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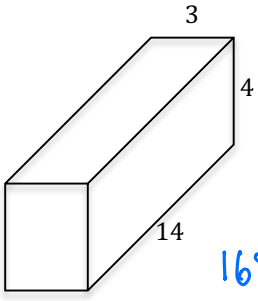
LEARNING OBJECTIVE: We will calculate the volumes of cylinders, cones, and spheres. (G8M5L7)

ACTIVATING PRIOR KNOWLEDGE

We know how to calculate the volume of a rectangular prism (length x width x height):

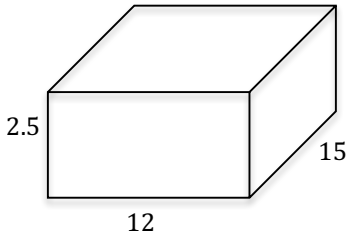


$3 \times 4 \times 14$

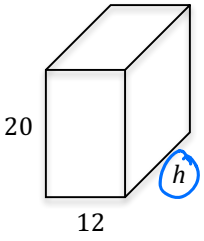
12×14

168 un.^3

168 cubic units



$V = 450 \text{ un.}^3$



$\ell \quad w \quad h$

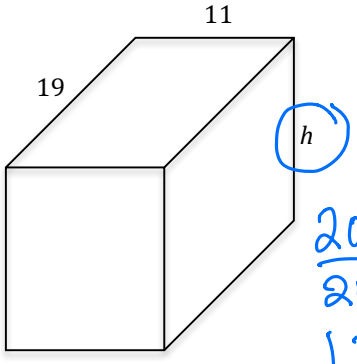
$20 \times 12 \times h = 1440$

$240h = 1440$

$\frac{240h}{240} = \frac{1440}{240}$

$h = 6$

Vol = 1440 cubic units



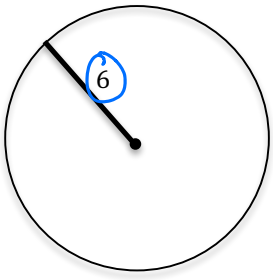
$209h = 1672$

$\frac{209h}{209} = \frac{1672}{209}$

$h = 8$

Vol. = 1672 cu. units

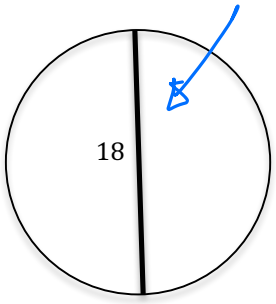
We ALSO know how to calculate the area of a circle (in terms of π)



$A = \pi r^2$

$36\pi \text{ un.}^2$

113.04 un.^2



$A = 81\pi$ sq. un.

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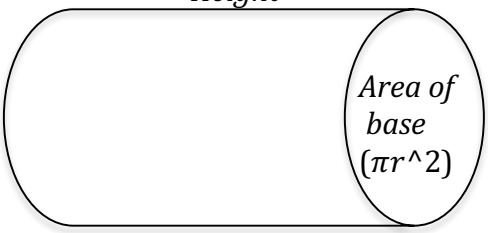
CONCEPT DEVELOPMENT

Volume of a Cylinder:



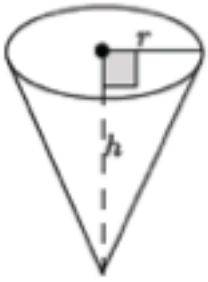
$$V = (\textbf{area of base}) \times \textbf{height}$$

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

- Water bottle
- Pencil holder
- Glue stick
- Apple pen
- Pot holding pasta sauce

Volume of a Cone:

The base is still a circle!



