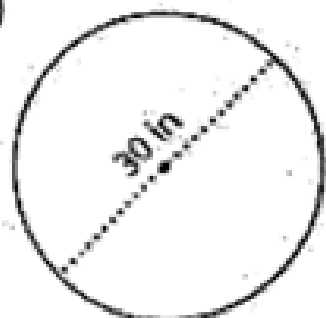


Get out your homework and Warm Up on #1 (A-C) and #2 on the front side.

Classwork - Volume of Cylinders

1) Find the circumference and area of the following circles. Use the 3.14 for  $\pi$ . SHOW WORK and LABEL. Round to the nearest tenth  $\rightarrow$  One number past the decimal point.

A)



$$C = 3.14(30)$$
$$A = 3.14(15^2)$$

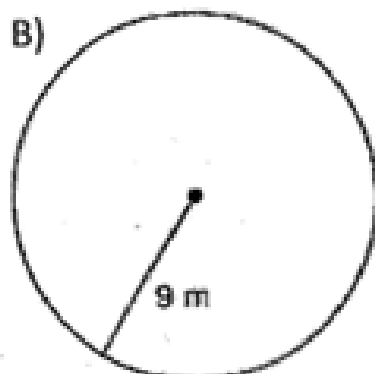
$$r = \underline{15 \text{ in}}$$

$$d = \underline{30 \text{ in}}$$

$$C = \underline{94.2 \text{ in}}$$

$$A = \underline{706.5 \text{ in}^2}$$

B)



$$C = 3.14(2)(9)$$
$$A = 3.14(9^2)$$

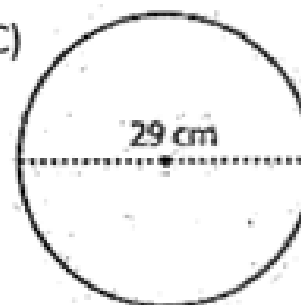
$$r = \underline{9 \text{ m}}$$

$$d = \underline{18 \text{ m}}$$

$$C = \underline{56.5 \text{ m}}$$

$$A = \underline{254.3 \text{ m}^2}$$

C)



$$C = 3.14(29)$$
$$A = 3.14(14.5^2)$$

$$r = \underline{14.5 \text{ cm}}$$

$$d = \underline{29 \text{ cm}}$$

$$C = \underline{91.1 \text{ cm}}$$

$$A = \underline{660.2 \text{ cm}^2}$$

2) Find the distance around and area of the figure below. Use the 3.14 for  $\pi$ . SHOW WORK and LABEL. Round to the nearest tenth  $\rightarrow$  One number past the decimal point.



$$d = 28 \text{ yd}$$

$$C = 3.14(2)(14) \\ = 87.92 \text{ yd}$$

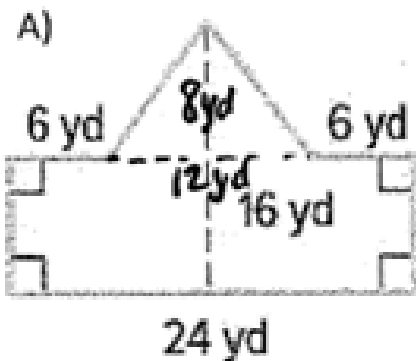
$$\frac{87.92}{2} = 43.96 + 28 = 71.96$$

$$A = 3.14(14^2) \\ = \frac{607.6 \text{ yd}^2}{2} = 303.8$$

$$\text{Distance around} = \underline{71.96 \text{ yd}}$$

$$\text{Area} = \underline{303.8 \text{ yd}^2}$$

3) Find the area of the following 2D composite figures. SHOW WORK AND LABEL.



