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

Figure 2

* 1. 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.
	2. 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 makes 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**

* 1. 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)?

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| Figure 5 | Figure 6 | Figure 7 |

* 1. Draw an example of a slice in a pentagon shape and a slice in a hexagon shape.

Example 4

Figure 8

* 1. 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.



* 1. 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

* 1. A triangle
	2. A quadrilateral
	3. A pentagon
	4. A hexagon
1. 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

* 1. A triangle
	2. A quadrilateral
	3. A pentagon
1. Why isn’t it possible to draw a slice in the shape of a hexagon for a right rectangular pyramid?
2. 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?
3. 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.
	1. 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?
	2. 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?