ILLUSTRATING THE MATHEMATICS STANDARDS

The following examples of student work illustrate achievement at the mathematics standards for years 1–3 and 5–6.

Moving Around

The task used in this illustration was part of a geometry unit focusing on position and orientation. It was adapted from a task in the *Kiwisport Orienteering Manual* called Desktop Map Game (p. 28).

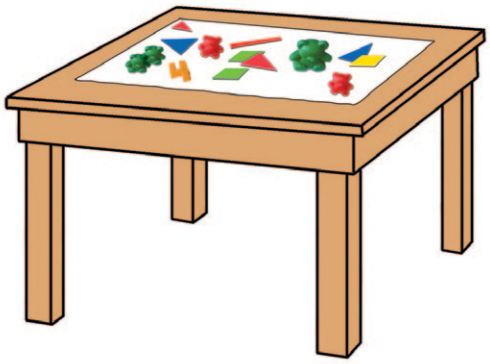
The task relates to achievement objectives for Number and for Geometry and Measurement from the mathematics and statistics learning area in *The New Zealand Curriculum*.

Moving Around

On a sheet of A3 paper, arrange small bears and other objects (for example, ice block sticks, attribute blocks, small model vehicles) to create a model of a scene.

1. *Describe your model and where objects are on it.*
2. *Years 1–3: Hide a piece of treasure (such as a counter) under an object on your model and give instructions for moving to it.*
   Years 4–6: Give directions for moving an object from one point to another on the model.

(Note: Students working within curriculum level 3 should use grid paper with compass points on it instead of a blank sheet of paper.)



Some features of students' work used to make judgments in relation to the mathematics standards are described below.

Moving Around

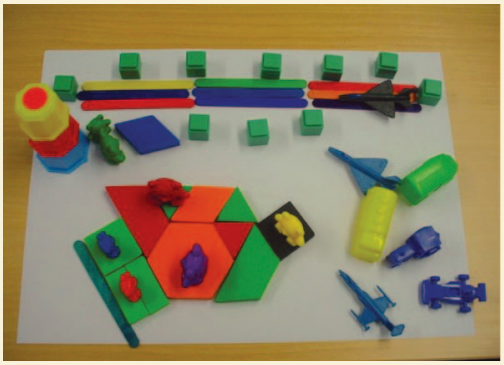
New Zealand Curriculum: Level 1	*Mathematics Standard: After one year at school*
In solving problems and modelling situations, students will:	
Number and Algebra • *use a range of counting ... strategies with whole numbers ... (number strategies)*	*Number and Algebra* • *apply counting-all strategies*
Geometry and Measurement • *give and follow instructions for movement that involve ... directions ...* • *describe their position relative to a person or object (position and orientation)*	*Geometry and Measurement* • *describe personal locations and give directions, using everyday language*

Kalepo described his model, using everyday language.

There is a big tower **near** the paddock. The black plane is **at the end of** the runway. There is a paddock **next to** the airport. The yellow truck is **between** two planes. The red light is **on top of** the tower.

Kalepo pointed to each teddy as he counted them.

There are **1, 2, 3, 4, 5** teddies in the paddock and **6, 7** for the two teddies by the tower. That's **7** teddies.



Kalepo described where teddies were located in relation to other objects on the model.

The purple teddy is in the **middle** of the paddock. There are 4 other teddies **in** the paddock. Two green teddies are **between** the tower and the blue block.

Kalepo gave simple directions for locating a piece of hidden treasure.

Walk the yellow teddy round the back of the paddock. Go up to the tall tower and along to the blue diamond shape. Look under it.

Discussion

This task provides some of the evidence needed to show that Kalepo is achieving at early curriculum level 1 and the year 1 standard in Geometry and in Number. He has demonstrated that he is able to describe personal locations and to give directions using everyday language. He can also apply a counting-all strategy, which suggests that he is working at the Counting from One on Materials stage of the Number Framework.

