What makes this an important phrase for me to know?

I can find the surface area of three-dimensional figures.

Cones

How does this fit with other words and concepts I know?
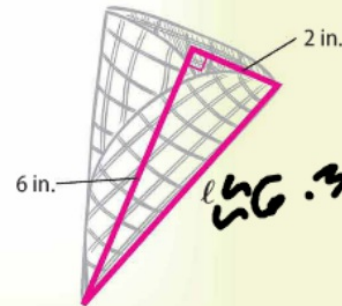
I've already found the surface area of other solids and the volume of a cone.

$$a^2 + b^2 = c^2$$
$$6^2 + 2^2 = \ell^2$$
$$36 + 4 = \ell^2$$
$$40 = \ell^2$$

Real-World Link

Bobbie is making waffle cones from scratch. Use the Pythagorean Theorem to find the slant height ℓ of the cone if the radius is 2 inches and the height is 6 inches. Round to the nearest tenth. **6.3** in.

2 in.

6 in.

$\ell = 6.3$

$S.A = \pi r \underline{l} + \pi r^2$

L.A.   base

a)
$\underline{333.5} + (3.14)(7.5)^2$

$333.5 + 176.625$

$S.A. = 510.125$

↗ 7.5

9. The lateral area of a cone with a diameter of 15 millimeters is about 333.5 square millimeters.

   a. Find the surface area of the cone. Round to the nearest tenth.

   510.2 mm²

   b. What is the slant height of the cone? Round to the nearest tenth.

   14.2 mm

$510.125 = (3.14)(7.5)l + 176.625$

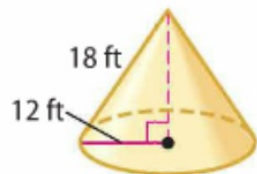$\dfrac{333.875}{(3.14)(7.5)} = \dfrac{(3.14)(7.5)l}{3.14 \quad 7.5}$

$14 = l$

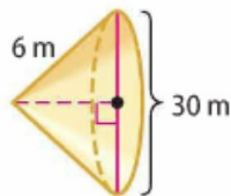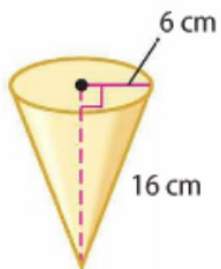**Find the lateral area of each cone. Round to the nearest tenth.** (Example 1)

1. **678.6 ft²**

18 ft
12 ft

2. **282.7 m²**

6 m
30 m

3. **301.6 cm²**

6 cm
16 cm

4. **230.9 m²**

21 m
7 m

Find the surface area of each cone. Round to the nearest tenth. (Example 2)

5. **1,276.3 in²**

20 in.

25 in.

6. **122.5 m²**

3 m

10 m
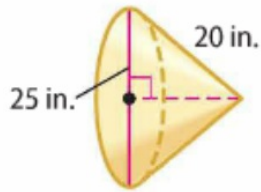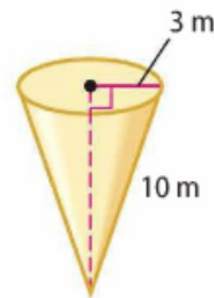
7. A local ice cream shop sells waffle cones dipped in chocolate. The waffle cone has a diameter $2\frac{5}{8}$ inches and a slant height of 6 inches. Find the lateral area of the waffle cone. Round to the nearest tenth. (Example 3)

24.7 in²

8. **ⓔ Building on the Essential Question** How does the volume of a three-dimensional figure differ from its surface area?

Volume is the amount a container holds. Surface area

is the sum of the areas of the surfaces of the figure.

Find the lateral area of each cone. Round to the nearest tenth. (Example 1)

1 **269.2 in²**
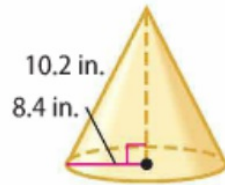
10.2 in.
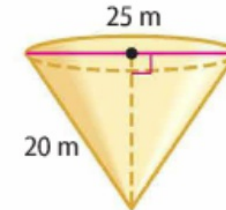8.4 in.

2. **1,979.2 mm²**

35 mm
18 mm

3. **785.4 m²**

25 m
20 m

Show your work.
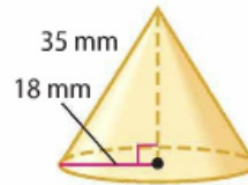
Find the surface area of each cone. Round to the nearest tenth. (Example 2)

4. **2,082.9 in²**
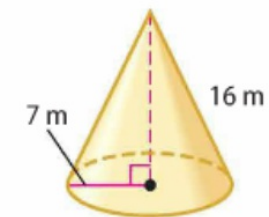
17 in.   22 in.