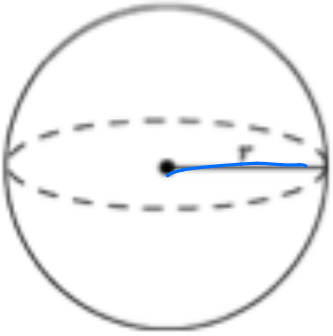
The vertex is the pointed part of the cone

$$V = \frac{1}{3}(\textbf{area of base}) \times \textbf{height}$$

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

- Ice cream cone
- traffic cone
- dunce hat

Volume of a Sphere:



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

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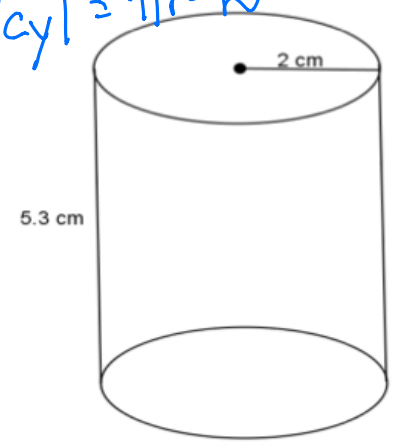
GUIDED PRACTICE

Steps for Measuring Volume of Common Shapes

1. Identify the correct shape, and the important measurements.
2. Use the correct volume formula.
3. Determine the volume and express your answer in cubic units.

$V_{cyl} = \pi r^2 h$

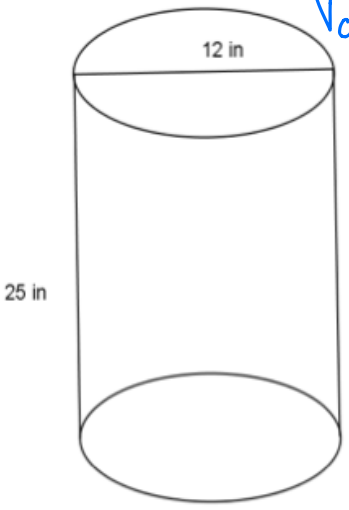


$= \pi 2^2 \cdot 5.3$

$= 21.2\pi \text{ cm}^3$

$= 66.57 \text{ cm}^3$

$V_{cyl} = \pi r^2 h$

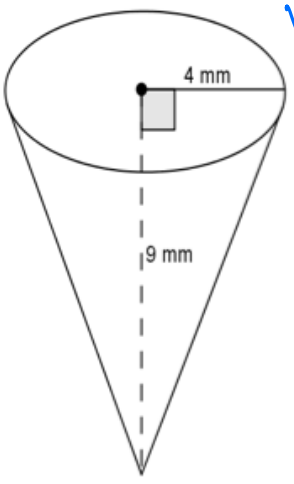


$= \pi 6^2 \cdot 25$

$= 900\pi$

$= 2826 \text{ in}^3$

$V_{cone} = \frac{1}{3}\pi r^2 h$



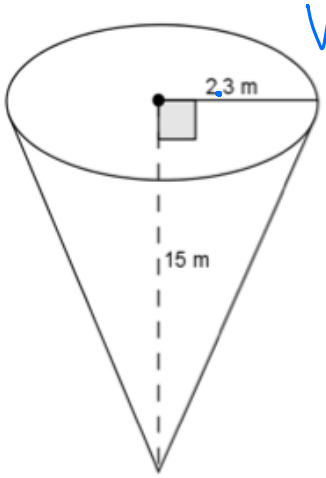
$= \frac{1}{3}\pi \cdot 4^2 \cdot 9$

$= \frac{1}{3}\pi \cdot 16 \cdot 9$

$= 48\pi$

$= 150.72 \text{ cubic mm}$

$V_{cone} = \frac{1}{3}\pi r^2 h$



83.05 m^3

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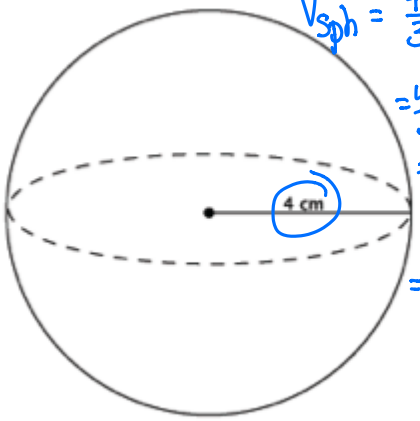


