**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 chose 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 tihi 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 whētuia 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 carboard 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?)*