

Exploration Guide » Prisms and Cylinders - Activity A

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Volume of a Prism

In this activity, you will see how to find the volumes of prisms.

1. In the Gizmo[™], be sure that **Rectangle** is selected under Shape of Base. Set the **Base length** to 6.0, the **Base width** to 9.0, and set the **Height** to 4.0 using the sliders. (To quickly set a value, type a number in the box to the right of the slider and press ENTER.)
 - a. What is the length of the base of the prism? What is the width? Find the area of the base. Click on **Show area of base** to check your answer.
 - b. To find the volume of a prism, multiply the area of the base (B) by the height (h), or $V = Bh$. What is the base area of this prism? What is the height? Find the volume of the prism. Check your answer by clicking **Show volume** in the Gizmo.
 - c. How many dimensions is a prism? What is the exponent on the units when expressing the volume of a figure? What is the exponent on the units when expressing area? Explain why.
2. With **Rectangle** selected under Shape of Base, turn off **Show volume** and **Show area of base**. Form a prism that you would like to work with by adjusting the three sliders.
 - a. When a prism has a rectangular base, the volume formula $V = Bh$ can be written as $V = lwh$. Explain why.
 - b. Find the volume of your rectangular prism using $V = lwh$. Check your answer using the Gizmo.
3. If the volume of a rectangular prism is 300 ft^3 , the base length is 8 ft, and the base width is 7.5 ft, how can you find the height? Explain your method and find the answer. Use the Gizmo to check your answer.
4. Under Shape of Base, select **Triangle**. With **Show volume** and **Show area of base** turned off, set **Height** to 6.0 and **Base edge** to 7.6. (Note: The base is an equilateral triangle.)
 - a. The prism volume formula ($V = Bh$) is true no matter what the shape of the base is. Turn on **Show area of base**. What is the area of the base? What do you multiply that area by to find the volume of this prism? Find the volume and click on **Show volume** to check your answer.
 - b. If a prism has height 12 cm and its bases are right triangles with one leg of length 6 cm and one leg of length 8 cm, find its volume. What is the formula for the area of a triangle? Use that formula to find the area of the base. Next, multiply the base area by the height to find the volume of this prism. What is the volume? Be sure to use correct units in your answer.
5. Use what you have learned about prisms to solve these problems.
 - a. If the base of a prism is a square with side length 9 feet, what is the area of the base? If the height of the prism is also 9 feet, find the volume. This prism is called a cube.
 - b. If you know the volume of a square prism is 490 cm^3 and the base area is 49 cm^2 , what is the height? What is the side length of the base?

Volume of a Cylinder

In this activity, you will learn how to find the volume of a cylinder. A cylinder is a prism with a circular base.

1. Under Shape of Base, select **Circle**. Turn off **Show volume** and **Show area of base**. Set the **Radius** to 6.0 and set the **Height** to 4.0.

- a. A cylinder has a circular base. What is the formula to find the area of a circle?
- b. Use $A = \pi r^2$ to find the area of the base of the cylinder shown in the Gizmo. Give an exact answer by leaving π in your answer. Click on **Show area of base** to check your answer.
- c. The formula for the volume of a cylinder is the same as for a prism: $V = Bh$, where B is the area of the base and h is the height of the cylinder. Use this formula to find the volume of the cylinder shown in the Gizmo. Leave π in your answer and click **Show volume** to check your answer.
- d. Use the π button on a calculator to find the decimal value of the volume you found in the part c. Round your answer to the nearest whole number. What is your final answer?

2. Suppose you are given a cylinder with base diameter = 15.0 cm.

- a. What is the first step in finding the area of that base? What is the area of the base?
- b. If the height is 8.0 cm, what is the volume of this cylinder? Use the Gizmo to check your answer. Then round your answer to the nearest whole cm^3 .

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