

Name: Key

Notes/Examples of Composites and Applications:

Surface Area & Volume of Cylinders, Cones, and Spheres

Directions: Identify any figures used, find the surface area and/or volume of the following figures. You must write the formulas you used first. Keep all answers in terms of pi, then show the rounded value to the nearest thousandth.

1. Find the surface area and volume.



SA = Cone + Cylinder
(No base on cone + No top circle on cylinder)

$$SA = \pi r^2 + \pi r l + 2\pi r^2 + 2\pi r h$$

$$SA = \pi 3 \cdot 5 + \pi 3^2 + 2\pi 3 \cdot 10$$

$$SA = 15\pi + 9\pi + 60\pi$$

V = Cone + Cylinder

$$V = \frac{1}{3}\pi r^2 \cdot h + \pi r^2 \cdot h$$

$$V = \frac{1}{3}\pi 3^2 \cdot 4 + \pi 3^2 \cdot 10$$

$$V = 12\pi + 90\pi$$

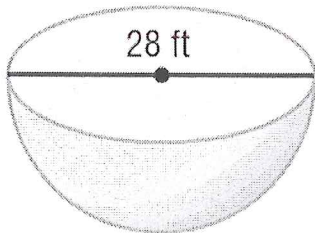
Top: Cone

Bottom: Cylinder

Surface Area: 84π units²

Volume: 102π units³

2. Find the surface area and volume.



SA = $\frac{1}{2}$ sphere + top circle

$$SA = \frac{1}{2} 4\pi r^2 + \pi r^2$$

$$SA = 392\pi + 196\pi$$

V = $\frac{1}{2}$ sphere

$$V = \frac{1}{2} \left(\frac{4}{3}\pi r^3 \right)$$

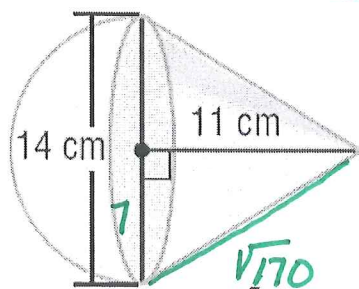
Top: Flat circle surface

Bottom: $\frac{1}{2}$ sphere

Surface Area: 588π ft²

Volume: 130.6π ft³

3. Find the surface area and volume.



SA = $\frac{1}{2} 4\pi r^2 + \pi r^2 + \pi r l$

$$SA = \frac{1}{2} 4\pi 7^2 + \pi 7 \cdot \sqrt{170}$$

$$SA = 98\pi + 7 \cdot \sqrt{170}\pi$$

$$V = \left(\frac{1}{2} \left(\frac{4}{3}\pi 7^3 \right) \right) + \frac{1}{3}\pi 7^2 \cdot 11$$

V =

(hemisphere)

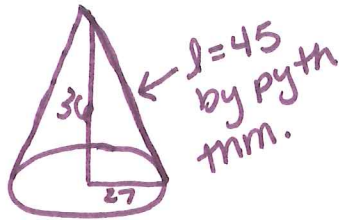
Top: $\frac{1}{2}$ sphere

Bottom: Cone

Surface Area: ≈ 594.606 cm²

Volume: ≈ 1282.817 cm³

4. Naomi is asked to paint several congruent construction cones. She is told that the radius of the cones is 27 inches and 3 feet tall (=36 inches), the bottom of the cone will be open. What is the surface area of the cone to be painted? How much square inches will she need to paint if she has 18 cones? Keep all answers in terms of pi, then show the rounded value to the nearest thousandth.

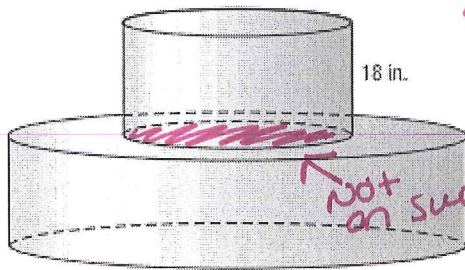


$$A = (\pi r l) 18$$

$$A = (\pi 27 \cdot 45) 18$$

$$A = 11664\pi \text{ in}^2 \approx 36643.537 \text{ in}^2$$

5. A circular model of a tower is made by placing one cylinder on top of another. Both cylinders have a height of 18 inches. The top cylinder has a radius of 18 inches and the bottom cylinder has a radius of 36 inches. (a) If each cylinder is made with both bases and lateral face on the surface, what is the total surface area of the tower of cylinders? Keep all answers in terms of pi, then show the rounded value to the nearest thousandth.



once stacked

$$SA = 2\pi R^2 + 2\pi R H \quad R=36 \quad H=18$$

$$+ \cancel{2\pi r^2} + 2\pi r h \quad r=18 \quad h=18$$

$$- \pi r^2$$

$$SA = 2\pi 36^2 + 2\pi 36 \cdot 18 + 2\pi 18 \cdot 18$$

$$= 2592\pi + 1296\pi + 648\pi$$

$$SA = 4536\pi \text{ in}^2$$

$$SA \approx 14250.264 \text{ in}^2$$

(b) How much filling would this tower hold? Keep all answers in terms of pi, then show the rounded value to the nearest thousandth.

$$V = \pi R^2 \cdot H + \pi r^2 \cdot h$$

$$V = \pi 36^2 \cdot 18 + \pi 18^2 \cdot 18$$

$$V = 23328\pi + 5832\pi$$

$$V = 28160\pi \text{ in}^3$$

$$\approx 88467.249 \text{ in}^3$$

6. A spherical meteorite lies half exposed in the earth. The diameter of the meteorite is 14 inches. What is the surface area of the exposed surface? Keep all answers in terms of pi, then show the rounded value to the nearest thousandth.



$$SA = \frac{1}{2} 4\pi r^2$$

$$SA = 98\pi \text{ in}^2$$

$$SA \approx 307.876 \text{ in}^2$$