CROSS SECTIONS

CHAPTER 7.6
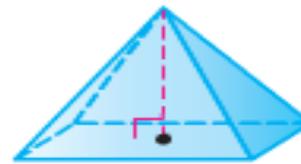
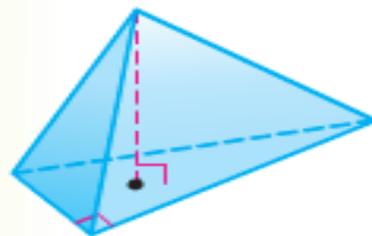Identify and draw three-dimensional figures

Vocabulary Start-Up

A **prism** is a three-dimensional figure with at least two parallel, congruent faces called **bases** that are polygons. A **pyramid** is a three-dimensional figure with one base that is a polygon. Its other faces are triangles.
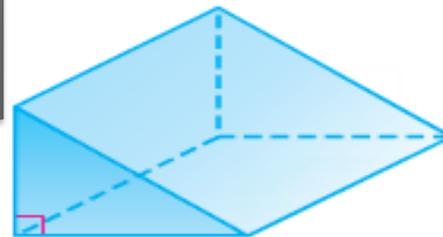
Write *prism* or *pyramid* on the line below each figure.

A plane figure with at least three straight sides and angles

Identify Three-Dimensional Figures

A **plane** is a flat surface that goes on forever in all directions. The figure at the right shows rectangle *ABCD*. Line segments *AB* and *DC* are **coplanar** because they lie in the same plane. They are also **parallel** because they will never intersect, no matter how far they are extended.

A   *B*

D   *C*

g
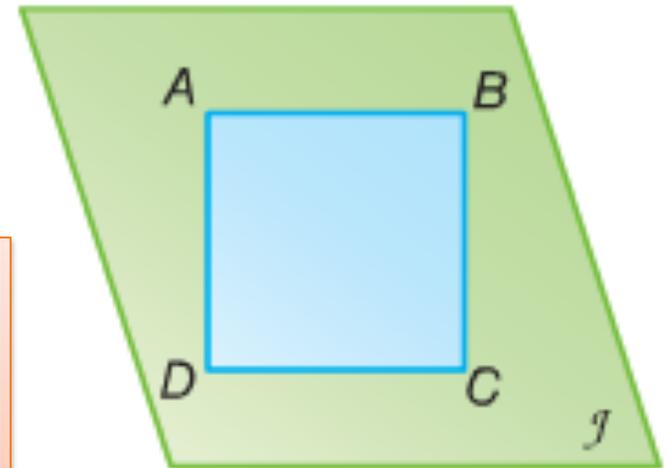
Polygons

The table below lists some common names of polygons.

Sides	Name
5	pentagon
7	hexagon
7	heptagon
8	octagon
9	nonagon
10	decagon

A set of points, lines, line segments, rays or any other geometrical shapes that lie on the same plane are said to be Coplanar.
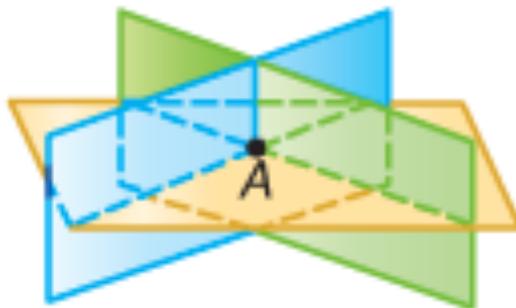
Identify Three-Dimensional Figures

Just as two lines in a plane can intersect or be parallel, there are different ways that planes may be related in space.

Intersect in a Line
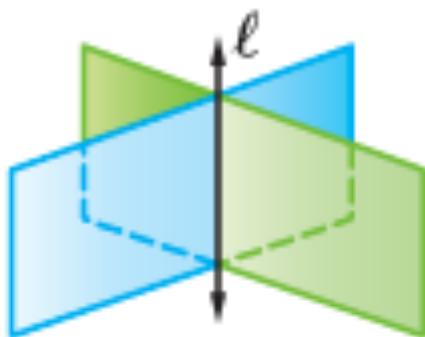
Intersect at a Point

