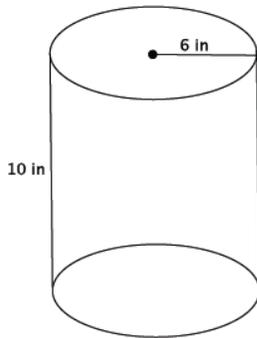# Lesson 19: Cones and Spheres

Classwork

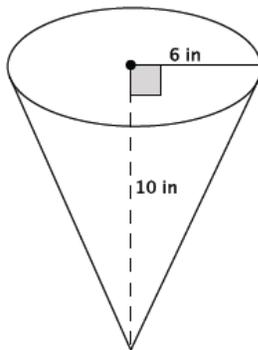### Exercises 1–2

Note: Figures not drawn to scale.

1. Determine the volume for each figure below.

   a. Write an expression that shows volume in terms of the area of the base, B, and the height of the figure. Explain the meaning of the expression, and then use it to determine the volume of the figure.

   b. Write an expression that shows volume in terms of the area of the base, B, and the height of the figure. Explain the meaning of the expression, and then use it to determine the volume of the figure.

2.

a. Write an expression that shows volume in terms of the area of the base, B, and the height of the figure. Explain the meaning of the expression, and then use it to determine the volume of the figure.
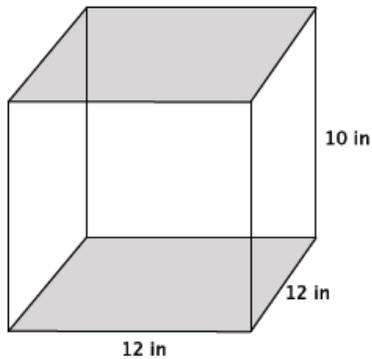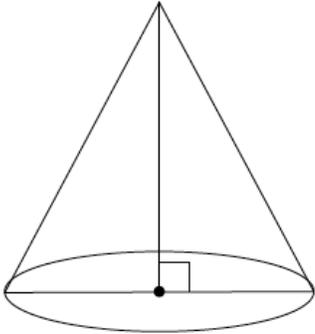

b. The volume of the square pyramid shown below is 480 in^3. What might be a reasonable guess for the formula for the volume of a pyramid? What makes you suggest your particular guess?
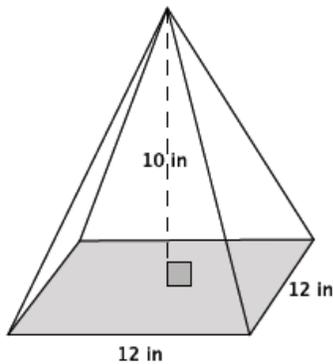
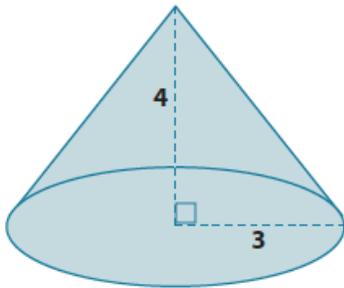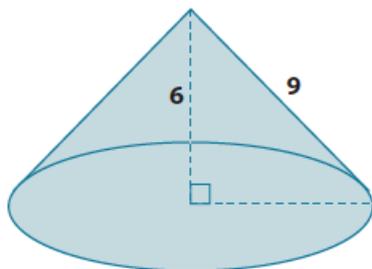## Example 1

State as many facts as you can about a cone.
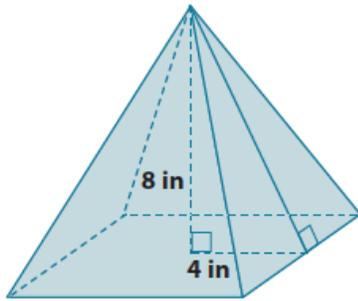

Exercises 3–10

3. What is the lateral length (slant height) of the cone shown below?

4. Determine the exact volume of the cone shown below.

5. What is the lateral length (slant height) of the pyramid shown below? Give an exact square root answer and an approximate answer rounded to the tenths place.
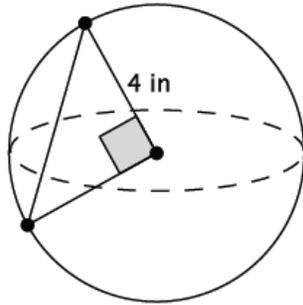

