

Elementary Mathematics Methods

Video Guide Sheet

Geometry: Solid

Focus

- Polyhedron and non-polyhedron

Concepts To Think About

- Solids that have sides, edges and vertices are called polyhedra.

Vocabulary

- Solids – a three-dimensional object. Some of these solids are polyhedra and some are not polyhedra
- Side – the flat surface of a solid
- Edge – the place where two sides meet
- Vertex – the place where three or more edges meet
- Polyhedra – solids that have sides, edges and vertices

Tools

- solids

Process

- The flat surface of a solid is called a side.
- The place where two sides meet is called an edge.
- The place where three or more edges meet is called a vertex
- Solids that have sides, edges and vertices are called polyhedra.
- Solids that do not have all three characteristics are not polyhedra.

Try Another Example

- Categorize some of the solids in your own environment as polyhedron indicating the number of sides, edges and vertices (e.g., gift box) or non-polyhedron (e.g., globe).

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Focus

- Naming Solids

Concepts To Think About

- Describing and naming solids is an important step in understanding the three dimensional world in which we live.

Vocabulary

- Polyhedra – solids that have sides, edges and vertices
- Cylinder – a solid with two congruent and parallel bases and opposite sides that are parallel and connect corresponding points on the bases.
- Prism – a special case of cylinders. A prism is a cylinder with polygon bases.
- Cube – a prism for which the bases and the sides are all squares.
- Cone – a solid with a circular base and a curved surface that rises and meets at a point.
- Pyramid – a solid with a polygonal base and triangular sides that meet at a point (vertex).

Tools

- solids

Process

- A cylinder is a solid with two congruent and parallel bases and opposite sides that are parallel and connect corresponding points on the bases.
 - Right circular cylinder
- A prism is a special case of cylinders. A prism is a cylinder with polygon bases.
 - Square based prism
 - Rectangle based prism
 - Equilateral triangular prism
 - Hexagonal prism
- A cube is a prism for which the bases and the sides are all squares.
 - Cube
- A cone is a solid with a circular base and a curved surface that rises and meets at a point.
 - Cone
- A pyramid is a solid with a polygonal base and triangular sides that meet at a point (vertex).
 - Square based pyramid
 - Triangular based pyramid

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Focus

- Relationships Between Sides, Edges and Vertices of Polyhedra

Concepts To Think About

- Euler's formula: $\text{Vertices} - \text{Edges} + \text{Faces} = 2$.

Vocabulary

- Polyhedra – solids that have sides, edges and vertices
- Side – the flat surface of a solid (face)
- Edge – the place where two sides meet
- Vertices – the place where three or more edges meet

Tools

- solids

Process

- A square based prism has 5 faces, 8 edges and 5 vertices.
- An equilateral triangular prism has 4 faces, 6 edges and 4 vertices
- A hexagonal prism has 7 faces, 12 edges and 7 vertices.
- A relationship between the number of faces, the number of edges and the number of vertices for each solid exists.
- Try to determine this relationship.
- This relationship is $\text{Vertices} - \text{Edges} + \text{Faces} = 2$.
- See how this relationship works for a cube:
- A cube has 8 vertices, 12 edges, and 6 faces
- $8 - 12 + 6 = 2$
- This is called Euler's formula and is applicable for all polyhedra.

Try Another Example

Explore a rectangular based prism, by applying Euler's formula.