating pattern when turn taking. Provide patterned resources including those representing a range of cultures, such as clothing, fabrics or wrapping paper.
<p>Measures</p> <ul style="list-style-type: none"> In meaningful contexts, finds the longer or shorter, heavier or lighter and more/less full of two items Recalls a sequence of events in everyday life and stories 	<ul style="list-style-type: none"> During play, model comparing lengths and distances. Look out for meaningful opportunities for children to compare by length, weight, capacity and time using comparative language (<i>longer/shorter, heavier/lighter, holds more/holds less, longer time/shorter time</i>). Encourage children to participate in seesaw and balance scale play. Encourage children to respond to and use words such as <i>before, after, soon or later</i> when talking about routines, recent events and events in a story or rhyme. 	<ul style="list-style-type: none"> Provide problem-solving opportunities indoors and outdoors for comparing length, weight and capacity, e.g. <i>Which is the best bottle so we'll have enough drink for everyone at the picnic?</i> Ask children to predict <i>What happens next?</i> using visual timetables, books and stories. Provide items that can be ordered by size, such as plates and clothes in role play.

RANGE 5
(cont.)



Birth to 5 Matters

A Unique Child: what a child might be doing

Spatial Awareness

- Uses spatial language, including following and giving directions, using relative terms and describing what they see from different viewpoints
- Investigates turning and flipping objects in order to make shapes fit and create models; predicting and visualising how they will look (spatial reasoning)
- May enjoy making simple maps of familiar and imaginative environments, with landmarks

Shape

- Uses informal language and analogies, (e.g. *heart-shaped and hand-shaped leaves*), as well as mathematical terms to describe shapes
- Enjoys composing and decomposing shapes, learning which shapes combine to make other shapes
- Uses own ideas to make models of increasing complexity, selecting blocks needed, solving problems and visualising what they will build

Pattern

- Spots patterns in the environment, beginning to identify the pattern "rule"
- Chooses familiar objects to create and recreate repeating patterns beyond AB patterns and begins to identify the unit of repeat

Positive Relationships: what adults might do

- Encourage the use of relative terms (*in front of, behind, before and after, in a line, next to and between*).
- Encourage children to explore what can be seen from different viewpoints.
- Encourage children to describe position and give directions in play and in everyday routines.
- Encourage children to create scaled-down models such as in small world play.
- When children are fitting shapes into an outline or making a model from a 2D picture, help them to select more spatially challenging activities.
- Encourage children to make maps of routes they have walked or travelled in some way.

- Encourage children to use the names of shapes and their properties (e.g. *straight, curved, edges*) and prompt them to say what shapes remind them of.
- Discuss different examples of the same shape (e.g. equilateral and right-angled triangles) in a variety of orientations.
- Take opportunities to discuss the shapes that children paint, draw and collage and shapes noticed in their local environment using regular shapes and shapes with no name.
- When acting out their own stories encourage children to make the shapes involved on their own or with others.
- When constructing, sensitively discuss which shapes make other shapes (e.g. triangles making rectangles and hexagons with pattern blocks or mosaic tiles).
- Challenge children to make more complex constructions such as towers of arches, a window or a staircase.

- Encourage children to notice and appreciate a range of patterns involving repetition and symmetry in the environment, including traditional patterns from a range of cultures.
- Model using symbols to represent a pattern in other ways (e.g. using a spot/cross/dash pattern of symbols and doing a twirl/jump/glide in response).
- Make deliberate mistakes when creating patterns alongside children and playfully challenge them to fix the problem.
- Make border patterns where the repeating pattern continues around an object or frame.

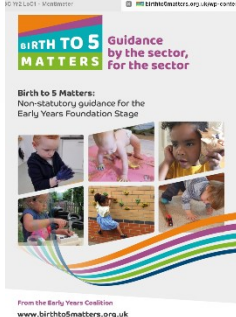
Enabling Environments: what adults might provide

- Play barrier games (where players have an identical set of objects which are hidden from each other; one player makes an arrangement of objects and gives instructions to the other to try to make the same arrangement).
- Plan opportunities for children to describe and recall familiar routes.
- Engage families in taking photos of familiar things from different viewpoints.

