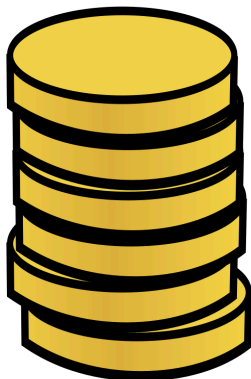


## 12-5 Volumes of spheres, cones and cylinders.

Objective: I can find the volume of spheres, cones and cylinders.

### Discovering the Volume of a Cylinder

Class discussion: How can we come up with the volume of a cylinder? What is a cylinder?



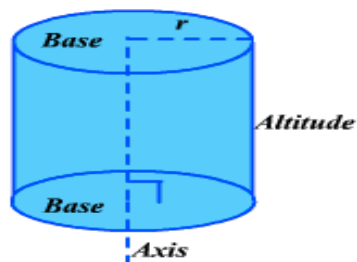
## Volume of a cylinder

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

$\swarrow$  area of base  
 $\searrow$  height

Remember: Cylinders may be oblique. Height is always perpendicular to the base.

**Right Cylinder**

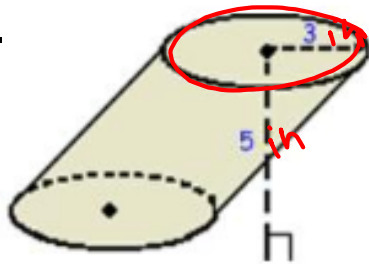


**Oblique Cylinder**



Find the volume of the cylinder.

1.



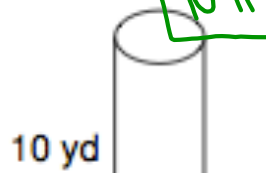
$$A = \pi r^2$$

$$= \pi \cdot 3^2$$

$$= 9\pi$$

$$Ah = 9\pi \cdot 5 = 45\pi \text{ in}^3$$

2.



$$Ah = 4\pi \cdot 10$$

$$= 40\pi \text{ yd}^3$$

$$\pi \cdot 2^2$$

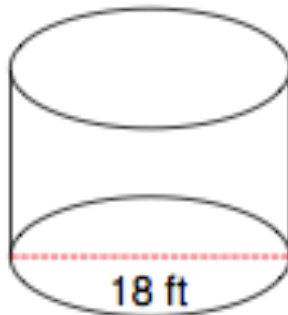
$$A = 4\pi$$

You try

$$\pi \cdot 9^2$$

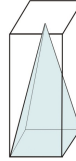
$$\pi \cdot 81 \cdot 12$$

$$972\pi \text{ ft}^3$$

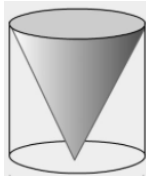


## Volume of a Cone

**Remember** the volume of a prism vs. the volume of a pyramid.



What do you conjecture the volume of a cone is (based on the volume of a cylinder)?



\*Check conjecture by seeing how many cones of water will fill the cylinder!

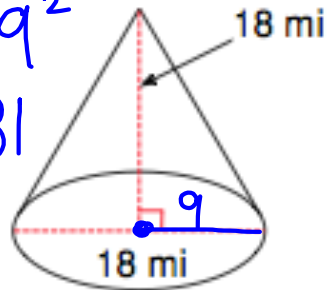
## Volume of a cone

$$\frac{AH}{3} = \frac{(\pi r^2)h}{3}$$

Find the volume of the cone.

$$A = \pi \cdot 9^2$$

$$= \pi \cdot 81$$



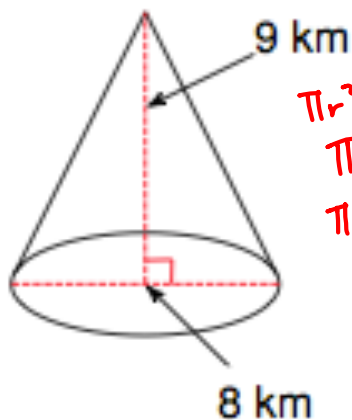
$$\frac{Ah}{3} = \frac{\pi \cdot 81 \cdot 18}{3}$$

$$= \frac{\pi \cdot 1458}{3}$$

$$= 486\pi \text{ mi}^3$$

You Try

Find the volume of the cone.



$$\pi r^2 = 9^2$$

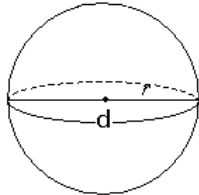
$$\pi \cdot 16$$

$$\pi \cdot 16 \cdot 9$$

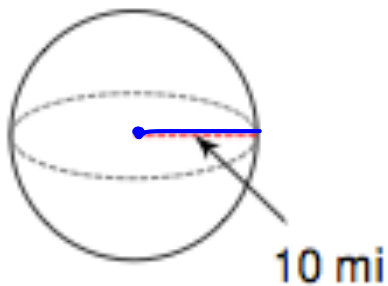
$$\frac{144}{3}$$

$$48\pi \text{ km}^3$$

Volume of a sphere:  $V = \frac{4}{3}\pi r^3$



Find the volume of the sphere.



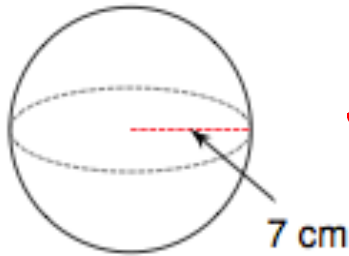
$$V = \frac{4}{3} \cdot \pi r^3$$

$$\frac{4}{3} \cdot \frac{\pi 10^3}{1}$$

$$\frac{4000\pi}{3} \text{ mi}^3$$

Find the volume of the sphere.

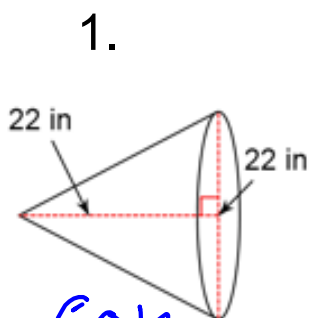
You Try



$$V = \frac{4}{3} \cdot \pi 7^3 = \frac{1372\pi \text{ cm}^3}{3}$$

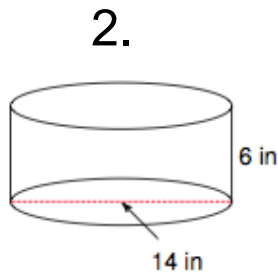
Check for understanding.

Find the volume of each figure.



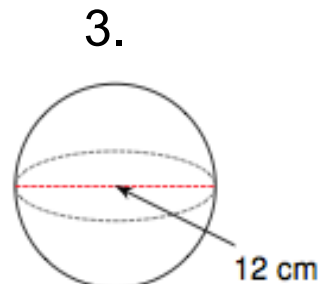
Cone  

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



Cylinder  

$$Ah \text{ or } \pi r^2 h$$



Sphere  

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