No Intersection



These are called *parallel planes.*

Identify Three-Dimensional Figures

Intersecting planes can form three-dimensional figures. A **polyhedron** is a three-dimensional figure with flat surfaces that are polygons. Prisms and pyramids are both polyhedrons. Some terms associated with three-dimensional figures are *edge*, *face*, *vertex*, and *diagonal*.
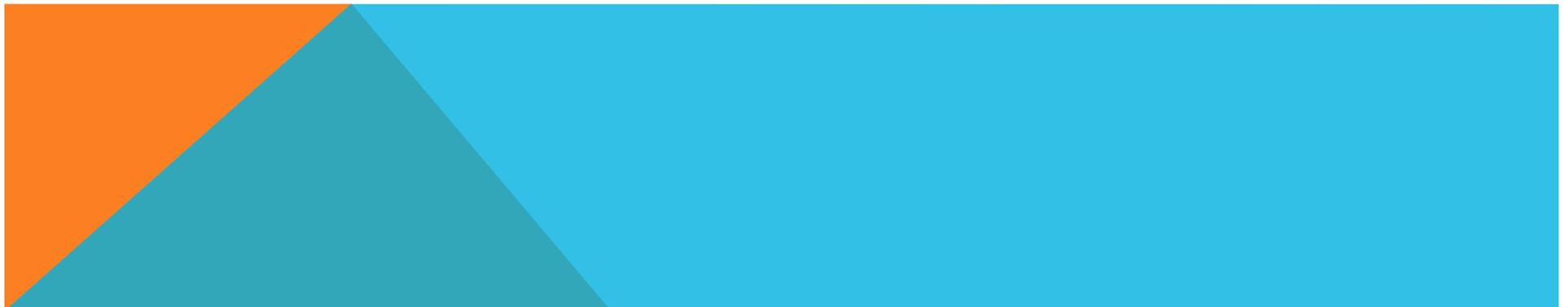
Edge where two planes intersect in a line

Face a flat surface

**Vertex** where three or more planes intersect at a point
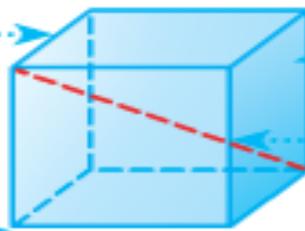
Diagonal a line segment whose endpoints are vertices that are neither adjacent nor on the same face
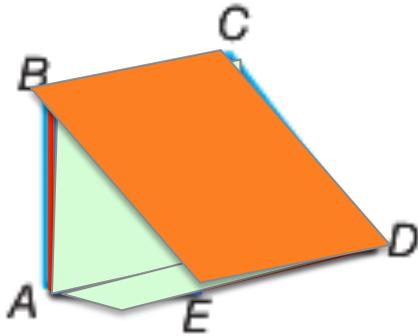
Identify Three-Dimensional Figures

There are also solids that are not polyhedrons. A **cylinder** is a three-dimensional figure with two parallel congruent circular bases connected by a curved surface. A **cone** has one circular base connected by a curved side to a single vertex.

cylinder

cone
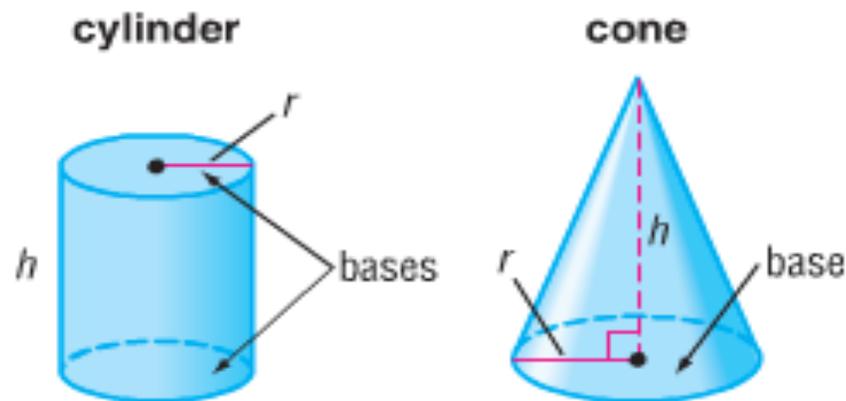
Examples

Identify the figure. Name the bases, faces, edges, and vertices.

1.

The figure has two parallel congruent bases that are triangles, so it is a triangular prism.
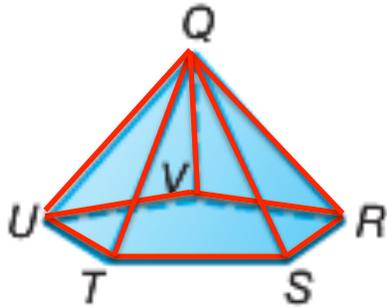
bases:

faces:

edges:

vertices:

In geometry, vertices are a point where two or more curves, lines, or edges meet. As a consequence of this definition, the point where two lines meet to form an angle in known as a vertex.

Identify the figure. Name the bases, faces, edges, and vertices.

2.

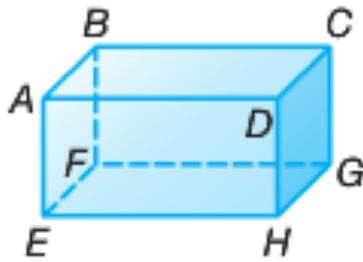The figure has one base that is a pentagon, so it is a pentagonal pyramid.

base:

faces:

edges:

vertices:

Identify the figure. Name the bases, faces, edges, and vertices.

3.

