

0-3 Years: Mathematics Concept Overview

(taken from <https://birthto5matters.org.uk/>)

Spatial Awareness



A Unique Child: what a child might be doing

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

Positive Relationships: what adults might do

- 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.

Enabling Environments: what adults might provide

- 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.

Spatial awareness

- Explores space around them and engages with position and direction, such as pointing to where they would like to go

- Use spatial words during everyday play and routines. or one-word comments e.g. as you get children *in* and *out* 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 *up* and *down*.

- Play games that involve curling and stretching, popping *up* and bobbing *down*.
- 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
 - 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 *up* for the child to knock *down*.
 - Provide shape sorters and packaging where children can hide, enclose or post items through holes.

Spatial Awareness

- Enjoys filling and emptying containers
- Investigates fitting themselves inside and moving through spaces

- 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 *inside*, *under*, *over*, *between* and *squeezing through*.
- Look for opportunities to use spatial language during play activities.

Spatial Awareness



A Unique Child: what a child might be doing

Spatial Awareness

- Moves their bodies and toys around objects and explores fitting into spaces
- Begins to remember their way around familiar environments
- Responds to some spatial and positional language
- Explores how things look from different viewpoints including things that are near or far away

Positive Relationships: what adults might do

- Encourage children to predict what they will see next on a familiar route.
- Take everyday opportunities to use words for position and direction accompanied by gesture (e.g. *in, on, inside, under, over*) using equivalent terms for these in home languages through liaison with families where possible.
- Enjoy games involving jumping, running and hiding and make very simple obstacle courses, e.g. *going up and down*.
- Model your thinking when arranging things, using some position words.
- Help children to create simple roads and rail tracks and talk about position.
- Value children's explorations of spaces and viewpoints and their interest in how things look different.

Enabling Environments: what adults might provide

- Design outdoor spaces where children can learn through a variety of spatial experiences (*going under, over, around, on top, through*) and hear spatial language in context.
- Encourage children to freely communicate their mathematical thinking through gesture, talk and graphical signs.
- Plan stimulating indoor and outdoor spaces where children make choices about where to go and create their own routes. Provide materials to create trails.
- Provide resources for transporting.

Pattern



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"> 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 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Plan for adults to have time to enjoy repetitive activities with babies. Provide resources with high-contrast patterns.
<p>Pattern</p> <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.
<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.
<p>Pattern</p> <ul style="list-style-type: none"> Joins in and anticipates repeated sound and action patterns Is interested in what happens next using the pattern of everyday routines 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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.

Shape



A Unique Child: what a child might be doing	Positive Relationships: what adults might do	Enabling Environments: what adults might provide
<p>Shape</p> <ul style="list-style-type: none"> • Explores differently sized and shaped objects • Beginning to put objects of similar shapes inside others and take them out again 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Provide interestingly shaped objects to explore. • Make towers for children to knock down using objects that stack.
<p>Shape</p> <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.
<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>Shape</p> <ul style="list-style-type: none"> • Chooses puzzle pieces and tries to fit them in • Recognises that two objects have the same shape • Makes simple constructions 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 <i>same</i> and <i>different</i>.

Measure



A Unique Child: what a child might be doing

Positive Relationships: what adults might do

Enabling Environments: what adults might provide

<p>Measures</p> <ul style="list-style-type: none"> • Responds to size, reacting to very big or very small items that they see or try to pick up 	<ul style="list-style-type: none"> • Comment on the size and weight of objects when babies grasp objects that are <i>big</i> or <i>heavy</i>. • 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: <i>All gone!</i> 	<ul style="list-style-type: none"> • Provide a range of objects of various lengths and weights in treasure baskets to excite and encourage babies' interests including larger and smaller items.
<p>Measures</p> <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, huge, enormous, long, tall, heavy</i>. • Talk about what is going to happen and what has happened during the day using <i>first, next and 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.
<p>Measures</p> <ul style="list-style-type: none"> • Shows an interest in size and weight • Explores capacity by selecting, filling and emptying containers, e.g. fitting toys in a pram • Beginning to understand that things might happen now or at another time, in routines 	<ul style="list-style-type: none"> • Use the language of size and weight as children are involved in everyday play and routines. • Use the language of capacity as children explore water or sand to encourage them to think about when something is <i>full, empty or holds more</i>. • Emphasise the sequence within familiar activities or routines. 	<ul style="list-style-type: none"> • Provide a range of objects, including big, heavy and awkward ones that can be transported, both indoors and outdoors. • Provide different sizes and shapes of bags, boxes and containers so that children can experiment with filling, experiencing weight and size. • Plan to share images and books which show the order of daily routines.
<p>Measures</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Use everyday opportunities to describe everyday items and contexts using informal language of size (<i>giant, teeny, big, little, huge, small</i>), length (<i>long, tall, short</i>), weight (<i>heavy, light</i>) and capacity (<i>full, empty</i>). • 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 (<i>before, later, soon, next, after, morning, afternoon, evening, night-time</i>). • 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. 	<ul style="list-style-type: none"> • 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.

Number



A Unique Child: what a child might be doing	Positive Relationships: what adults might do	Enabling Environments: what adults might provide
<p>Number</p> <ul style="list-style-type: none"> • Reacts to changes of amount when those amounts are significant (more than double) 	<ul style="list-style-type: none"> • Notice and mirror children's reactions to changes in amount. • Add to objects & draw attention to the change in amount, using words like <i>more</i>. • When feeding babies comment on whether they would like more after being winded, e.g. <i>Oh, you want more</i>. • Use feeding, changing and bathing times for finger-play with young babies 	<ul style="list-style-type: none"> • Provide small groups of the same objects in treasure baskets, as well as single items.
<p>Number</p> <ul style="list-style-type: none"> • May be aware of number names through their enjoyment of action rhymes and songs that relate to numbers 	<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.
<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. <i>1,2,3 go!</i> • 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.

Number



A Unique Child: what a child might be doing

Comparison

- Beginning to compare and recognise changes in numbers of things, using words like *more*, *lots* or *'same'*

Counting

- Begins to say numbers in order, some of which are in the right order (ordinality)

Cardinality (*How many?*)

- In everyday situations, takes or gives two or three objects from a group
- Beginning to notice numerals (number symbols)
- Beginning to count on their fingers.

Positive Relationships: what adults might do

- Include the number sequence in everyday contexts and songs so children experience the order of the numbers (ordinality)
- Encourage children to explore the collections they make, comparing amounts and counting some of the items, emphasising the last number, e.g. 1,2,3. *There are 3 leaves.*
- Use opportunities to model and encourage counting on fingers.
- When singing number rhymes with props, draw attention to contrasting differences and changes in numbers, checking together *How many now?*
- Point out the number of things whenever possible, e.g. rather than just *chairs*, say *four chairs*.
- Encourage children to use marks to represent their mathematical ideas in role play.
- Help children to give or get two or three items, e.g. during snack time help children to take two pieces of fruit.

Enabling Environments: what adults might provide

- Provide buckets and bags for children to create collections of objects which they can count.
- Provide mark-making materials indoors and outdoors for children to represent their own ideas in play.
- Provide opportunities for children to explore cardinality in the environment using self-correcting resources, e.g. jigsaw with two ducks and the number two, or displays showing the numeral and the number of items.
- Sing counting songs and rhymes which help to develop children's understanding of number.
- Say the counting sequence going to higher numbers, in a variety of contexts, indoors and out, and sometimes counting backwards.