

Prisms and Pyramids.

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Describe and draw features of prisms and pyramids - vertical, horizontal and parallel lines (faces and edges), angles (vertices)	page3
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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.

EXPLICIT TEACHING PLAN OVERVIEW PAGE

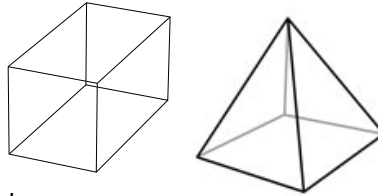
THIS PAGE IS A SUMMARY OF THE EXPLICIT TEACHING PLAN, INCLUDING STRATEGIC QUESTIONS, AND DESCRIBING THE SEQUENCE WHICH WILL OCCUR OVER MULTIPLE LESSONS.

RESOURCES: PRISMS, PYRAMIDS, MODELLING CLAY (PLASTICINE IS GREAT!), PACKAGING IN PRISMS AND PYRAMIDS, RULER, PENCIL, PAPER

WHAT COULD WE DO?

Children:

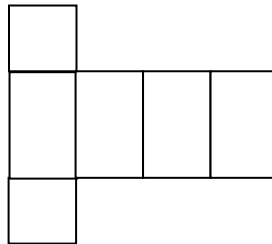
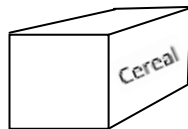
- identify the difference between prisms and pyramids, for example,
 - pyramid has 1 base
 - prism has 2 bases
 - faces that are not the base on a pyramid are triangles
 - faces that are not bases on a prism are quadrilaterals



- describes lines and angles on prisms and pyramids

- identify symmetry on prisms and pyramids, for example,

- deconstruct packaging to form nets of prisms and pyramids, for example,



WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

Children

- ask one another questions about features of prisms and pyramids, including angles, lines, symmetry and nets, for example:
 - ▶ What is a prism?
 - ▶ What is a pyramid?
 - ▶ How many bases on prisms?
 - ▶ How many bases on pyramids?
 - ▶ How could we describe parallel, horizontal, and vertical lines on a prism or pyramid?
 - ▶ How could we describe angles on a prism or pyramid?
 - ▶ How could we describe symmetry on a prism or pyramid?
 - ▶ How could we deconstruct packaging to form nets of prisms or pyramids?
 - ▶ How could we put the faces together to form the net again?

PRISMS AND PYRAMIDS.

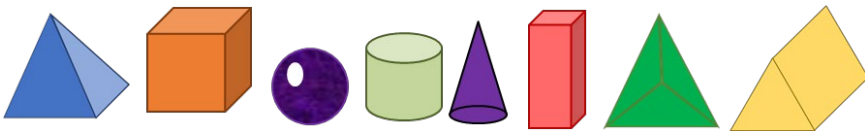
EXPLICIT TEACHING PLAN

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

WHAT COULD WE DO?

Children think about, talk and listen to a friend about, then have the opportunity to share what they already know, wonder, including relationships to other concepts.

Display some three-dimensional objects, with flat and curved surfaces, straight and curved lines, for example,



WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

- ▶ Today brings an investigation about three-dimensional objects.
- ▶ What do you know about three-dimensional objects? What do you wonder about three-dimensional objects?
What relationships can you see between three-dimensional objects and other maths concepts?
- ▶ Talk about three-dimensional objects with a friend.
- ▶ Is anyone ready to share what they are thinking about three-dimensional objects?

- ▶ 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.
- ▶ We've investigated the surfaces of three-dimensional objects.
- ▶ And we found that a surface can be flat or curved.
- ▶ We've investigated the lines on three-dimensional objects.
- ▶ And we found that the lines can be straight or curved.

- ▶ We investigated three-dimensional objects with flat and curved surfaces, and

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

Record, for example, a face is a flat surface with straight lines on a three-dimensional object

Record, for example, an edge is a straight line on a three-dimensional object.

Record, for example, a vertex is a point where 2 or more edges meet.

curved lines.

