



# Mathematics:

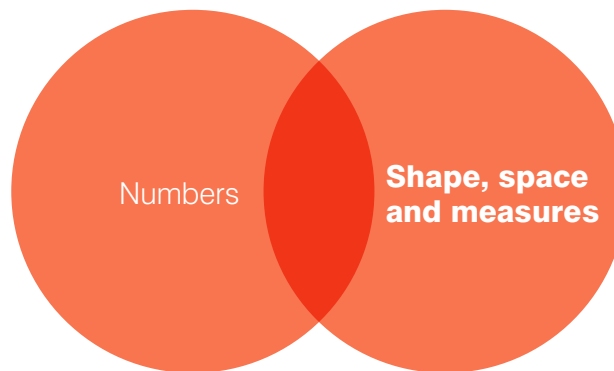
## Shape, space and measures

### Introduction

Mathematics (M) is one of the **four specific areas** of learning in the EYFS framework. It involves providing children with opportunities to practise and improve their skills in counting on and counting back, and using numbers up to 20 to do simple addition and subtraction to solve simple problems.

Mathematics also involves children using everyday language to describe and compare size, weight, capacity, time, position, and distance. They are given opportunities to know, and talk about, patterns and the properties of flat and solid shapes.

In the EYFS framework **Mathematics** is made up of two aspects:



### Prime and specific areas of learning

- The **three prime areas** of the EYFS are Personal, Social and Emotional Development (PSED), Physical Development (PD) AND Communication and Language (CL).
- The **four specific areas** are Literacy (L), Mathematics (M), Understanding the World (UW) and Expressive Arts and Design (EAD).
- The **three prime areas** should be the focus for practitioners working with the youngest children, as these form the basis for successful learning and progress in the **four specific areas**.
- As children become older, the emphasis will shift towards a more equal focus on **all areas of learning** as children's confidence and abilities increase.

### Supporting young children's development in shape, space and measures

Mathematics covers the area of learning and development which was previously called 'Problem solving, reasoning and numeracy' in the original EYFS framework.

This aspect of mathematics was also previously called 'Shape, Space and Measures'.

Babies and children's mathematical development occurs as they seek to make patterns, make connections, and recognise relationships as they learn about sorting and matching, and develop an understanding of shape, space and measures.

Practitioners can make the most of the mathematical potential of the outdoor environment by encouraging children to discover things about shape, distance, and measures through their physical play.

## **Progress in M Numbers**

### **Under 3s**

*'Practitioners working with the youngest children should focus on the prime areas, but also recognise that the foundations of all areas of learning are laid from birth – for example mathematics through early experiences of quantity and spatial relationships.'*

[Tickell Review of the EYFS, 2011]

### **Early Learning Goal for Shape, space and measures**

*'Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.'*

[Statement from revised draft EYFS Framework, 2011]

## What quality looks like in practice

The following three scenarios show how practitioners in a children's centre with access to a fairly large outdoor area have created an environment, and developed their practice, to enhance children's understanding of shape, space and measures.

### Under twos

The practitioners in the children's centre who work with babies have looked at research into how children recognise shapes and symbols and have decided, in the light of their findings, to provide the babies with a rich array of black and white resources to stimulate their problem solving and thinking processes. As well as black and white fabrics, play mats, and cushions, they have provided black and white toys, wall decorations, and friezes which are positioned above the skirting boards. They use black and white stimulus cards which have been designed to stimulate the vision, focus and attention of babies, and which show a variety of shapes, patterns and images to support the babies' mathematical development.

In the toddler rooms the practitioners have selected resources which will enable them to work with the children to develop their understanding of shapes and space. They use pop-up books with flaps of different shapes and sizes, puzzles which require the children to match different shaped pieces with the appropriate spaces, and sets of multisensory building blocks which are different shapes and colours.

Practitioners use everyday experiences as opportunities to use mathematical language which relates to shape, space, and measures, for example 'big', 'little', 'top', 'bottom', 'next to', 'round', 'square', 'up', and 'down'.

