**2.*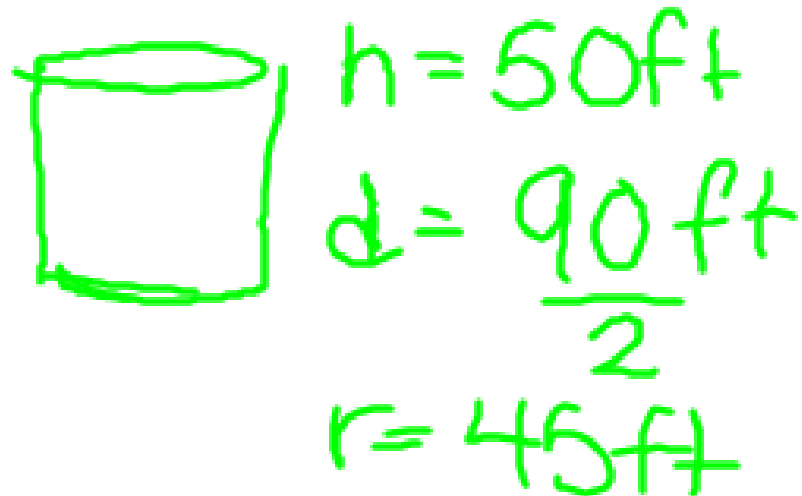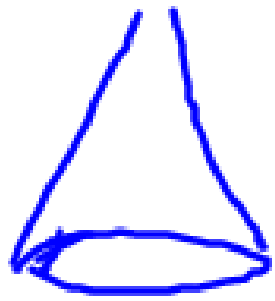* Some grain silos are in the shape of cylinders with conical tops. The inside diameter of a silo is 90 feet. The height inside the cylinder is 50 feet. The height inside the cone is 30 feet. Determine the capacity of the silo. Round your answer to the nearest cubic foot.

