

**NOTES: Volume of Spheres, Cones and Pyramids**

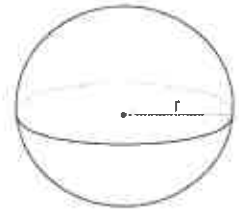
Date: Oct. 30 / Oct. 31

**Volume of a Sphere**

The volume of a sphere is calculated using the following formula:

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

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



A spherical exercise ball has a diameter of 1.2 m. What is its volume? Round your answer to the nearest hundredth.

$$r = 1.2 \div 2 = 0.6$$

$$\begin{aligned} V &= \frac{4 \times \pi \times 0.6^3}{3} \\ &= \frac{2.714}{3} \\ &= 0.9047... \\ &= \boxed{0.90 \text{ m}^3} \end{aligned}$$

$0.6^3 = 0.6 \times 0.6 \times 0.6$

$0.6 \wedge 3 =$

$0.6 \times 3 =$

A sphere has a volume of 100 m<sup>3</sup>. Find its radius. Round your answer to the nearest hundredth.

$$\begin{aligned} V &= \frac{4 \times \pi \times r^3}{3} \\ 100 &= \frac{4 \times \pi \times r^3}{3} \\ \frac{100}{4.1888} &= \frac{4.1888 \times r^3}{4.1888} \\ 23.873 &= r^3 \\ \sqrt[3]{23.873} &= r \\ 2.879 &= r \end{aligned}$$

$\boxed{2.88 \text{ m}}$

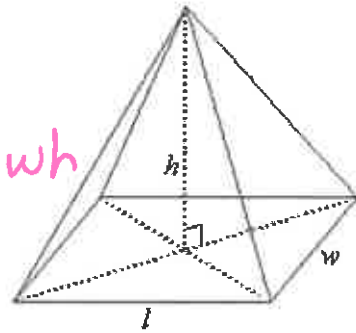
## Volume of a Pyramid (Rectangular Base)

The volume of a pyramid with a rectangular base is calculated using the following formula:

$$V = \frac{l \times w \times h}{3}$$

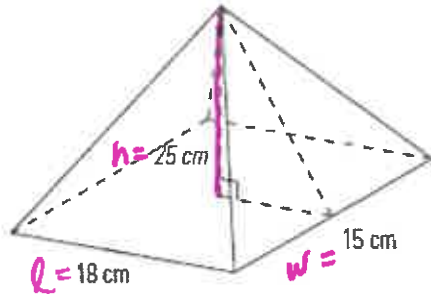
or

$$V = \frac{1}{3} lwh$$



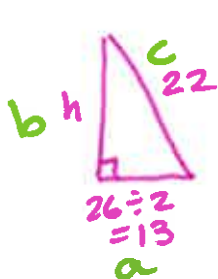
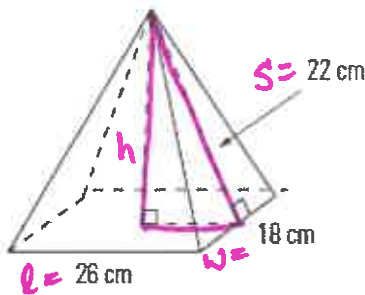
\* We may need to use Pythagoras to find  $h$  if we are given  $s$ .

Calculate the volume of the pyramid. Round your answer to the nearest hundredth.



$$\begin{aligned} V &= \frac{l \times w \times h}{3} \\ &= \frac{18 \times 15 \times 25}{3} \\ &= \frac{6750}{3} \\ &= \boxed{2250 \text{ cm}^3} \end{aligned}$$

Calculate the volume of the pyramid. Round your answer to the nearest hundredth.



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 13^2 + h^2 &= 22^2 \\ h^2 &= 22^2 - 13^2 \\ h &= \sqrt{315} \end{aligned}$$

$$h = 17.748 \text{ cm}$$

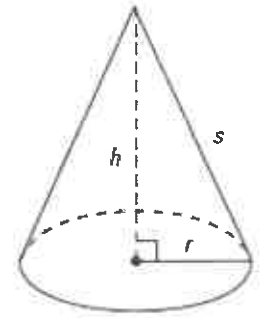
$$\begin{aligned} V &= \frac{26 \times 18 \times 17.748}{3} \\ &= \frac{8306.064}{3} \\ &= 2768.688 \text{ cm}^3 \\ &= \boxed{2768.69 \text{ cm}^3} \end{aligned}$$

Oct. 31

## Volume of a Cone

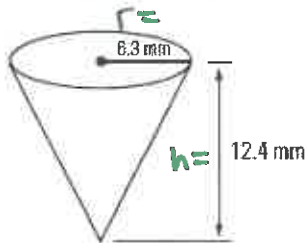
The volume of a cone is calculated using the following formula:

$$V = \frac{1}{3} \pi r^2 h \quad \text{OR} \quad V = \frac{\pi r^2 h}{3}$$



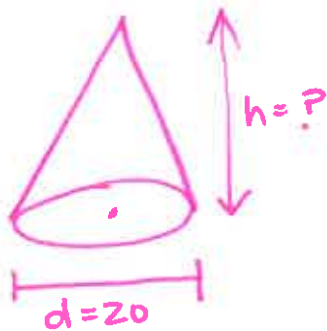
\* We may need to use Pythagoras to find h (if given s)

Calculate the volume of the cone. Round your answer to the nearest hundredth.



$$\begin{aligned} V &= \frac{\pi \times 6.3^2 \times 12.4}{3} \\ &= \frac{1546.153\dots}{3} \\ &= 515.3845\dots \\ &= \boxed{515.38 \text{ mm}^3} \end{aligned}$$

Find the height of a cone with a volume of  $2000 \text{ cm}^3$  and a diameter of  $20 \text{ cm}$ . Round your answer to the nearest tenth.



$$\begin{aligned} r &= 20 \div 2 \\ &= 10 \end{aligned}$$

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

Annotations: '2000' with an arrow pointing to the volume, '10' with an arrow pointing to the radius, and '?' with an arrow pointing to the height.

$$2000 = \frac{\pi \times 10^2 \times h}{3}$$

$$\frac{\pi \times 10^2}{3} = 104.7198$$

$$2000 = 104.7198 \times h$$

$$19.098\dots = h$$

$$\boxed{19.1 \text{ cm}}$$