### Two- to three-year-olds

In the children's centre overhead projectors are used to encourage the children to be creative and to think critically. The two- and three-year-olds use the overhead projector and the accompanying resources to build on their understanding of shape, space, and measures. The practitioners have provided a clear tray of resources which include translucent and transparent plastic shapes, soft glitter filled shapes, buttons of different shapes and sizes, reclaimed materials such as curtain rings, cotton reels and spools, and natural materials such as stones, shells and leaves. The children place the different objects on the overhead projector and project large images onto the wall or ceiling. They are able to explore the projected images on the walls with their hands and fingers, learning about shape, line, corners, and angles as they do so.

To help the children learn to differentiate the times and routines of the day, the practitioners use a variety of sounds – bells, a drum beat, a whistle to show when it is time for a snack, time to tidy up, or time to go indoors from the garden. Making interesting sounds encourages the children to listen carefully and to begin to sequence events of the day as they occur.

The staff of the children's centre have made good use of the available space out of doors by providing a large sand play area and a big water tray. By giving children plenty of space the practitioners have been able to introduce a wide variety of containers of different shapes, sizes, and capacities to both the sand and water play. This in turn provides a wealth of opportunities to introduce language appropriate to shape, space and measures including 'full', 'empty', 'how much', 'how many', 'into'.

### Four- to five-year-olds

In the pre-school rooms of the children's centre, practitioners make the most of opportunities to introduce transactional play, which involves the children in buying and selling, weighing and measuring, and organising daily routines. They are careful to make sure that the transactional play is of interest to both boys and girls by setting up a garage and carwash, a DIY or pet shop, as well as a café, supermarket, or shoe shop. By providing the resources for different types of role play, the practitioners can introduce handling money, making price lists, weighing, counting, and sorting items for sale, or keeping a diary or log book. By varying the nature of the transactional play available to the children, adults can model the use of a wide range of vocabulary connected to shape, space and measures.

In the same way that the practitioners working with the two to three year olds provide a variety of interesting handmade, reclaimed, and natural resources for use with the overhead projector, the staff working with the older children provide similar resources for the children to arrange, sort, compare, and order.

To help the children begin to develop a sense of how times of the day are sequenced, the practitioners have worked with the children to produce a pictorial timetable of the sequence of events during the day. By referring to the pictorial timetable during the day, the practitioners are able to introduce and reinforce the use of everyday language relating to time.

Pathways, the patio, walls and fences, the arrangements of the raised flower beds, and the vegetable plot in the outdoor area of the children's centre all provide excellent examples to observe and talk about shapes and patterns. The practitioners encourage a variety of activities and games where the children use their physical and mathematical skills to follow, and give, directions. This is then built upon indoors using programmable toys.

## How to help young children develop their skills with shape, space and measures

Use these reflective questions to think about how you might support young children to develop their skills with shape, space, and measures.

### Under twos

- Are all practitioners working with the under twos knowledgeable about how to support young children's learning and development in shape, space, and measures?
- Do any of the practitioners working with the youngest children keep up-to-date with the latest thinking about how babies and toddlers learn about mathematics?
- When resources are selected for the babies and toddlers, is this aspect of mathematics taken into account?
- Does the baby room include black and white, or other resources, which support children's understanding of pattern, shape, and space?
- How well do practitioners observe individual children's interests in shapes and patterns?
- Do the toddlers have access to a range of books, puzzles and construction materials which will support their learning and development in shape, space, and measures?
- Do we take opportunities to talk to the children about the different shapes, sizes, and patterns they can see?
- Are parents made aware of the mathematical opportunities in sharing puzzles, pop-up books with flaps, and different types of building blocks with their babies and toddlers?

### Two- to three-year-olds

- How well do all practitioners recognise the mathematical learning which is taking place in everyday situations?
- Do we provide a range of interesting opportunities, such as using an overhead projector or light box, for two and three year olds to develop their knowledge, understanding, and skills in shape, space, and measures?
- When resources are chosen for the children to use across all areas of learning, do we look for the mathematical opportunities they provide?
- Do we look for opportunities in everyday routines which help children to become familiar with measuring time?
- How often do the two and three year olds have the opportunity to investigate shape and spaces on a large scale, perhaps out of doors?
- Are all practitioners aware of the different ways in which they could present resources which support shape, space, and measures to appeal to both boys and girls?
- How well do we use the wealth of opportunities which children's play offers to use appropriate language to describe shape, space, and measures?
- Could we provide parents with guidance which will help them to support their children's learning and development in this area of mathematics?

