Lesson 9: Volume and Surface Area

Volume: how much fits IN a 3-D object

Surface Area: The entire area around a 3-D figure

[PRISMS] Sides are rectangles/squares

Square and Rectangular: l x w x h

Triangular: $\frac{l \times w \times h}{2}$

Ex 1: 3in, 3in, 3 in — $2 \times 3 \times 3 = 27 in^3$

Ex 2: 6 in, 8 in, 4 in — $6 \times 8 \times 4 = 192 in^3$

Ex 3: 4 in, 7 in, 5 in — $\frac{4 \times 5 \times 7}{2} = 70 in^3$

(PRACTICE)

1) 2) 3) 4) 5) 6)

[Pyramids] Sides are triangles

Square or Rectangular: $\frac{L \times w \times h}{3}$

Triangular: $\frac{L \times w \times h}{6}$

Ex 1: $\frac{2 \times 4 \times 7}{3} = 10.6$ — 7 cm, 4 cm, 4 cm

Ex 2: $\frac{4 \times 3 \times 8}{2} = 32$ — 4 cm, 3 cm, 8 cm

Ex 3: 3 cm, 4 cm, 5 cm — $\frac{3 \times 4 \times 5}{6} = 10$

(PRACTICE)

1) 2) 3) 4) 5) 6)

[Cylinders and Cones] Cylinder: Pi x r^2 x h

Cone: $\frac{\text{Pi} \times r^2 \times h}{3}$

Ex 1: 5 m, 7 m — $\pi \cdot 5^2 \cdot 7 \approx 549.78$

Ex 2: 8 m, 3 m — $\frac{\pi \cdot 3^2 \cdot 8}{3} \approx 75.4$

(PRACTICE)

1) 2) 3) 4) 5) 6)

[Spheres] Volume: $\frac{4 \times \text{Pi} \times r^3}{3}$

Surface Area: 4 x Pi x r^2

Ex — 12 mm — Volume: $\frac{4 \cdot \pi \cdot 12^3}{3} \approx 7238.23$ — Surface Area: $4 \cdot \pi \cdot 12^2 \approx 1809.56$

(PRACTICE)

Find the volume of each figure. Round your answers to the nearest hundredth, if necessary.

1) 2) 3) 4)

Find the surface area of each figure. Round your answers to the nearest hundredth, if necessary.

5) 6) 7) 8)

[sdrawkcaB gnikroW]

Answer the following questions using π = 3. 14. Round your answer to the nearest hundredth where necessary.

1. Find the height of a cylinder with a volume of 30 in^3 and a radius of 1 in.
2. Find the height of a cylinder with a volume of 308 cm^3 and a radius of 2 cm. $100 = \pi \cdot 2^2 \cdot h$, $h = 7.96$
3. Find the height of a cylinder with a volume of 7296 ft^3 and a radius of 6 ft.
4. Find the height of a cylinder with a volume of 11278 mm^3 and a radius of 9 mm.
5. Find the radius of a cylinder with a volume of 954 in^3 and a height of 18 in. $\frac{950 = \pi r^2 \cdot 10}{3}$, $30.25 = r^2$, $5.5 = r$
6. Find the radius of a cylinder with a volume of 2281 cm^3 and a height of 4 cm. $\frac{228 = 3 \cdot r^2 \cdot 3.4}{}$, $19.56 = r^2$, $4.42 = r$
7. Find the radius of a cylinder with a volume of 1884 ft^3 and a height of 12 ft.
8. Find the radius of a cylinder with a volume 616 mm^3 and a height of 14 mm.
9. Find the height of a cone with a volume of 158 in^3 and a radius of 10 in.
10. Find the height of a cone with a volume of 21 ft^3 and a radius of 4 ft.
11. Find the radius of a cone with a volume of 175 cm^3 and a height of 21 cm.
12. Find the radius of a cone with a volume of 1966 mm^3 and a height of 12 mm.
13. Find the radius of a sphere with volume = 113.04 in^3.
14. Find the radius of a sphere with volume = 904.32 cm^3. $904.32 = \frac{4 \cdot 3 \cdot r^3}{3}$
15. Find the radius of a sphere with volume = 3052.80 m^3. $216 = r^3$, $6 = r$
16. Find the radius of a sphere with volume = 4.186 ft^3.