

Building firm foundations in mathematics ...with babies to two year olds

Developing children's mathematical well-being for future learning

The Early Childhood Mathematics Group would like to offer some support and encouragement to all adults in helping children to become confident young mathematicians. We all know that maths is very important for young children's lives and their future life options. If we can help them build firm mathematical foundations, we will have given them a really good start. It is also important that families and practitioners work together to support children's mathematical learning.



Everyday experiences and routines, rhymes and games provide excellent mathematical learning opportunities for children under seven. Opportunities for mathematical learning can happen anywhere and should be practical wherever possible. What matters is building young children's confidence and their willingness to have a go, whether at counting, construction or shape puzzles. Since supportive relationships are so important, it is imperative to find activities that not only children enjoy, but that adults can enjoy too. Recognising the maths in everyday activities helps to develop children's mathematical learning even further. When playing and in everyday routines, such as having a snack, children can learn lots of maths.

Important mathematical learning for birth to seven years includes:

- counting by just saying number words
- counting objects; making and comparing small numbers of things
- comparing sizes and dimensions, capacities and weights
- exploring properties of shapes by fitting them together and building models
- exploring spatially, describing where to find things and giving directions
- spotting and discussing different patterns
- finding different ways to solve problems practically

Learning and enjoying being mathematical

Time for independent exploration

Very young children need plenty of time to repeatedly and freely explore any resources on offer; to repeat actions, arrange objects and develop their own fascinations (collecting, holding, sucking) in order to make sense of what they see, hear and are shown. They need to do this independently as well as with other children, and alongside adults, in order to deepen their understanding and develop the confidence to play with and extend their ideas. Even young children's independent play can often surpass adult expectations and demonstrate the [Characteristics of Effective Teaching and Learning](#) (EYFS para1.18), which are relevant for learning mathematics at all ages.

Working together

It is important that practitioners, carers and families work together to support mathematical learning, exchanging ideas and observations of children's interests and responses. In early years settings, it helps if a little time is regularly set aside for these exchanges, so families and practitioners have regular conversations about how the child is being mathematical at home and in the setting.

Activities, games, rhymes and books

By playfully engaging with mathematics in everyday interactions, provides meaningful repeated opportunities to build children's early mathematical awareness. Moving around together and talking or singing to young children as you go about daily life, helps children to enjoy sound and movement patterns as well as to learn about the space around them. Adults help children by talking to them about numbers, shape and movement and by drawing their attention to the number, shape and position of objects around them or in books. Even before children begin to use these words for themselves, they look and listen with interest to adults using them.



Babies and one year olds

Babies and one year olds

At this age children often enjoy ...

- Reaching out for things
- Feeling objects of different shapes, sizes and weights
- Posting things through holes
- Playing hiding games and covering things up
- Dropping, throwing and hitting things
- Moving to a beat
- Bath play



Activities, games, rhymes and books

Activities

Developing spatial awareness

- When nappy changing and dressing, put words to actions and singing. e.g. 'Up, up, up!' when lifting the baby from the changing table.
- Provide varied things for babies to reach for, lying on their tummies (in 'tummy time').
- Make obstacle courses with pillows for a baby to climb over and sit on. Describe positions, *Now you're sitting on top of the cushion!* Explore what children can crawl under or fit inside, *You can't fit in there - you're too big!*
- Carry a baby around a garden or outdoor space, giving them opportunities to see the area from different viewpoints (higher in your arms to see over the wall, looking up from low down, etc). Use words such as *up high, down low, under the tree*.
- Explore making marks on the ground using fingers, sponges or large paint brushes and water (in pots). Vary the marks (e.g. splodges, curved and straight lines) and where you make them. Toddlers can move around and make trails of water marks on the ground and walls.

Engaging with size, shape and space

- Stacking and building, with cups and boxes of different sizes. Experiment with fitting these inside each other, talking about *big* and *small*.
- Posting objects through holes, moving them around to make them fit.
- Provide 'treasure' baskets with everyday objects of contrasting shapes and sizes, e.g. wooden spoons of different sizes and weights, balls made of plastic, wood or fabric, woollen or floaty scarves to hide under. Use baskets, boxes or tins with straight sides so they don't tip over.
- Provide different (and harmless) things to throw, like cotton wool balls, or things to hit, like plastic bottles hung on string and talk about weight, distance and numbers.
- Fill containers like buckets or plant pots with small items to shake and listen to the sounds they make.



Babies and one year olds

Experiencing number

- Count aloud when dressing, e.g. fingers and toes, shoes and poppers.
- Add and eat food items one by one, talking about *more* and *all gone!* Ask children if they want or can give you *just one more*.
- Draw children's attention to numbers of things as often as you can: *You've got two crackers.. there are three birds in the pond...*

Pattern activities

- Help children predict routines to build an early understanding of sequence and patterns: *first we... then... now...*
- Hand clapping and knee bouncing with pauses so babies anticipate. Shake rattles and bang drums using simple rhythmic patterns.

