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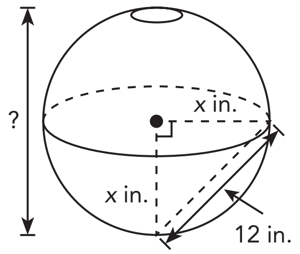
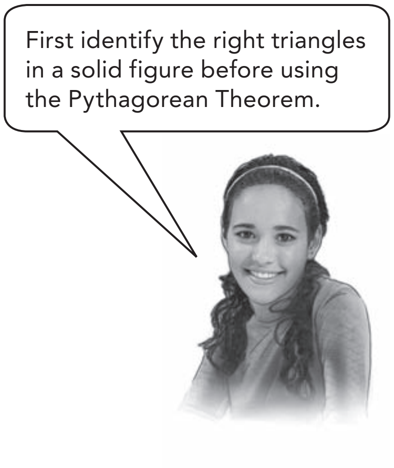
Lesson 7.3 Understanding the Pythagorean Theorem and Solids

Use the Pythagorean Theorem to find unknown side lengths.

Example

Shea uses a spherical bowl shown as a flower vase. Find the diameter of the spherical bowl. Round your answer to the nearest tenth.





Let the radius of the sphere be x inches.

$x^2 + x^2 = 12^2$	Use the Pythagorean Theorem.
$x^2 + x^2 = 144$	Multiply.
$2x^2 = 144$	Add.
$x^2 = 72$	Simplify.
$x = \sqrt{72}$	Find the positive square root.
$x \approx 8.5$	Round to the nearest tenth.

To find the diameter of the sphere, multiply 8.5 by 2.

$2x \approx 2 \cdot 8.5$

$2x \approx 17$

So, the diameter of the spherical bowl is approximately __17__ inches.

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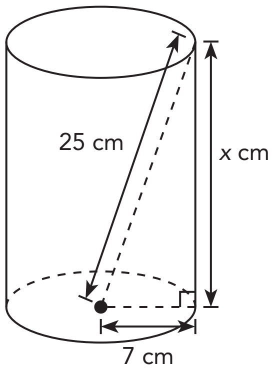
Complete.

1. A cylindrical container is used to contain a chemical liquid.



a) Find the height of the cylindrical container.

Let the height of the cylindrical container be x centimeters.

$\_\_\_\_ + x^2 = \_\_\_\_$	Use the Pythagorean Theorem.
$\_\_\_\_ + x^2 = \_\_\_\_$	Multiply.
$\_\_\_\_ + x^2 - \_\_\_\_ = \_\_\_\_ - \_\_\_\_$	Subtract.
$x^2 = \_\_\_\_$	Simplify.
$x = \_\_\_\_$	Find the positive square root.
$x = \_\_\_\_$	

So, the height of the cylindrical container is ________ centimeters.

b) Find the lateral surface area of the cylindrical container. Use 3.14 as an approximation for π. Round your answer to the nearest tenth.

Lateral surface area of cylindrical container

$= 2\pi rh$	Use formula for finding lateral surface area of cylinder.
$\approx 2 \cdot 3.14 \cdot \_\_\_\_ \cdot \_\_\_\_$	Substitute values for r and h.
$\approx \_\_\_\_$ cm^2	Round to the nearest tenth.

So, the lateral surface area of the cylindrical container is approximately

________ square centimeters.

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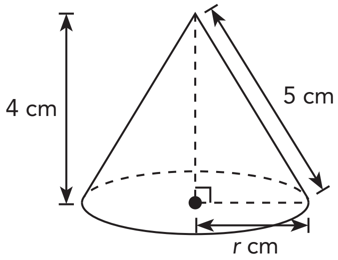
Complete.

2. The height of a cone-shaped paperweight is 4 centimeters. The slant height of the paperweight is 5 centimeters.



a) What is the radius of the paperweight?

Let the radius of the paper weight be r centimeters.

r^2 + ______ = ______ Use the Pythagorean Theorem.

r^2 + ______ = ______ Multiply.

r^2 + ______ − ______ = ______ − ______ Subtract.

r^2 = ______ Simplify.

r = ______ Find the positive square root.

r = ______

So, the radius of the paperweight is ______ centimeters.

b) Find the lateral surface area of the paperweight. Use 3.14 as an approximation for π. Round your answer to the nearest tenth.

Lateral surface area of paperweight

$= \pi r l$ Use formula for finding lateral surface area of cone.

$\approx 3.14 \cdot$ ______ $\cdot$ ______ Substitute values for r and l.

