Name _____ Date _____

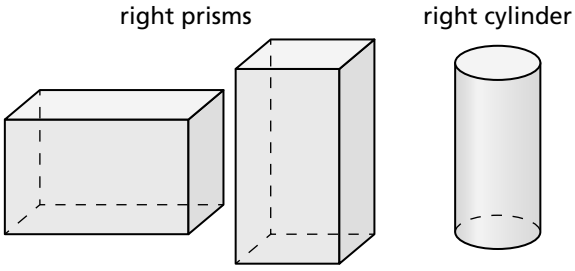
8.4 Volumes of Prisms and Cylinders

For use with Exploration 8.4

Essential Question How can you find the volume of a prism or cylinder that is not a right prism or right cylinder?

Recall that the volume V of a right prism or a right cylinder is equal to the product of the area of a base B and the height h.

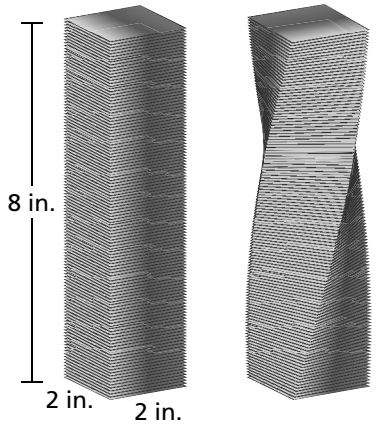
$$V = Bh$$



1 EXPLORATION: Finding Volume

Work with a partner. Consider a stack of square papers that is in the form of a right prism.

a. What is the volume of the prism?



b. When you twist the stack of papers, as shown at the right, do you change the volume? Explain your reasoning.

c. Write a carefully worded conjecture that describes the conclusion you reached in part (b).

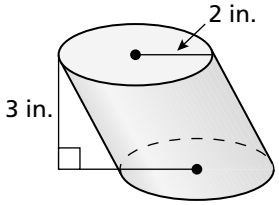
d. Use your conjecture to find the volume of the twisted stack of papers.

Name_____ Date _____

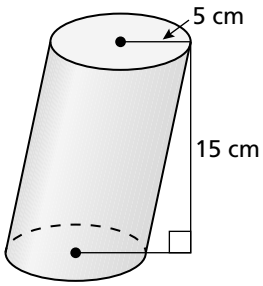
2 EXPLORATION: Finding Volume

Work with a partner. Use the conjecture you wrote in Exploration 1 to find the volume of the cylinder.

a.



b.



Communicate Your Answer

3. How can you find the volume of a prism or cylinder that is not a right prism or right cylinder?

4. In Exploration 1, would the conjecture you wrote change if the papers in each stack were not squares? Explain your reasoning.

Name _____ Date _____

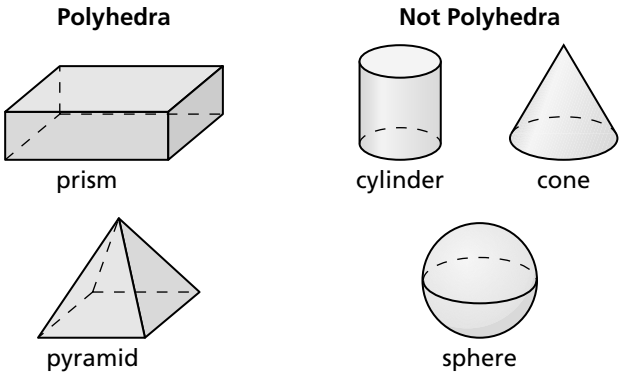
8.4 Practice

For use after Lesson 8.4

Notes:

Core Concepts

Types of Solids



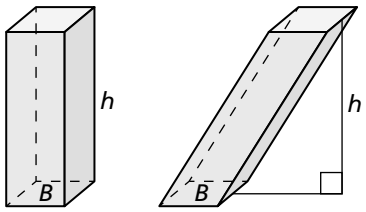
Notes:

Volume of a Prism

The volume V of a prism is

$$V = Bh$$

where B is the area of a base and h is the height.