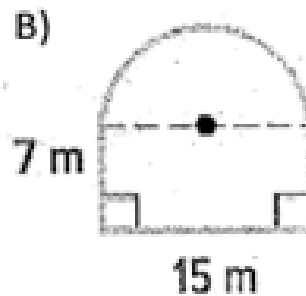
8 yd

$$A \text{ of } \square = 8 \cdot 24 \\ = 192 \text{ yd}^2$$

$$A \text{ of } \triangle = \frac{1}{2}(12)(8) \\ = 48 \text{ yd}^2$$

$$192 + 48 = 240$$

$$A = \underline{240 \text{ yd}^2}$$



$$d = 15 \text{ m} \quad A \text{ of } \square = 7 \cdot 15 = 105 \text{ m}^2$$

$$r = 7.5 \text{ m} \quad A \text{ of } \triangle = 3.14(7.5^2) \\ = \frac{176.625 \text{ m}^2}{2} \\ = 88.3125$$

$$105 + 88.3 = 193.3 \quad A = \underline{193.3 \text{ m}^2}$$

A) Surface Area

Front + Back  $\rightarrow 5 \cdot 6 = 30 \text{ cm}^2$

$30 \cdot 2 = 60 \text{ cm}^2$

Sides  $\rightarrow 5 \cdot 14 = 70 \text{ cm}^2$

$70 \cdot 2 = 140 \text{ cm}^2$

Front and Back  $\rightarrow$

Top + Bottom  $\rightarrow 6 \cdot 14 = 84 \text{ cm}^2$

$84 \cdot 2 = 168 \text{ cm}^2$

60  
+140  
+168

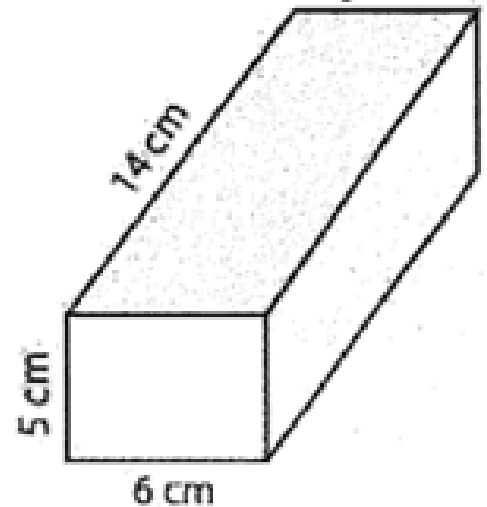
SA = 368 cm<sup>2</sup>

Volume

$V = lwh$   
 $V = 14 \cdot 5 \cdot 6$

$V = 420 \text{ cm}^3$

Figure Name: Rectangular Prism



B) Surface Area

F+B  $\rightarrow \frac{1}{2} \cdot 5 \cdot 12 = 30 \text{ ft}^2$

$30 \cdot 2 = 60 \text{ ft}^2$

Top  $\square \rightarrow 11 \cdot 13 = 143 \text{ ft}^2$

Bottom  $\square \rightarrow 12 \cdot 11 = 132 \text{ ft}^2$

Left  $\square \rightarrow 5 \cdot 11 = 55 \text{ ft}^2$

SA = 390 ft<sup>2</sup>

Volume