Moving Around

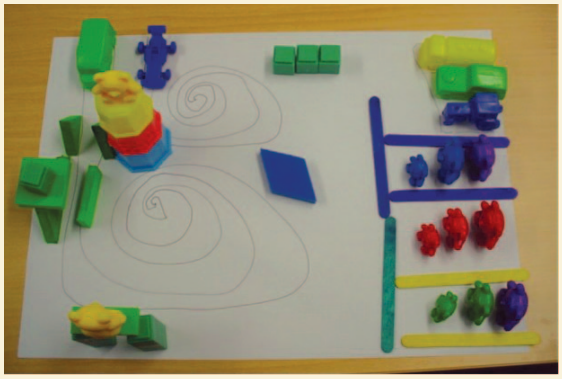
New Zealand Curriculum: Level 1	*Mathematics Standard: After two years at school*
In solving problems and modelling situations, students will:	
Number and Algebra • *use a range of counting ... strategies with whole numbers ... (number strategies)*	*Number and Algebra* • *apply ... skip-counting ... strategies to combine ... whole numbers*
Geometry and Measurement • *give and follow instructions for movement that involve distances, directions, and half- or quarter-turns* • *describe their position relative to a person or object (position and orientation)* • *order and compare objects ... by length ... (measurement)*	*Geometry and Measurement* • *describe personal locations and give directions, using steps and half- or quarter-turns* • *compare the lengths ... of objects ... using self-chosen units of measurement*

Lien described her model.

In the teddy bear farm, there are three paddocks with three bears in each. The small bear is at one end and the big bear is at the other end. The green truck and the blue racing car are beside each other at the starting line. The tall tower with a yellow teddy on it is in the middle of the racing track.

Lien used a skip-counting strategy to count the bears.

There are nine teddies altogether in the paddocks – I went 3, 6, 9. The big bears are 2 little bears high.



Lien compared the heights of the bears by using a little bear as a self-chosen unit of measurement.

Take the small green teddy for a walk to find the treasure. Jump over the green fence and walk forwards about 4 teddy steps. Turn right and walk about 8 teddy steps to the bottom of the blue diamond. Turn a quarter-turn left. Walk another 10 teddy steps, straight ahead, to the green tower. Look up for the treasure.

Lien gave simple directions for locating a piece of hidden treasure, using mathematical language. She used teddy steps as a self-chosen unit of measurement to indicate distances.

Discussion

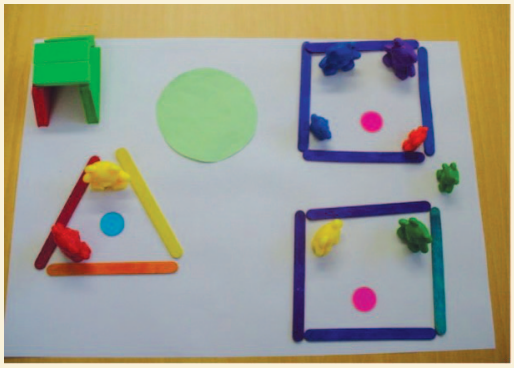
This task provides some of the evidence needed to show that Lien is achieving at curriculum level 1 and the year 2 standard in Geometry and Measurement and in Number. She has demonstrated that she is able to describe personal locations and give directions, using quarter-turns and steps, and to use self-chosen units of measurement. She can also apply a skip-counting strategy to combine numbers, which suggests that she is working at the Advanced Counting stage of the Number Framework.

Moving Around

New Zealand Curriculum: Level 2	***Mathematics Standard: After three years at school***
In solving problems and modelling situations, students will:	
Geometry and Measurement • *create and use simple maps to show position and direction* • *describe different views and pathways from locations on a map (position and orientation)* • *create and use appropriate units ... to measure length [and] ... turn ... (measurement)*	*Geometry and Measurement* • *describe personal locations and give directions, using whole-number measures and half- or quarter-turns* • *measure ... lengths ... of objects ..., using linear whole-number scales ...*

Hemi used mathematical language and whole-number measures (centimetres) to describe his model.

On the **right** of the shed about 5 **centimetres** away is a small pond. There are two **square** paddocks near each other on the farm. The sides are about 10 **centimetres** long. Below the shed is a **triangle** paddock with two bears in it.



Hemi gave directions for locating a piece of hidden treasure, indicating left, right, and quarter-turns and using whole number measures (centimetres).

Take the small blue teddy out of the top paddock. Start in front of the shed. Walk the teddy about 10 centimetres forward to the bottom left corner of the triangle paddock. Turn a quarter-turn left. Walk the teddy about 10 centimetres to just past the end of the paddock. Turn left and walk the teddy up to the pond. Go around the pond to the right, then walk the teddy along to the top left corner of the paddock. Jump him over the fence so that he can look under the closest big blue bear for the treasure.