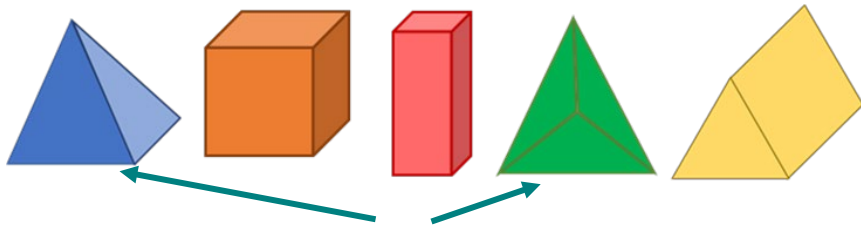
- ▶ And we found that the surfaces are just called flat or curved surfaces, and the lines are just called curved lines.
- ▶ We found that cones, cylinders and spheres have flat or curved surfaces and curved lines.
- ▶ We've investigated three-dimensional objects with flat surfaces and straight lines.
- ▶ And we found that the flat surfaces with straight lines are called faces.
- ▶ And we found that the straight lines are called edges.
- ▶ And we found that the point where edges meet are called vertices.
- ▶ We called these three-dimensional objects with faces and edges, prisms.

- ▶ Today we're going to investigate the other three-dimensional objects that have flat surfaces and straight lines.
- ▶ Do all of these objects have faces?
- ▶ What is a face?
- ▶ Is a face a flat surface with straight lines on a three-dimensional object?
- ▶ Do all of these objects have edges?
- ▶ What is an edge?
- ▶ Is an edge a straight line on a three-dimensional object?
- ▶ Do all of these objects have vertices?
- ▶ What is a vertex?
- ▶ Is a vertex a point where 2 or more edges meet?

- ▶ We've investigated prisms, and we found that a prism is a three-dimensional object with faces and edges.

Record for example, prisms

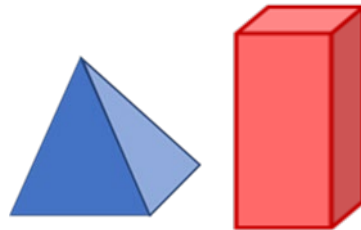
Display some prisms and pyramids, for example,



Allow children to identify the pyramids are different to the prism, for example,

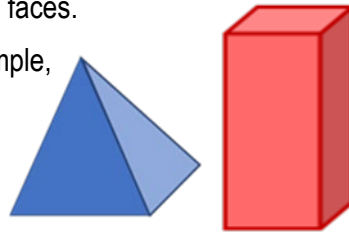
Record, for example, pyramids

Select 1 prism, and 1 pyramid, for example, a square prism and a square pyramid,



Record, for example, both prisms and pyramids have faces.

Stand the prism and pyramid on their bases, for example,



- ▶ Two of these three-dimensional objects are not prisms.
- ▶ Which of these three-dimensional objects are different?
- ▶ Are these 2 three-dimensional objects different to the prisms?
- ▶ Does anyone know what these three-dimensional objects are called?
- ▶ Are these three-dimensional objects called pyramids?

- ▶ How are pyramids different to prisms? Let's investigate!
- ▶ Let's select 1 prism, and 1 pyramid.
- ▶ Do both prisms and pyramids have flat surfaces and straight lines?

- ▶ Do both prisms and pyramids have faces?
- ▶ Let's stand the pyramid and prism on their bases.
- ▶ What shape is the base of the pyramid?
- ▶ Is the base of the pyramid, a square?
- ▶ Do you think the pyramid might be a square pyramid?
- ▶ What shape is the base of the prism?
- ▶ Is the base of the prism, a square?
- ▶ Do you think the prism might be a square prism?

- ▶ How many bases does the pyramid have?

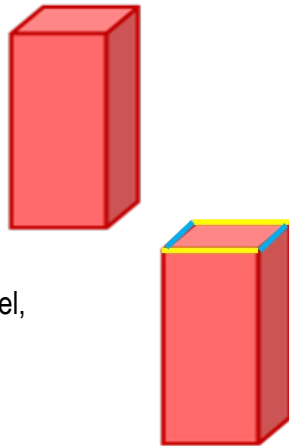
Record, for example, pyramids have 1 base

Record, for example, prisms have 2 bases

Record, faces that are not the base on a pyramid are triangles

Record, for example, faces that are not bases on a prism are quadrilaterals

Stand the square prism on a face that is its base,
for example,



Display the opposite lines on each base are parallel,
for example,

- ▶ Does the pyramid have 1 base?
- ▶ How many bases does the prism have?
- ▶ Does the prism have 2 bases?

- ▶ Let's look at the faces that are not the bases.

- ▶ What shape are the faces that are not the base on a pyramid?
- ▶ Are the faces that are not the base on a pyramid, triangles?

- ▶ What shape are the faces that are not bases on a prism?
- ▶ Are the faces that are not bases on a prism, quadrilaterals?

- ▶ Let's investigate the square prism.
- ▶ What shape are the bases?
- ▶ Are the bases, squares?

