Prisms and Pyramids - Properties, Cross-sections.

Table of Contents

Differentiate and Assess

Not every student will be ready to investigate this concept at this Level and so we will need to differentiate to ensure every student is learning at their leading edge. Select the Differentiate button on this screen.

Integrate

Every mathematical concept is integrally related to other mathematical concepts. Teaching and learning related concepts simultaneously develops deep relational understanding. Select the Integrate button on this screen.

Intervene

Some students may not yet be ready to investigate this concept at any Level, and so we will need to provide some intervention. Select the Intervention button on this screen.

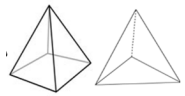
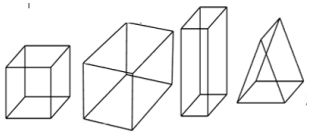
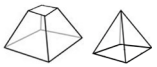
PRISMS AND PYRAMIDS - PROPERTIES, CROSS-SECTIONS.

EXPLICIT TEACHING PLAN OVERVIEW PAGE

THIS PAGE IS A SUMMARY OF THE EXPLICIT TEACHING PLAN, INCLUDING STRATEGIC QUESTIONS, AND DESRIBING THE SEQUENCE WHICH WILL OCCUR OVER MULTIPLE LESSONS.

RESOURCES: PRISMS, PYRAMIDS, MODELLING CLAY (PLASTICINE IS GREAT!), PLASTIC KNIFE OR FISHING LINE, PENCIL, PAPER

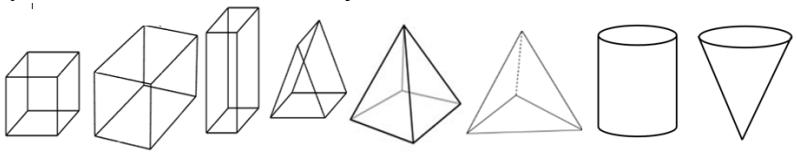
WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

Children:
• identify properties of prisms and pyramids, for example,
  ◦ pyramids have 1 base, and the faces that are not the base are triangles 
  ◦ prisms have 2 bases, and the faces that are not the bases are quadrilaterals 
  ◦ prisms and pyramids are named by the shape of their base
  ◦ cut sections from prisms, for example, 
  ◦ cut cross-sections from prisms, for example, 
  ◦ cut sections from pyramids, for example, 
  ◦ cut cross-sections from pyramids, for example, 
  ◦ describe cross-sections as being parallel to the base and having the same shape as the base.
  ◦ describe cross-sections on prisms as uniform – same shape and size as the base.
  ◦ describe cross-sections on pyramids as non-uniform – same shape but different size as the base.
	Children
	• ask one another questions about properties and cross-section of prisms and pyramids, for example:
	  ▸ What is a prism?
	  ▸ What is a pyramid?
	  ▸ How many bases does a pyramid have?
	  ▸ How many bases does a prism have?
	  ▸ What shape are the faces that are not the base on pyramids?
	  ▸ What shape are the faces that are not the bases on prisms?
	  ▸ How are prisms and pyramids named?
	
	  ▸ What is a section?
	  ▸ What is a cross-section?
	  ▸ How could we cut a section from a prism?
	  ▸ How could we cut a cross-section from a prism?
	  ▸ How could we cut a section from a pyramid?
	  ▸ How could we cut a cross-section from a pyramid?
	
	  ▸ Are cross-sections on prisms uniform?
	  ▸ What does a uniform cross-section mean?
	  ▸ Are cross-sections on pyramids non-uniform?

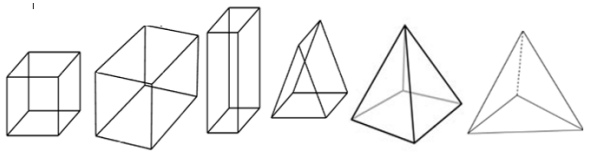
PRISMS AND PYRAMIDS - PROPERTIES, CROSS-SECTIONS.

EXPLICIT TEACHING PLAN

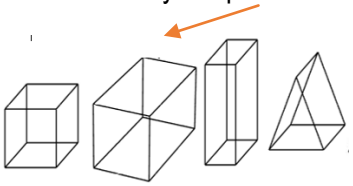
FULL EXPLICIT TEACHING PLAN, EMBEDDING DEEP RELATIONAL UNDERSTANDING, METALANGUAGE, AND QUESTIONS THAT MAY BE USED OVER MULTIPLE LESSONS.

