

## Unit 8 Quiz Review: Surface Area & Volume

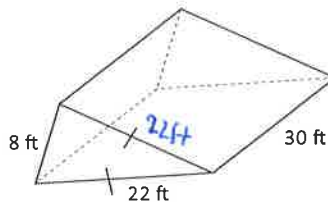
On this quiz, you should be able to...

- Find the volume of prisms, cylinders, pyramids, cones, spheres, and composite figures.
- Use surface area and volume formulas to solve real-world problems.

1. Please find the surface area of the figure below.

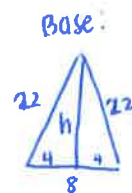
- A) 855.07 ft<sup>2</sup>  
 B) 1733.07 ft<sup>2</sup>  
 C) 1342.47 ft<sup>2</sup>  
 D) 2625.68 ft<sup>2</sup>

$$SA = 2B + Ph$$



$$P = 8 + 22 + 22$$

$$P = 52 \quad h = 30$$



$$4^2 + h^2 = 22^2$$

$$16 + h^2 = 484$$

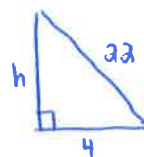
$$h^2 = 468$$

$$h = 21.6$$

$$B = \frac{1}{2}bh$$

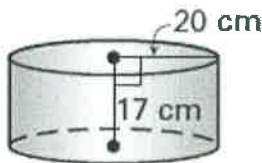
$$B = \frac{1}{2}(21.6)(8)$$

$$B = 86.4$$



2. Please find the surface area of the figure below.

- A) 4647.2 cm<sup>2</sup>  
 B) 2960 cm<sup>2</sup>  
 C) 2323.6 cm<sup>2</sup>  
 D) 1480 cm<sup>2</sup>



$$SA = 2\pi r^2 + 2\pi rh$$

$$= 2\pi(20)^2 + 2\pi(20)(17)$$

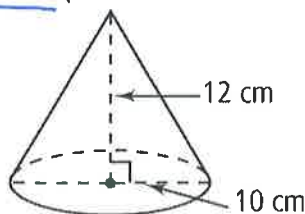
$$= 2\pi(400) + 2\pi(340)$$

$$= 2512 + 2135.2$$

$$= 4647.2$$

3. Please find the volume of the cone (the diameter is 10 cm).

- A) 1256 cm<sup>3</sup>  
 B) 3768 cm<sup>3</sup>  
 C) 314 cm<sup>3</sup>  
 D) 942 cm<sup>3</sup>



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

$$= \frac{1}{3}\pi(5)^2(12)$$

$$= \frac{1}{3}\pi(25)(12)$$

$$= 314$$

4. Please find the surface area of a globe with a 24-inch diameter.

- A) 1808.64 in<sup>2</sup>    B) 7234.56 in<sup>2</sup>    C) 904.32 in<sup>2</sup>    D) 3627.28 in<sup>2</sup>

→ sphere  
↳ r = 12

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

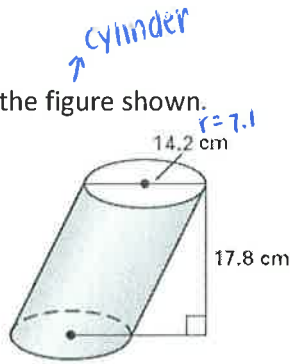
$$= 4\pi(12)^2$$

$$= 4\pi(144)$$

$$= 1808.64$$

5. Please find the volume of the figure shown.

- A) 11270.1 cm<sup>3</sup>
- B) 3589.2 cm<sup>3</sup>
- C) 2817.5 cm<sup>3</sup>**
- D) 897.3 cm<sup>3</sup>



$$\begin{aligned}
 V &= \pi r^2 h \\
 &= \pi (7.1)^2 (17.8) \\
 &= \pi (50.41)(17.8) \\
 &= 2817.5
 \end{aligned}$$

6. A grain storage tank is called a silo. A silo is the shape of a cylinder covered by a half-sphere as shown. The height of the cylinder is 50 feet and its diameter is 80 ft. Please find how much grain the silo can hold. (Volume)

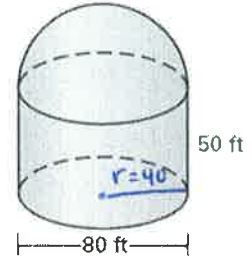
- A) 251200 ft<sup>3</sup>
- B) 13397.3 ft<sup>3</sup>
- C) 519146.7 ft<sup>3</sup>
- D) 385173.3 ft<sup>3</sup>**

