

Geometry

Unit Three: LA/SA/Volume Applications/Review (IC18)

Name: _____

Date: _____ Period: _____

- Moti has a 18-inch x 20-inch aquarium. He wants to upgrade to a new 36-inch x 20-inch aquarium and estimates that it will hold 2 times as much water as his old one. Both aquariums are 18-inches high. Find the volume of both aquariums. Is Moti's estimate about the amount of water correct? Write a sentence to explain your answer.

$$\begin{array}{ll} \text{Old: } 18(20)(18) & \text{New: } 36(20)(18) \\ 6480 \text{ in}^3 & 12,960 \text{ in}^3 \end{array}$$



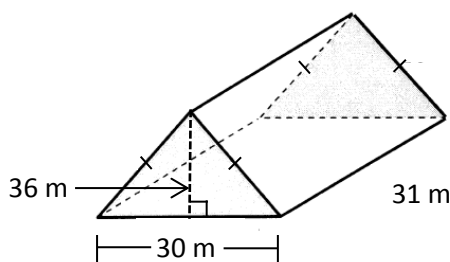
Yes, he is correct

- When Marguerite opens a cereal box and lays it out flat, she sees that the top and bottom of the box each measure 6 centimeters by 22 centimeters, the sides of the box each measure 6 centimeters by 29 centimeters, and the front and back of the box each measure 22 centimeters by 29 centimeters. What is the surface area of Marguerite's cereal box?

$$\begin{array}{l} 2(6)(22) = 264 \\ 2(6)(29) = 348 \\ 2(6)(29) = \underline{1276} \\ 1,888 \text{ cm}^2 \end{array}$$



- Find the surface area for the right prism pictured below.



$$\begin{array}{l} 15^2 + 36^2 = x^2 \\ x = 39 \end{array}$$

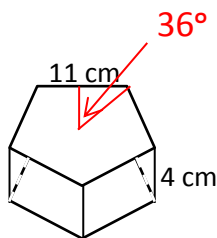
$$B = \frac{1}{2}bh = \frac{1}{2}(30)(36) = 540\text{m}^2$$

$$p = 30 + 39 + 39 = 108$$

$$\begin{array}{l} LA = ph \\ = (108)(31) \\ = 3348 \text{ m}^2 \end{array}$$

$$\begin{array}{l} SA = LA + 2B \\ = 3348 + 2(540) \\ = 4428 \text{ m}^2 \end{array}$$

- Find the lateral area and surface area of this right prism whose bases are regular pentagons.



$$\tan 36 = \frac{5.5}{a}$$

$$a = 7.57$$

$$p = 11(5) = 55$$

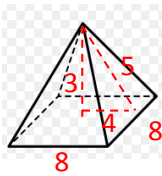
$$B = \frac{1}{2}ap = \frac{1}{2} (7.57)(55) = 208.175 \text{ cm}^2$$

$$\begin{array}{l} LA = ph \\ = 55(4) \\ = 220 \text{ cm}^2 \end{array}$$

$$\begin{array}{l} SA = LA + 2B \\ = 220 + 2(208.175) \\ = 636.35 \text{ cm}^2 \end{array}$$

5. A right square pyramid has base edges that are 8 in. and slant height that is 5 in. Draw and label a picture and then find the following:

a) Drawing:



b) Lateral Area:

$$\begin{aligned} LA &= \frac{1}{2} p \ell \\ &= \frac{1}{2} (32)(5) \\ &= 80 \text{ in}^2 \end{aligned}$$



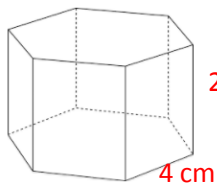
c) Surface Area:

$$\begin{aligned} SA &= LA + B \\ &= 80 + 64 \\ &= 144 \text{ in}^2 \end{aligned}$$

d) Volume:

$$\begin{aligned} \text{Vol} &= \frac{1}{3} Bh \\ &= \frac{1}{3} (64)(3) \\ &= 64 \text{ in}^3 \end{aligned}$$

6. The base of a prism is a regular hexagon that measures 4 cm on each side. The prism has a height of 20 cm. What is the LA, SA, and volume of this prism? Draw and label a picture as part of your work. Round your answer to the nearest tenth.



$$\begin{aligned} V &= Bh \\ &= 24\sqrt{3}(20) \\ &= 480\sqrt{3} \text{ cm}^3 \\ &\approx 831.4 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} LA &= ph \\ &= 24(20) \\ &= 480 \text{ cm}^2 \end{aligned}$$

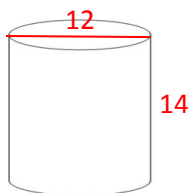
$$\begin{aligned} SA &= LA + 2B \\ &= 480 + 2(24\sqrt{3}) \\ &= 480 + 48\sqrt{3} \text{ cm}^2 \\ &\approx 563.1 \text{ cm}^2 \end{aligned}$$



$$p = 4(6) = 24$$

$$B = \frac{1}{2}ap = \frac{1}{2} (2\sqrt{3})(24) = 24\sqrt{3} \text{ cm}^2$$

7. A cylindrical vat measures 12 feet across and 14 feet tall. Find the amount of material necessary to make the vat if it **doesn't** have a lid.