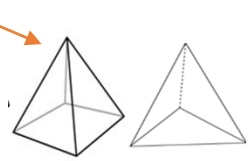
WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?
Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.	► Today brings an investigation about cross-sections in three-dimensional objects. ► What do you know about cross-sections in three-dimensional objects? ► Talk about cross-sections in three-dimensional objects with a friend. ► Is anyone ready to share what they are thinking about cross-sections in three-dimensional objects?
Demonstrate the 3 dimensions - up and down, left to right, and front to back.	► We've investigated three-dimensional objects. ► And we found that three-dimensional objects have 3 dimensions. ► We found that the 3 dimensions are up and down, left to right, and front to back.
Display some three-dimensional objects with flat and curved surfaces, for example,  Children identify curved and flat surfaces. Children identify flat surfaces and faces.	► And we found that three-dimensional objects can have flat or curved surfaces. ► We found that a flat surface might be a face, but a curved surface is just a curved surface. ► We found that if a flat surface has curved lines, the curved lines are just curved lines, and the flat surface is just a flat surface. ► We found that if a flat surface has straight lines, the straight lines are called edges and the flat surface is a face. ► We found that three-dimensional objects with faces are prisms or pyramids.

Display some prisms and pyramids, for example, cubes, square prisms, rectangular prisms, triangular prisms, square pyramids and triangular pyramids



Children identify the prisms and pyramids, for example,





Distribute some modelling clay (plasticine is great because it keeps its shape and doesn't go hard. If you have children put some baking paper on their table, it won't get waxy.)

Children construct a prism, for example, a rectangular prism,

- Today we're going to investigate the properties of prisms and pyramids.

- Which of these three-dimensional objects are prisms?
- Which of these three-dimensional objects are pyramids?
- How many bases on a prism?
- Are there 2 bases on a prism?
- How many bases on a pyramid?
- Is there 1 base on a pyramid?

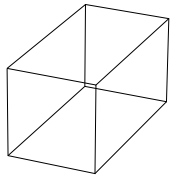
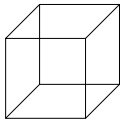
- **Let's investigate properties of prisms first.**
- Could we construct some prisms out of modelling clay?

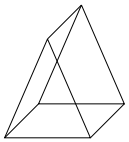
- Let's construct a rectangular prism.

- How many faces does a rectangular prism have?
- Does a rectangular prism have 6 faces?

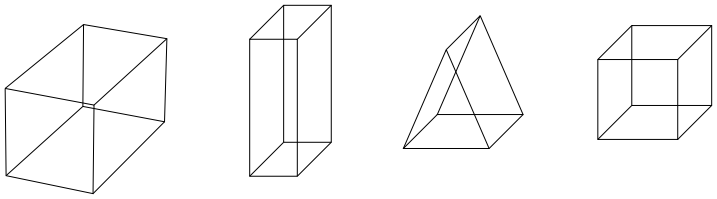
- How many bases does a rectangular prism have?
- Does a rectangular prism have 2 bases?

- What shape are the bases?
- Are the bases, rectangles?
- Is that why it is called a rectangular prism?

Children construct another prism, for example, a square prism, 	► Let's look at the bases. ► Are the bases parallel? ► Let's construct a square prism. ► How many faces does a square prism have? ► Does a square prism have 6 faces? ► How many bases does a square prism have? ► Does a square prism have 2 bases? ► What shape are the bases? ► Are the bases, square? ► Is that why it is called a square prism? ► Let's look at the bases. ► Are the bases parallel?
Children constructanother prism, for example, a cube, 	► Let's construct a cube. ► How many faces does a cube have? ► Does a cube have 6 faces?

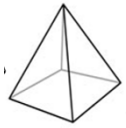
	► How many bases does a cube have? ► Does a cube have 2 bases? ► What shape are the bases? ► Are the bases, square? ► Are all of the faces square? ► Is a cube a regular prism? ► Let's look at the bases. ► Are the bases parallel?
Children construct another prism, for example, a triangular prism, 	► Let's construct a triangular prism. ► How many faces does a triangular prism have? ► Does a triangular prism have 5 faces? ► How many bases does a triangular prism have? ► Does a triangular prism have 2 bases? ► What shape are the bases? ► Are the bases, triangular? ► Is that why it is called a triangular prism?

