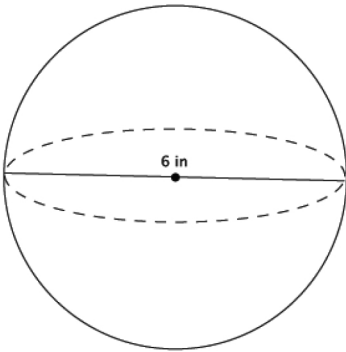


Name \_\_\_\_\_

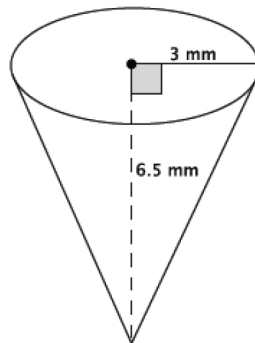
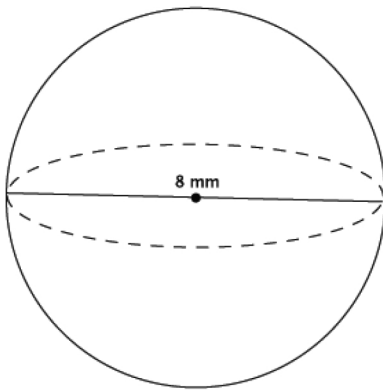
Date \_\_\_\_\_

## Volume of a Sphere

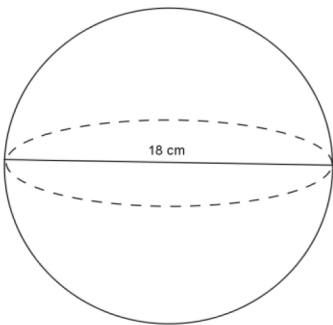
1. What is the volume of the sphere shown below?



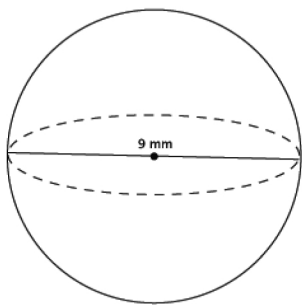
2. Which of the two figures below has the greater volume?



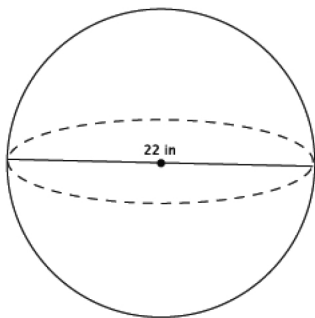
1. Use the diagram to find the volume of the sphere.



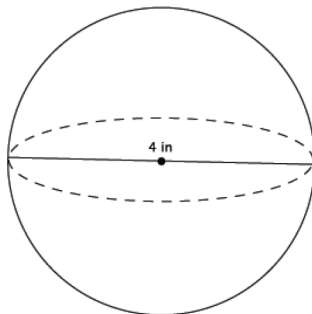
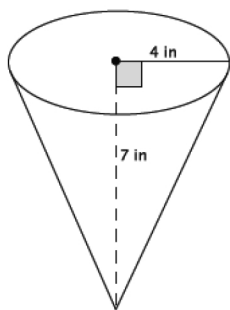
2. Determine the volume of a sphere with diameter 9 mm, shown below.



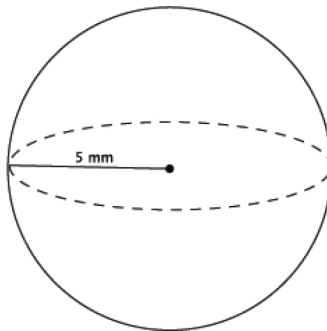
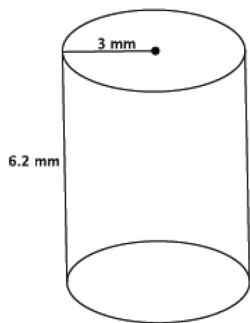
3. Determine the volume of a sphere with diameter 22 in., shown below.



4. Which of the two figures below has the lesser volume?



5. Which of the two figures below has the greater volume?



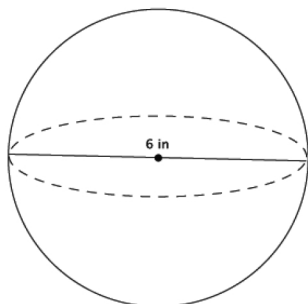
6. Bridget wants to determine which ice cream option is the best choice. The chart below gives the description and prices for her options. Use the space below each item to record your findings.

