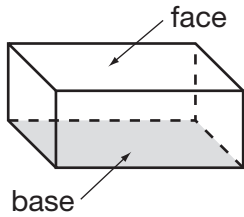
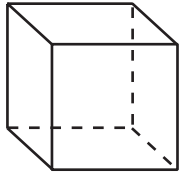
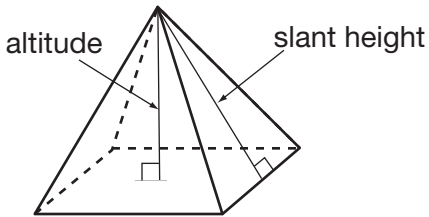
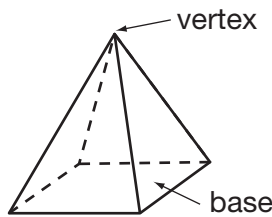


# Cross Sections of Three-Dimensional Figures



## Getting the Idea

A **three-dimensional figure** (also called a **solid figure**) has length, width, and height. It is not flat. Some examples of three-dimensional figures are below.

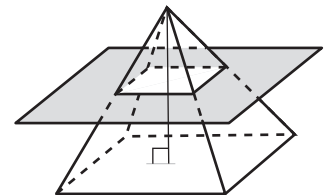
<p>A <b>prism</b> has a pair of bases that are parallel, congruent polygons. Its other faces are rectangles.</p>	<p>A <b>rectangular prism</b> has 6 faces that are rectangles.</p> 	<p>A <b>cube</b> is a rectangular prism with 6 square faces.</p> 
<p>A <b>pyramid</b> has one base that is a polygon. Its other faces are triangles. The height of a pyramid is called its <b>altitude</b>, and the height of its lateral face is called its <b>slant height</b>.</p>	<p>A <b>rectangular pyramid</b> has a base that is a rectangle.</p> 	<p>A <b>square pyramid</b> has a base that is a square.</p> 

A three-dimensional figure can be sliced by a plane to show a two dimensional view. This view is called a **cross section**.

### Example 1

A square pyramid is sliced by a plane that is parallel to its base, as shown.

What is the shape of the cross section?



**Strategy** Visualize a plane, parallel to the base, slicing through the pyramid.

The cross section will have the same shape as the base.

It will be a square.

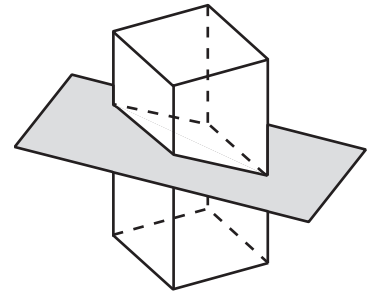


**Solution** The shape of the cross section is a square.

## Example 2

A rectangular prism is cut by the slanted plane shown.

What is the shape of the cross section?



**Strategy** Visualize the prism being sliced by a thin piece of wire.

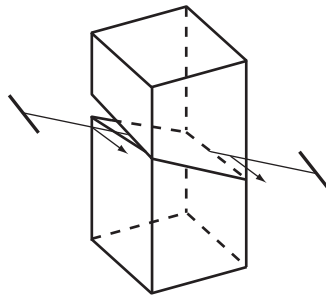
**Step 1**

Determine the angle at which the plane intersects the prism.

The plane is neither horizontal nor vertical to the faces of the prism.

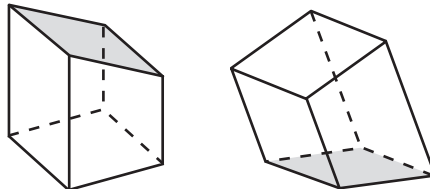
**Step 2**

Imagine slicing the rectangular prism with a piece of wire.



**Step 3**

The prism is now in two parts.



**Step 4**

Visualize the shape of the cross section.



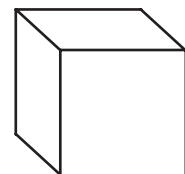
**Solution** The shape of the cross section is a parallelogram.

## Example 3

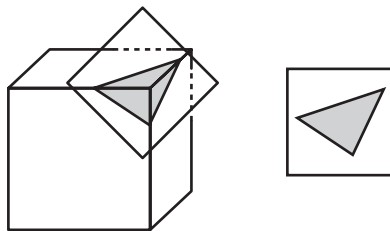
Look at this cube.