Place all four prisms in a group, for example,



Children identify the prisms and pyramids, for example,

Children construct a pyramid, for example, a square pyramid,



- Let's look at the bases.
- Are the bases parallel?

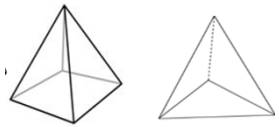
- How could we describe the properties of all prisms?
- Do all prisms have 2 bases?
- Are the faces that aren't bases, quadrilaterals?
- Are prisms named by the shape of their bases?
- Are the bases parallel?
- Have we identified the properties of prisms?

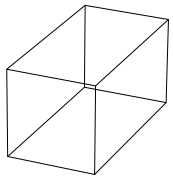
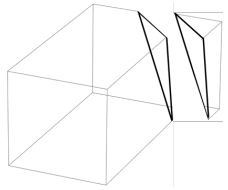
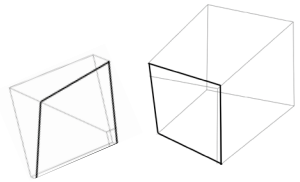
- **Let's investigate properties of pyramids now.**
- Could we construct some pyramids out of modelling clay?

- Let's construct a square pyramid.

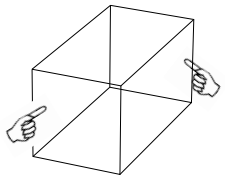
- How many faces does a square pyramid have?
- Does a square pyramid have 5 faces?

- How many bases does a square pyramid have?
- Does a square pyramid have 1 base?

	► What shape is the base? ► Is the base, square? ► Is that why it is called a square pyramid?
Children construct another pyramid, for example, a triangular pyramid, 	► Let's construct a triangular pyramid.
	► How many faces does a triangular pyramid have? ► Does a triangular pyramid have 4 faces?
	► How many bases does a triangular pyramid have? ► Does a triangular pyramid have 1 base?
	► What shape is the base? ► Is the base, triangular? ► Is that why it is called a triangular pyramid?
Place both pyramids in a group, for example, 	► How could we describe the properties of pyramids? ► Do all pyramids have 1 base? ► Are the faces that aren't the base, triangles? ► Are pyramids named by the shape of their base? ► Have we identified the properties of pyramids?

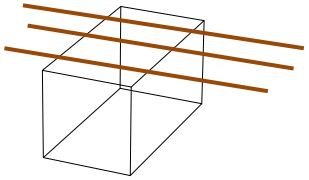
Children make a square prism made from modelling clay, for example, 	► **Today we're going to investigate sections and cross-sections of prisms.** ► If we cut a section through a prism, we make a straight cut through it. ► If we cut a cross-section through a prism, we make a straight cut parallel to the bases.
Cut a section from the square prism to create a triangular section, for example, 	► Let's cut a section through the square prism. ► Is this section parallel to the base? ► If this section is not parallel to the base, is it a cross-section, or just a section? ► Is it just a section? ► What shape is the section? ► Is the section a triangle? ► Let's record the shape of the section.
Cut a section from the square prism to create a quadrilateral section, for example, 	► Let's cut another section through this square prism. ► Is this section parallel to the base? ► If this section is not parallel to the base, is it a cross-section, or just a section? ► Is it just a section? ► What shape is the section? ► Is the section a quadrilateral?
Children compare the sections.	► Are these sections the same shape? ► Are these sections the same size? ► Do you think sections can be different shapes and sizes? ► Are these sections cut parallel to the bases?

Children identify the bases on their square prism, for example,



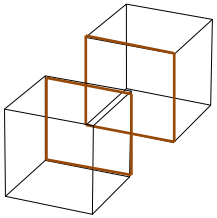
- What shape do you think the section will be if we cut it parallel to the bases? Let's investigate!
- Where are the bases on your square prism?

Children identify where they could slice their prism parallel to its bases, for example,



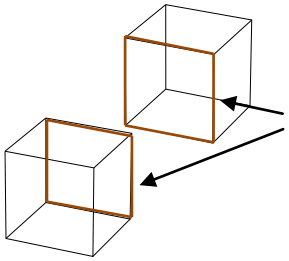
- Where could you slice your square prism parallel to its bases?