- Provide resources for shape play including unit blocks, pattern blocks, mosaic tiles and jigsaw puzzles with different levels of challenge.
- Teach strategies for solving shape and jigsaw puzzles, describing shape properties and modelling the mathematical vocabulary such as *straight, corner, edges*.
- Play games focussing on the properties of shapes, such as hiding and partially revealing a shape, asking children to say what different shapes it could be or not, and why.

- Provide opportunities for printing patterns using a variety of objects.
- Using photos, challenge children to copy and continue patterns.
- Invite children to create a pattern with the same structure using different objects (e.g. instead of a red/blue/blue pattern, create a sheep/cow/cow pattern).

RANGE 6
(cont.)



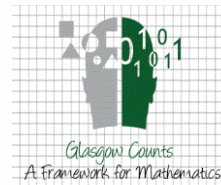
From the Early Years Coalition
www.birthto5matters.org.uk

Mathematics

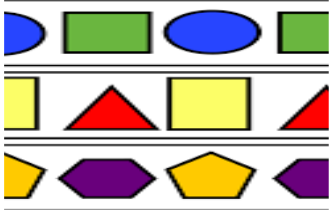
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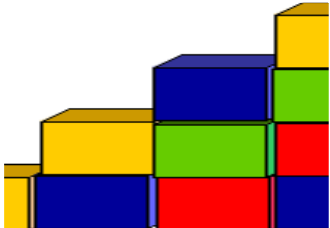
Understanding Pattern



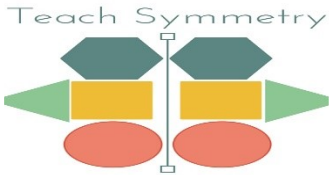
3 main types of pattern



Repeating

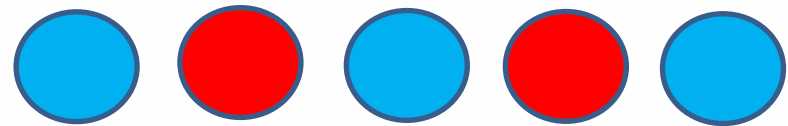
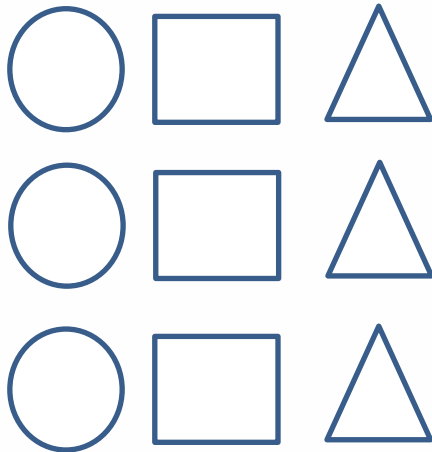