\$2.00	\$3.00	\$4.00
1 scoop in a cup	2 scoops in a cup	3 scoops in a cup
Half a scoop on a cone filled with ice cream		A cup filled with ice cream (level to the top of the cup)

A scoop of ice cream is considered a perfect sphere and has a 2-inch diameter. A cone has a 2-inch diameter and a height of 4.5 inches. A cup, considered a right circular cylinder, has a 3-inch diameter and a height of 2 inches.

- a. Determine the volume of each choice. Use 3.14 to approximate  $\pi$ .
- b. Determine which choice is the best value for her money. Explain your reasoning.

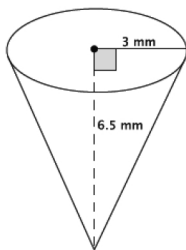
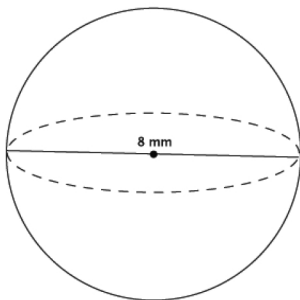
1. What is the volume of the sphere shown below?



$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}\pi(6^3) \\ &= \frac{108}{3}\pi \\ &= 36\pi \end{aligned}$$

The volume of the sphere is  $36\pi \text{ in}^3$ .

2. Which of the two figures below has the greater volume?



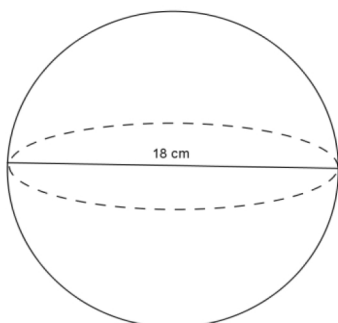
$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}\pi(8^3) \\ &= \frac{256}{3}\pi \\ &= 85\frac{1}{3}\pi \end{aligned}$$

The volume of the sphere is  $85\frac{1}{3}\pi \text{ mm}^3$ .

$$\begin{aligned} V &= \frac{1}{3}\pi r^2 h \\ &= \frac{1}{3}\pi(3^2)(6.5) \\ &= \frac{58.5}{3}\pi \\ &= 19.5\pi \end{aligned}$$

The volume of the cone is  $19.5\pi \text{ mm}^3$ . The sphere has the greater volume.

1. Use the diagram to find the volume of the sphere.



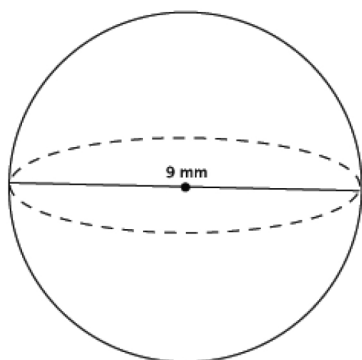
$$V = \frac{4}{3}\pi r^3$$

$$V = \frac{4}{3}\pi(9^3)$$

$$V = 972\pi$$

The volume of the sphere is  $972\pi \text{ cm}^3$ .

2. Determine the volume of a sphere with diameter 9 mm, shown below.



$$V = \frac{4}{3}\pi r^3$$

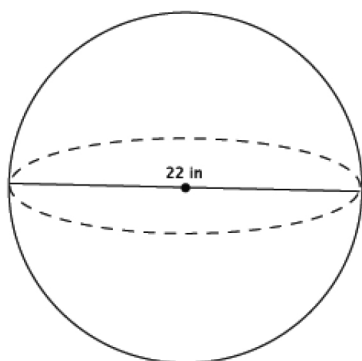
$$= \frac{4}{3}\pi(4.5^3)$$

$$= \frac{364.5}{3}\pi$$

$$= 121.5\pi$$

The volume of the sphere is  $121.5\pi \text{ mm}^3$ .

3. Determine the volume of a sphere with diameter in., shown below.



$$V = \frac{4}{3}\pi r^3$$

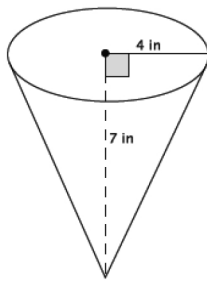
$$= \frac{4}{3}\pi(11^3)$$

$$= \frac{5324}{3}\pi$$

$$= 1774\frac{2}{3}\pi$$

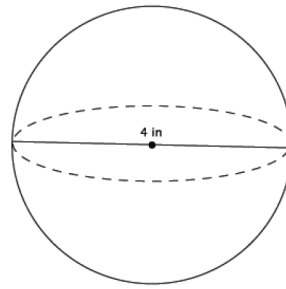
The volume of the sphere is  $1774\frac{2}{3}\pi \text{ in}^3$ .