Make a straight slice through the square prism parallel to the bases to make a cross-section, for example,



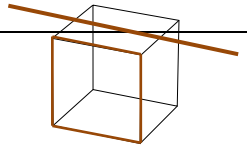
- I'm going to cut a section through the square prism parallel to the bases.
- How could we describe the shape of the section?
- Is the section a square?
- Is the section the same shape as the bases?
- Is the section the same size as the bases?
- Is the section the same shape and size as the bases because we cut the section parallel to its bases?
- A section cut parallel to the bases, is called a cross-section.
- Have we cut a cross-section?
- How could we record this?
- Is a cross-section the shape we get if we slice the prism parallel to its bases?
- Is the cross-section on this prism the same shape and the same size as the bases?

Record, for example,

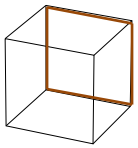


cross-section - square,
same shape as bases,
same size as bases

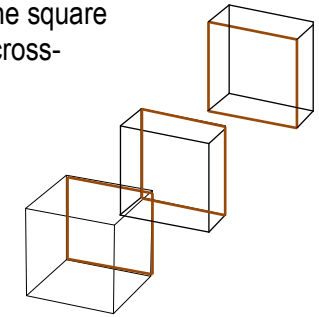
Children identify another place they could cut another section through the prism parallel to its



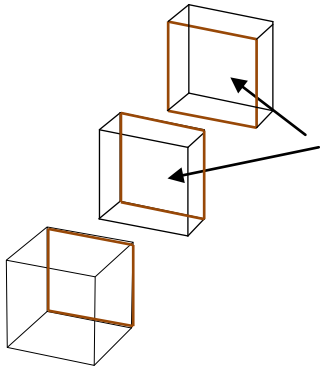
bases, for example,



Children cut another section through the square prism parallel to the bases to make a cross-section, for example,



Record, for example,



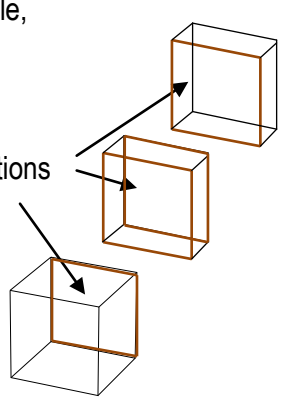
cross-section
square, same shape as bases, same size as bases

Children compare their cross-sections.

- Where else could we cut a section parallel to the square prism's bases?
- Let's cut another section through the square prism parallel to the bases to make another cross-section.
- How could we describe the shape of the section?
- Is the section a square?
- Is the section the same shape as the bases?
- Is the section the same size as the bases?
- Is the section the same shape and size as the bases because we cut the section parallel to its bases?
- What is a section cut parallel to the bases?
- Have we cut a cross-section?
- How could we record this?
- Is a cross-section the shape we get if we slice the prism parallel to its bases?
- Is the cross-section on this prism the same shape and the same size as the bases?

Record, for example, uniform

Record, for example,

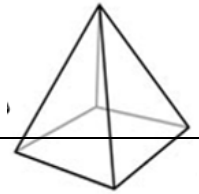


- Let's compare the cross-sections.
- Are the cross-sections the same shape?
- Are the cross-sections the same size?
- When cross-sections are exactly the same shape and size as the bases, we say they are uniform.
- Uniform means they look exactly the same.
- Do these cross-sections look exactly the same?
- Could we say these cross-sections are uniform?
- How could we record this?

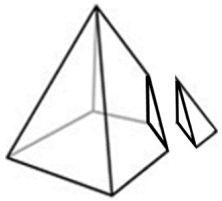
- So this square prism has uniform cross-sections.
- Why does this square prism have uniform cross-sections?
- If a cross section is a section cut parallel to the bases, will a cross-section on a square prism have the same shape and size as the base?

- Do you think all prisms would have uniform cross-sections?

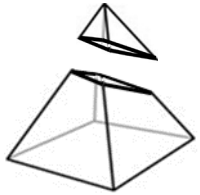
Children make a square pyramid made from modelling clay, for example,



Cut a section from the square pyramid to create a triangular section, for example,



Cut a section from the square pyramid to create a triangular section, for example,

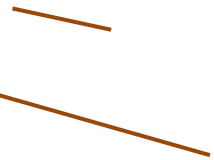


- **Let's investigate sections and cross-sections of pyramids.**
- If we cut a section through a pyramid, we make a straight cut through it.
- If we cut a cross-section through a pyramid, we make a straight cut parallel to the base.

