



## Volume of Prisms

Suggested time: 75 minutes

### **What's important in this lesson:**

In this lesson you will understand the volume of a prism can be represented as the product of the area of its base and height. You will use this knowledge to calculate the volume of various prisms.

### **Complete these steps:**

1. Read through the lesson portion of the package independently.
2. Complete any of the examples in the lesson.
3. Check your lesson answers with the lesson key your teacher has.
4. Seek assistance from the teacher as needed.
5. Complete the Assessment and Evaluation and submit for evaluation. Be sure to ask for any assistance when experiencing difficulties.

### **Hand-in the following to your teacher:**

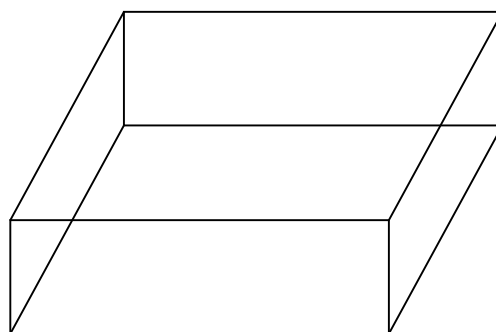
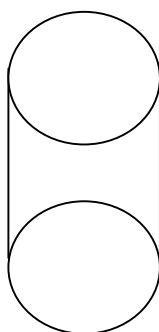
1. Assessment and Evaluation

### **Questions for the teacher:**

Diagnostic/Introductory Activity:  
Unit 4 Lesson 4



1. Draw two examples of a three-dimensional shape.
2. Explain the meaning of the term volume.
3.  $m^3$  is a possible unit for the volume of a figure. Why do you think this is a good choice?
4. Explain the difference between  $m$ ,  $m^2$  and  $m^3$ . Include examples of where each unit of measure may be used.
5. Identify the common shape that has been extended to form each shape below. This shape is normally called the base of the figure.





## Volume of Prisms

**Volume** is the amount of space a figure occupies. The volume of an object is the number of cube units required to fill a space. Volume is a three-dimensional measurement, which means the units will be in  $m^3$ ,  $cm^3$ ,  $km^3$ , etc.

Any two-dimensional figure extended into a third dimension by stacking the same shape on top of itself is called a prism. Notice the object that remains constant throughout the figure is referred to as the base. In the example below the base is a square. The basic formula for calculating the volume of a prism is

Volume of a Prism

Volume = Area of Base x Height  
 $V = bh$

, where  $b$  represents the area of the base and  $h$  represents the height of the prism.

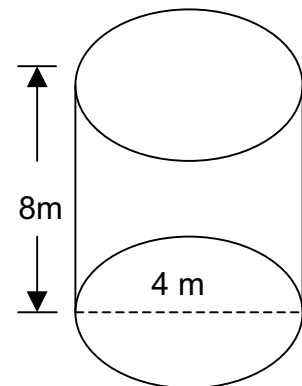
### Example 1

Calculate the volume of the cylinder shown in the diagram. Round your answer to one decimal place.

### Solution

$$\begin{aligned}
 \text{Volume} &= \text{Area of Circular Base} \times \text{Height} \\
 &= \pi r^2 \times h \\
 &= \pi (2)^2 \times 8 \\
 &= 100.5
 \end{aligned}$$

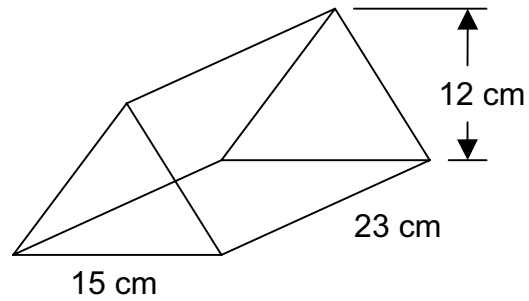
Therefore the volume of the cylinder is  $100.5 \text{ cm}^3$ .





**Example #2**

Calculate the volume of the triangular prism shown in the diagram. Round your answer to one decimal place.




**Solution**

$$\begin{aligned} \text{Volume} &= \text{Area of Triangle} \times \text{Depth} \\ &= \frac{1}{2} bh \times \text{depth} \\ &= \frac{1}{2} (15)(12) \times (23) \\ &= 2070 \end{aligned}$$

Note: Depth is used in this example to avoid two heights.