V cylinder:  $\pi r^2 h$

$$\begin{aligned}
 V &= \pi (40)^2 (50) \\
 &= \pi (1600)(50) \\
 &= 251200
 \end{aligned}$$

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

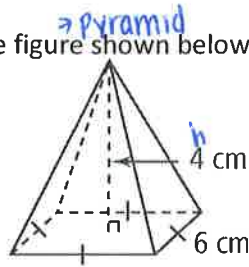
$$\begin{aligned}
 &= \frac{4}{3} \pi (40)^3 \\
 &= \frac{4}{3} \pi (64000) \\
 &= 267946.7 \\
 &\div 2 \\
 &= 133973.35
 \end{aligned}$$



$$\begin{aligned}
 \text{Total} &= 251200 + 133973.4 \\
 &= 385173.4
 \end{aligned}$$

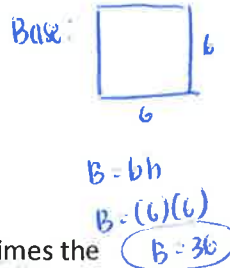
7. Please find the volume of the figure shown below.

- A) 144 cm<sup>3</sup>
- B) 48 cm<sup>3</sup>**
- C) 156 cm<sup>3</sup>
- D) 180 cm<sup>3</sup>



V =  $\frac{1}{3} B h$

$$\begin{aligned}
 &= \frac{1}{3} (36)(4) \\
 &= 48
 \end{aligned}$$



8. Jon's favorite snack is Pringles. The container has a volume of 223 in<sup>3</sup>. The height of the can is 7 times the radius. What is the radius of the can?

$r = x$   
 $h = 7x$

- A) 3.2 in
- B) 14.6 in
- C) 2.2 in**
- D) 8 in

$$\begin{aligned}
 V &= \pi r^2 h \\
 223 &= \pi (x)^2 (7x) \\
 223 &= \pi (7x^3) \\
 \frac{223}{7\pi} &= \frac{7\pi x^3}{7\pi} \\
 10.15 &= x^3
 \end{aligned}$$

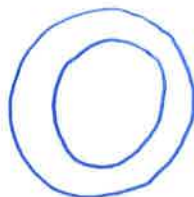
$$\begin{aligned}
 x &= \sqrt[3]{10.15} \\
 r &= 2.2 \text{ in}
 \end{aligned}$$



cylinder

9. A rubber shell filled with air forms a rubber ball. The shell's outer diameter is 65 millimeters, and its inner diameter is 56 millimeters. Please find the volume of the rubber used to make the ball.

- A) 143720.4 mm<sup>3</sup>
- B) 51814.7 mm<sup>3</sup>**
- C) 91905.7 mm<sup>3</sup>
- D) 34719.46 mm<sup>3</sup>



Outer:  $r = 32.5$

$$\begin{aligned}
 V &= \frac{4}{3} \pi r^3 \\
 &= \frac{4}{3} \pi (32.5)^3 \\
 &= \frac{4}{3} \pi (34328.125) \\
 &= 143720.42
 \end{aligned}$$

Inner:  $r = 28$

$$\begin{aligned}
 V &= \frac{4}{3} \pi r^3 \\
 &= \frac{4}{3} \pi (28)^3 \\
 &= \frac{4}{3} \pi (21952) \\
 &= 91905.71
 \end{aligned}$$

$$\begin{aligned}
 \text{Rubber} &= 143720.4 - 91905.7 \\
 &= 51814.7
 \end{aligned}$$



10. Kristin is ordering a circular cake for her party. The bakery labels the different cakes by the distance around the cake, rather than by diameter. Kristin ordered a cake that measured 27 inches around. If the cake was 4 inches tall, please find the volume of the cake that Kristin ordered.

↳ circumference = 27 in

- A) 224.13 in<sup>3</sup>  
 B) 232.2 in<sup>3</sup>  
 C) 116.12 in<sup>3</sup>  
 D) 2289 in<sup>3</sup>

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

$$= \pi (4.3)^2 (4)$$

$$= \pi (18.44) (4)$$

$$= 232.2 \text{ in}^3$$

$$C = 2\pi r$$

$$\frac{27}{2\pi} = \frac{2\pi r}{2\pi}$$

$$r = 4.3$$

11. Robbie brought cheese and crackers for lunch. The wedge of cheese he brought is shown below. Each side of the cheese is 3 inches and it is 1.25 inches tall. If there are 336 calories in this piece of cheese, how many calories are there per cubic inch?