$$\begin{aligned} SA &= LA + \pi r^2 \\ &= 2\pi rh + \pi r^2 \\ &= 2\pi(6)(14) + \pi(6)^2 \\ &= 204\pi \text{ ft}^2 \end{aligned}$$



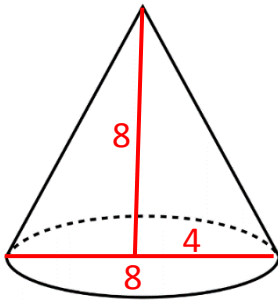
8. How much liquid would be able to fit into the vat in #7?

$$\begin{aligned} \text{Vol} &= \pi r^2 h \\ &= \pi(6)^2(14) \\ &= 504\pi \text{ ft}^3 \end{aligned}$$

9. A cube has a volume of 343 in^3 . What is its surface area?

$$\begin{aligned} \text{Vol} &= s^3 & SA &= ph + 2B \\ 343 &= s^3 & &= 28(7) + 2(49) \\ s &= \sqrt[3]{343} & &= 294 \text{ in}^2 \\ s &= 7 & & \end{aligned}$$

10. A party-planner wants to make party hats for a birthday party she is throwing later in the week. If the hats are to be cone-shaped and have a diameter of 8 inches and a height of 8 inches, how much material will she need to make 10 of these hats?



$$4^2 + 8^2 = c^2$$

$$16 + 64 = c^2$$

$$c = \sqrt{80}$$

$$c = 4\sqrt{5}$$

$$SA = \pi r \ell$$

$$= \pi(4)(4\sqrt{5})$$

$$= 16\pi\sqrt{5} \text{ (for one)}$$

$$\text{For 10: } 160\pi\sqrt{5} \approx 1123.97 \text{ in}^2$$

11. Find the surface area of the figure drawn below if the cylinder has a height of 11 in. and the hemisphere has a radius of 5 in. The end of the shape is closed. Round your answer to the nearest tenth.

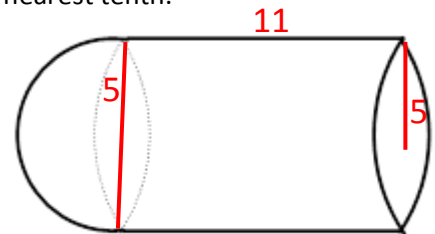
$$SA = \text{hemisphere} + LA \text{ cylinder} + \text{circle}$$

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

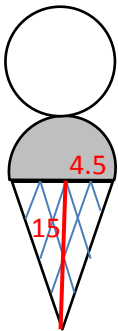
$$= 2\pi(5)^2 + 2\pi(5)(11) + \pi(5)^2$$

$$= 50\pi + 110\pi + 25\pi$$

$$= 185\pi \approx 581.2 \text{ in}^2$$



12. At your favorite ice cream parlor you order a double scoop of razzle raspberry ice cream. The generous server first fills the cone, which is 15 cm high and 9 cm across, with ice cream. Then, she tops the cone with a nicely rounded half scoop. Then, on top of that, she puts a perfectly spherical second scoop. To the nearest tenth, how much ice cream did you receive?



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

$$= \frac{1}{3}\pi(4.5)^2(15)$$

$$= 101.25\pi$$

$$V_{\text{hemisphere}} = \frac{2}{3}\pi r^3$$

$$= \frac{2}{3}\pi(4.5)^3$$

$$= 60.75\pi$$

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

$$= \frac{4}{3}\pi(4.5)^3$$

$$= 121.5\pi$$

$$\text{Total: } 283.5\pi \approx 890.6 \text{ cm}^3$$

13. A lighting engineer wants to know how many lights it will take to cover the entire surface of the ball that is dropped in Times Square for New Year's Eve. Assume that the ball is a sphere (in real-life it's an icosahedral geodesic sphere) and that the diameter of the ball is 12 feet, what is the surface area? If each set of lights covers 0.7 ft^2 , how many sets will be needed to cover the whole sphere?

$$SA = 4\pi r^2$$

$$= 4\pi(6)^2$$

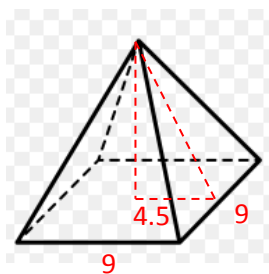
$$= 144\pi$$

$$\approx 452.4 \text{ ft}^2$$



$$452.4/0.7 = 646.25 \text{ round up to } 647 \text{ sets}$$

14. If the area of the base of a right square pyramid is 81 m^2 and the volume of the pyramid is 108 m^3 , find the height, slant height, and base edge length of the pyramid.



$$\begin{aligned}\text{Vol} &= \frac{1}{3}Bh \\ 108 &= \frac{1}{3}(81)(h) \\ 108 &= 27h \\ h &= 4\end{aligned}$$

$$\begin{aligned}4^2 + 4.5^2 &= l^2 \\ 16 + 20.25 &= l^2 \\ l &= \sqrt{36.25} \\ l &\approx 6.02\end{aligned}$$

15. Find the lateral area of a cylinder that has a base area of $49\pi \text{ cm}^2$ and a height that is twice the radius.

$$B = \pi r^2$$

$$49\pi = \pi r^2$$

$$r = 7$$

$$\text{LA} = 2\pi(7)(14)$$

$$= 196\pi \text{ cm}^2$$