$V_{sph} = \frac{4}{3}\pi r^3$

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

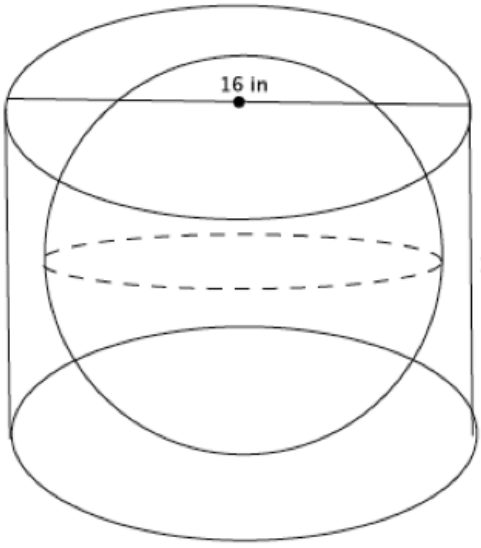
$= \frac{4}{3}\pi 64$

$= 85.3\pi$

$= 267.95\ cm^3$

The average basketball has a diameter of 9.5 inches. What is the volume of the average basketball?

$448.7\ in.^3$



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 inside the cylinder?

$\frac{4}{3} \cdot \pi \cdot 7^3$

$\frac{4}{3} \cdot \pi \cdot 343$

$= 457.33\pi$

$= 1436.03\ in^3$

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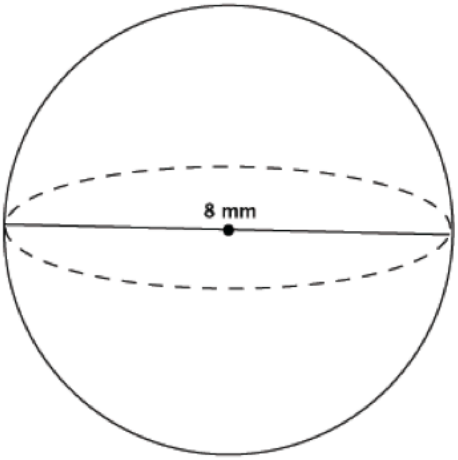
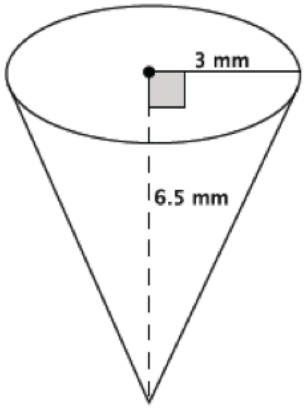
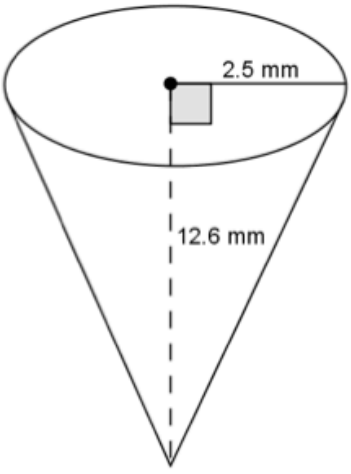
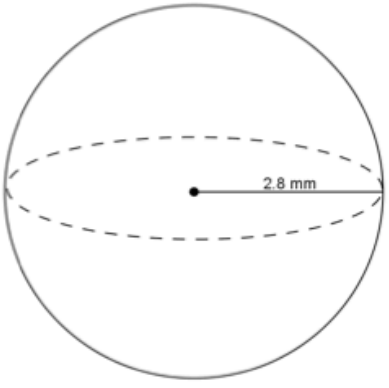
Which of the two figures below has the greater volume?





Which of the two figures below has the greater volume?





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INDEPENDENT PRACTICE

Problem set from Lesson 10 can be independent practice.

CLOSURE

Hand out exit ticket for lesson 10

NOTES

HW can be Lesson 11 problem set