5. **279.5 cm²**

9 cm
5.95 cm

6. **505.8 m²**

7 m   16 m
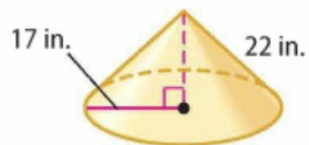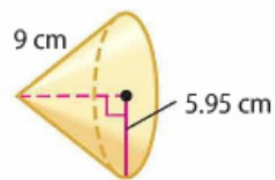
7 A snow cone has a diameter of 1.9 inches and a slant height of 4.5 inches. What is the lateral area of the snow cone? Round to the nearest tenth. *(Example 3)*

13.4 in²

8. An active conical volcano has a radius of about 2.5 kilometers and slant height of about 9.6 kilometers. What is the lateral area of the volcano? Round to the nearest tenth. *(Example 3)* 75.4 km²

9. The lateral area of a cone with a diameter of 15 millimeters is about 333.5 square millimeters.
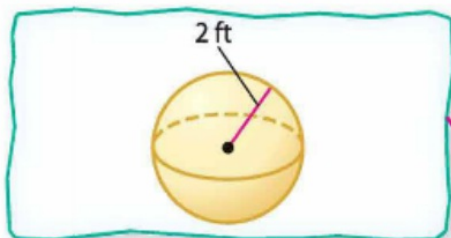
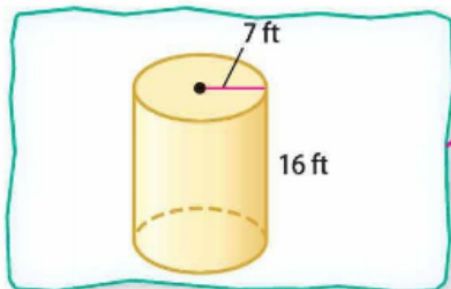 a. Find the surface area of the cone. Round to the nearest tenth.

 510.2 mm²

 b. What is the slant height of the cone? Round to the nearest tenth.

 14.2 mm

10. **CCSS** **Identify Structure** Match the figure with its correct volume or surface area formula.
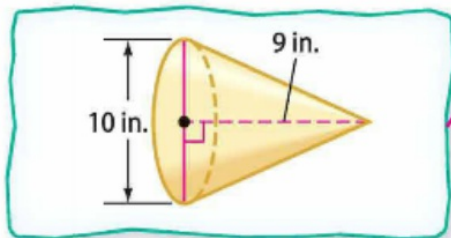
Figures (left):
- Sphere, 2 ft
- Cylinder, 7 ft, 16 ft
- Hemisphere, 3.4 mm
- Cone, 9 in., 10 in.
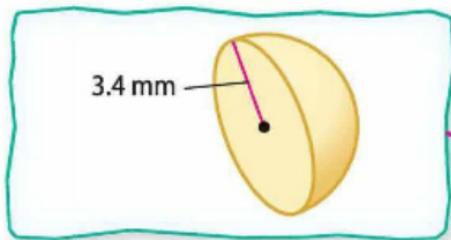
Formulas (right):
- $SA = 2\pi r^2 + 2\pi rh$
- $SA = \pi r l + \pi r^2$
- $V = \dfrac{4}{3}\pi r^3$
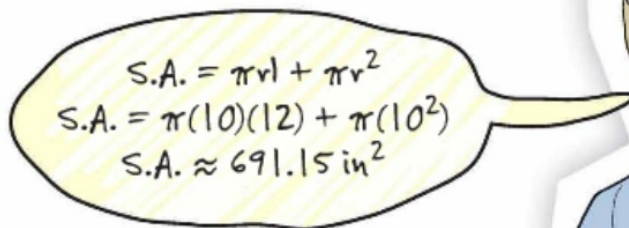- $V = \dfrac{2}{3}\pi r^3$

H.O.T. Problems Higher Order Thinking

11. **CCSS** **Find The Error** Enrique is finding the surface area of a traffic cone. The traffic cone has a diameter of 10 inches and a height of 12 inches. Find his mistake and correct it.

Enrique did not use the right radius. He did not divide the diameter by 2 to get the radius; 267.04 in^2

$$S.A. = \pi r l + \pi r^2$$
$$S.A. = \pi(10)(12) + \pi(10^2)$$
$$S.A. \approx 691.15 \text{ in}^2$$

12. **CCSS** **Persevere with Problems** Draw a cone with a surface area that is between 50 and 100 square units.

See students' work.

13. **CCSS** **Justify Conclusions** Which has a greater surface area: a square pyramid with a base of x units and a slant height of ℓ units or a cone with a diameter of x units and a slant height of ℓ units? Explain your reasoning.

Square pyramid; sample answer: The surface area of the pyramid is $x^2 + 2x\ell$. If you use $\pi \approx 3.14$, the surface area of the cone is $0.785x^2 + 1.57x\ell$. For all positive values of x and ℓ, the surface area of the pyramid is greater than the surface area of the cone.

636 **Chapter 8** Volume and Surface Area