Games

Hiding games

- Hide three favourite soft toys under a pillow case or towel. Take just two out – notice as the baby looks for the missing toy. Then take all the toys out and play together again.
- Hide one toy and make it pop out from different places, inviting the child to find it, talking about *behind* the settee, *under* the table.
- Make fists, with one fist containing a small toy. Who has it?
- Briefly cover baby's head with a thin cloth, count *1,2,3 OFF!* Baby pulls the cloth off.

Back and forth games

- Play rolling ball games. Sit on the floor, a little way apart, and take turns to roll the ball backwards and forwards between you. Vary the direction of the ball slightly so the child watches the movement of the ball and begins to predict its path. Observe how they follow the path of the ball with their eyes, hands or feet, when they seem surprised by its pathway and where they try to intercept or stop the ball. Vary the game by using balls of different sizes or rolling different objects such as cardboard tubes, a rubber ring or a plastic disc or lid (as well as trying to roll or slide boxes).

Stacking and knocking down games

- Build a tower of blocks, boxes or cups, one at a time, saying *one more*. Keep building (*What a tall tower!*) and then knock all the blocks down and start again.

Songs & Rhymes

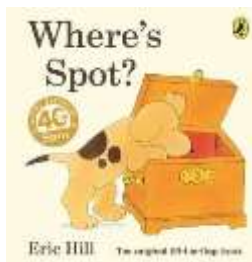
- [*Round and round the garden*](#): direction and counting 1, 2 and more
- [*Wind the bobbin up*](#): going *round*, experiencing up to 3 actions, counting words
- [*Two little dicky birds sitting on a wall*](#): finger rhyme with 0,1 and 2 fingers
- [*Incy Wincy spider*](#): going *up* and *down*, with a repeating action pattern
- *Open shut them*: repeating action pattern, experiencing 3 actions.

*'Open, shut them. Open, shut them. Give a little clap, clap, clap
Open, shut them. Open, shut them. Place them on your lap, lap, lap
Creep them, crawl them. Creep them, crawl them, right up to your chin, chin, chin
Open wide your little mouth, but do not let them in!'*

Babies and one year olds

Sit facing your baby and start with your fingertips and thumbs extended then pull them together each time you say *open, shut them*. Then clap three times / tap your lap three times / walk your fingertips from your baby's tummy to chin for *creep them, crawl them*. Then quickly open and shut your mouth before hiding your hands behind your back.

Books



[Where's Spot](#)

Eric Hill

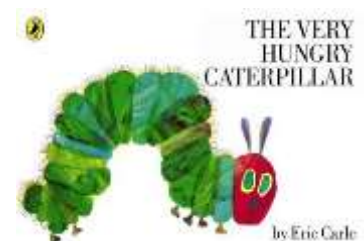
Surprising animals fit into spaces of varying shapes and sizes



[Black and white](#)

Tana Hoban

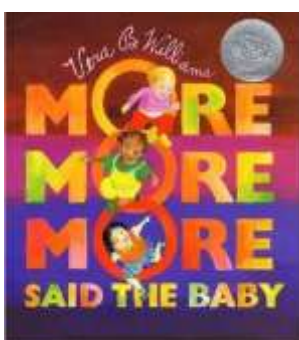
Contrasting simple images for very young babies



[The Very Hungry Caterpillar](#)

Eric Carle

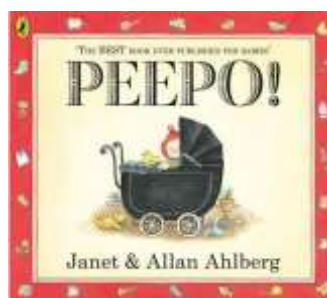
Numbers to 5 (and more) and the days of the week



[More, More, More said the Baby](#)

Vera B Williams

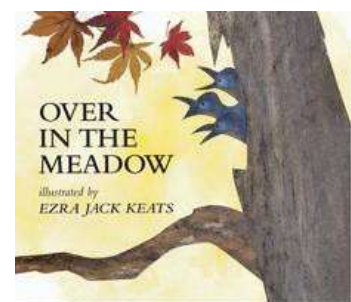
Eyes, toes numbers and positions



[Peepo](#)

Alan and Janet Ahlberg

A hole to peep through and a repetitive pattern



[Over in the Meadow](#)

Ezra Jack Keats

A counting rhyme

Two year olds

Two year olds

As they get older, children often enjoy...

- Investigating objects of different shapes, sizes and weights
- Filling and fitting things inside containers
- Finding hidden things and hiding themselves in different spaces
- Saying numbers in order
- Being asked to give one or two objects
- Mixing and pouring
- Simple insert jigsaw puzzles
- Playing with toys that replicate their lives, e.g. dolls, cars, home play
- Trips out to familiar places, e.g. the local shop, the park