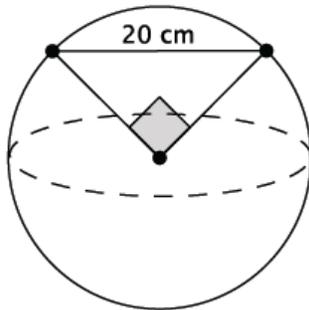6. Determine the volume of the square pyramid shown below. Give an exact answer using a square root.
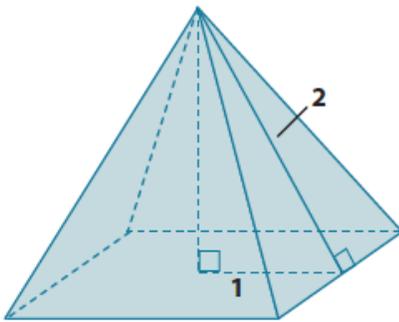
7. What is the length of the chord of the sphere shown below? Give an exact answer using a square root.
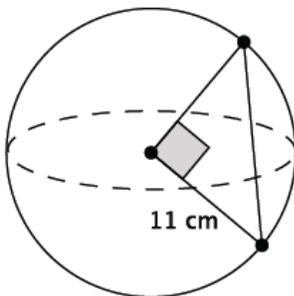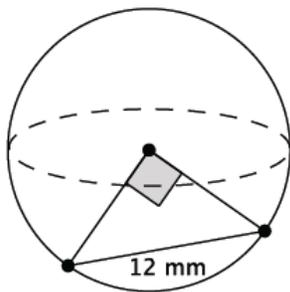
8. What is the length of the chord of the sphere shown below? Give an exact answer using a square root.

9. What is the volume of the sphere shown below? Give an exact answer using a square root.
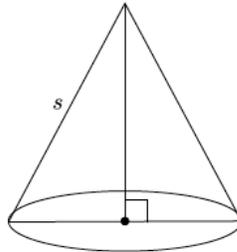

10. What is the volume of the sphere shown below? Give an exact answer using a square root.

Lesson Summary

The volume formula for a right square pyramid is $V = \frac{1}{3}Bh$, where B is the area of the square base.

The lateral length of a cone, sometimes referred to as the slant height, is the side s, shown in the diagram below.

Given the lateral length and the length of the radius, the Pythagorean theorem can be used to determine the height of the cone.

Let O be the center of a circle, and let P and Q be two points on the circle. Then $\overline{PQ}$ is called a chord of the circle.
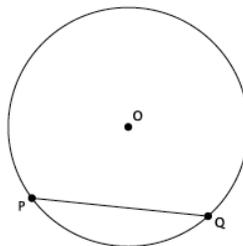

The segments OP and OQ are equal in length because both represent the radius of the circle. If the angle formed by POQ is a right angle, then the Pythagorean theorem can be used to determine the length of the radius when given the length of the chord, or the length of the chord can be determined if given the length of the radius.
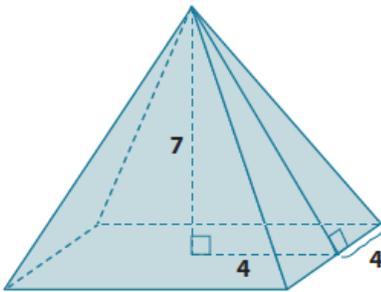
Problem Set

1. What is the lateral length (slant height) of the cone shown below? Give an approximate answer rounded to the tenths place.


10 m

4 m

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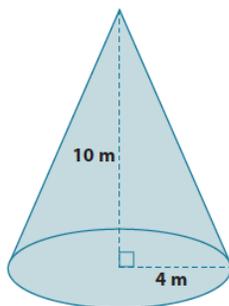
2. What is the volume of the cone shown below? Give an exact answer.
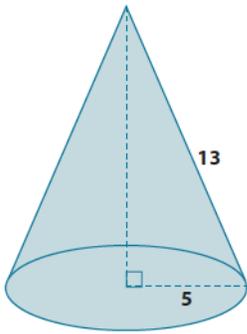
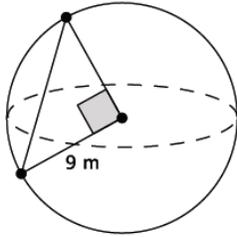3. Determine the volume and surface area of the square pyramid shown below. Give exact answers.

4. Alejandra computed the volume of the cone shown below as 64π cm^3. Her work is shown below. Is she correct? If not, explain what she did wrong, and calculate the correct volume of the cone. Give an exact answer.

$$V = \frac{1}{3}\pi(4)^2(12)$$

$$= \frac{(16)(12)\pi}{3}$$

$$= 64\pi$$
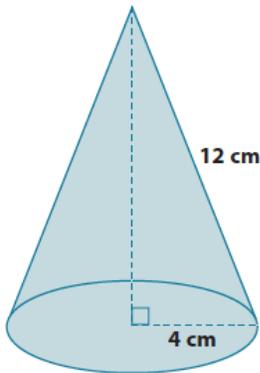
The volume of the cone is 64π cm^3.

5. What is the length of the chord of the sphere shown below? Give an exact answer using a square root.

6. What is the volume of the sphere shown below? Give an exact answer using a square root.