

## Slicing and cutting problems

### Purpose:

The purpose of this activity is to help your child to make common solid (three-dimensional) shapes and make paper/cardboard patterns for these, and to correctly identify prisms.

### Link to NZ Curriculum:

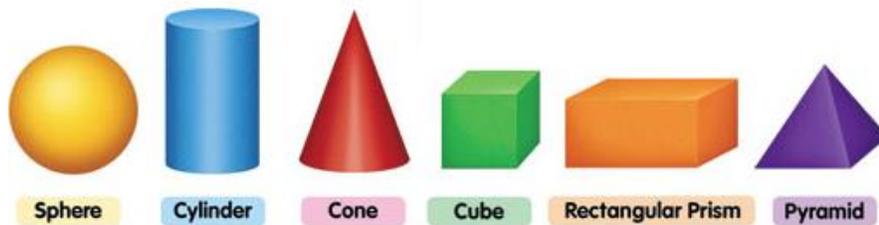
Your child is learning to make paper or cardboard patterns (nets) for common three-dimensional shapes, and to identify prisms by their features.

### What you need:

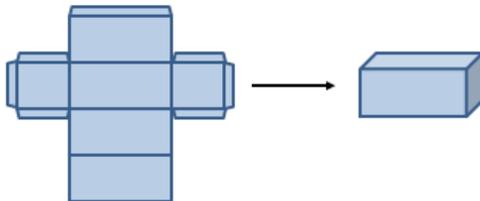
Play dough  
A plastic knife, or 'safe' kitchen knife  
Spare paper or cardboard  
Pencil, ruler and eraser  
Scissors  
Cellotape or glue

### What to do:

- Have your child use the dough to make and name a cube, a cylinder, a sphere, a cuboid (long cube or rectangular prism), a square based pyramid, a cone and a triangular prism.



- Have your child talk to you about the distinguishing features of each shape, for example "The square based pyramid has 5 vertices (corners where 3 edges meet), 8 edges (where 2 'sides' or faces meet), and 5 faces of which one is a square and 4 are triangles."
- Have your child choose some of the shapes with straight edges, and using paper or card, make and cut a pattern for this shape. They should include tabs on their pattern so the shape can be folded and glued to make a three dimensional model. For example:



Have your child put their play dough shapes in the fridge while they cut out and glue/tape their paper/cardboard shapes together. Chilling the dough shapes will make them firmer and this will make the next task more successful.

- Now say, "I want you to slice at least twice through each play dough shape. But before you do, I want you to predict which shapes will have slices that are all the same size and shape, and which ones will have slices that are different sizes or shapes."

- Have them make their prediction and then have them slice through their play dough shapes to see if their predictions are correct.

NB. When a prism is sliced through, its slices are the same size shape, like this:



If you slice through a shape that is not a prism, eg, a pyramid, the slices will change shape and size.

So, a prism is a solid object that has two identical ends and all flat sides. The cross section is the same all along its length.

- Talk together about what has happened and together agree which shapes are prisms.

#### What to expect your child to do:

- Make and name common solid three-dimensional shapes.
- Make paper or cardboard patterns (nets) for common three-dimensional shapes.
- Identify features of prisms.

#### He Kupu Māori:

play dough	poikere
shape	āhua
round	porotaka
straight	torotika
sharp, pointy	koi, whakakoikoi
curvy, bendy	kōpiko
flat	papatahi
cone	koeko
cube	mataono rite
corner, vertice	kokonga
edge	tapa
surface/face	mata
cone	koeko
cylinder	rango
sphere	poi
rectangular prism	poro tapawhā hāngai
pyramid	koeko tapawhā rite
triangular prism	poro tapatoru
net (of a 3 dimensional shape)	raumata

### He Whakawhitinga Kōrero:

- Hangaia tētahi mataono rite ki te poikere. *(Make a cube from the play dough.)*
- He aha ngā ingoa pāngarau mō ēnei āhua? *(What are the maths names for these shapes?)*
- Whakamāramatia mai te āhua o te koeko tapawhā rite. *(Explain to me the shape of the cone.)*
- He tapawhā rite te pūtake o tēnei āhua. E whā atu anō ngā mata, he tapatoru te āhua. Ka tūtaki ēnei mata ki te tihī o te koeko. *(The base of this shape is a square. There are four other faces which are triangular. They meet at the point or apex of the pyramid.)*
- E hia ngā kokonga o te ...? *(How many corners has the ... got?)*
- He torotika, he kōpiko rānei ngā tapa? *(Are the edges straight or curved?)*
- He ōrite te āhua me te rahi o ngā mata katoa. *(The shape and size of all the faces are the same.)*
- E rua ngā mata porowhita. *(There are two circular faces.)*
- Ka whakamahi tāua i te kāri mārō hei hanga i tētahi poro tapawhā hāngai. He papatahi te kāri, engari ka whētuaia hei hanga i te poro. He rite ki te pouaka. Ka kīia tēnei he raumata. Koia nei te raumata hei hanga poro tapawhā hāngai. *(Together we're going to use some cardboard to make a rectangular prism. The cardboard is flat but we can fold it to make the prism. It'll be like a box. This is called a net. This is a net for making a rectangular prism.)*
- Me pēhea te hanga raumata hei mahi i tētahi poro tapatoru? *(How can we make a net to build a triangular prism?)*
- E rua ngā pito o te poro tapatoru, he tapatoru te āhua. He tapawhā hāngai ngā mata e toru e hono ana i ēnei pito. *(There are two ends of the triangular prism which are triangular shaped. The three faces which join these ends are a rectangular shape.)*
- Mēnā ka tapahia te [poro tapatoru] ki konei, ka pēhea te āhua o te mata tapahi ka hua mai? *(If we cut the triangular prism here, what will be the shape of the sliced surface?)*
- Mēnā ka tapahia ki konei, ka ōrite anō te āhua o te mata tapahi, ka rerekē rānei? *(If it is sliced here, will the sliced surface be the same or different?)*