Module 5: Constructing and Measuring

TOPIC 2: THREE-DIMENSIONAL FIGURES

In this topic, students use nets of right rectangular prisms and pyramids, and discover that the volume of a pyramid is one-third the volume of the prism with the same base and height. Students practice using the volume formulas as they investigate the effect on the volume of doubling and tripling dimensions, and as they solve composite volume problems. Then students calculate the surface areas of familiar pyramids and prisms. Finally, students use strategies to calculate the volumes and surface areas of prisms and pyramids with non-rectangular bases.

Where have we been?

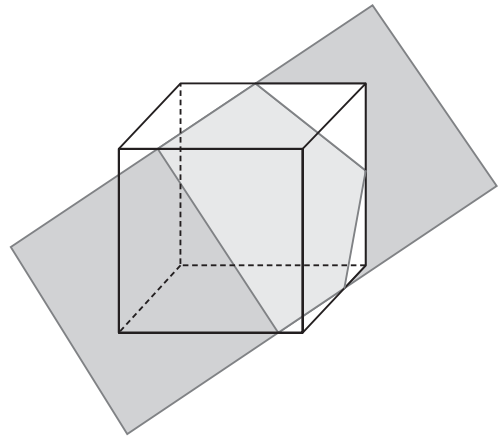
In grade 6, students learned to compose and decompose shapes in order to determine the area, volume, and surface area of a restricted set of geometric objects. They also learned the terminology associated with prisms and pyramids. Throughout this topic, students review the language of two- and three-dimensional geometry. As students move to measures of three-dimensional solids, they begin with the volume and surface area of prisms, which they computed in grade 6, and build up to additional solids.

Where are we going?

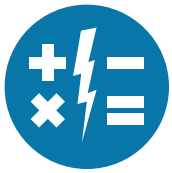
Generalizations of the formulas for the volume of prisms and pyramids will be used in grade 8 and in high school as students continue determining volumes of solids. They will also provide justifications for volume formulas in high school and use volume formulas to solve problems, building on the knowledge established in this topic.

Using Cross-Sections of Solids to Investigate Characteristics of 3D Figures

Students use clay and dental floss or wire to model cross-sections of three-dimensional figures. This image shows the intersection of a plane and a cube, which can form various cross-sections, including a pentagon, as shown.



Myth: "Once I understand something, it has been learned."



Learning is tricky for three reasons. First, even when we learn something, we don't always recognize when that knowledge is useful. For example, you know there are four quarters in a dollar. But if someone asks you, "What is 75 times 2?" you might not immediately recognize that is the same thing as having six quarters.

Second, when you learn something new, it's not as if the old way of thinking goes away. For example, some children think of north as straight ahead. But have you ever been following directions on your phone and made a wrong turn, only to catch yourself and think, "I know better than that!"?

The final reason that learning is tricky is that it is balanced by a different mental process: forgetting. Even when we learn something (e.g., your phone number), when you stop using it (e.g., when you move), it becomes extremely hard to remember.

There should always be an asterisk next to the word when we say we learned* something.

#mathmythbusted

Talking Points

You can further support your student's learning by asking questions about the work they do in class or at home. Your student is continuing to reason about abstract geometric objects such as three-dimensional pyramids and prisms.

Questions to Ask

- How does this problem look like something you did in class?
- Can you show me the strategy you used to solve this problem? Do you know another way to solve it?
- Does your answer make sense? How do you know?

Key Terms

cross-section

A cross-section of a solid is the two-dimensional figure formed by the intersection of a plane and a solid when a plane passes through the solid.

regular polygon

A regular polygon is a polygon with all sides congruent and all angles congruent.