

Mathematics in the New Zealand Curriculum Second Tier

Strand: Geometry

Thread: Position and Orientation

Level: One

Achievement Objective:

- Give and follow instructions for movement that involve distances, directions, and half /quarter turns;
- Describe their position relative to a person or object.

Exemplars of student performance:

Exemplar One: The student is standing on the netball court and is completing the following set of instructions. In order to help the student determine which letter of the alphabet they have just made, they are drawing on the concrete with chalk or squirting behind them with a drink bottle as they move. The instructions are, “Take 12 steps forward followed by a $\frac{1}{2}$ turn. Take 6 steps forward and then do a $\frac{1}{4}$ turn to the left. Next take 6 steps forward followed by a $\frac{1}{4}$ turn to the left followed by 6 steps forward. Do a $\frac{1}{2}$ turn followed by 12 steps forward.” The student correctly states that they have made the letter H. The student then creates clues for a shape or letter for another student to complete. After a few examples the students should be encouraged to image what the shape or letter would from the given clues. Rather than actually following the clues to check their answer the students could share and justify their solution with another student.

Exemplar Two: The teacher asks the class to walk around the classroom. On the command of, “Stop!” they all stand still. The teacher describes a student’s position for the class to try and identify. “This person is in front of the teacher’s desk and behind Joe” The class responds “Anna”. “This person is the closest to the rubbish bin, under the light and in between Jude and Trevor” The class responds “Mike”.

The class moves around the room again. The teacher stops the class and takes a digital photo of the room. The photo is then downloaded onto the computer and copies of the photo are made or the teacher projects the photo onto the screen. The students have to compile statements about where they are in the photo so other students can guess who wrote each statement. The student describes their position in the classroom in terms of where they are relative to other objects. Vocabulary used in the statements include sideways, underneath, on top, away from, over.

This student shows level one achievement because they are able to follow and give instructions using the following terms: forward, $\frac{1}{4}$ turn, $\frac{1}{2}$ turn, left, right, nearest to, underneath. They are also able to accurately describe their position with reference to objects around them.

Important teaching ideas (working at):

Locational or positional language is a key aspect of the early location work. Students will arrive at school with varying levels of language knowledge relating to location. Time needs to be spent developing the language aspect of location. The location language includes describing objects in relation to others – the chair is *behind* the table, Marie is *in front of* the OHP. Movement language also needs to be emphasised – move *forward* one step; jump *backwards* three squares. Care needs to be taken when using positional language e.g. *close, closer, closest*. What is the difference between the three words? If I asked some students who was close to the bin, it would depend on their interpretation of the word. There may be many answers to the question whereas if the question had been who is the closest to the bin, then we would need some sort of measuring system to determine who was closest especially if there were two students close by!

At this stage we are looking at moving a certain distance in a given direction. The units used will often be steps, foot length or paces. It would be useful to develop some ideas of how we measure during this topic e.g the size of the steps taken, that there are no gaps or overlaps of the measuring unit etc. For more detail on the development of the measurement ideas see Measurement level 1.

The difficult concepts of quarter turn, half turn, turning left and right also need to be focused on. The students often need help to remember their left from their right. Initially a ribbon could be placed around the student's right wrist to help remind them which hand is their right hand. Links can be made between turns and the hands on a clock. The hands on a clock turn to the right for a $\frac{1}{4}$ turn. Later on the concept of an angle will be introduced as an amount of a rotation (turn). The idea of angles can be explored by students at an early age by focusing on turns with their body e.g. all face the white board now do a $\frac{1}{4}$ turn to the left, what are you facing now? etc. Exploration can take place of whether it matters which way you turn when you do a $\frac{1}{2}$ turn. The students can investigate which turn is the result of another turn. E.g. A half turn to the right followed by a $\frac{1}{4}$ turn to the right is the same as what turn?

Positional tasks initially involve the student interpreting where they are in terms of objects. The next step for this activity is to get the students to interpret someone else's perspective. E.g I am in front of the rubbish bin and between Vince and Deb. Who am I? This type of task leads towards level 2 where the student would be required to describe their position from many different angles including the ceiling. E.g. Draw what you would see if you were a fly on the ceiling.

Games / PE activities such as Blind Man's Bluff and Pin the tail on the donkey are often used to reinforce concepts as they provide an opportunity for students to follow instructions for movement and location.

Other situations can be created to allow students to use the appropriate vocabulary e.g. 1. In pairs, students sit back to back. One of the students creates a model with either blocks or shapes and then describes their model to their partner who then tries to recreate it. 2. One person from a group describes their model (made from blocks or shapes) and the group try to re create it. 3. In pairs, students sit back to back. One student draws a simple picture on a piece of paper (or is given one) and then describes it to their partner who has to draw it. Grids could be used to help younger students.

Useful Resources:

Give and follow instructions for movement that involve distances, directions, and half/quarter turns.

- Beginning School Mathematics, Ministry of Education, Cycles 1-4, 6-12, Module 2.
- Digistore TKI, Direct a Robot.
- <http://www.nzmaths.co.nz/geometry/Position/AmazingMazes.aspx>
- <http://www.nzmaths.co.nz/geometry/Position/ScatterCat.aspx>
- <http://www.nzmaths.co.nz/geometry/Position/DirectingMe.aspx>

Describe their position relative to a person or object.

- Beginning School Mathematics, Ministry of Education, Cycles 2 and 4, module 2.
- <http://www.nzmaths.co.nz/geometry/Position/ScatterCat.aspx>
- Level A, B, C and D, Position, <http://www.rainforestmaths.com/>