Notes:

Name_____ Date _____

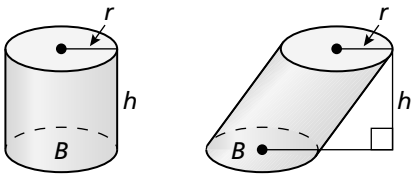
8.4 Practice (continued)

Volume of a Cylinder

The volume V of a cylinder is

$$V = Bh = \pi r^2 h$$

where B is the area of a base, h is the height, and r is the radius of a base.



Notes:

Similar Solids

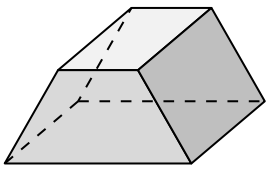
Two solids of the same type with equal ratios of corresponding linear measures, such as heights or radii, are called **similar solids**. The ratio of the corresponding linear measures of two similar solids is called the *scale factor*. If two similar solids have a scale factor of k, then the ratio of their volumes is equal to k^3.

Notes:

Worked-Out Examples

Example #1

Tell whether the solid is a polyhedron. If it is, name the polyhedron.



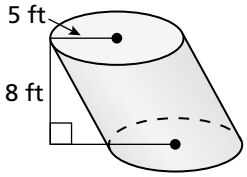
Yes, it is a polyhedron. It is a trapezoidal prism.

Name _____ Date _____

8.4 Practice (continued)

Example #2

Find the volume of the cylinder.



$V = \pi r^2 h$

$= \pi(5)^2(8)$

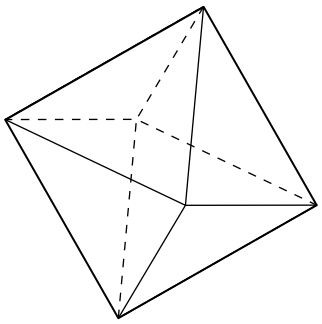
≈ 628.32

The volume of the cylinder is about 628.32 cubic feet.

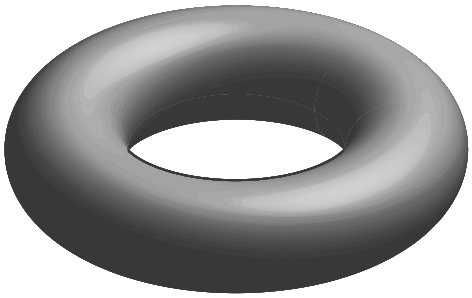
Practice A

In Exercises 1 and 2, tell whether the solid is a polyhedron. If it is, name the polyhedron.

1.

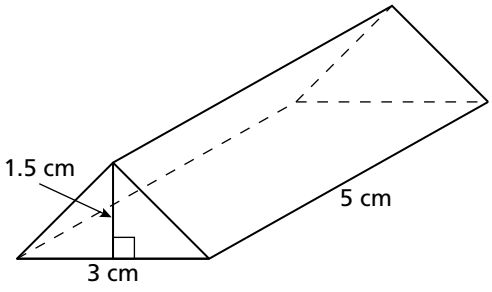


2.

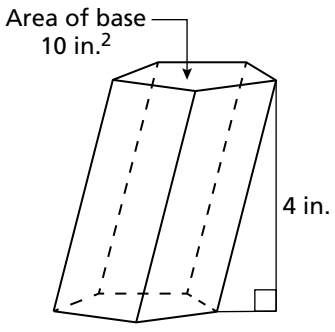


In Exercises 3 and 4, find the volume of the prism.

3.



4.

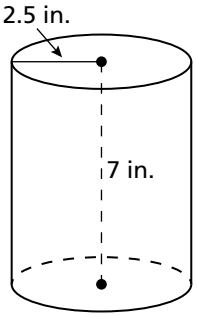


Name_____ Date _____

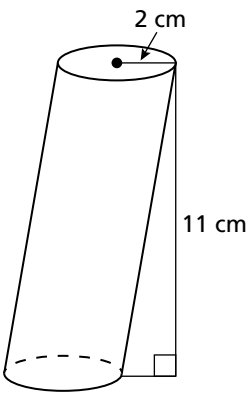
8.4 Practice (continued)

In Exercises 5 and 6, find the volume of the cylinder.