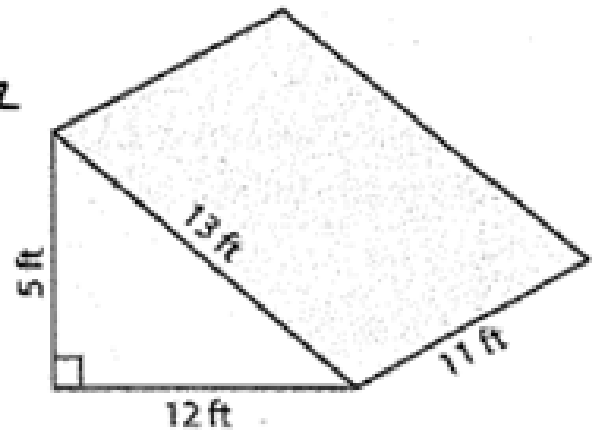
$V = Bh$

$B = \frac{1}{2} (5)(12) = 30 \text{ ft}^2$

$V = 30 \text{ ft}^2 (11 \text{ ft})$

$V = 330 \text{ ft}^3$

Figure Name: Triangular Prism



C) Surface Area

$$F+B \rightarrow \frac{1}{2}(8)(12) = 48 \text{ cm}^2$$

$$48 \cdot 2 = 96 \text{ cm}^2$$

$$\text{Bottom } \square \rightarrow 12 \cdot 11 = 132 \text{ cm}^2$$

$$L+R \square \rightarrow 10 \cdot 11 = 110 \text{ cm}^2$$

$$110 \cdot 2 = 220 \text{ cm}^2$$

$$\text{SA} = 448 \text{ cm}^2$$

D) Surface Area

$$A \text{ of } \square = 4 \cdot 4 = 16 \text{ cm}^2$$

$$16 \cdot 6 = 96 \text{ cm}^2$$

$$\text{SA} = 96 \text{ cm}^2$$

Volume

$$B = \frac{1}{2}(8)(12) = 48 \text{ cm}^2$$

$$V = 48 \text{ cm}^2(11)$$

$$= 528 \text{ cm}^3$$

Volume

$$V = 4 \cdot 4 \cdot 4$$

$$V = 64 \text{ cm}^3$$

Figure Name: triangular Prism

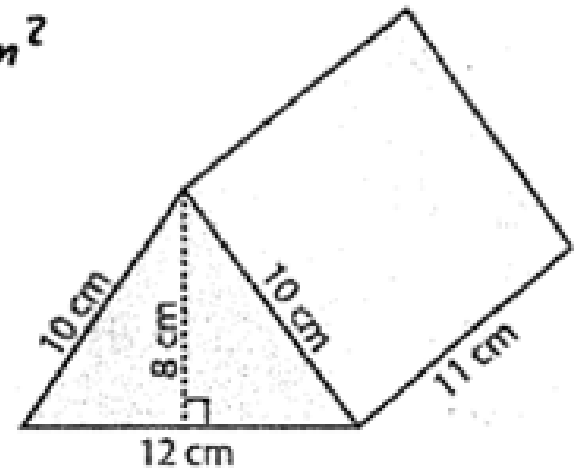
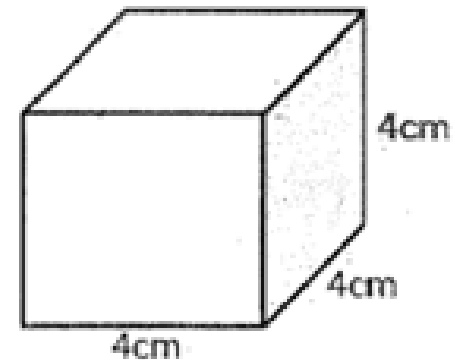


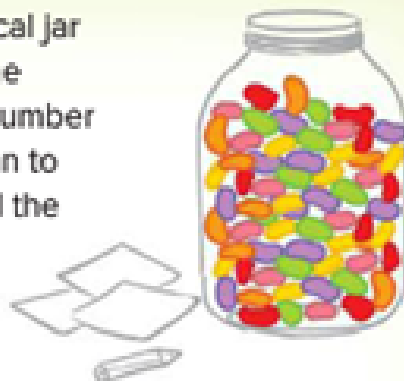
Figure Name: Cube





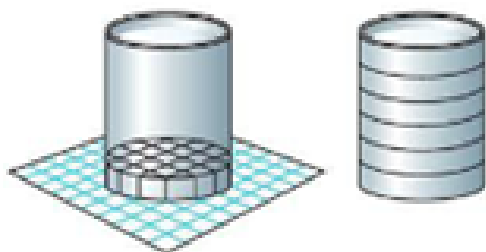
## Real-World Link

**Jelly Beans** Olivia's teacher filled a cylindrical jar with jelly beans. She is awarding a prize to the student who most accurately estimates the number of jelly beans in the jar. Olivia used a soup can to model the jar and centimeter cubes to model the jelly beans.



