Lesson 11: Volume of a Sphere

Classwork

Exercises 1–3

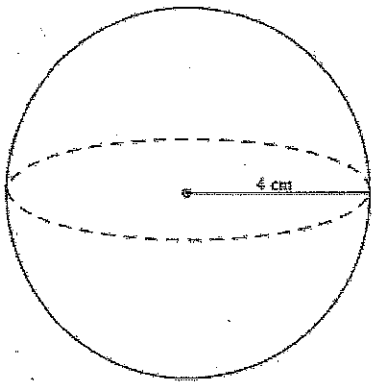
1. What is the volume of a cylinder?

2. What is the height of the cylinder?

3. If $volume(sphere) = \frac{2}{3} volume(cylinder\ with\ same\ diameter\ and\ height)$, what is the formula for the volume of a sphere?

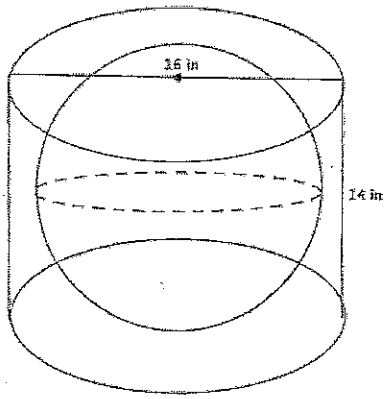
Example 1

Compute the exact volume for the sphere shown below.



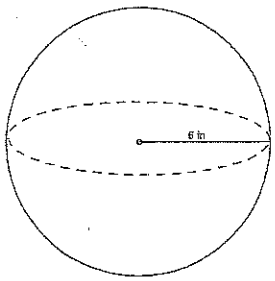
Example 2

A cylinder has a diameter of 16 inches and a height of 14 inches. What is the volume of the largest sphere that will fit into the cylinder?



Exercises4–8

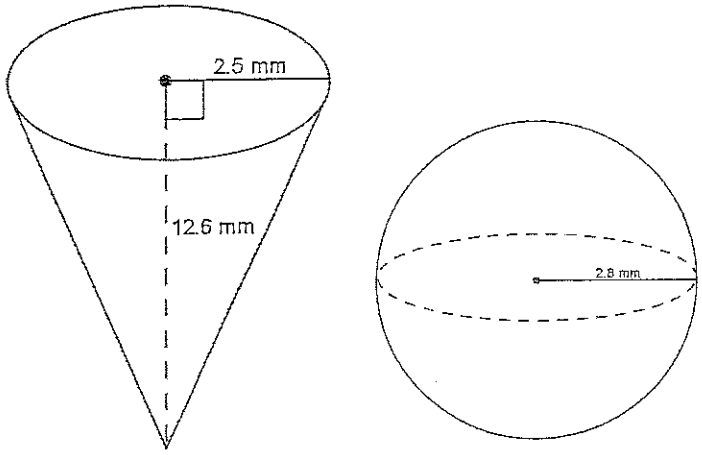
4. Use the diagram and the general formula to find the volume of the sphere.



5. The average basketball has a diameter of 9.5 inches. What is the volume of an average basketball? Round your answer to the tenths place.

6. A spherical fish tank has a radius of 8 inches. Assuming the entire tank could be filled with water, what would the volume of the tank be? Round your answer to the tenths place.

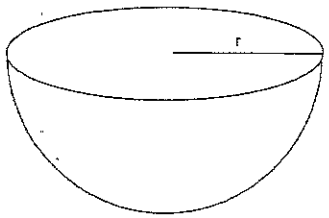
7. Use the diagram to answer the questions.



a. Predict which of the figures below has the greater volume. Explain.

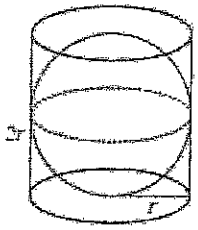
b. Use the diagram to find the volume of each and determine which has the larger volume.

8. One of two half spheres formed by a plane through the spheres center is called a hemisphere. What is the formula for the volume of a hemisphere?

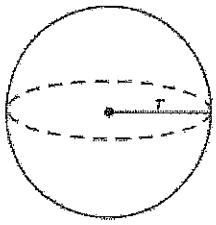


Lesson Summary

The formula to find the volume of a sphere is directly related to that of the right circular cylinder. Given a right circular cylinder with radius r and height h, which is equal to $2r$, a sphere with the same radius r has a volume that is exactly two-thirds of the cylinder.

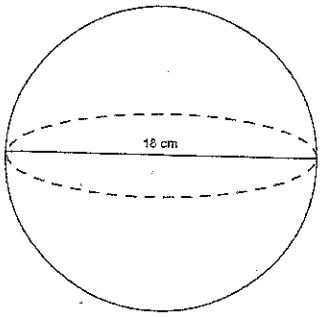


Therefore, the volume of a sphere with radius r has a volume given by the formula $V = \frac{4}{3}\pi r^3$.

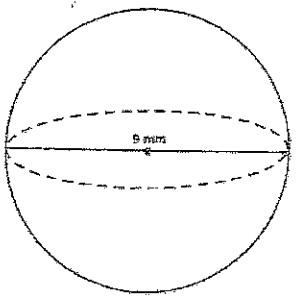


Problem Set

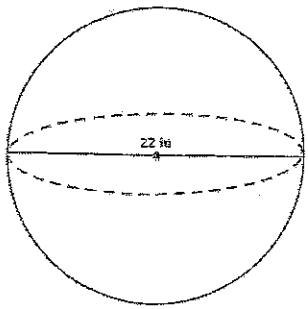
1. Use the diagram to find the volume of the sphere.



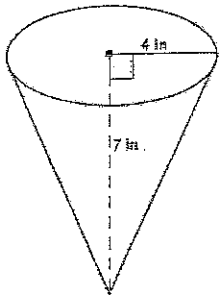
2. Determine the volume of a sphere with diameter 9 mm, shown below.

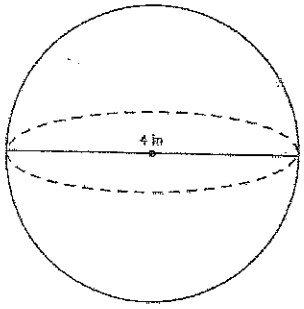


3. Determine the volume of a sphere with diameter 22 in., shown below.



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





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