Growing

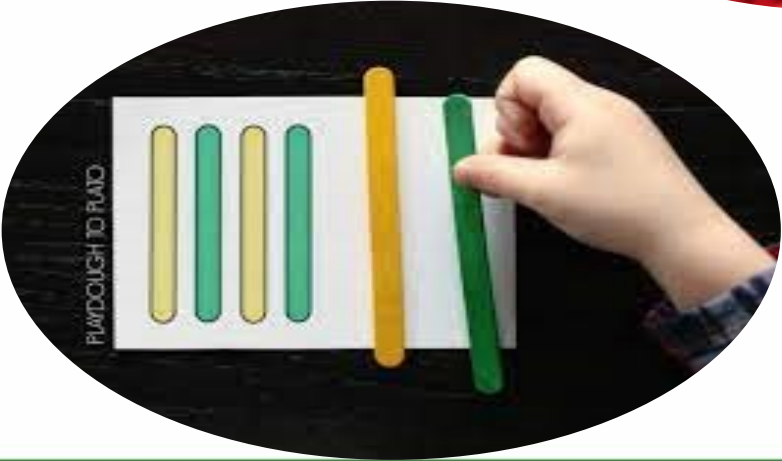


Symmetrical

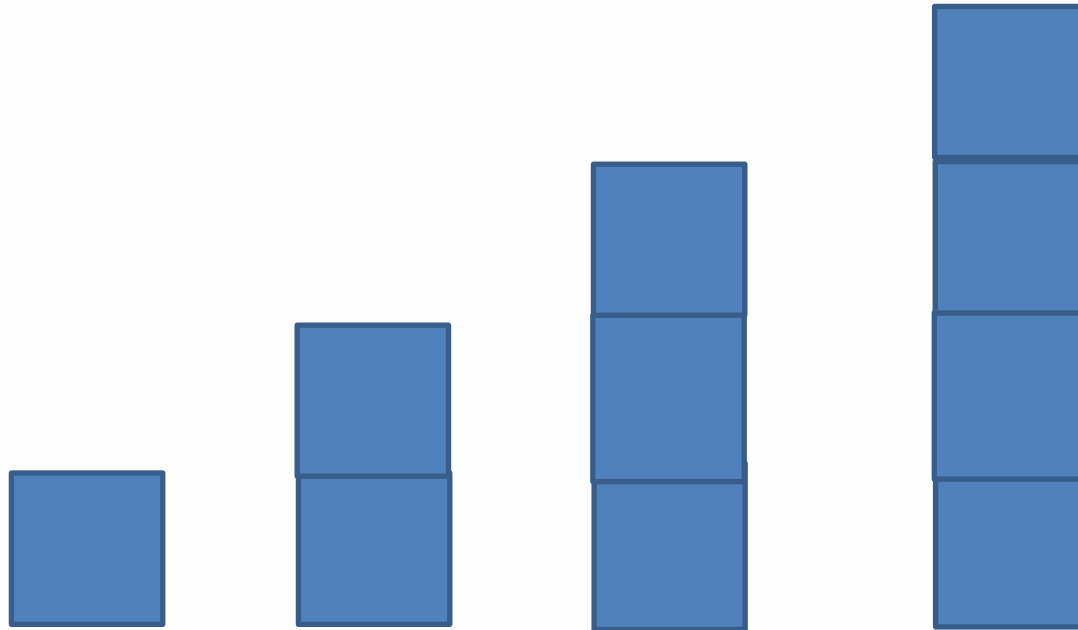
Repeating pattern



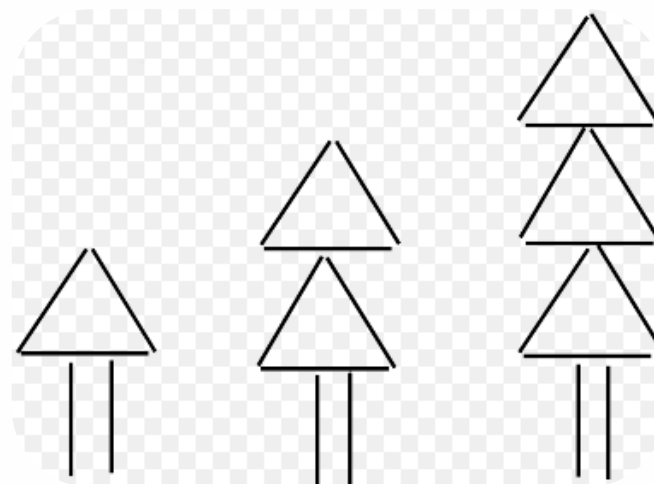
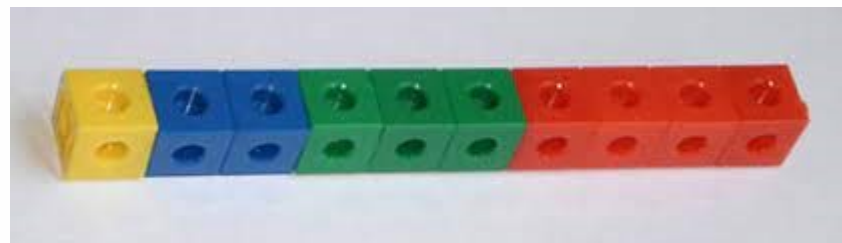
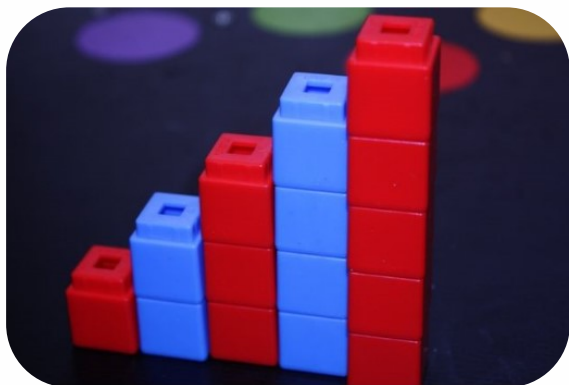
Examples of repeating patterns