The figure has rectangular bases that are parallel and congruent, so it is a rectangular prism.

bases: *ABCD* and *EFGH, ABFE* and *DCGH, ADHE* and *BCGF*

faces: *ABCD, EFGH, ABFE, DCGH, ADHE, BCGF*

edges: $\overline{AB}, \overline{BC}, \overline{CD}, \overline{AD}, \overline{EF}, \overline{FG}, \overline{GH}, \overline{EH}, \overline{AE},$ $\overline{BF}, \overline{CG}, \overline{DH}$

vertices: *A, B, C, D, E, F, G, H*

Common Error

In the drawing of a rectangular prism, the bases do not have to be on the top and bottom. Any two parallel rectangles are bases. In a triangular pyramid, any face is a base.
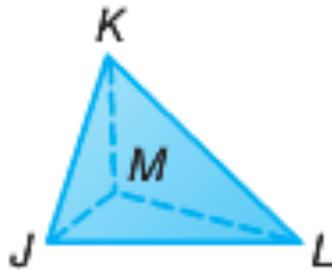
Practice Problem

a.

K

M

J   L

Figure name:
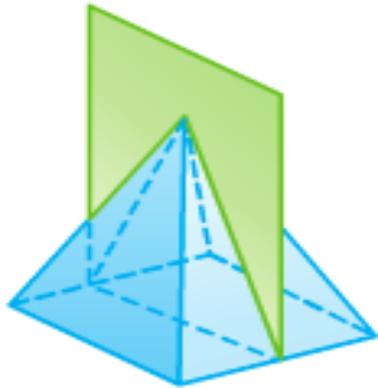
base:

faces:

edges:

vertices:

Identify Cross Sections

The intersection of a solid and a plane is called a **cross section** of the solid.
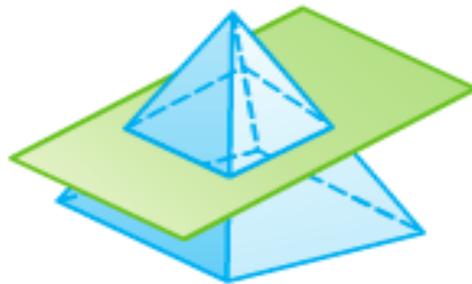
VIDEO

Examples

Describe the shape resulting from a vertical, angled, and horizontal cross section of a square pyramid.
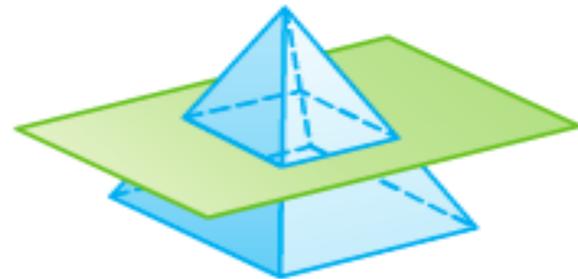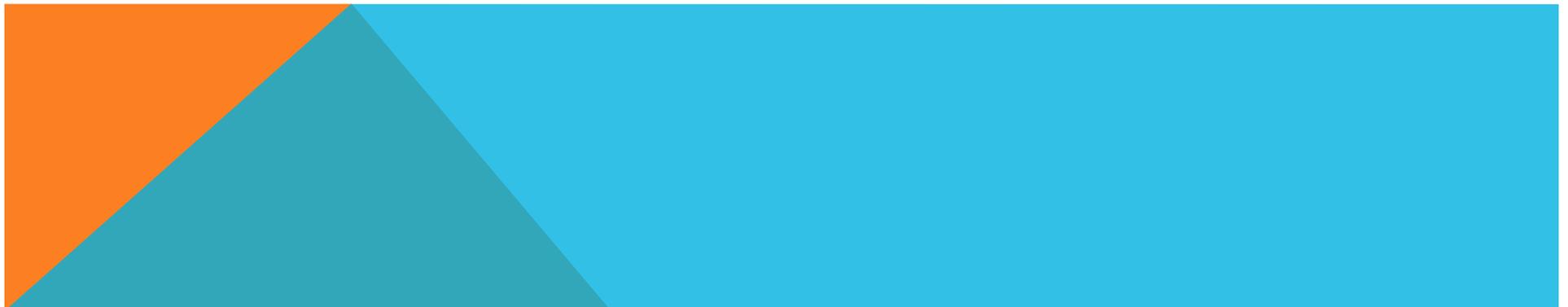
Vertical Slice

The cross section is a

Angled Slice

The cross section is a

Horizontal Slice

The cross section is a

Practice Problem

Describe the shape resulting from a vertical, angled, and horizontal cross section of a cylinder.

Vertical
Rectangle

Angled
Oval

Horizontal
Circle

Practice Problem

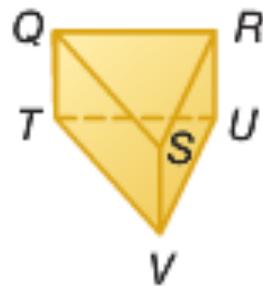Identify the figure. Then name the bases, faces, edges, and vertices.

Figure name:

bases:

faces:

edges:

vertices:

Practice Problem

Describe the shape resulting from the

cross section shown.