Name_____ Date _____

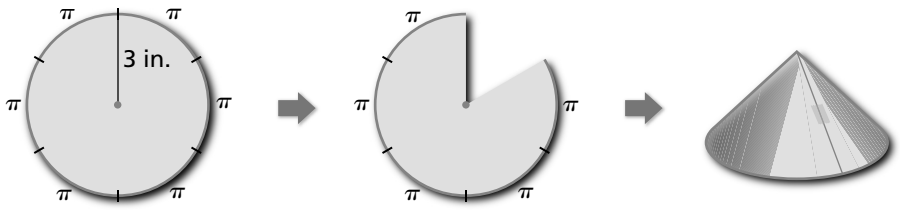
8.6 Surface Areas and Volumes of Cones

For use with Exploration 8.6

Essential Question How can you find the surface area and the volume of a cone?

1 EXPLORATION: Finding the Surface Area of a Cone

Work with a partner. Construct a circle with a radius of 3 inches. Mark the circumference of the circle into six equal parts, and label the length of each part. Then cut out one sector of the circle and make a cone.



a. Explain why the base of the cone is a circle. What are the circumference and radius of the base?

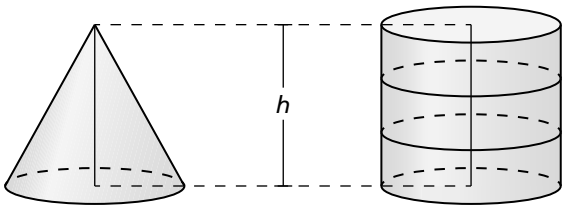
b. What is the area of the original circle? What is the area with one sector missing?

c. Describe the surface area of the cone, including the base. Use your description to find the surface area.

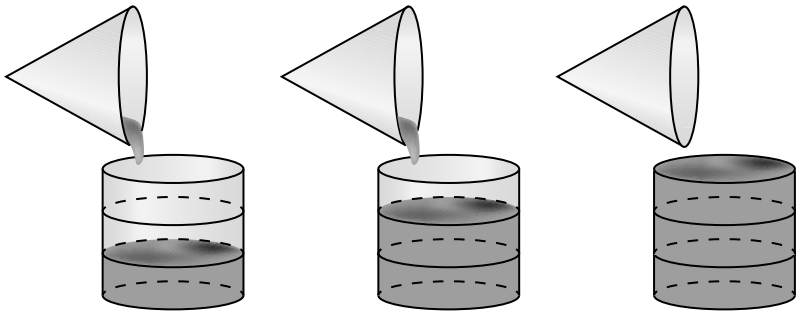
Name _____ Date _____

2 EXPLORATION: Finding the Volume of a Cone

Work with a partner. The cone and the cylinder have the same height and the same circular base.



When the cone is filled with sand and poured into the cylinder, it takes three cones to fill the cylinder.



Use this information to write a formula for the volume V of a cone.

Communicate Your Answer

3. How can you find the surface area and the volume of a cone?

4. In Exploration 1, cut another sector from the circle and make a cone. Find the radius of the base and the surface area of the cone. Repeat this three times, recording your results in a table. Describe the pattern.

Radius of Base	Surface Area of Cone

Name_____ Date _____

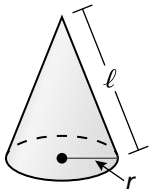
8.6 Practice

For use after Lesson 8.6

Notes:

Core Concepts

Surface Area of a Right Cone



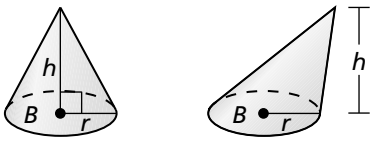
The surface area S of a right cone is

$$S = \pi r^2 + \pi r\ell$$

where r is the radius of the base and ℓ is the slant height.

Notes:

Volume of a Cone



The volume V of a cone is

$$V = \frac{1}{3}Bh = \frac{1}{3}\pi r^2 h$$

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

Notes:

Name _____ Date _____

8.6 Practice (continued)

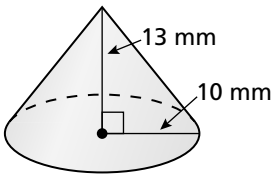
Worked-Out Examples

Example #1

Find the volume of the cone.

$$V = \frac{1}{3}\pi r^2 h$$
$$= \frac{1}{3} \cdot \pi \cdot 10^2 \cdot 13$$
$$= \frac{1300}{3} \cdot \pi$$
$$= 433.33\pi \approx 1361.36$$

The volume is about 1361.36 cubic millimeters.



Example #2

The cones are similar. Find the volume of cone B.

The scale factor is $K = \frac{\text{Radius of cone B}}{\text{Radius of cone A}} = \frac{8}{4} = 2$.

