Lesson Objectives
- Recognize cylinders, cones, and spheres.
- Identify cross sections of solids.

Vocabulary
- cylinder: cone
- lateral surface: slant height
- sphere: hemisphere
- plane: cross section
Recognize Cylinders.

A solid cylinder has a curved surface and two parallel bases that are congruent circles.

The radius of a cylinder is the radius of one of its bases. The height is the perpendicular distance between the parallel bases.

A cylinder has some things in common with a prism. Both solids have two bases. But the bases of a cylinder are circles instead of a polygon, and a cylinder has a curved surface instead of flat faces.

The cylinder has the net shown below.

Math Note

An object shaped like a cylinder can be called a cylindrical object.

The net of a cylinder is made up of two circles for the two bases, and a rectangle for the curved surface.
Lesson 8.1.notebook

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Cylinder

height
distance between the bases

curved surface aka: lateral surface

base (circle)

NET!

Curved/lateral surface

base

\[ A_0 = \pi r^2 \]

\[ C = \pi d \text{ or } C = 2\pi r \]
Recognize Cones.

A cone has a circular base, a curved surface, and one vertex. The curved surface of the cone is also called its **lateral surface**.

A cone has some things in common with a pyramid. Both solids have only one base with a vertex above the center of the base (when the base is horizontal). But the base of a cone is a circle instead of a polygon.

The cone has the net shown below.

The net of a cone is made up of a circle for the base and a portion of a circle for the lateral surface.
Recognize Spheres.

A sphere has a curved surface. Every point on the surface is an equal distance from the center of the sphere.

The distance from the center of a sphere to any point on its surface is called the radius of the sphere. Each segment joining the center to a point on the sphere is also called a radius.

If you slice a sphere in half you will get two hemispheres, as shown below.

Math Note

An object shaped like a sphere can be called a spherical object.
2-D

radius

hemisphere (half sphere)
Identify Cross Sections of Solids.

A **plane** is a flat surface that extends infinitely in two dimensions. When a flat plane slices through a solid, the result is a **cross section**. The shape of the cross section depends on how the plane slices the solid.

Suppose a plane could slice through Earth at the equator. The plane would divide Earth into a northern hemisphere and a southern hemisphere. The cross section you would see is the circle formed by the equator.

![Diagram of Earth with northern and southern hemisphere](image)
Identify Cross Sections of a Square Pyramid.

You can slice a square pyramid through $AB$ so that the cross section is parallel to its base. The cross section is a square.

You can also slice the square pyramid through its vertex and through $DE$ so that the cross section is perpendicular to the base. The cross section formed is not a square. It is a triangle.

In general, when you slice a pyramid parallel to its base, the cross section has the same shape as the base of the pyramid. When you slice a pyramid through its vertex and its base so that the cross section is perpendicular to the base, the cross section is a triangle.
Think Math

A rectangular pyramid and a rectangular prism have congruent bases. A plane slices each solid so that the cross section formed is parallel to the base. How are the two cross sections formed the same? How are they different?
Example 1 Identify cross sections of solids.

Tell what cross section is formed when a plane slices the solid as described.

a) A plane slices a rectangular prism parallel to its base.

Solution

The cross section is a rectangle.

b) A plane slices a triangular prism parallel to its base.

Solution

The cross section is a triangle.

c) A plane slices a cube perpendicular to its base.

Solution

The cross section is a square.