Discussion

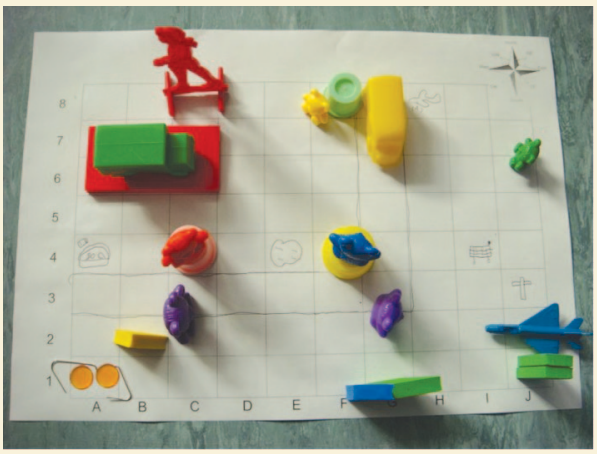
This task provides some of the evidence needed to show that Hemi is achieving at early curriculum level 2 and the year 3 standard in Geometry and Measurement. He has demonstrated that he can describe locations and give directions, using whole-number measures and quarter-turns.

Moving Around

New Zealand Curriculum: Level 3	*Mathematics Standard: By the end of year 5*
In solving problems and modelling situations, students will:	
Geometry and Measurement • *use a co-ordinate system or the language of direction and distance to specify locations and describe paths (position and orientation)*	*Geometry and Measurement* • *describe locations and give directions, using grid references and points of the compass*

Rakai made his model on grid paper and described the location of items on it, using compass points and grid references.

There's a plane at J2 next to the military base at J1. The plane faces west. I can see the side of the girl at C8 and the front side, the face, of the blue bear at F4. There are two vehicles sitting on the model at different points. The truck faces east and its back end is at A6 and A7. North of the purple bear, there is a yellow bus facing south at G7 and G8.



Rakai gave directions for moving an object from one point to another, using compass and grid references.

Drive the yellow bus south to G5. Turn west. Drive 2 spaces to E5 and turn south. Drive 3 spaces to E2. Turn west and pick up the purple bear at C2.

Discussion

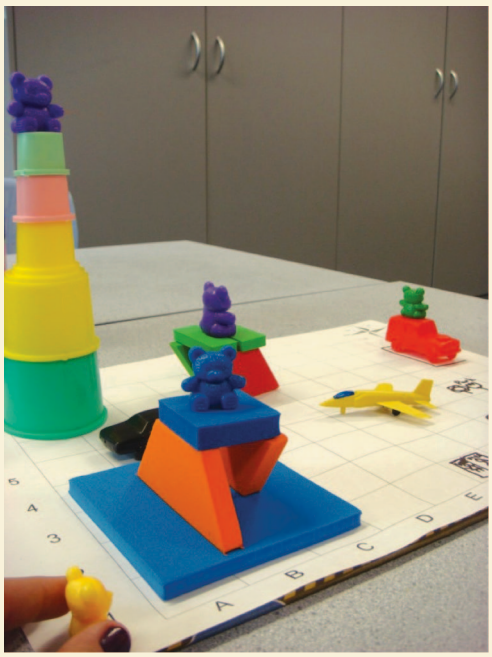
This task provides some of the evidence needed to show that Rakai is achieving at early curriculum level 3 and the year 5 standard in Geometry. He has demonstrated that he is able to describe locations and give directions, using grid references and points of the compass.

Moving Around

New Zealand Curriculum: Level 3	*Mathematics Standard: By the end of year 6*
In solving problems and modelling situations, students will:	
Geometry and Measurement • *use a co-ordinate system or the language of direction and distance to specify locations and describe paths (position and orientation)*	*Geometry and Measurement* • *describe locations and give directions, using grid references, turns, and points of the compass*

Lusi made her model on grid paper and described the locations of items on it from her viewpoint (behind the model), using turns, compass points, and grid references.

I can see the back of the purple bear sitting on top of a tall tower at around A8. If he did a 180 degree turn, I would see his face! At E7, I see the side view of the purple bear sitting on top of a red and green tunnel. If he did a 90 degree turn to the north, I'd see his face too. At J7, I can see the back of a red car. A green bear sits on top of the car, facing east.



Lusi gave directions for a path across her model, using turns, compass points, and grid references.

Move the yellow bear onto the platform at A1. Walk him north to the bottom of A6. Turn him 90 degrees to the east. Continue to walk him east, past a black car. This will be on his right side. Stop him at F6. Turn him 90 degrees to the south. He is now ready to board his jet.

Discussion

This task provides some of the evidence needed to show that Lusi is achieving at curriculum level 3 and the year 6 standard in Geometry. She has demonstrated that she is able to describe locations and give directions using grid references, turns, and points of the compass.