Growing pattern



Examples of growing patterns



Symmetrical pattern



Examples of symmetrical patterns



What do children need to know to understand pattern?

To make sense of the patterns children recognise they need to develop awareness and understanding of 'next to', 'before', 'after' and 'between'.



What do children need to know to understand pattern?

To understand pattern children need to be able to identify the similarities and differences between objects such as:

Colour – describe order

Shape – describe order

Size – compare objects/volume of sounds

Texture – compare feel/appearance

Position – body movement/positioning, pegboards

Quantity – order by quantity objects/body movements



"When we discover a pattern, we make a connection and recognise a structure or rule."

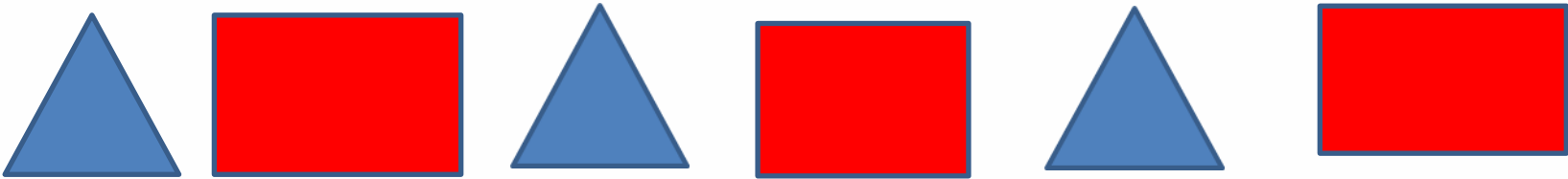
*Robertson, J.: (2017)
Messy Maths*



What is the rule?

2,4,6,8,10,12

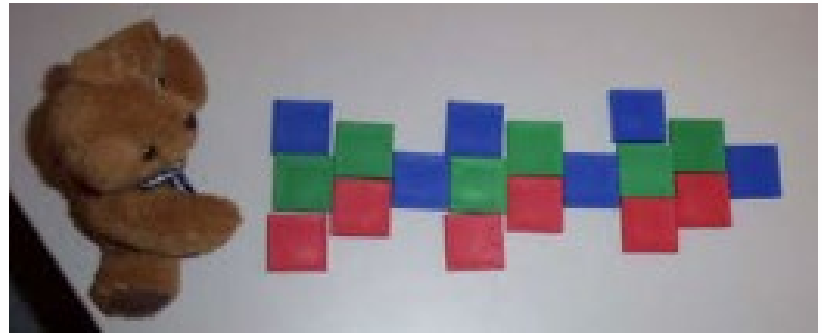
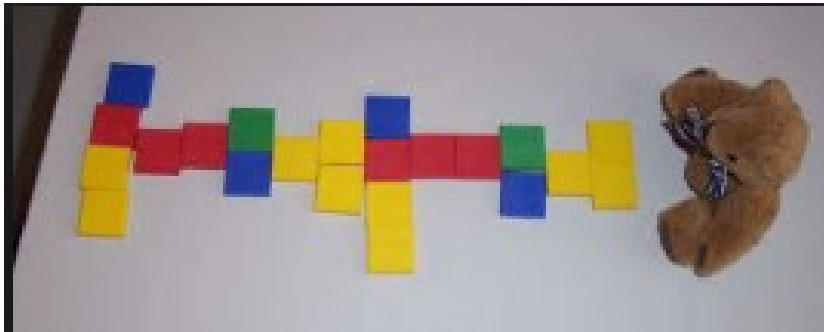
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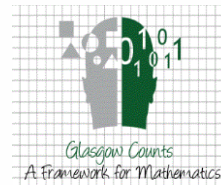
red, blue - AB