- ▶ Let's look at the edges on the actual square prism.
- ▶ Are the edges, straight lines?
- ▶ Which lines on each base are parallel?
- ▶ Are the opposite lines on each base parallel? Why?
- ▶ Are the opposite lines on each base parallel, because each base is a square?

- ▶ Which lines on both bases are parallel?

Display the lines on the opposite ends of each face are parallel, for example,



Stand the square prism on a face that is not its base, for example,

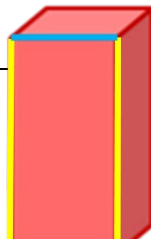


Use a square as an angle tester to test if the angles in the base are right angles, smaller than right angles, or larger than right angles.

Display where the lines on the bases meet the lines on the faces that aren't bases, for example,



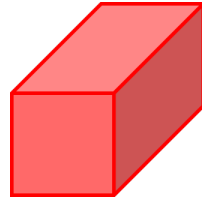
Display the lines on the faces that aren't bases,



- ▶ Are the lines that on the opposite ends of each face parallel?
- ▶ If the prism is standing on a face that is its base, are the lines of the bases horizontal or vertical?
- ▶ Are all 4 lines of each base, horizontal?
- ▶ If the prism is standing on a face that is not its base, are the lines of the base horizontal or vertical?
- ▶ Are 2 of the lines horizontal and 2 of the lines vertical on each base?
- ▶ How could we describe the angles on the base?
- ▶ Could we use a square as an angle tester to test if the angles in the base are right angles, smaller than right angles, or larger than right angles?
- ▶ Are the angles, right angles?
- ▶ Let's look at where the lines on the bases meet the lines on the faces that aren't bases on our actual square prism.
- ▶ Do they join to the base at right angles?
- ▶ Are the angles on the faces that aren't bases, right angles?
- ▶ Because the lines meet at right angles, are the lines on the base, and the lines on the faces that aren't bases, perpendicular?
- ▶ Let's look at the lines on the faces that aren't bases.

for example,

Place the prism on a face that is not the base, so that one of the bases is facing us, for example,



Display the square pyramid, standing on its base, for example,



Display the angles on the base of a square pyramid are right angles, for example,



- ▶ Which lines on the faces that aren't bases, are parallel?
- ▶ Are the opposite lines on the faces that aren't bases parallel? Why?
- ▶ Are the opposite lines parallel because the faces that aren't bases are rectangles?

- ▶ So the lines on the faces that aren't bases, are parallel, and are perpendicular to the lines on the base because they meet the lines on the base at right angles.
- ▶ What shape is the base?
- ▶ Is the base a square?
- ▶ Are the edges, straight lines?
- ▶ Which lines are parallel?
- ▶ Are the opposite lines parallel?

- ▶ If the pyramid is standing on its base, are the lines on the base horizontal or vertical?
- ▶ Are the lines on the base horizontal?
- ▶ How could we describe the angles on the square base?
- ▶ Are the angles on the square base, right angles?

- ▶ Let's look at the lines on the faces that are not the base.
- ▶ Do any of the lines on the faces that are not bases, go straight up and down, with no slope?
- ▶ Are any of the lines on the faces that are not bases, vertical?
- ▶ Does the pyramid standing on its base have no vertical lines?
- ▶ Are any of the lines on the faces that are not the base, parallel?

- ▶ Do all of the lines on the faces that are not the base, meet at the same point?
- ▶ Are the angles formed when the lines meet at the vertex, right angles, smaller than right angles, or larger than right angles?
- ▶ Are the angles formed when the lines meet at the vertex, smaller than right angles?

Record, for example, symmetry



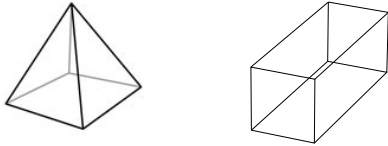
- ▶ We've investigated symmetry with shapes.

Display a square, for example,

Allow children to divide the square in half along a line of symmetry, for example,



Display the square prism and the square pyramid, for example,

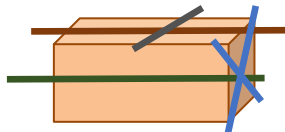


Distribute modeling clay (plasticine is great!) to children.

Allow children to construct a square prism out of the modeling clay, for example,



Allow children to identify how they could cut the square prism in half along a plane of symmetry, for example,



Allow children to construct a square pyramid out of the modeling clay, for example,

▶ And we found that a line of symmetry is a line that divides a shape in half with one half being the reflection of the other half.

▶ **Today we're going to investigate symmetry on prisms and pyramids.**

▶ On three-dimensional objects, instead of a line a symmetry, we have a plane of symmetry.