### Four- to five-year-olds

- As a setting which provides early educational opportunities throughout the birth to five age range, are all staff familiar with the requirements of the EYFS in shape, space and measures for all age groups to ensure consistency and the planning of appropriate learning opportunities?
- Are all staff confident in using the mathematical vocabulary relevant to shape, space, and measures, for example naming 2-D and 3-D shapes correctly and using the correct mathematical terms to describe these shapes?
- Do all practitioners create an enabling environment which supports children's learning and development in shape, space, and measures?
- How well do we use role play, construction, small world play and physical play out of doors as contexts for learning about shape, space, and measures?
- Have we considered using pictorial timetables to help children recognise the pattern of the day?
- Do we ensure that we include appropriate activities which will engage visual, auditory, and kinaesthetic learning – such as playing with shape dominoes, following and giving directions, or using different shapes and sizes of blocks in construction?
- Are the four- to five-years-olds taken out into the local environment to look for shapes, experience spaces, and explore opportunities for using measures, including time, distance, speed, length, weight, and capacity?
- Could we improve the information on children's mathematical learning and development which we provide for parents, to help them to recognise everyday opportunities to develop their children's understanding of shape, space, pattern, and measures?

## Ideas for parents

Mathematics is not simply about knowing about numbers and how to count and calculate. Young children need to learn about shapes and patterns as well as about how we measure things such as time, distance, weight, and capacity.

### Helping your child to understand shape, space and measures

There are lots of easy ways you can help your child to develop their skills with shape, space, and measures.

You could use the ideas below as starting points to help you do this.

#### **Under twos**

- Play a game with your baby where you hide a toy under a cloth and encourage your baby to find it or, when s/he is older, tell you what it is.
- Look out for books which show illustrations of different shapes or different shaped objects.
- Help your baby to stack cups or boxes on top of each other.
- Give your baby or toddler a shape sorter to play with – you might be able to borrow one from a toy library.
- Provide a range of puzzles or jigsaws for your child to play with.
- When you are out for a walk, talk to your child about the route you are taking – for example, we go straight along here, now we go round a corner, and then it is the end of our walk.
- Watch how your toddler begins to learn about shape, space, and measures – putting things inside boxes or tins, or pouring water in and out of different containers at bath time.

#### **Two- to three-year-olds**

- Choose library books which have stories and information about different shapes.
- Shape dominoes, jigsaws, and puzzles in comics will all help children to recognise and understand shapes.
- Make a collection of different buttons and keep them in a special tin – choose buttons of different sizes, shapes, weight, and with different numbers of holes – for your child to arrange, order, sort and count.
- Help your child to begin to understand the pattern of the day by talking about 'after breakfast or lunch', 'when you get home from nursery' or 'at bed time'.
- With your three-year-old, play a shape hunting game around the house or when you are out for a walk.
- Talk to your child about 'how long' things are, 'how heavy' or 'how full or empty'.
- Buy, or make, a height chart to measure how tall your child is and how much they have grown.

#### **Four- to five-year-olds**

- Your child will benefit from a range of puzzles and games to play with – dominoes, snap cards, jigsaws, and building sets such as Lego – to further develop an understanding of shape and space.
- Buy some sticky shapes or make some out of different scraps of paper with your child to create mosaic patterns and pictures.
- Plan a trip to a museum, art gallery, or the library to find images which show different shapes and patterns from different cultures.
- Use the stopwatch or timer on your mobile phone to see how long it takes to tidy up or get ready for bed.
- Encourage your child to help you when you are cooking – weighing ingredients, measuring liquids, and setting the timer on the cooker.
- Talk about the different shapes you make – rectangle, square, triangle – when you fold a tablecloth, newspaper or duvet cover.
- When you are out for a walk play shape 'I-Spy', 'I-Spy circles', 'I-Spy triangles' and so on.