

Maths – position and movement

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Position and movement are a fundamental part of the mathematics curriculum throughout all key stages. Children are expected to understand the key language associated with this topic, how to use a grid, plot coordinates and follow compass directions, as well as the practical applications of understanding right angles.

Many children find it difficult to understand mathematical concepts like this until they are given an application in real life. This is why getting outdoors is so vital. It provides children with the perfect opportunity to have hands-on experiences that by their very nature are often more memorable than lessons indoors. Lessons like these are especially valuable for kinaesthetic learners and those children who are usually disengaged in lessons.

Outdoors also offers extra space which helps with the teaching of the larger scale elements of position and movement. Compass directions are one example where outdoors children benefit from having a larger area to explore. Outside children also get a better sense of scale, and there are fantastic opportunities to build position and movement into problem-solving activities.



Up, over and under

Incorporate positional language into everyday activities. For example, when taking children across the school site use words like 'right', 'left', 'over' and 'around'. Or play 'Simon says': 'Simon says take two steps forward and stretch your hands up in the air'. Use familiar landmarks and ensure lower ability pupils are supported by other pupils or by staff placed at key points.



Right... or wrong?

Your school grounds offers lots of opportunities for exploring right angles. For example:

- how many right angles can the children spot when looking around the school grounds? Make sure they look up (window frames, brickwork etc) as well as down (paving slabs, drain covers etc). Lower ability children could use a large set square to check the angles. Higher ability children could look for other angles too – 180 degrees and 270 degrees.
- why do you find so many right angles in buildings? Try and create homemade structures using natural materials such as cardboard and straw to find out which angles are best at bearing weight.
- mark out an area of paving stones in your school grounds (if you don't have any, draw a grid on the school playground instead). Ask the children to work out how many right angles the marked area contains. Can they find a quick way of working this out? For example, how many right angles does each paving stone have and how many paving stones are there?



Five ways to be inspired

From hide and seek to hopscotch, children have always naturally explored position and movement in their school grounds. Here are some other fun ways of getting to grips with these important concepts.

1 Find the treasure

Dot various objects around the school grounds and give clues written on a 'treasure map' for reaching the objects. Children should work in pairs or small groups. If you position the objects in a circuit you can get the children to start at different points while using the same instructions. Use language that is appropriate to the age and ability of the children in the class. Examples might include, 'walk forward until you reach...', 'turn 90 degrees to the right' or 'walk six metres south west'. You can also use this opportunity to talk about standard and non-standard measures and why you would use metres instead of paces. Trundle wheels are often helpful here if you have completed a lesson on measuring.

2 Mirror mirror

Gather natural objects from around your school grounds and look at using rotation and symmetry to create natural artwork. Use the work of Andy Goldsworthy as inspiration (see 'Further resources'). Explain that the children can use rotations through 90 degrees or 45 degrees, or symmetry of one or multiple objects.

3 Giant battleships

Prior to the lesson, on a piece of paper with 10 x 10 square grid get each child to shade in the squares representing battleships or a boat. Each player needs the same number – for example, aircraft carrier, 5 squares; battleship, 4 squares; destroyer, 3 squares; submarine, 3 squares; patrol boat, 2 squares. Draw two large

10 x 10 square grids opposite each other on the playground in chalk – or adapt existing grids on your school playground. Children should work in teams of two, with one person calling out the coordinates and the other placing markers to show whether there is a 'hit' or 'miss' when the other team call out their coordinates. The team that destroys all of the opposition's boats is the winner.

4 The world around me

Talk through the basics of compass directions with the children and demonstrate how to use one. Put the children into groups and get each group to walk to a point within the school grounds and chalk the correct compass directions – north, south, east and west – on the ground. From there they have to note down what they see in each direction. For example, 'When I look north I can see the big oak tree'. As an extension the children could then look at the notes made by others and guess where the group was standing. You could make the activity more difficult by adding in another four compass directions (NE, SE, SW, NW) or asking the children to estimate or measure the distance between where they are standing and what they can see.

5 Follow the leader

Divide the children into an even number of small groups. Each group walks through the grounds and writes instructions on how to reach a given point (without saying what that point is). Two groups then swap their instructions and follow the new instructions. When they finish they have to write down where they think the end point was supposed to be. This can also be adapted to support whichever topic you are working on – for example, a bear-hunt activity with one group acting as the bear and writing instructions on how to reach the picnic.

FAQ How can we develop our grounds to support exploring position and movement?

Try these simple and cost effective ideas:

- when adding to or refreshing the markings on your school playground, include a large grid and compass directions
- use signs – laminated labels or carved posts – to reinforce positional language. For example, where children can move around the site in different ways – using large logs, boulders, tunnels and steps – position signs that suggest children go over, through, round or under. You could also label
- areas in the grounds that show right angles and 45 degree angles.
- have loose-play directional arrows available that children can place to mark routes around the grounds
- create a sundial in the grounds to teach children about compass positions, or a weather vane showing which direction the wind is moving in (see 'Further resources')
- leave an area of grass to grow and then mow a maze into it.





