

**Unit 7 → Volume**  
**7.3 Volume of a Cylinder**

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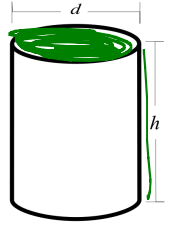
The base of a cylinder is a circle

The formula for the area of the base of a cylinder must then be:

$$A = \pi r^2$$

The volume of a cylinder can be found using the formula:

$$V = \pi r^2 \times h$$



Examples:

BEDMAS

1. Find the volume of this dime. What information would you need to calculate the volume of a roll of dimes?

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi (9.015)^2 \times 1.22 \\ &= \pi (81.27) \times 1.22 \\ &= 311.49 \text{ mm}^3 \end{aligned}$$

↓ How many in a roll?

$$\begin{aligned} r &= \frac{d}{2} = \frac{18.03}{2} \\ &= 9.015 \text{ mm} \end{aligned}$$

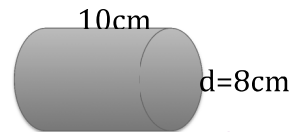
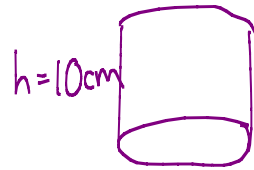
$$\begin{aligned} d &= 18.03 \text{ mm} \\ h &= 1.22 \text{ mm} \end{aligned}$$



2. Hanna want to calculate the volume of the cylinder shown but does not know which measurement is the height.

- a) What is the height? → 10cm
- b) What is the volume?

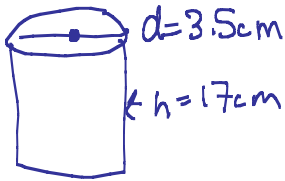
$$\begin{aligned} V &= \pi r^2 \times h \\ &= \pi (4)^2 \times 10 \\ &= \pi \times 16 \times 10 \\ &= 502.7 \text{ cm}^3 \end{aligned}$$



$$\begin{aligned} r &= \frac{d}{2} = \frac{8}{2} \\ &= 4 \text{ cm} \end{aligned}$$

3. What is the volume of the following cylinder?

diameter 3.5cm, height = 17cm



$$\begin{aligned} V &= \pi r^2 h \\ &= \pi (1.75)^2 \times 17 \\ &= \pi \times 3.0625 \times 17 \\ &= 163.56 \text{ cm}^3 \end{aligned}$$

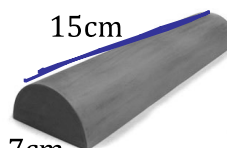
$$r = \frac{d}{2} = \frac{3.5}{2} = 1.75 \text{ cm}$$

4. Determine the volume of the shape below:

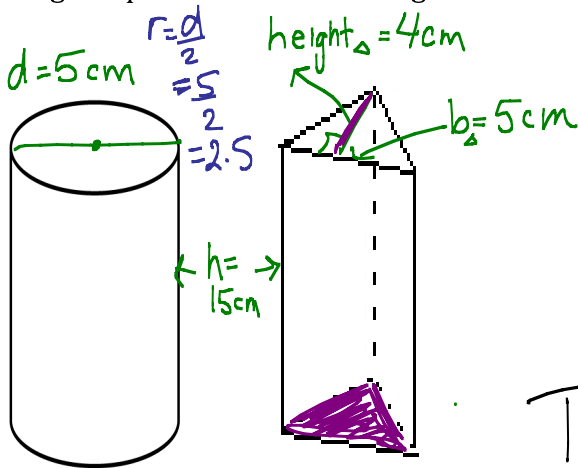
$$\begin{aligned} V &= \pi r^2 \times h \\ &= 3.14 \times 3.5^2 \times 15 \\ &= 3.14 \times 12.25 \times 15 \\ &= 577.267 \end{aligned}$$

$$\begin{aligned} V_{1/2} &= \frac{577.267}{2} \\ &= 288.6 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} d &= 7 \\ r &= \frac{7}{2} \\ &= 3.5 \text{ cm} \end{aligned}$$



5. Kyle uses a cylinder to store jelly beans. He wonders if he could store more jelly beans if he used a triangular prism of the same height. Which container is larger?



$$\begin{aligned}
 V_c &= \pi r^2 h \\
 &= \pi 2.5^2 \times 15 \\
 &= \pi 6.25 \times 15 \\
 &= \underline{294.5\text{ cm}^3}
 \end{aligned}$$

$$\begin{aligned}
 V_T &= \left(\frac{b \times h}{2}\right) \times h \\
 &= \left(\frac{5 \times 4}{2}\right) \times 15 \\
 &= \left(\frac{20}{2}\right) \times 15 \\
 &= 10 \times 15 \\
 &= \underline{150\text{ cm}^3}
 \end{aligned}$$

The cylinder has more volume.