Summary of Key Volume Formulas

Solid	Volume Formula
Cone	$\frac{1}{3}\pi r^2 h$
Frustum	$\frac{1}{3}\pi h(R^2 + Rr + r^2)$
Sphere	$\frac{4}{3}\pi r^3$
Hemisphere	$\frac{2}{3}\pi r^3$
Cylinder	$\pi r^2 h$
Pyramid	$\frac{1}{3} \times \text{Base Area} \times h$
Prism	$\text{Base Area} \times \text{Height}$

1. Volume of a Cone

Q: Find the volume of a cone with a radius of 7 cm and a height of 9 cm. (Use $\pi = \frac{22}{7}$)

A:

$$V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 7^2 \times 9 = \boxed{462 \text{ cm}^3}$$

2. Volume of a Frustum

Q: A frustum has a top radius of 3 cm, bottom radius of 6 cm, and a height of 4 cm. (Use $\pi = 3.14$)

A:

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

$$= \frac{1}{3} \times 3.14 \times 4 \times (36 + 18 + 9) = \boxed{263.76 \text{ cm}^3}$$

3. Volume of a Sphere

Q: What is the volume of a sphere with diameter 14 cm? (Use $\pi = \frac{22}{7}$)

A:

Radius $r = \frac{14}{2} = 7$ cm

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3} \times \frac{22}{7} \times 343 = \boxed{1437.33 \text{ cm}^3}$$

4. Volume of a Square Pyramid

Q: A square pyramid has a base side of 8 cm and a height of 5 cm.

A:

$$V = \frac{1}{3} \times \text{Base Area} \times h = \frac{1}{3} \times 64 \times 5 = \boxed{106.67 \text{ cm}^3}$$

5. Volume of a Triangular Prism

Q: A triangular prism has a right-angled base (sides 3 cm and 4 cm) and a length of 10 cm.

A:

$$\text{Base Area} = \frac{1}{2} \times 3 \times 4 = 6 \text{ cm}^2$$

$$V = 6 \times 10 = \boxed{60 \text{ cm}^3}$$

6. Volume of a Cylinder

Q: Find the volume of a cylinder with radius 5 cm and height 7 cm. (Use $\pi = 3.14$)

A:

$$V = \pi r^2 h = 3.14 \times 25 \times 7 = \boxed{549.5 \text{ cm}^3}$$

7. Volume of a Hemisphere

Q: Find the volume of a hemisphere with radius 10 cm. (Use $\pi = 3.14$)

A:

$$V = \frac{2}{3}\pi r^3 = \frac{2}{3} \times 3.14 \times 1000 = \boxed{2093.33 \text{ cm}^3}$$

8. Volume of a Rectangular Prism

Q: A box measures 6 cm by 4 cm by 2 cm. What is its volume?

A:

$$V = l \times w \times h = 6 \times 4 \times 2 = \boxed{48 \text{ cm}^3}$$

9. Volume of a Composite Solid (Cylinder + Cone)

Q: A solid is made of a cylinder (radius 4 cm, height 5 cm) topped with a cone (radius 4 cm, height 3 cm). (Use $\pi = \frac{22}{7}$)

A:

Cylinder:

$$V_1 = \frac{22}{7} \times 16 \times 5 = 251.43 \text{ cm}^3$$

Cone:

$$V_2 = \frac{1}{3} \times \frac{22}{7} \times 16 \times 3 = 50.29 \text{ cm}^3$$

Total Volume:

$$V = 251.43 + 50.29 = \boxed{301.72 \text{ cm}^3}$$

10. Volume of a Real-World Frustum (Bucket)

Q: A bucket has a top diameter of 30 cm, bottom diameter of 20 cm, and height 25 cm. Find its capacity in liters. (Use $\pi = 3.14$)

A:

$$R = 15 \text{ cm}, r = 10 \text{ cm}$$

$$V = \frac{1}{3} \times 3.14 \times 25 \times (225 + 150 + 100) = 12,717.5 \text{ cm}^3$$

$$= \boxed{12.72 \text{ L}}$$