$h = 50 ft$

$d = \dfrac{90 ft}{2}$

$r = 45 ft$

$V = \pi r^2 h$

$V = \pi (45)^2 (50)$

$= \pi (2025)(50)$

$V = 318086.2562 ft^3$

$V = 318086.26 ft^3$

$h = 30 \, ft$

$r = 45 \, ft$

$V_{TOT} = V_{cyn} + V_{cone}$

$V_T = 38086.26 \, ft^3 + 63617.25 \, ft^3$

$V = \dfrac{\pi r^2 h}{3}$

$V = \pi (45)^2 (30) / 3$

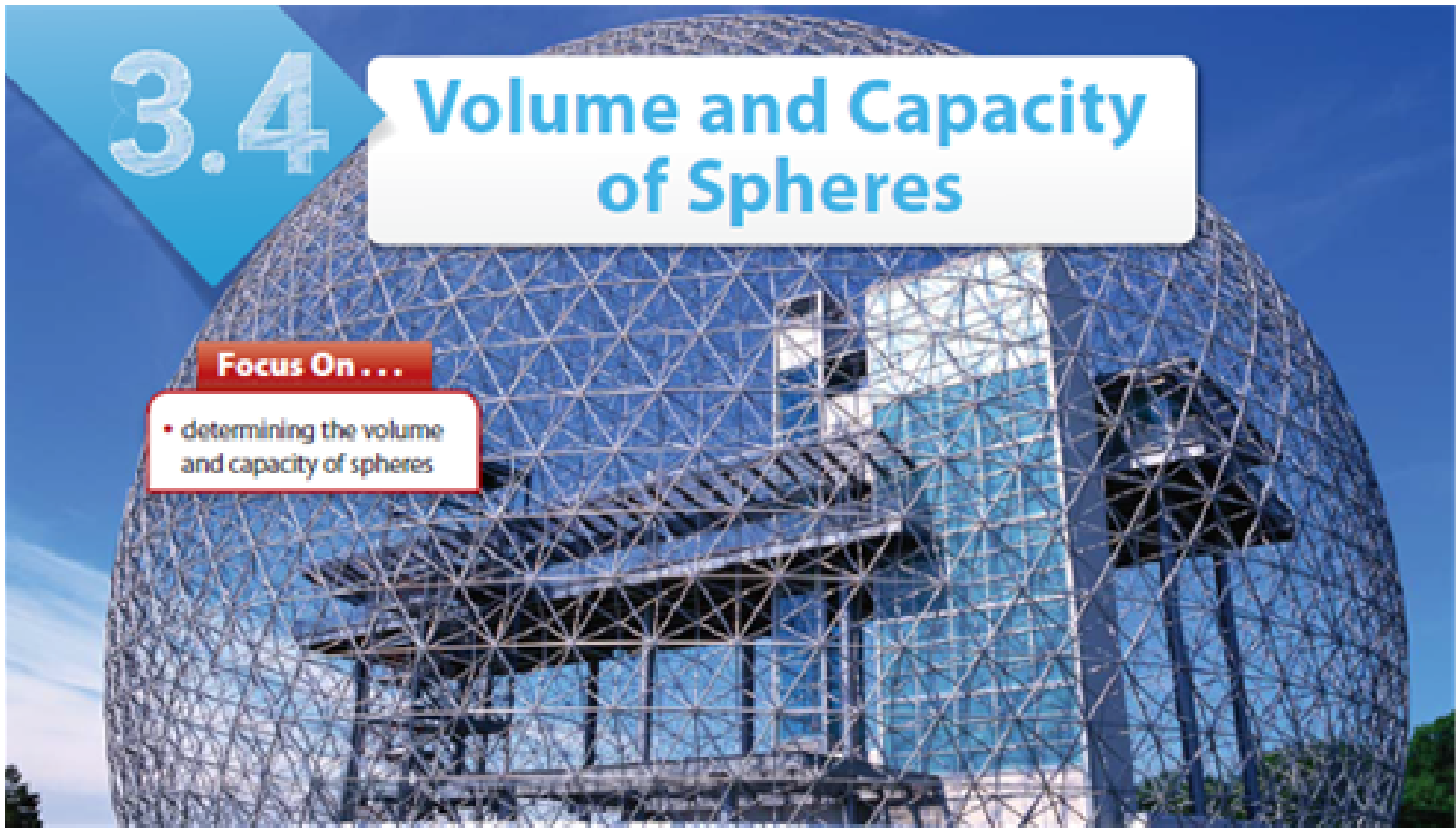$V = \pi (2025)(30) / 3$

$V_T = 381703.51 \, ft^3$

$V = \dfrac{190511.7537}{3}$
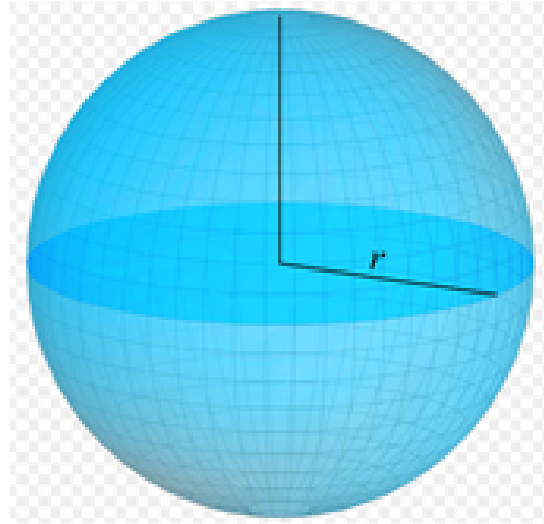
$V = 63617.25 \, ft^3$

3.4 Volume and Capacity of Spheres

Focus On...