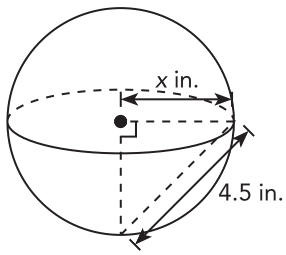
= ______ cm^2 Round to the nearest tenth.

So, the lateral surface area of the paperweight is approximately

______ square centimeters.

For this practice, you may solve using 3.14 as an approximation for π. Round your answer to the nearest tenth.

3. Find the radius of the sphere.



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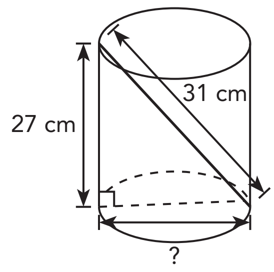
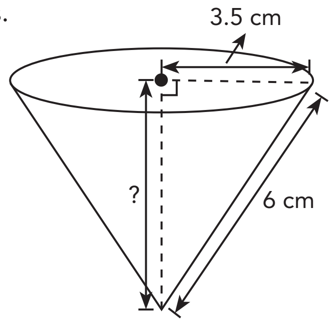
For this practice, you may use a calculator. Use 3.14 as an approximation for π. Round your answer to the nearest tenth.

4. A rod, 31 centimeters in length, fits inside a cylindrical metal tank as shown. The height of the tank is 27 centimeters. Find the diameter of the tank.



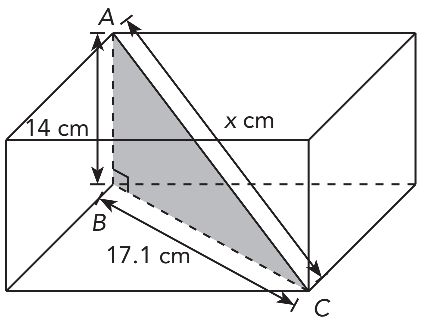
5. A cone has a 3.5 centimeters radius and a slant height of 6 centimeters. Find the height of the cone.



Use the Pythagorean Theorem to find unknown side lengths.

Example

The diagram shows a rectangular box. Find the length of the central diagonal of the box.



$AC^2 = 17.1^2 + 14^2$	Use the Pythagorean Theorem.
$AC^2 = 292.41 + 196$	Multiply.
$AC^2 = 488.41$	Add.
$AC = \sqrt{488.41}$	Find the positive square root.
$AC = 22.1$ cm	

So, the length of the central diagonal of the box is 22.1 centimeters.

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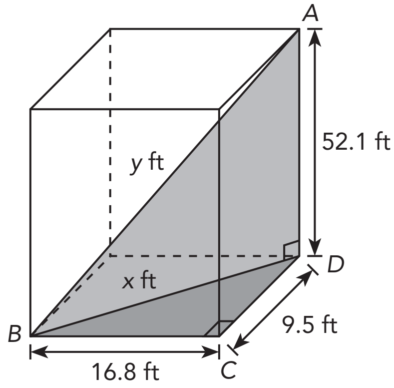
Complete.

6. The diagram shows a large empty carton.



a) Find the length of the diagonal of the base.

BD^2 = ______ + ______	Use the Pythagorean Theorem.
BD^2 = ______ + ______	Multiply.
BD^2 = ______	Add.
BD = ______	Find the positive square root.
BD = ______ ft	

So, the length of the diagonal of the base is ______ feet.

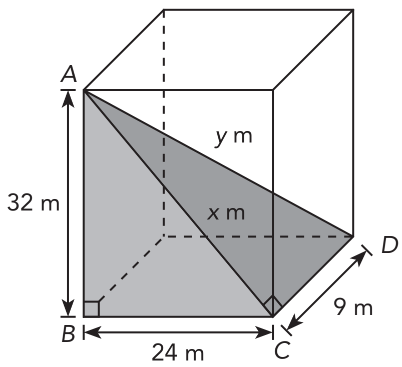
b) Find the length of the central diagonal of the box. Round your answer to the nearest tenth.

$AB^2 = BD^2$ + ______	Use the Pythagorean Theorem.
AB^2 = ______ + ______	Substitute the value of x.
AB^2 = ______ + ______	Multiply.
AB^2 = ______	Add.
AB = ______	Find the positive square root.
$AB \approx$ ______ ft	Round to the nearest tenth.

So, the length of the central diagonal of the box is approximately ______ feet.

Solve. Show your work. Round your answer to the nearest tenth.

7. The diagram shows the dimensions of a rectangular building.



a) Find AC.

b) Find AD.