

Getting hands-on with maths

Early years consultant **Carole Skinner** explains how the presence of sand and water can stimulate children's understanding of problem solving, reasoning and numeracy...

Sand and water are wonderful mediums to use to develop children's maths knowledge, skills and understanding. Playing with them involves, amongst other things, investigating, experimenting, constructing and problem solving – and, lest we forget, it can be lots of fun.

The maths content in the Early Years Foundation Stage Framework, Problem Solving, Reasoning and Numeracy (PSRN) is about understanding number and calculation, becoming familiar with measuring and working with shapes and solving problems. We all know that children are constantly trying to put their ideas and theories to the test by hands-on 'doing', and the presence of sand or water gives

them opportunity to do just that.

As they play with the sand and water, children acquire and practise new maths skills – from counting how many plastic fish they managed to net, to deciding the best bucket to use to make the largest sand pie – just the sort of activities that give children opportunities to count and measure, and to find out about shapes in a meaningful way.

As such there need to be plenty of opportunities for children to experiment with the sand and water, and to have opportunities to make decisions about what equipment to use and how to use it. You will need to spend time preparing the environment, selecting and gathering props and displaying them in a way that invites their use.

You can encourage children's independence and responsibility by expecting the children to share equipment and take turns. Put in place strategies that support children in playing cooperatively and learning to be active members of the group or pair when they are using the sand or water. You should supply additional materials to extend their experiences as well as modelling uses for particular props by playing alongside and demonstrating how to use a funnel or a rake. It's a good idea to make sure there are at least a couple of small dustpans and brushes or mops and buckets nearby so that children can be involved in clearing up.

Setting up the sand play

Wet and dry sand have very different properties, so the children need to experiment with and experience both types, as well as occasionally adding lots of water to turn the sand into very wet sloppy sand. Whether the sand is damp or dry it should be deep enough to dig, scoop or sieve with – children really do need to be able to fill two or three containers each without running out of sand.

You should provide a good variety of equipment (hanging close by is better than cluttering up the sand tray). Include some natural materials such as shells, driftwood and small stones that can be mixed into the sand or used to embellish sand constructions. Make sure there is a range of different sized plastic combs, shapes and small sticks for pattern making. Introduce lentils, rice, small buttons or

10 MATHS Experiences with water

There are lots of additional ideas that will enhance children's mathematical play, including collecting and measuring rainwater, looking at reflections in puddles and dissolving substances such as sugar. You could also try encouraging the following play activities:

- 1 Sorting, counting and comparing objects that float
- 2 Counting how many pebbles were added to a small bucket of water before it spilt out
- 3 Netting slimy worms of cooked spaghetti and comparing their lengths
- 4 Using a hose to make water patterns on the ground
- 5 Squeezing plastic bottles to empty and fill them up
- 6 Deciding when a container is nearly half full
- 7 Filling containers with a funnel
- 8 Showing where to hold the hose to make rainbows in the sun
- 9 Sorting objects into those that float and those that sink
- 10 Filling containers until the water overflows and discussing what that means



10 MATHS Experiences with sand

The mathematically good things children do when they play with sand include lining things up, counting them, making patterns, comparing sizes and using moulds and containers, burying treasure and digging it up again. You should encourage the following play activities:

- 1 Counting how many spoonfuls, shovelfuls, handfuls it takes to fill a container
- 2 Lining up and counting objects found in a sieve
- 3 Making handprints in the sand and then making one more
- 4 Arranging a row of full and nearly full containers
- 5 Pressing shapes in damp sand to make a pattern
- 6 Sieving out beads, small pebbles, etc. and finding the total
- 7 Sorting sand tools into things to dig with and containers to fill
- 8 Using a stick to draw a very, very long line in the sand
- 9 Observing how quickly/slowly the sand flows through a sieve
- 10 Filling and emptying containers and using size language

counters to make the sand gritty and then sieve them out.

Sometimes children should have access to sand in small containers and shallow trays on a table top as well as in a conventional sand tray. On these occasions, provide miniature equipment such as measuring spoons, tea strainers and egg cups. Children should be able to experience digging in a large amount of sand in an outdoor sandpit or at the very least a tarpaulin on the ground filled with sand something they can walk on barefoot. A large tyre or plastic paddling pool filled with sand, can make a quick instant outdoor sandpit.

