

## Lesson 18: Slicing on an Angle

### Classwork

#### Example 1

With your group, discuss whether a right rectangular prism can be sliced at an angle so that the resulting slice looks like the figure in Figure 1? If it is possible, draw an example of such a slice into the following prism.

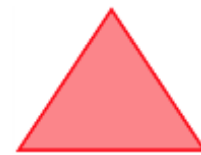
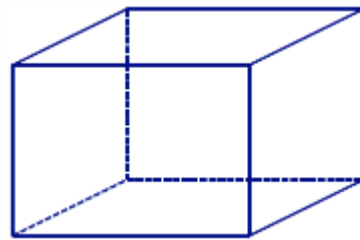


Figure 1

#### Exercise 1

- a. With your group, discuss how to slice a right rectangular prism so that the resulting slice looks like the figure in Figure 2. Justify your reasoning.

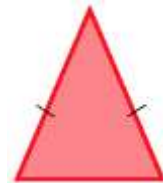


Figure 2

- b. With your group, discuss how to slice a right rectangular prism so that the resulting slice looks like the figure in Figure 3. Justify your reasoning.

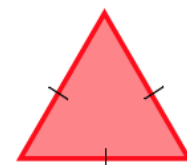


Figure 3

### Example 2

With your group, discuss whether a right rectangular prism can be sliced at an angle so that the resulting slice looks like the figure in Figure 4. If it is possible, draw an example of such a slice into the following prism.

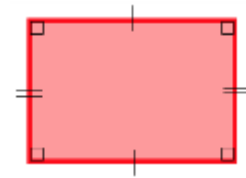
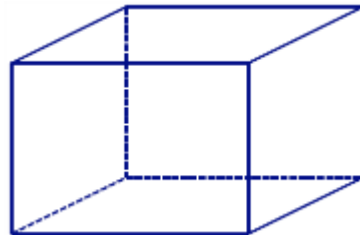


Figure 4

### Exercise 2

In Example 2, we discovered how to slice a right rectangular prism to make the shapes of a rectangle and a parallelogram. Are there other ways to slice a right rectangular prism that result in other quadrilateral-shaped slices?

### Example 3

- a. Slicing a plane through a right rectangular prism so that the slice meets the three faces of the prism, the resulting slice is in the shape of a triangle; if the slice meets four faces, the resulting slice is in the shape of a quadrilateral. Is it possible to slice the prism in a way that the region formed is a pentagon (as in Figure 5)? A hexagon (as in Figure 6)? An octagon (as in Figure 7)?



Figure 5



Figure 6

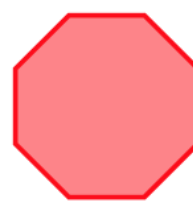


Figure 7

- b. Draw an example of a slice in a pentagon shape and a slice in a hexagon shape.

**Example 4**

- a. With your group, discuss whether a right rectangular pyramid can be sliced at an angle so that the resulting slice looks like the figure in Figure 8. If it is possible, draw an example of such a slice into the following pyramid.

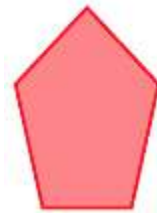
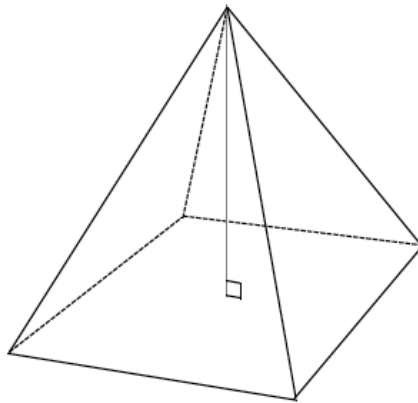


Figure 8

- b. With your group, discuss whether a right rectangular pyramid can be sliced at an angle so that the resulting slice looks like the figure in Figure 9. If it is possible, draw an example of such a slice into the pyramid above.