Work with a partner.

1. Set a soup can on a piece of grid paper. Trace the area around the base as shown.



2. Suppose each layer is 1 centimeter high. How many layers would it take to fill the cylinder?
3. **MP Be Precise** Write a formula that allows you to find the volume of the container. \_\_\_\_\_

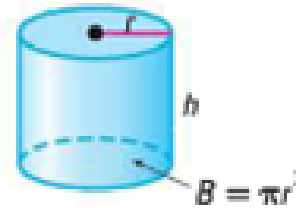
About how many centimeter cubes would fit at the bottom of the container? Remember to include partial cubes in your total. \_\_\_\_\_

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## Volume of a Cylinder

**Words** The volume  $V$  of a cylinder with radius  $r$  is the area of the base  $B$  times the height  $h$ .

**Symbols**  $V = Bh$ , where  $B = \pi r^2$  or  $V = \pi r^2 h$



$B = \text{Area of Circle base}$

**Volume** is the measure of the space occupied by a solid. Volume is measured in cubic units. A **cylinder** is a three-dimensional figure with two parallel congruent circular bases connected by a curved surface. The area of the base of a cylinder tells the number of cubic units in one layer. The height tells how many layers there are in the cylinder.

## Examples



- 1.** Find the volume of the cylinder.  
Round to the nearest tenth.

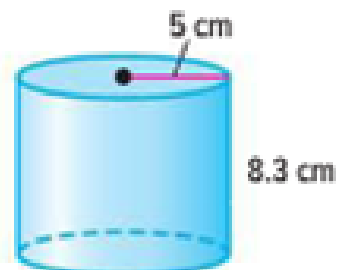
$$V = \pi r^2 h \quad \text{Volume of a cylinder}$$

$$V = \pi(5)^2(8.3) \quad \text{Replace } r \text{ with } 5 \text{ and } h \text{ with } 8.3.$$

Use a calculator.

$$\boxed{2\text{nd}} \boxed{[\pi]} \boxed{\times} \boxed{5} \boxed{x^2} \boxed{\times} \boxed{8.3} \boxed{\text{ENTER}} \quad 651.8804756$$

The volume is about 651.9 cubic centimeters.



- 
- 2.** Find the volume of a cylinder with a diameter of 16 inches and a height of 20 inches. Round to the nearest tenth.

$$V = \pi r^2 h \quad \text{Volume of a cylinder}$$

$$V = \pi(8)^2(20) \quad \text{The diameter is } 16 \text{ so the radius is } 8. \text{ Replace } h \text{ with } 20.$$

$$V \approx 4,021.2 \quad \text{Use a calculator.}$$

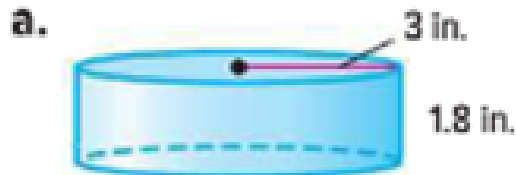
The volume is about 4,021.2 cubic inches.



$$V = Bh$$

Got it? Do these problems to find out.

Find the volume of each cylinder. Round to the nearest tenth.



b. diameter: 12 mm  $r = 6$  mm  
height: 5 mm

$$B = 3.14(3^2) = 28.3 \text{ in}^2$$

$$V = 28.3(1.8) = 50.9 \text{ in}^3$$

$$V = 3.14(6^2) \cdot 5$$

$$V = 113.04(5)$$

$$V = 565.2 \text{ mm}^3$$



## Example



- 3.** A metal paperweight is in the shape of a cylinder. The paperweight has a height of 1.5 inches and a diameter of 2 inches. How much does the paperweight weigh if 1 cubic inch weighs 1.8 ounces? Round to the nearest tenth.