4. Which of the two figures below has the lesser volume?



*The volume of the cone:*

$$\begin{aligned} V &= \frac{1}{3}\pi r^2 h \\ &= \frac{1}{3}\pi(16)(7) \\ &= \frac{112}{3}\pi \\ &= 37\frac{1}{3}\pi \text{ in}^3 \end{aligned}$$

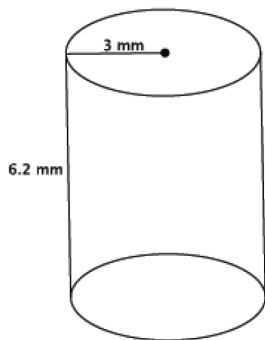


*The volume of the sphere:*

$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}\pi(2^3) \\ &= \frac{32}{3}\pi \\ &= 10\frac{2}{3}\pi \text{ in}^3 \end{aligned}$$

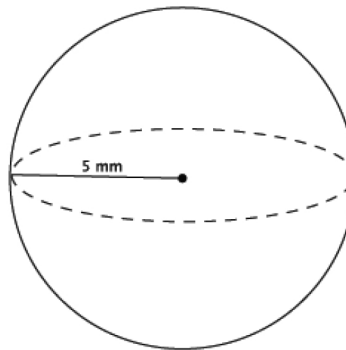
*The sphere has less volume.*

5. Which of the two figures below has the greater volume?



*The volume of the cylinder:*

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi(3^2)(6.2) \\ &= 55.8\pi \text{ mm}^3 \end{aligned}$$



*The volume of the sphere:*

$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}\pi(5^3) \\ &= \frac{500}{3}\pi \\ &= 166\frac{2}{3}\pi \text{ mm}^3 \end{aligned}$$

*The sphere has the greater volume.*

6. Bridget wants to determine which ice cream option is the best choice. The chart below gives the description and prices for her options. Use the space below each item to record your findings.

\$2.00	\$3.00	\$4.00
One scoop in a cup	Two scoops in a cup	Three scoops in a cup
$V \approx 4.19 \text{ in}^3$	$V \approx 8.37 \text{ in}^3$	$V \approx 12.56 \text{ in}^3$
Half a scoop on a cone filled with ice cream		A cup filled with ice cream (level to the top of the cup)
$V \approx 6.8 \text{ in}^3$		$V \approx 14.13 \text{ in}^3$

A scoop of ice cream is considered a perfect sphere and has a 2-inch diameter. A cone has a 2-inch diameter and a height of 4.5 inches. A cup, considered a right circular cylinder, has a 3-inch diameter and a height of 2 inches.

- a. Determine the volume of each choice. Use 3.14 to approximate  $\pi$ .

First, find the volume of one scoop of ice cream.

$$\text{Volume of one scoop} = \frac{4}{3}\pi(1^3)$$

The volume of one scoop of ice cream is  $\frac{4}{3}\pi \text{ in}^3$ , or approximately  $4.19 \text{ in}^3$ .

The volume of two scoops of ice cream is  $\frac{8}{3}\pi \text{ in}^3$ , or approximately  $8.37 \text{ in}^3$ .

The volume of three scoops of ice cream is  $\frac{12}{3}\pi \text{ in}^3$ , or approximately  $12.56 \text{ in}^3$ .

$$\text{Volume of half scoop} = \frac{2}{3}\pi(1^3)$$

The volume of half a scoop of ice cream is  $\frac{2}{3}\pi \text{ in}^3$ , or approximately  $2.09 \text{ in}^3$ .

$$\text{Volume of cone} = \frac{1}{3}(\pi r^2)h$$

$$V = \frac{1}{3}(\pi 1^2)4.5$$

$$V = 1.5\pi$$

The volume of the cone is  $1.5\pi \text{ in}^3$ , or approximately  $4.71 \text{ in}^3$ . Then, the cone with half a scoop of ice cream on top is approximately  $6.8 \text{ in}^3$ .

$$V = \pi r^2 h$$

$$V = \pi 1.5^2(2)$$

$$V = 4.5\pi$$

The volume of the cup is  $4.5\pi \text{ in}^3$ , or approximately  $14.13 \text{ in}^3$ .



- b. Determine which choice is the best value for her money. Explain your reasoning.

*Student answers may vary.*

*Checking the cost for every in<sup>3</sup> of each choice:*

$$\frac{2}{4.19} \approx 0.47723 \dots$$

$$\frac{2}{6.8} \approx 0.29411 \dots$$

$$\frac{3}{8.37} \approx 0.35842 \dots$$

$$\frac{4}{12.56} \approx 0.31847 \dots$$

$$\frac{4}{14.13} \approx 0.28308 \dots$$

*The best value for her money is the cup filled with ice cream since it costs about 28 cents for every in<sup>3</sup>.*