Adult-directed sand play

- Together make a line of five sand castles and then increase the number to 10 castles (PSRN Calculating – finding the total number of items in two groups)
- Use damp sand and four different shaped containers to make some 3D shapes. Challenge the children to say which container made which shape (PSRN Shape, Space and Measures – use language to describe the shape and size of solids)
- Make two sand pies and discuss what's the same and what's different about them (PSRN Shape, Space and Measures – sort familiar objects to identify their similarities and differences)
- Bury seashells, stones and other small objects in the sand to find, count, sort and classify. Record by drawing or photos how many of each type have been dug up (PSRN Numbers for Counting – estimate how many objects they can see and check by counting)

Setting up water play

Children enjoy playing with water. When they are investigating with it they will have much more fun, and learn much more, if they have access to water both indoors and outside. The indoor water tray should be as large as space allows – transparent trays are a good choice, as children can see changes of water colour and whether objects are really sinking or just hovering halfway between the surface and the bottom of the tray – whilst the outdoor water should include, if at all possible, a hose, some watering cans and plastic guttering and pipes.

Simple changes can add new experiences such as warm water, ices cubes, chopped jelly, food colouring and sometimes bubbles. Buy a sack of shells from a garden centre to put in the water and add different perfumes with bath salts.

The properties of water that we want young children to experience, recognise and discuss can also help them develop maths knowledge and skills. Of course a lot of the activity at the water tray will involve pouring and measuring, but ask open-ended questions such as, "I wonder if that amount will fit in this jug?" or "Will the water stay in a sieve?" or "What's the best way to find out which cup holds the most?"

Support children in developing pouring skills – use funnels where needed. As their skills increase show how to mark the water level by using an elastic band around the container.

Adult-directed water play

■ Put some plastic sea creatures in the water tray, add blue food colouring and use aquarium nets or strainers to catch the creatures. Put them in a bucket and count



how many were caught. Release the creatures back to the sea once they have been counted. (PSRN Numbers as Labels and for Counting – count reliably up to 10 everyday objects)

- Pour water down a slope or gutter and decide if you make the slope steeper whether the water will run faster or slower (PSRN Shape, Space and Measures – use everyday language related to time)
- Add bubble mixture to the water tray and sponge numerals. Invite the children to net a number, name it and match it to a plastic covered number line. (PSRN Numbers as Labels and for Counting – recognise numerals 1 to 9)
- Investigate the way water spouts out of holes. Use a skewer to pierce holes in an empty plastic drinks bottle. Make the holes in a circle around the bottle. Investigate tilting the bottle to switch the holes on and off. Next time make the holes in a different pattern. (PSRN Shape, Space and Measures – describe solutions to practical problems)

Playing pirates

USE SAND AND WATER PLAY AS PART OF A MINI-PROJECT...

- Write letters, put them in plastic bottles and float on the water.
- Draw maps to show where the treasure is buried
- Design flags to hoist on the pirate ship
- Investigate materials for boat making
- Sing pirate songs such as *This way, that way, over the deep blue sea* and use actions to accompany the words
- Read these books and vote on the best pirate story -

The Night

Pirates

(Egmont)

-*Pirate Ship*

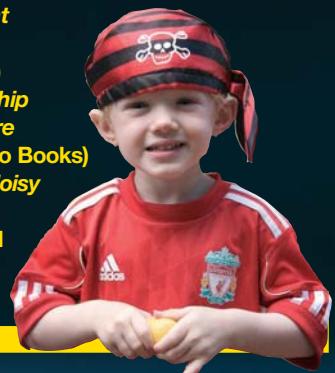
Adventure

(Armadillo Books)

-*Noisy, Noisy*

Pirates

(Ladybird Books)



"Children are constantly trying to put their theories to the test by hands-on 'doing', and the presence of sand or water gives them opportunity to do this"

CAROLE SKINNER

Making waves

BUILD A MORE CREATIVE ENVIRONMENT WITH THESE NEW RESOURCES...



Dig in

With features such as adjustable height, storage pockets and a multi-use play lid, Wesco's sand and water tray opens up all kinds of opportunities for learning through play. Call 0115 989 9765 or email sales@wescouk.co.uk to request a catalogue.

Splash out

A new range of outdoor play equipment, Elements for Play, has been launched by Playgarden. The first set of resources to be released focus on water and the many play opportunities it offers to children. Call 0114 282 1285 or visit www.playgardens.co.uk



It's a scoop!

Children build number skills as they sift, making exciting discoveries with every scoop. The plastic shells are printed with numbers 1–20. The £22.95 set includes 20 shells, sieves and a guide, all in a colourful bucket. Visit www.tts-shopping.com or call 0800 318 686.