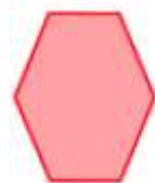


Figure 9

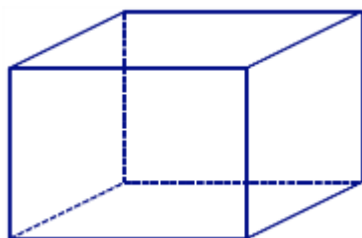
# Problem Set

1. Draw a slice into the right rectangular prism at an angle in the form of the provided shape, and draw each slice as a 2D shape.

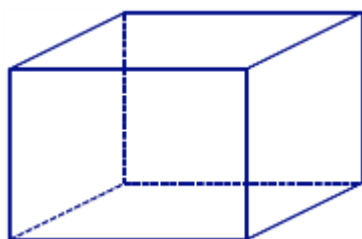
Slice made in the prism

Slice as a 2D shape

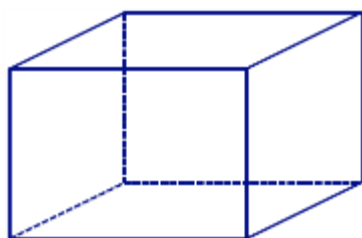
- a. A triangle



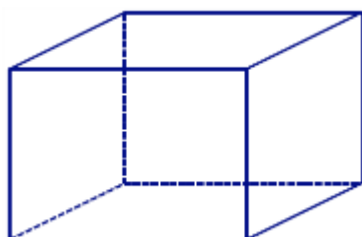
- b. A quadrilateral



- c. A pentagon



- d. A hexagon

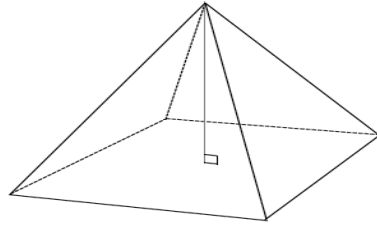


2. Draw slices at an angle in the form of each given shape into each right rectangular pyramid, and draw each slice as a 2D shape:

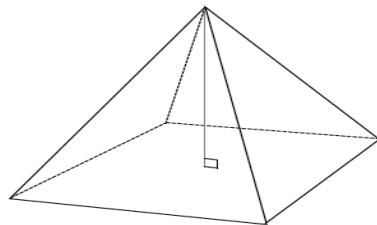
Slice made in the pyramid

Slice as a 2D shape

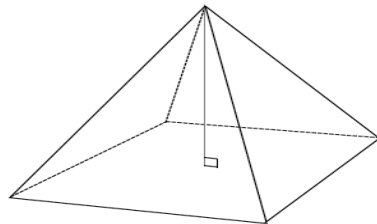
- a. A triangle



- b. A quadrilateral



- c. A pentagon



3. Why isn't it possible to draw a slice in the shape of a hexagon for a right rectangular pyramid?
4. If the slicing plane meets every face of a right rectangular prism, then the slice is a hexagonal region. What can you say about opposite sides of the hexagon?
5. Draw a right rectangular prism so that rectangles  $ABCD$  and  $A'B'C'D'$  are base faces. The line segments  $AA'$ ,  $BB'$ ,  $CC'$  and  $DD'$  are edges of the lateral faces.
- A slicing plane meets the prism so that vertices  $A$ ,  $B$ ,  $C$ , and  $D$  lie on one side of the plane and vertices  $A'$ ,  $B'$ ,  $C'$ , and  $D'$  lie on the other side. What other information can be concluded about the slice based on its position?
  - A slicing plane meets the prism so that vertices  $A$ ,  $B$ ,  $C$ , and  $B'$  are on one side of the plane and vertices  $A'$ ,  $D'$ ,  $C'$ , and  $D$  are on the other side. What other information can be concluded about the slice based on its position?