What is the rule?

Leaf, conker, conker, leaf - ABBA



Exploring Pattern through Stories



Exploring Patterns with Stories



What type of pattern could this book explore?



Exploring Pattern through Songs and Rhymes

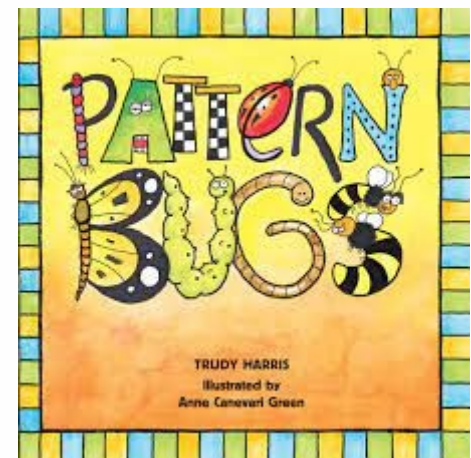
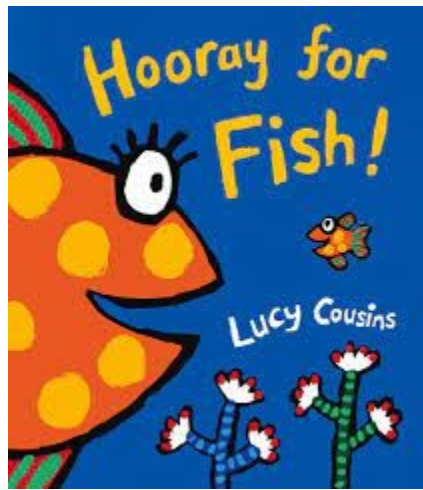
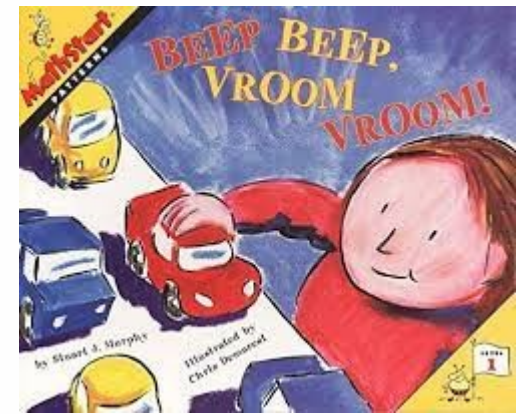
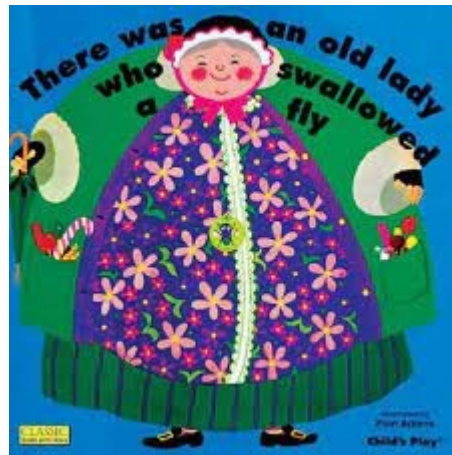
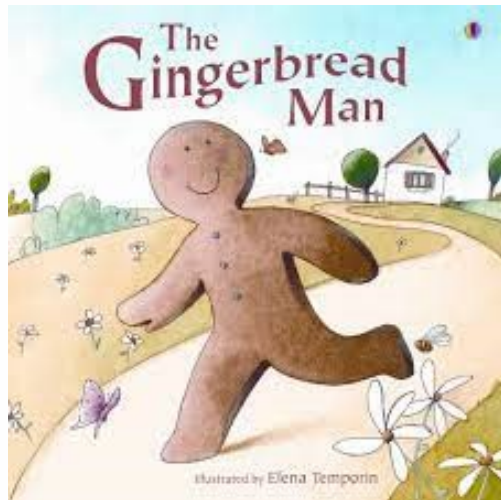
Name that tune...