How can a plane slice the cube so that the cross section is a triangle?

**Strategy** Visualize using a plane to slice the cube to get a triangular cross section.



Slice through a corner of the cube with a plane.

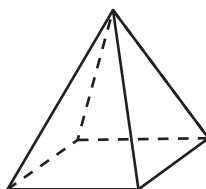


**Solution** The cross section of the cube is shown above.



### Coached Example

Nari will slice this pyramid with a plane that is perpendicular to the base and passes through the top vertex.



**What is the shape of the cross section?**

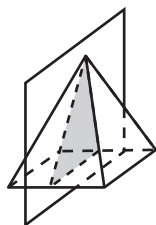
What does “perpendicular” mean?

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Visualize slicing the prism with a plane that is perpendicular to the base and passes through the top vertex.



Make a sketch of the cross section in the space below.

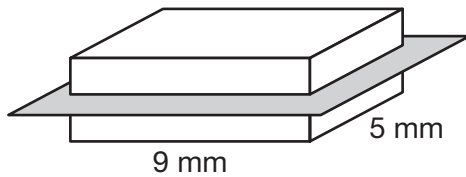
**The shape of the cross section is** \_\_\_\_\_.



## Lesson Practice

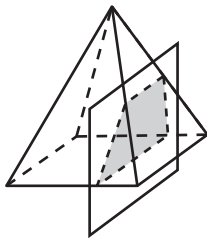
Choose the correct answer.

1. The rectangular prism is being sliced by a plane parallel to its base.



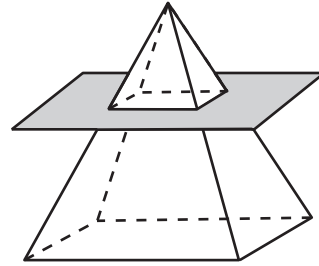
What will be the shape of the cross section formed?





- A. parallelogram that is not a rectangle
  - B. rectangle that is not a square
  - C. square
  - D. triangle
2. What is the shape of the cross section formed when the square pyramid is sliced by a plane perpendicular to its base that does **not** pass through its top vertex?



- A. parallelogram (not a square)
- B. square
- C. trapezoid
- D. triangle

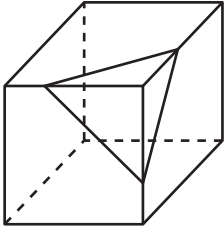

3. What is the shape of the cross section formed when the rectangular pyramid is cut by the plane parallel to its base?

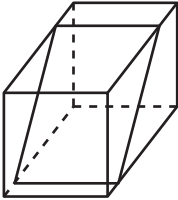
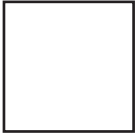


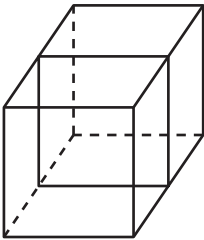
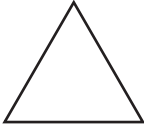
- A. 
- B. 
- C. 
- D. 



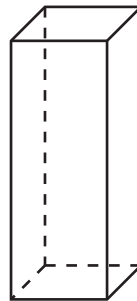
7. Draw a line from each cube to its cross section.

A.  •  •

B.  •  •

C.  •  •

8. A square prism is sliced by a plane that is perpendicular to its base. Circle the cross section.



The cross section is a

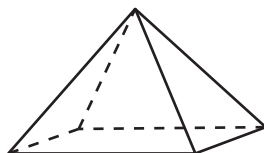
triangle

square

rectangle

trapezoid

9. A rectangular pyramid is sliced by a plane. Select True or False for each statement.



- A. If the slice is parallel to the pyramid's base, the cross section is a triangle.  True  False
- B. If the slice is perpendicular to the pyramid's base but not through the vertex, the cross section is a triangle.  True  False
- C. If the slice is perpendicular to the pyramid's base through the vertex, the cross section is a triangle.  True  False
- D. If the slice is neither parallel nor perpendicular to the pyramid's base, the cross section is a trapezoid.  True  False

10. Look at each figure. Is the cross section a triangle? Select Yes or No.