5.



6.



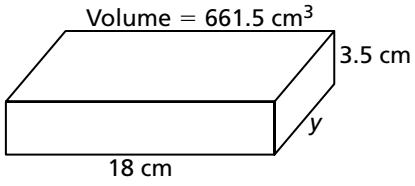
In Exercises 7 and 8, find the indicated measure.

7. height of a cylinder with a base radius of 8 inches and a volume of 2010 cubic inches

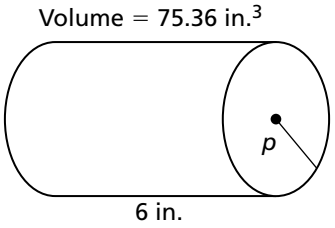
8. area of the base of a pentagonal prism with a volume of 50 cubic centimeters and a height of 7.5 centimeters

In Exercises 9 and 10, find the missing dimension of the prism or cylinder.

9.



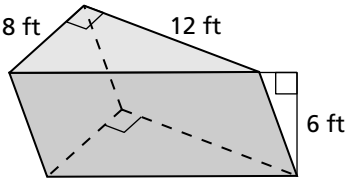
10.

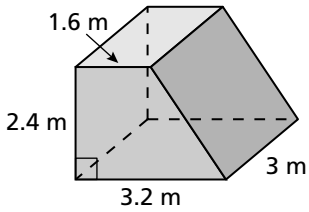


Name _____ Date _____

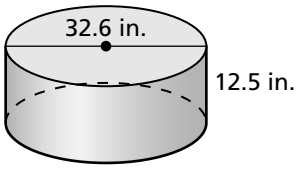
Practice B

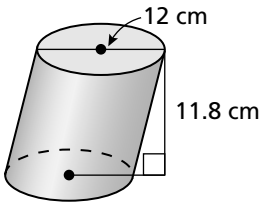
In Exercises 1 and 2, find the volume of the prism.

1. 

2. 

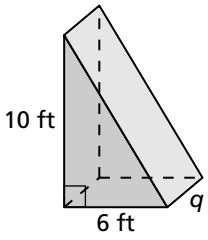
In Exercises 3 and 4, find the volume of the cylinder.

3. 

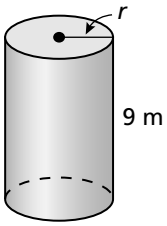
4. 

In Exercises 5 and 6, find the missing dimension.

5. Volume $= 120$ ft^3



6. Volume $= 254.5$ m^3

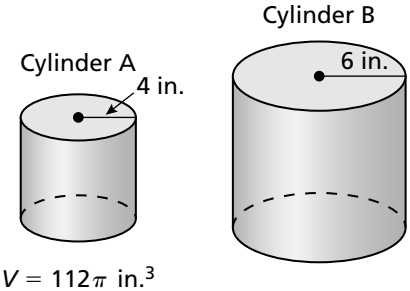


In Exercises 7 and 8, find the area of the base of the rectangular prism with the given volume and height. Then give a possible length and width.

7. $V = 216$ yd^3, $h = 12$ yd

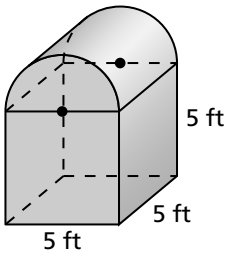
8. $V = 448$ in.^{3}, $h = 14$ in.

9. The cylinders are similar. Find the volume of Cylinder B.



$V = 112\pi$ in.^{3}

10. Find the volume of the composite solid.



11. An aquarium shaped like a rectangular prism has a length of 24 inches, a width of 12 inches, and a height of 18 inches. You fill the aquarium half full with water. When you submerge a rock in the aquarium, the water level rises 0.5 inch. Find the volume of the rock.