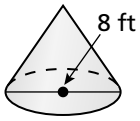
$$\frac{\text{Volume of cone B}}{\text{Volume of cone A}} = K^3$$

$$\frac{\text{Volume of cone B}}{32\pi} = (2)^3$$

Volume of cone B $= 256\pi$

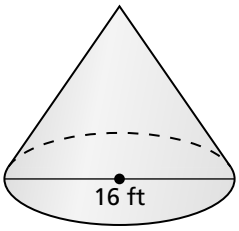
The volume of cone B is 256π cubic feet.

Cone A



$V = 32\pi$ ft^3

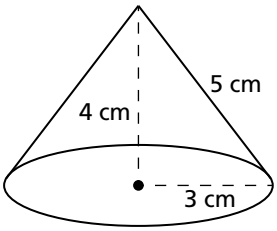
Cone B



Practice A

In Exercises 1 and 2, find the surface area of the right cone.

1.



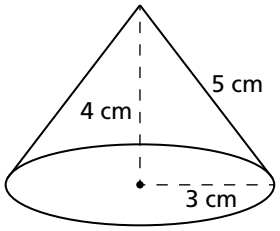
2. A right cone has a diameter of 1.8 inches and a height of 3 inches.

Name_____ Date _____

8.6 Practice (continued)

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

3.



4. A right cone has a radius of 5 feet and a slant height of 13 feet.

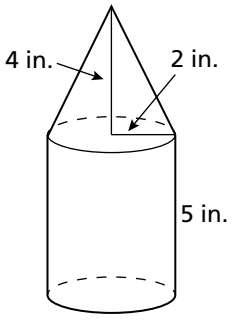
In Exercises 5–7, find the indicated measure.

5. A right cone has a surface area of 440 square inches and a radius of 7 inches. Find its slant height.

6. A right cone has a volume of 528 cubic meters and a diameter of 12 meters. Find its height.

7. Cone A and cone B are similar. The radius of cone A is 4 cm and the radius of cone B is 10 cm. The volume of cone A is 134 cm^3. Find the volume of cone B.

8. Find the volume of the composite solid.

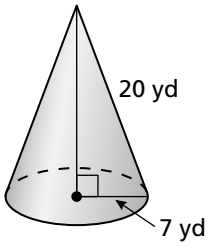


Name _____ Date _____

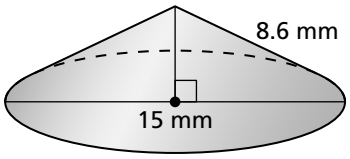
Practice B

In Exercises 1 and 2, find the surface area of the right cone.

1.

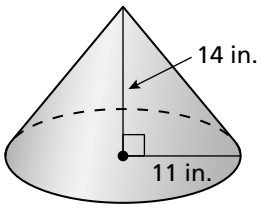


2.

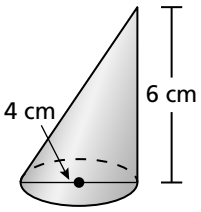


In Exercises 3 and 4, find the volume of the cone.

3.

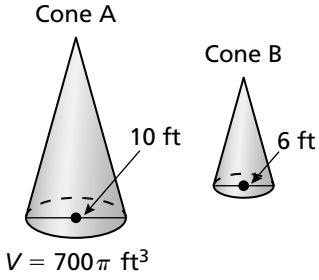


4.

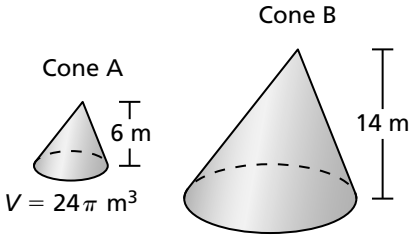


In Exercises 5 and 6, the cones are similar. Find the volume of Cone B.

5.

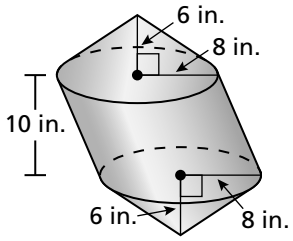


6.

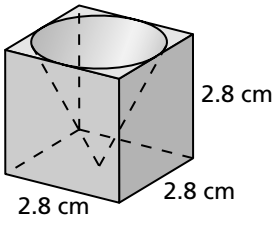


In Exercises 7 and 8, find the volume of the composite solid.

7.



8.



9. A cone has height h and a base with radius r. You want to change the cone so its volume is halved. What is the new height if you only change the height? What is the new radius if you only change the radius? Explain.

10. During a chemistry lab, you use a funnel to pour a solvent into a flask. The radius of the funnel is 4 centimeters and its height is 12 centimeters. You pour the solvent into the funnel at a rate of 60 milliliters per second and the solvent flows out of the funnel at a rate of 40 milliliters per second. How long will it be before the funnel overflows? (Remember that 1 milliliter is equal to 1 cubic centimeter.)