Top tip
Teach the points of a compass with a mnemonic. For example: 'naughty elephants squirt water' or 'never eat shredded wheat'



Subject links

Almost every subject can incorporate explorations into position and movement. For example:

- **Science** Develop an understanding of compass points by exploring shadows. Draw round the shadow of a chosen object outdoors at different times of the day and see how it changes (see 'Further resources').
- **Design and technology** Make your own compass. For example, you can magnetise a large needle by stroking it repeatedly with a magnetic bar. Then fill a bowl half full with water and float a milk carton top in the water. Lay the needle centred on top of the this. Watch the needle spin slowly and then stop. The needle tip will be pointing north.
- **English** Incorporate positional language into a diary describing the travels of mini-beasts through your school grounds. Get the children to sit and watch an ant or butterfly and then write about its journey.
- **History** Recreate Roman or Greek military formations and use commands relating to position: 'Turn 90 degrees left' or 'March forward 12 paces'.
- **ICT** Use GPS positioning equipment to follow directions and reach points within the school grounds.
- **Geography** Draw maps of the school grounds – or parts of the grounds – and add the compass points. Draw a map on a scaled grid, too.
- **PE** Warm up activities can involve the use of lots of positional language. For example, place various pieces of equipment/objects out on the playground and ask the children to go round, over, under, through, to the left, to the right etc.

Get topical!

Whatever your topic this term, exploring position and movement can enhance knowledge and understanding.

Mini-beasts Supporting biodiversity in school grounds adds lots of opportunities for positional language. Explore your grounds looking for mini-beasts, and then use positional language – 'in' trees, 'under' leaves, 'at the bottom of' plants, 'in-between' branches, etc – to capture important information about habitats. Talk about why different creatures have different habitats. Why, for example, do spiders live in-between plants on a web? Why do birds stay up high in the trees? The children can then use their findings to encourage more wildlife into the school grounds with bug hotels, bird boxes, hedgehog houses, solitary bee houses and new plants.

Traditional fairytales As a cross-curricular problem-solving exercise, place various objects at one end of the school site and explain that the three little pigs in their haste to escape from the big bad wolf forgot to take the materials they needed to build their house. It is the children's job to work out how they are going to transport each of the items safely to the building site. Children should walk the route they will be taking and write the

instructions of how to get there. They must include details like walk 'through' and 'over' or 'under'. Get them to consider the size and weight of the objects and whether narrow alleys are the best routes to take for larger items. Selecting appropriate tools is obviously an important part of this topic too – is it possible, for example, for wheelbarrows to go up or down steps?

The Greeks While studying Greek myths and legends read the children the story of the Minotaur – the mythical monster with the head of a bull and the body of a man who lived in the centre of the Cretan Labyrinth. Draw a large grid in chalk on the playground (or use a grid already there) and place small positional tasks along a set route. Tell the children that they have to follow the directions given to complete the tasks along the route and beat the Minotaur. If they complete all of the tasks successfully then they will have beaten the Minotaur and can leave. If they don't follow the correct route they might miss a task and will be lost in the labyrinth forever! This task is best completed in small groups one at a time and with a helper placed in the centre of the maze as the Minotaur.



‘Some of the clues use simple language like “turn left...”; others involve using a compass’



Exploring maths through role play

Each year, **Holy Trinity School** in Guildford use their grounds to deliver an inspiring lesson designed to reinforce positional language and introduce their topic – ‘explorers’ – for the coming weeks. On the first day of term the Year 4 assembly is thrown into chaos when a man dressed as an explorer bursts into the hall holding a map. After a brief explanation the children learn that the man is indeed an explorer, that he has found an ancient text, and to stop anyone from uncovering its secrets before he can make sense of them, he has hidden his learning around the local area. Unfortunately for him, he isn’t a great explorer, is hopeless at following directions and needs the children’s help. Both classes in the year group are given an area to explore and information to find the first clue. One class searches the local area with parent helpers and the other focuses on the school grounds.

A series of directions lead them to their first location. When they arrive, the children are presented with a code (eg $d = a$, $y = f$, $a = s$) to help them decipher the text when they find it, and a

directional clue to get to the next area. Some of the clues use simple language like ‘turn left at Mr Rowe’s office’ or ‘climb over the fallen tree’; others involve using a compass and getting the children to ‘walk north’. Elements of measuring – non-standard measuring (paces) and standard measuring (using trundle wheels) – are also part of the challenge. When all clues are found the children join together to set about deciphering the text. The text talks about the discovery of an unknown land and hints at the nature of the coming term’s topic on explorers.

The session is always a huge success. Children of all abilities can participate as the teachers are able to easily differentiate the work by altering clues and carefully selecting groups.

Following on, the children use their creative writing skills to explain how it felt to be an explorer discovering a new land. As one of the teachers comments: ‘The children really get into the activity and immerse themselves in the temporary world we have created for them. They also enjoyed the element of competition – being the first to solve the clues.’

Further resources

- *Making a sundial, Exploring micro-climates (this includes how to make a weather vane), Creating a home for mini-beasts, Creating and using a labyrinth.* All available to download for free from our website www.ltl.org.uk.
- *Mathematics in the School Grounds* by Zoe Rhydderch-Evans (for Learning through Landscapes). Available from Southgate Publishers. Visit www.southgatepublishers.co.uk or call 01363 776888.
- www.goldsworthy.cc.gla.ac.uk



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