volume

- A) 1636.32 Cal/in<sup>3</sup>  
 B) 4.87 Cal/in<sup>3</sup>  
 C) 68.99 Cal/in<sup>3</sup>  
 D) 59.7 Cal/in<sup>3</sup>



$$V = Bh$$

$$V = (3.9)(1.25)$$

$$V = 4.875$$

Base:  $B = \frac{1}{2}bh$   
 $= \frac{1}{2}(2.6)(3)$   
 $B = 3.9$

$$h^2 + 1.5^2 = 3^2$$

$$h^2 + 2.25 = 9$$

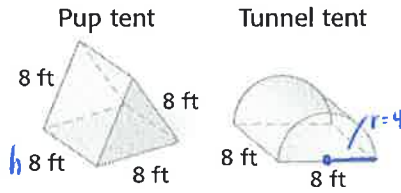
$$h^2 = 6.75 \Rightarrow h = 2.6$$

$$336 \text{ cal} \div 4.875 = 68.9 \text{ cal/in}^3$$

12. A sporting goods company sells tents in two styles, shown below. The sides and floor of each tent are made of nylon.

Pup: Base:  $B = \frac{1}{2}bh$   
 $= \frac{1}{2}(8)(6.9)$   
 $B = 27.6$

$P = 8 + 8 + 8$   
 $P = 24$



Tunnel:  $SA = 2\pi r^2 + 2\pi rh$   
 $= 2\pi(4)^2 + 2\pi(4)(8)$   
 $= 2\pi(16) + 2\pi(32)$   
 $= 100.48 + 200.96$   
 $= 301.44 \div 2 = 150.72$   
 + Rectangular Base area  $(8)(8)$   
 $= 150.72 + 64$   
 $SA = 214.7 \text{ ft}^2$

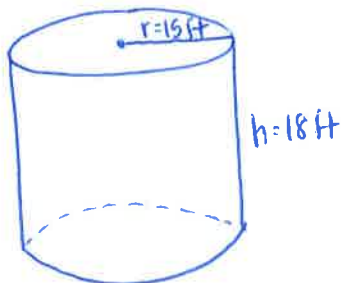
Which tent requires less nylon to manufacture?

Pup:  $SA = 2B + Ph$   
 $= 2(27.6) + 24(8)$   
 $= 55.2 + 192$   
 $SA = 247.2 \text{ ft}^2$

The tunnel tent takes less nylon

13. A steel water tank is a cylinder with a diameter of 30 ft and a height of 18 ft. To prevent rust, it is important to keep them painted. If one gallon of paint will cover about 350 square feet, how many gallons of paint are needed to paint the tank?

↳ surface area



$$SA = 2\pi r^2 + 2\pi rh$$

$$= 2\pi(15)^2 + 2\pi(15)(18)$$

$$= 2\pi(225) + 2\pi(270)$$

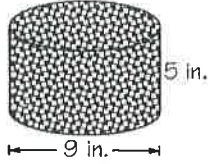
$$= 1413 + 1695.6$$

$$SA = 3108.6 \text{ ft}^2$$

$$\frac{3108.6}{350} = 8.88$$

about 9 gallons of paint

14. Mr. Butterworth baked a cake in the shape of a cylinder. The cake had a diameter of 9 inches and a height of 5 inches. He spread icing over the entire cake (except for the bottom). How much frosting did he use?



$$SA = 2\pi r^2 + 2\pi rh \leftarrow \text{Reg SA}$$

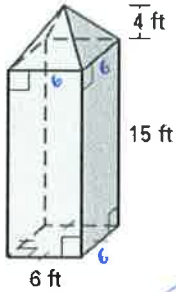
$$SA_{\text{cake}} = \pi r^2 + 2\pi rh \leftarrow \text{one base missing}$$

$$= \pi(4.5)^2 + 2\pi(4.5)(5)$$

$$= 63.585 + 141.3$$

$$\Rightarrow SA = 204.9 \text{ in}^2$$

15. Find the volume of the figure shown below.



$$\text{Pyramid: } V = \frac{1}{3} Bh$$

$$V = \frac{1}{3}(36)(4)$$

$$V = 48$$

$$\text{Prism: } V = Bh$$

$$V = (36)(15)$$

$$V = 540$$

$$\text{Total volume} = 48 + 540$$

$$V = 588 \text{ ft}^3$$



$$B = bh$$

$$B = (6)(6)$$

$$B = 36$$



$$B = bh$$

$$B = (6)(6)$$

$$B = 36$$

16. The surface area of an orange is  $78.5 \text{ in}^2$ . Please find the approximate volume of the orange.

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

$$78.5 = 4\pi r^2$$

$$78.5 = 12.56r^2$$

$$6.25 = r^2 \Rightarrow r = 2.5$$

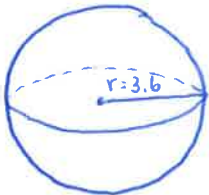
$$V = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\pi(2.5)^3$$

$$= \frac{4}{3}\pi(15.625)$$

$$= 65.4 \text{ in}^3$$

17. How much air is needed to fill a standard basketball with a diameter of 7.2 inches?



$$V = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\pi(3.6)^3$$

$$= \frac{4}{3}\pi(46.656)$$

$$\Rightarrow 195.3 \text{ in}^3$$

18. A pyramid is enclosed inside a prism. The pyramid and prism have equal base areas and equal heights. If the volume of the prism is  $60 \text{ m}^3$ , what is the volume of the pyramid?