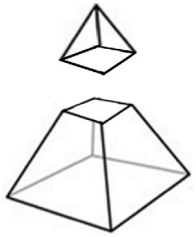
- Let's cut a section through the square pyramid.
- Is this section parallel to the base?
- If this section is not parallel to the base, is it a cross-section, or just a section?
- Is it just a section?
- What shape is the section?
- Is the section a triangle?

- Let's cut another section through this square pyramid.
- Is this section parallel to the base?
- If this section is not parallel to the base, is it a cross-section, or just a section?
- Is it just a section?
- What shape is the section?
- Is the section a quadrilateral?
- Are these sections the same shape?
- Are these sections the same size?
- Do you think sections can be different shapes and sizes?
- Are these sections cut parallel to the base?

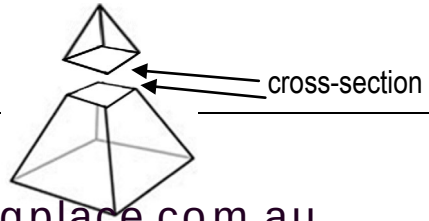
Children identify the base on their square pyramid and where they could slice their pyramid parallel to its base, for example,



Children make a straight slice through the square pyramid parallel to the base to make a cross-section, for example,



Children record, for example,

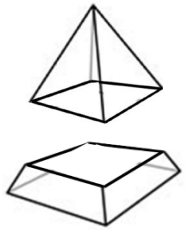


- What shape do you think the section will be if we cut it parallel to the base? Let's investigate!
- Where is the base on your square pyramid?
- Where could you slice your square pyramid parallel to its base?

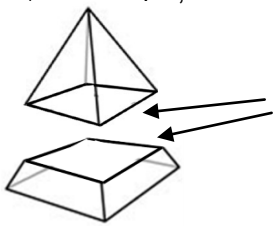
- I'm going to cut a section through the square pyramid parallel to the base.
- How could we describe the shape of the section?
- Is the section a square?
- Is the section the same shape as the base?
- Is the section the same shape because we cut the section parallel to its base?
- If a section cut parallel to the bases, it is called a cross-section.
- Have we cut a cross-section?
- Is a cross-section the shape we get if we slice the pyramid parallel to its base?
- Is the cross-section the same size as the base?
- Is the cross-section smaller than the base?
- Is the cross-section on this pyramid the same shape as the base but not the same size?
- How could we record this?

square, same shape as base, smaller than base

Children make another straight slice through the square pyramid parallel to the base to make a cross-section, for example,



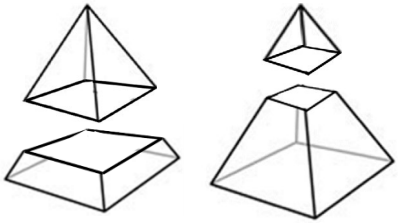
Children record, for example,



cross-section
square, same shape as base, smaller than base

Children compare their cross-sections.

- Where else could we cut a section parallel to the square pyramid's base?
- Let's cut another section through the square pyramid parallel to the base to make another cross-section.
- How could we describe the shape of the section?
- Is the section a square?
- Is the section the same shape as the base?
- Is the section the same shape because we cut the section parallel to its base?
- Is a section cut parallel to the base, called a cross-section.
- Have we cut a cross-section?
- Is a cross-section the shape we get if we slice the pyramid parallel to its base?
- Is the cross-section the same size as the base?
- Is the cross-section smaller than the base?
- Is the cross-section on this pyramid the same shape as the base but not the same size?
- How could we record this?

Record, for example, non-uniform Children record, for example, non-uniform cross-sections square, same shape as base, different sizes than base 	► Let's compare the cross-sections. ► Are the cross-sections the same shape? ► Are the cross-sections the same size? ► Are the cross-sections different sizes? ► When cross-sections are exactly the same shape as the base but different sizes, we say they are non-uniform. ► Non-uniform means they do not look exactly the same. ► Do these cross-sections look exactly the same? ► Could we say these cross-sections are non-uniform? ► How could we record this? ► So this square pyramid has non-uniform cross-sections. ► Why does this square pyramid have non-uniform cross-sections? ► If a cross section as a section cut parallel to the bases, will a cross-section on a square pyramid have the same shape as the base and but different size to the base? ► Do you think all pyramids would have non-uniform cross-sections?