Therefore the volume of the figure is 2070cm<sup>3</sup>.

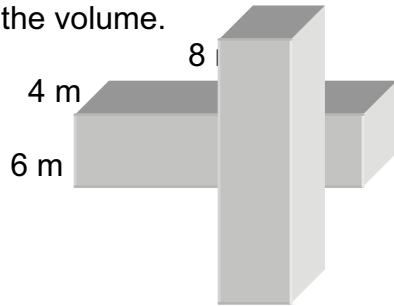
**Exercise.**

<p>1. Calculate the area of the base.</p> <div style="text-align: center;">  </div> <p>Calculate the volume.      8 cm             8 cm             8 cm</p> <p>Amount of seed to go in box: 500 cm<sup>3</sup>              Is the box big enough?</p>	<p>2. Calculate the area of the base.</p> <p>Calculate the volume.      9 mm</p> <p>Amount of fill to go in hole: 750 mm<sup>3</sup>              Do you have enough fill?</p>
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3. Calculate the area of the base.

Calculate the volume.



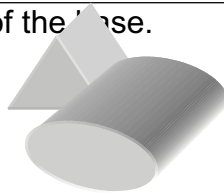
Amount of water to fill pool:  $195 \text{ m}^3$   
Is the pool big enough?

4. Calculate the area of the base.

Calculate the volume.  $2 \text{ cm}$   $0.5 \text{ cm}$   
 $30 \text{ cm}$

Amount of candies to fill box:  $32 \text{ cm}^3$   
Is the box large enough?

5. Calculate the area of the base.



Calculate the volume.  $h=6 \text{ cm}$

$8 \text{ cm}$   $12 \text{ cm}$

Amount of chocolate to fix box:  $280 \text{ cm}^2$   
Is the box big enough?

6. Calculate the area of the base.

Calculate the volume.  $r = 4 \text{ m}$   
 $5 \text{ m}$

Amount of soil to fill hole:  $63 \text{ m}^3$   
Is there enough soil to fill the hole?

Student Handout: Unit 4 Lesson 4



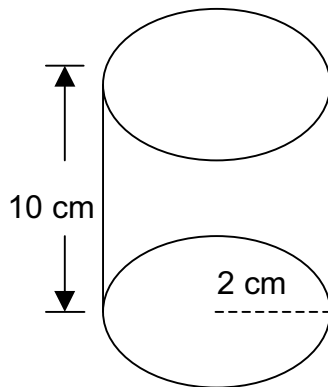


1. Calculate the volume of each figure correct to two decimal places.

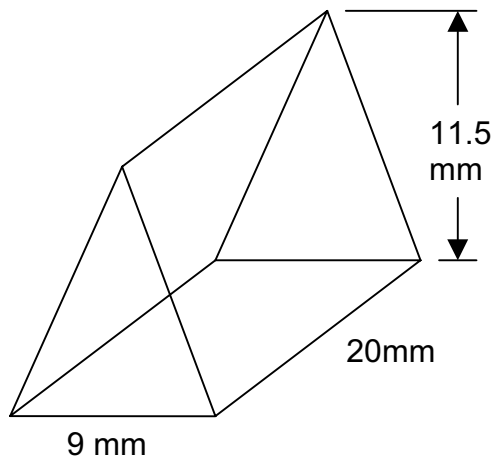
(a)



(b)



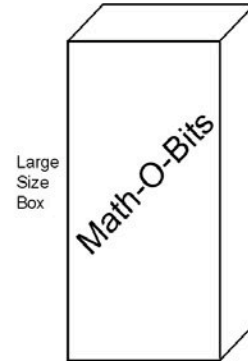
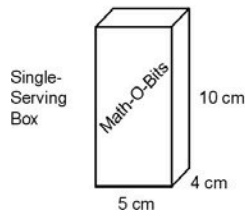
(c)





2. Math-O-Bits cereal is sold in a single-serving box. (See dimension on diagram.)

The volume of this box is  $200 \text{ cm}^3$ .



The manufacturer would like to sell Math-O-Bits in a large size too. The manufacturer doubles the length, width, and height of the single-serving box.

Calculate the volume new large box.

3. Explain how the volume of a rectangular prism changes when all the dimensions are doubled.