

NOTES: Capacity

Date: Nov. 1

volume

- the amount of space a 3-dimensional object occupies
- measured in cubic units (e.g. mm³, cm³, m³)

capacity

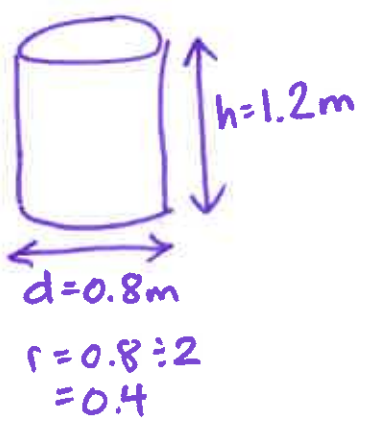
- the maximum amount that a container can hold
- often used with liquid measures

	Volume	Capacity
metric (SI)	1 cm ³	= 1 mL
	1000 cm ³	= 1 L
	1 m ³	= 1000 L
imperial	231 in ³	= 1 US gallon

Example

Kerry uses a cylindrical barrel to collect rainwater for her garden. The barrel has a diameter of 0.8 m and stands 1.2 m tall. What is the capacity of the rain barrel in liters?

① find volume



$$V = \pi r^2 h$$
$$= \pi \times 0.4^2 \times 1.2$$
$$= 0.6032\text{ m}^3$$

② convert volume to capacity

$$\text{m}^3 \rightarrow \text{L}$$

$$\frac{1\text{m}^3}{1000\text{L}} = \frac{0.6032\text{m}^3}{x}$$

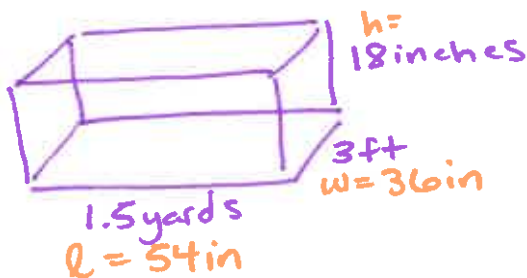
$$x = 603.2\text{ L}$$

$$x = \frac{1000 \times 0.6032}{1}$$

Example

Tim's fish tank is 1.5 yards long by 3 feet wide by 18 inches tall. What is the capacity of the tank in US gallons?

1 yard = 3 feet
1 foot = 12 inches



① convert measurements to inches (want volume in in³)

② $V = lwh$
 $= 54 \times 36 \times 18$
 $= 34\,992 \text{ in}^3$

③ convert volume to capacity

$$\frac{231 \text{ in}^3}{1 \text{ US gal}} = \frac{34\,992 \text{ in}^3}{x}$$

$$x = \frac{1 \times 34\,992}{231}$$

$$x = 151.5 \text{ US gallons}$$

Example

A company is designing a new can for its tomato juice. The can will have a capacity of 1.357 L. What will the can's radius be if it can only be 12 cm tall?

① convert capacity to volume
 $L \rightarrow \text{cm}^3$

$$\frac{1000 \text{ cm}^3}{1 \text{ L}} = \frac{x}{1.357}$$

$$x = 1357 \text{ cm}^3$$

② determine radius.

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

$$1357 = \pi \times r^2 \times 12$$

$$1357 = \pi \times 12 \times r^2$$

$$1357 = 37.699 \times r^2$$

$$\frac{1357}{37.699} = \frac{37.699 \times r^2}{37.699}$$

$$35.996 = r^2$$

$$\sqrt{35.996} = r$$

$$5.999... = r$$

$$6.0 \text{ cm}$$