First find the volume of the paperweight.

$$V = \pi r^2 h \quad \text{Volume of a cylinder}$$

$$V = \pi (1)^2 1.5 \quad \text{Replace } r \text{ with } 1 \text{ and } h \text{ with } 1.5.$$

$$V \approx 4.7 \quad \text{Simplify.}$$

To find the weight of the paperweight, multiply the volume by 1.8.

$$4.7(1.8) = 8.46$$

So, the weight of the paperweight is about 8.5 ounces.

**Got it?** Do this problem to find out.

- c. The Roberts family uses a container shaped like a cylinder to recycle aluminum cans. It has a height of 4 feet and a diameter of 1.5 feet. The container is full. How much do the contents weigh if the average weight of aluminum cans is 37 ounces per cubic foot? Round to the nearest tenth.

$$d = 1.5 \text{ ft} \quad r = 0.75 \text{ ft} \quad h = 4 \text{ ft}$$

$$B = 3.14(0.75^2) = 1.8 \text{ ft}^2$$

$$V = 1.8(4) = 7.1 \text{ ft}^3$$

$$7.1(37) = 262.7 \text{ ounces}$$

# Volume of a Composite Solid

Objects made up of more than one type of solid are called **composite solids**. To find the volume of a composite solid, decompose the figure into solids whose volumes you know how to find.

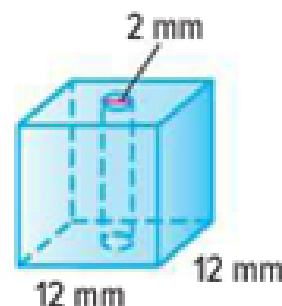


## Example



- 4.** Tanya uses cube-shaped beads to make jewelry. Each bead has a circular hole through the middle. Find the volume of each bead.

The bead is made of one rectangular prism and one cylinder. Find the volume of each solid. Then subtract to find the volume of the bead.



**Rectangular Prism**

$$V = Bh$$

$$V = (12 \cdot 12)12 \text{ or } 1,728$$

**Cylinder**

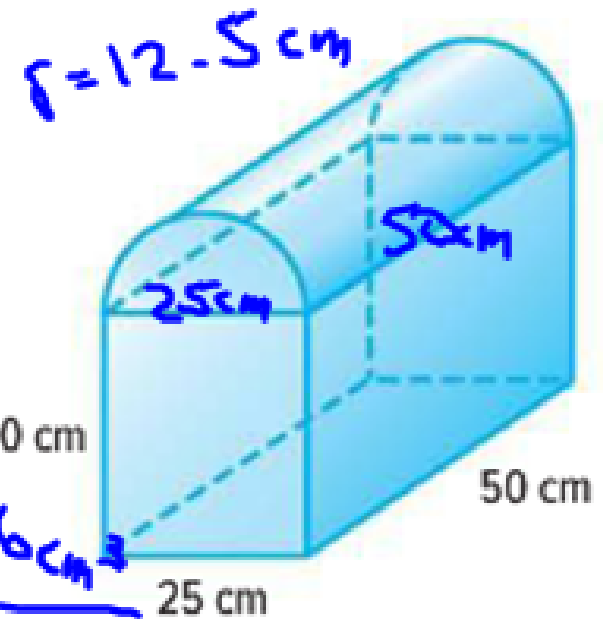
$$V = Bh$$

$$V = (\pi \cdot 1^2)12 \text{ or } 37.7$$

The volume of the bead is  $1,728 - 37.7$  or 1,690.3 cubic millimeters.

**Got it?** Do this problem to find out.

- d. The Service Club is building models of storage chests, like the one shown, to donate to a charity. Find the volume of the chest to the nearest tenth.



$$V \text{ of } \frac{1}{2} \text{ cyl.} = 3.14(12.5^2) \cdot 50 \\ = 24531.25 \div 2 = \underline{12265.6 \text{ cm}^3}$$

$$V \text{ of } \square = 30 \cdot 25 \cdot 50 = \underline{37500 \text{ cm}^3}$$

$$V = 49765.6 \text{ cm}^3$$