Activities, games, rhymes, books and apps

Activities

Engaging with shape, space and measures

- 'Shape snacks' - offering square or rectangle crackers, cut cheese into triangles... *Would you like your sandwich cut into 2 or 4 triangles / squares?...*
- Dress dolls or teddies, *Which nappy fits the best?*
- Make soda bread or playdough; weighing ingredients, counting spoonfuls and discussing when more is needed.
- Empty and fill old pans and containers with water, sand, leaves, pine cones, conkers, beans, or rice, use different sized containers and spoons, scoops, measuring cups and funnels.
- Build with boxes, bricks and construction toys etc , Encourage exploration, like seeing whether a cube block will balance on the point of a pyramid block. Talk about what the child is doing. *Ooh, you are putting the long thin brick on top of the curved brick. Wonder: Will it balance? Will it fall down? Is it long/big enough/ too tall? Model new challenges, describing what you are doing: I'm making a bridge/ a pattern with my tower, it goes this way, that way; I'm making my tower wide at the bottom and getting narrower and narrower... I wonder if I can make a tower as tall as me...*
- Water play including tea parties with water outside, washing up and washing dolls and toys
- Ride trikes through puddles and observing trails, going straight, then curving round
- Provide boxes and spaces for children to fit *inside* or crawl *under*





Two year olds

- Complete insert and simple jigsaws together. Demonstrate strategies like finding corner pieces or hovering and turning pieces above a space. Describe (with gestures) the shape you are looking for, e.g. *a piece with two sticking out bits*.
- Tidy up, using words like *on top, behind, under, above, full, empty etc.*
- Get dressed, with clothes in the right order, the right way round and finding two socks.
- Go to the shop and buying fruit or vegetables of different weights for snacks.
- On trips, point out things seen on the way and coming back, where they are and what comes next

Experiencing number

- Count together, up and back, as you go up and down stairs, step on paving slabs, etc. Counting objects including toys and food items, repeating last word: *1,2,3, there are 3 cars!*
- Talk about number symbols, for instance on buses or doors.
- Post pom-poms or balls down cardboard tubes, counting them as they drop and showing numbers on fingers.
- Hide a number of things in the sand to find e.g. small toys like cars or dinosaurs
- Teddy bears' picnic: getting one plate, then one cup for each teddy and sharing food items, making decisions about who gets what and solving problems when there isn't enough or there is some left over.
- Look for insects *under* logs, counting the number found.

Pattern activities

- Pair up socks, discussing length and patterns.
- Include clapping or body actions in songs and rhymes.

Games

- Use 3 or 4 upturned containers and hide an item under one container for the child to find. Muddle them up: *Can you find which one it's under?*
- Hide a favourite toy inside or outdoors for a child to find. *Ah, you're looking under that little table – good idea! Where will you look next? Oooh you're so close ...*
- Build a tower of blocks, boxes or cups together, one at a time. Both say *One more!* each time you add another one. Keep building (*What a tall tower!*) and then knock all the blocks down and start again.

Songs & Rhymes

- *One two three four five, once I caught a fish*: a counting rhyme to 10, using fingers
- *5 little monkeys swinging from a tree*, or, more actively, *jumping on the bed*: counting one less each time from 5
- *Head, Shoulders, Knees and Toes*: action song with repeating patterns
- *Zoom, zoom, zoom*: countdown from 5, with a catchy tune and actions

Two year olds

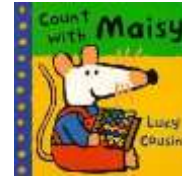
Books



Bear Counts
Karma Wilson &
Jane Chapman
Numbers to 5



1, 2, 3 to the Zoo
Eric Carle
Counting to 10



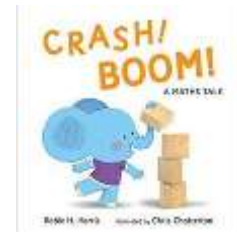
Count with Maisy
Lucy Cousins
Lift the flap and find
chicks to 10



Big and Small
Britta Teckentrup
Contrasting sizes



*Inside Outside Upside
Down*
Stan & Jan Berenstain
A story with positional
language



Crash boom!
Robbie H Harris &
Chris Chatterton
Building a tower as
tall as me

Adults can help babies to 2 year olds by:

- **building on children's current interests and turning repeated actions into games**
e.g. finding hidden toys, putting objects inside each other, building towers, jumping up and down, counting favourite toys, counting steps, pushing and carrying heavy items, providing different things to hit and throw
- **sometimes playing alongside and silently offering choices, watching what the child does**
e.g. pass them two different shaped blocks and watch how they decide which to use
- **talking about numbers**
e.g. *I wonder how many there are? I wonder if there are more trains or cars? I can see 1, 2, 3 - that's 3 cups.*
- **using maths words to talk about what you notice and what you are doing**
e.g. play with maths words by repeating them and allowing them to roll on the tongue, laughing together, *straaaaight, currrved, on top of, betweeeeen, more, longer, further*
- **being enthusiastic and encouraging, showing interest in how children think**
e.g. copying the way a child moves an object or their body, trying their way of doing something such as fitting a shape into a hole and clapping when they fit it successfully
- **being playfully wrong**
e.g. counting incorrectly or making silly suggestions, like trying to fit a huge block into a tiny hole or suggesting they wear twelve shoes today, pretending to carry a feather as if it were a heavy box
- **discussing options**
e.g. wondering *whether..?* or *what if?* and trying more than one way

The Early Childhood Mathematics Group (ECMG) is a UK based group of early years mathematics enthusiasts and experts that includes teachers, researchers and teacher educators. We work together to promote early childhood mathematics.

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