What other stories, songs and rhymes can you think of which would lend themselves to exploring pattern?







Mathematical Book Talk

What mathematical concept do you want children to learn from the book experience?

What words will you define or ask children to define?

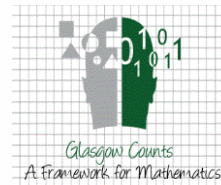
What mathematical key words will you introduce (maximum of 5)?

How will you introduce key mathematical vocabulary? What questions will you ask?

What statement/questions will you ask when reading aloud?

How will you build on children's own experiences to help them enjoy and relate to the text?

Explore the book at your table and consider how this could be used to explore pattern.



Learning Stories





Observations in action

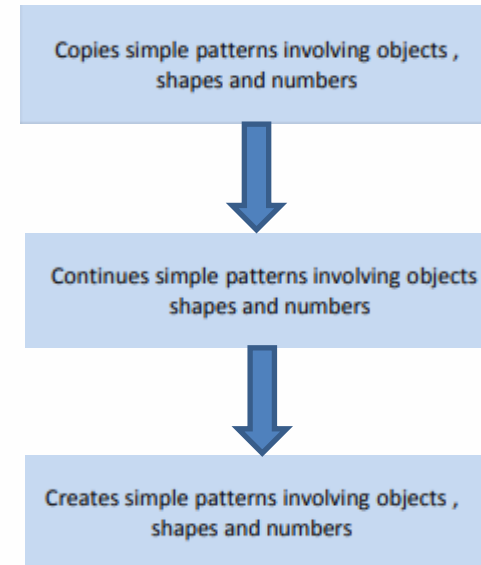
In your groups:

- Read the learning story.
- Discuss and identify the learning.
- Discuss and identify possible next steps



Progression

1. Copy a pattern
2. Continue a pattern
3. Create a pattern



Learner 1 - 4 years 12 months

(June of pre-school year)

Today, Learner 1, while you were building a tower you recognised the pattern in the blocks as red, yellow, blue, red, yellow, blue. I asked you what would come next and you replied, “red, yellow, blue.” I then made a tower using the pattern, red, red, yellow, yellow, blue, red, red, yellow, yellow, blue. I asked you to continue my pattern and you placed the blocks besides my tower to copy my pattern and then continued it. You took a picture of your tower and my tower together. You said you found it hard because there was 2 red and 2 yellow.



NOTICE AND NAEM
THE LEARNING

What learning do I think is happening here?

POSSIBILITIES AND OPPORTUNITIES

What are the next steps?

Learner 1 - 4 years 12 months

(June of pre-school year)

Notice and name the learning:

What learning do I think is happening here?

Today, Learner 1, you got involved with your friends playing with the cubes. You took an interest in using the cubes to create a pattern and identified the repeat, red, yellow, blue. You also managed to copy my pattern and kept trying when continuing the pattern by yourself even though you said it was hard, well done!

Possibilities and opportunities:

What are the next steps?

We will continue to offer patterns for you to copy and make sure there are a lots of different materials for you to explore so you can create your own patterns. We will help and encourage you when copying more difficult patterns like the one today which used red, red, yellow, yellow, blue cubes.