▶ Let's construct a square prism out of modeling clay.

▶ What shape will the base be?

▶ Will the base be square?

▶ How many bases?

▶ Will there be 2 bases?

▶ What shape will the faces that are not bases be?

▶ Will the faces that are not bases be quadrilaterals?

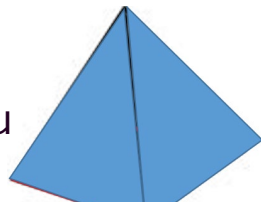
▶ Will the faces that are not bases be rectangles?

▶ Where could we cut the square prism in half along a plane of symmetry?

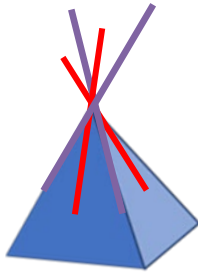
▶ How many planes of symmetry does our square prism have?

▶ Does it have 5 planes of symmetry?

▶ Let's construct a square pyramid out of modeling clay.

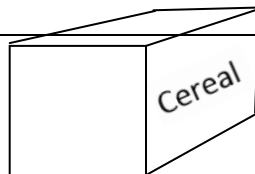


Allow children to identify how they could cut the square pyramid in half along a plane of symmetry, for example,



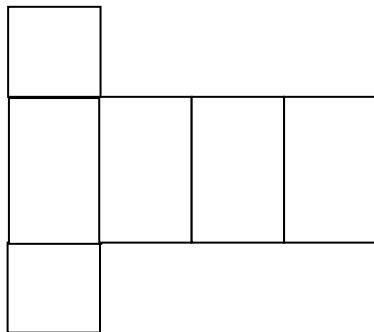
- ▶ What shape will the base be?
- ▶ Will the base be square?
- ▶ How many bases?
- ▶ Will there be 1 base?
- ▶ What shape will the faces that are not bases be?
- ▶ Will the faces that are not bases be triangles?
- ▶ Where could we cut the square pyramid in half along a plane of symmetry?
- ▶ How many planes of symmetry does our square pyramid have?
- ▶ Does a square pyramid have 4 planes of symmetry?

Display a packet of breakfast cereal that is a square prism, for example, Weetbix or Vitabrits



▶ **Today we're going to investigate the nets of prisms and**

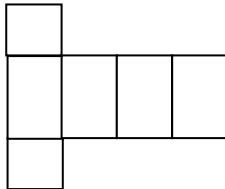
Cut up the faces of the breakfast cereal packet and lie it flat, for example,



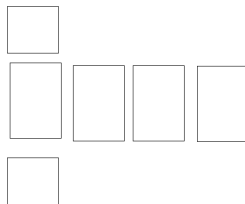
Record, for example, net

Record the net of the square prism, for example,

Net of a Square Prism



Cut up each face from the square prism, for example,



pyramids.

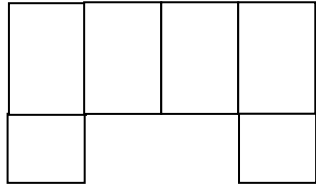
- ▶ Here we have a packet of breakfast cereal.
- ▶ How could you describe the packet of breakfast cereal?
- ▶ Are the bases square?
- ▶ Are the faces that aren't bases, rectangles?
- ▶ Is it a square prism?

- ▶ Let's cut up the square prism at its edges so that we can lie it flat.

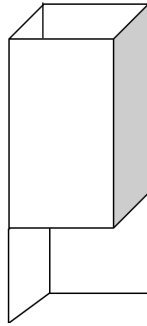
- ▶ When we have a flat shape that will fold to make a three-dimensional object, we say we have the net of the three-dimensional object.
- ▶ Could we fold this net to make a square prism?
- ▶ If we can fold this net to make a square prism, is this the net of a square prism?
- ▶ How could we record this net?

- ▶ Let's cut the net so that each face is separated.

Arrange the faces to make a different net, for example,

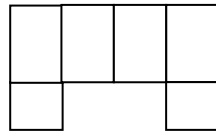


Allow children to try to make a square prism from the net, for example,



Record, for example,

Not the Net of a Square Prism



- ▶ Let's arrange the faces into a different net.
- ▶ Could we arrange the faces like this?

- ▶ Let's try to fold this net to make a square prism.
- ▶ Does this net fold back together to make a square prism?
- ▶ Why not?
- ▶ Do we have both square bases on the same end?
- ▶ If this does not fold into a square prism, is this not the net of a square prism?
- ▶ How could we record this?