$$V_{\text{prism}} = Bh$$

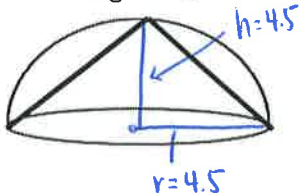
$$60 = Bh$$

$$V_{\text{pyramid}} = \frac{1}{3} Bh$$

If the volume of prism = 60, the volume of the pyramid must be  $\frac{1}{3}$ , so

$$60 \times \frac{1}{3} = 20 \text{ m}^3$$

19. A cone shaped hole is drilled out of a hemisphere with a radius of 4.5 inches. Please find the volume of the remaining solid.



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

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

$$= \frac{4}{3}\pi(91.125)$$

$$= 376.65$$

$$\div 2$$

$$V = 188.3 \leftarrow \text{hemisphere}$$

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

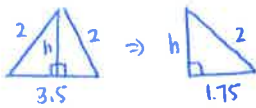
$$= \frac{1}{3}\pi(4.5)^2(4.5)$$

$$= \frac{1}{3}\pi(20.25)(4.5)$$

$$V = 95.4 \leftarrow \text{cone}$$

$$\text{Volume Remaining} = 188.3 - 95.4$$

$$= 92.9 \text{ in}^3$$



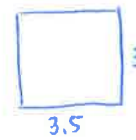
$$h^2 + 1.75^2 = 2^2$$

$$h^2 = .4375 \Rightarrow h = .9682$$

$$B = \frac{1}{2}bh$$

$$B = \frac{1}{2}(3.5)(.9682)$$

$$B = 1.69$$

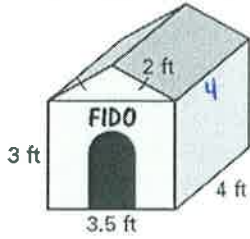


$$B = bh$$

$$B = (3.5)(3)$$

$$B = 10.5$$

20. Please find the volume of Fido's doghouse.



Triangular Prism:  $V = Bh$

$$V = (1.69)(4)$$

$$V = 6.76$$

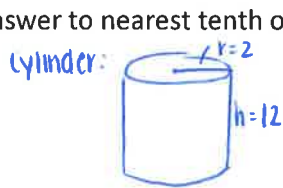
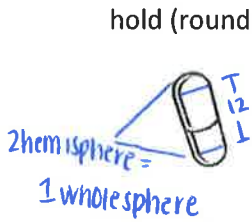
Rectangular Prism:  $V = Bh$

$$V = (10.5)(4)$$

$$V = 42$$

$$\text{Total Vol} = 6.76 + 42 = 48.8 \text{ ft}^3$$

21. A pharmacist is filling medicine capsules. The capsules are cylinders with half spheres on each end. If the length of the cylinder is 12 mm and the radius is 2 mm, how many cubic mm of medication can one capsule hold (round answer to nearest tenth of a cubic mm)?



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

$$= \pi(2)^2(12)$$

$$= \pi(4)(12)$$

$$= 150.72$$



$$V = \frac{4}{3}\pi r^3$$

$$V = \frac{4}{3}\pi(2)^3$$

$$V = \frac{4}{3}\pi(8)$$

$$V = 33.5$$

$$\text{Total Vol} = 33.5 + 150.72$$

$$= 184.2 \text{ mm}^3$$

22. A cone has a diameter of 10 inches and a height of 12 inches. The height of the cone was stretched to 15 inches. What must the radius be if the new cone still has the same volume?

Cone 1:  $V = \frac{1}{3}\pi r^2 h$

$$V = \frac{1}{3}\pi(5)^2(12)$$

$$V = \frac{1}{3}\pi(25)(12)$$

$$V = 314 \text{ in}^3$$

Cone 2:  $V = \frac{1}{3}\pi r^2 h$

$$314 = \frac{1}{3}\pi(r^2)(15)$$

$$\frac{314}{15.7} = \frac{15.7 r^2}{15.7}$$

$$20 = r^2$$

$$r \approx 4.47 \text{ in}$$