(AABBC)



Learner 2 - 4 years 6 months

(January of pre-school year)

This week, Learner 2, you made a bracelet for me using the beads and you told me that pattern was black, yellow, black, yellow. You said that you would like more colours so that you could make a necklace. You wanted to use all the colours for your necklace. Once you had all the colours on you asked me to help you continue the pattern. We talked about the pattern made by the colours and kept repeating this each time to find the next colour.

I suggested you could draw me a picture of your necklace and bracelet but you decided you didn't want to.



NOTICE AND NAEM
THE LEARNING

What learning do I think is happening here?

POSSIBILITIES AND OPPORTUNITIES

What are next steps?

Learner 2 - 4 years 6 months (January of pre-school year)

Notice and name the learning:

What learning do I think is happening here?

Today, Learner 2, you were very **focused** on creating a necklace using the beads. You **proudly showed** your necklace to me and told me about the **pattern** you created, 'it's black, yellow, black, yellow...'. I helped you to **continue** a pattern you had created using the different coloured beads. You **looked closely** at the pattern you had created and used this to help you answer the question, 'what comes next?', well done!

Possibilities and opportunities:

What are the next steps?

We will continue to make sure there are lots of loose parts for you to create your own pattern and have pictures of ready made patterns so that you can have a go at copying them. You could try to make patterns that have more than two colours or objects, we can help you. We will continue to talk to you about patterns and help you spot them when we are indoors and outdoors. Can you find any today?



Assessment

“Regular observation of individual children, noting their use of **language** and how they **create, continue** and **copy patterns**, will give useful evidence of what children **can do** and what they **understand.**”

Montague-Smith et al; (2018)
Mathematics in Early Years Education



Effective Interactions and Questioning

What do you like about this pattern?

Can you find another pattern with stripes?

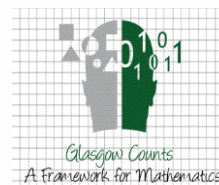
What comes next / before / after? How do you know?

Why did you put this one here?

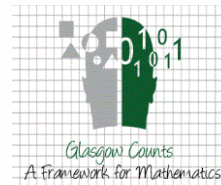
Are the patterns the same?
How are they different?

Can you make a new/different pattern using...?

*Montague-Smith et al; (2018)
Mathematics in Early Years Education*



Pattern Carousel





Have a go...

In groups, look at the resources on your table and discuss how you could use these to explore the pattern concept and provide a planned learning experience:

- Identify the learning intention and success criteria for your planned experience (remember to refer to the e and o and benchmarks (and frameworks) to support.
- Consider the developmental progression, how could you differentiate, providing challenge to some learners?
- Plan for quality interactions, what questions might you ask? What language will you use?



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

Benchmark statements:

- Copies, continues and creates simple patterns involving objects, shapes and numbers.
- Explores, recognises and continues simple number patterns.
- Finds missing numbers on a number line within the range 0 - 20.

Patterns & Relationships	Copies simple patterns involving objects, shapes and numbers	Continues simple patterns involving objects, shapes and numbers	Creates simple patterns involving objects, shapes and numbers
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Pattern Carousel

Environmental
pattern

Sound pattern

Simon says

What you
wearing
today?

Block pattern



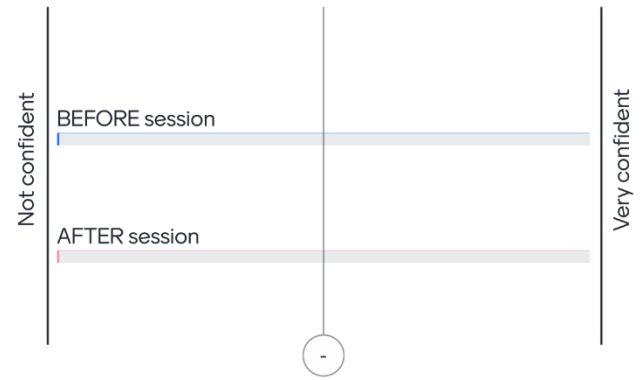
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Enter the code
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Or use QR code

Rate your knowledge and understanding of pattern progression and development:



What is your top takeaway from today's session?



Patterns and Relationships LPA Year 2



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