- determining the volume and capacity of spheres

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

Determine the Volume of a Sphere

A company supplies accessories for the game of pool. Pool balls today are generally made of plastic resins. The balls are numbered 1 through 15. Each has a diameter of 5.8 cm.

a) What is the volume of the material used to make one ball? Express your answer in cubic centimetres.

b) In a standard game of pool, you use 15 balls. What is the total volume of 15 balls, to the nearest hundredth of a cubic metre?

$$V = \frac{4\pi r^3}{3} \qquad d = \frac{5.8 \text{ cm}}{2}$$

$$r = 2.9 \text{ cm}$$

$$V = \frac{4\pi (2.9)^3}{3} \qquad \rightarrow \quad V = \frac{306.4812}{3}$$

$$V = \frac{4\pi (24.389)}{3} \qquad V = 102.16 \text{ cm}^3$$

$V = 102.16 \ cm^3$ — Volume of 1 pool ball

V of 15 pool balls?

$15 \times 102.16 \ cm^3$

$V = 1532.41 \ cm^3$

Convert to m

cm → m

small → big

$1532.41 \ cm^3 \times \dfrac{1 \ m}{100 \ cm} \times \dfrac{1 \ m}{100 \ cm} \times \dfrac{1 \ m}{100 \ cm}$

$0.0015 \ m^3$

Your Turn:

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

2. The basketballs used by the National Basketball Association (NBA) have a circumference of 75 cm.

   a) Determine the radius of an NBA basketball. Round your answer to the nearest tenth of a centimetre.
   Hint: The formula for the circumference of a circle is
   $C = \pi d$ or $C = 2\pi r$.

   $$\frac{75}{\pi} = \frac{\pi d}{\pi} \qquad d = 23.87 \qquad r = 11.94 \text{ cm}$$

   b) Calculate the volume of a basketball. Round your answer to the nearest tenth of a cubic centimetre.

   c) A basketball is generally made of leather that is 1.5 mm thick. Determine the interior diameter of a basketball, to the nearest tenth of a centimetre.

   d) Calculate the capacity of the inside of a basketball. Round your answer to the nearest tenth of a cubic centimetre.

$$r = 11.94$$

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

$1'$

$$V = \frac{4\pi (11.94)^3}{3}$$

$$V = \frac{4\pi (1685.159)}{3}$$

$$V = \frac{21176.3325}{3} \longrightarrow V = 7058.78\ cm^3$$

width → 1.5 mm

mm → cm
small → big

$1.5 mm \times \dfrac{1 cm}{10 mm} = 0.15 cm$

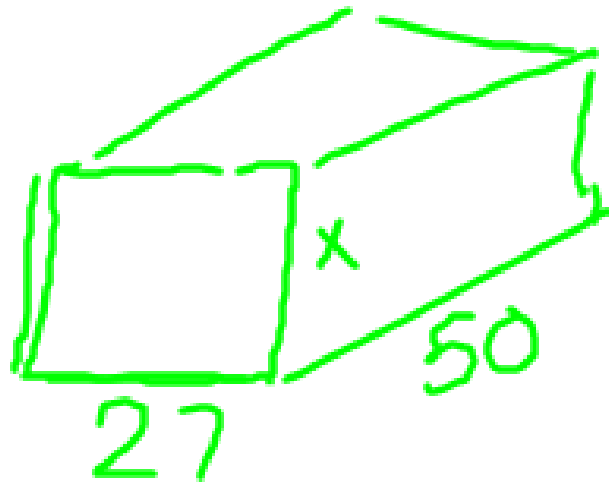→ $0.15 cm \times 2 = 0.3 cm$

$d = 23.87$

$23.87 - 0.3$

$d = 23.57 cm$

$r = 11.785$

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

$V = \dfrac{4\pi (11.785)^3}{3}$

$V = 6856.1 cm^3$

The volume of a rectangular prism is 185cm³. If the length of the prism is 50 cm and the with is 27 cm what is the height?

$$V = Area_{base} \times h$$

$$\frac{cm \times cm \times cm}{cm \times cm}$$

$$V = \ell w h$$

$$185 \, cm^3 = (50cm)(27cm) \, h$$

$$\frac{185 \, cm^3}{1350 \, cm^2} = \frac{1350 \, cm^2 \cdot h}{1350 \, cm^2}$$

$$0.137 \, cm = h$$

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