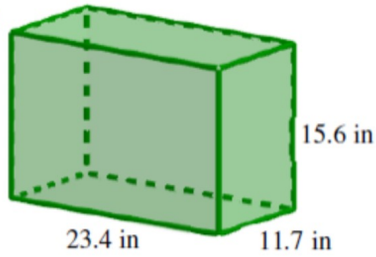
# Solutions

Page 300 #s 1, 2, 4, 9, 10, 11, 14, 18

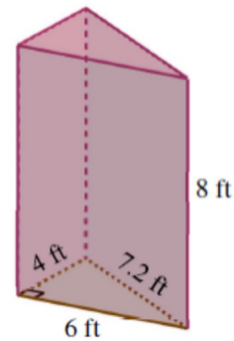
Apr 9-21:27

**1.** Determine the volume of each object.

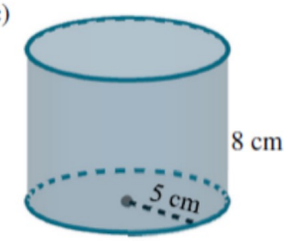
a)




b)




c)




$Vol = Lwh$

$= 23.4 \times 11.7 \times 15.6$

$= 4270.968$

$= 4271.0\ in^3$

$Vol = \frac{\text{area}}{\text{base}} \times h$

$= \frac{4 \times 6}{2} \times 8$

$= 96\ ft^3$

$Vol = \pi r^2 h$

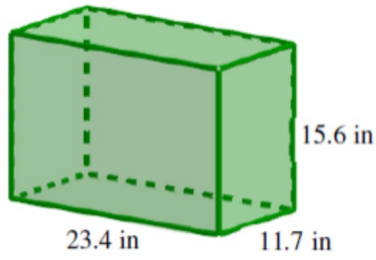
$= \pi (5)^2 (8)$

$= 628.3\ cm^3$

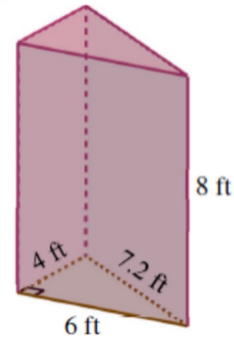
Apr 9-21:28

**2.** Determine the surface area of each object in question #1.

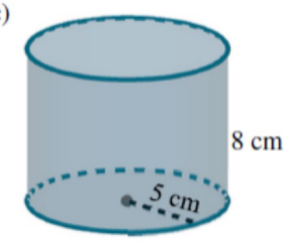
a)




b)




c)




$SA = 2(lw + lh + lw)$

$= 2(23.4 \times 11.7 + 23.4 \times 15.6 + 11.7 \times 15.6)$

$= 2(273.78 + 365.04 + 182.52)$

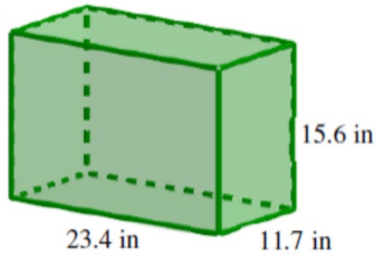
$= 2(821.34)$

$= 1642.68 \text{ in}^2$

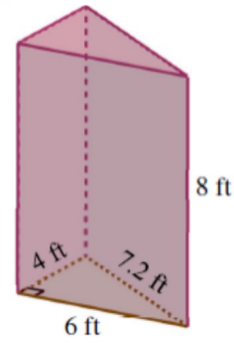
Apr 9-21:28

**2.** Determine the surface area of each object in question #1.

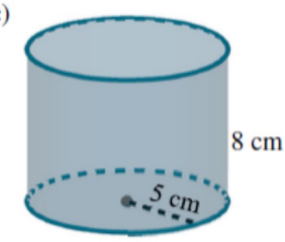
a)




b)




c)




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

$2\pi r^2$: top + bottom; $2\pi rh$: lateral area

$= 2 \times \pi \times 5^2 + 2 \times \pi \times 5 \times 8$

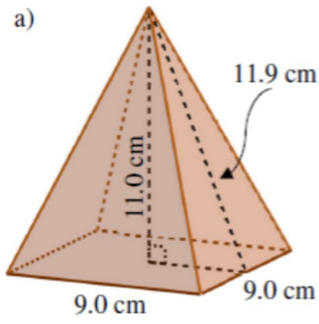
$= 157.08 + 251.33$

$= 408.4 \text{ cm}^2$

Apr 9-21:28

**4.** Determine the volume and surface area of each object.

a)




$Vol = \frac{1}{3} \times \text{area base} \times \text{height}$

$SA = \text{area base} + 4 \times \text{triangular face}$

$V = \frac{1}{3} \times (9 \times 9) \times 11$

$= 297.0 \text{ cm}^3$

$SA = (9 \times 9) + 4\left(\frac{9 \times 11.9}{2}\right)$

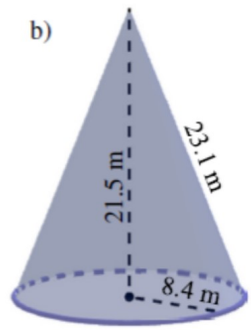
$= 81 + 214.2$

$= 295.2 \text{ cm}^2$

Apr 9-21:28

**4.** Determine the volume and surface area of each object.

b)




$Vol = \pi r^2 h$

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

$Vol = \pi \times 8.4^2 \times 21.5$

$= 4765.9 \text{ m}^3$

$SA = \pi \times 8.4^2 \times 21.5 + \pi \times 8.4 \times 23.1$

$= 4765.92 + 609.59$

$= 5375.5 \text{ m}^2$

Apr 9-21:28

**9.** A triangle has a base of $2\frac{3}{8}$ inches and height of $3\frac{1}{4}$ inches.

a) Determine the exact area of the triangle.

b) If the triangle is the base of a prism with length $5\frac{1}{2}$ inches, determine the exact volume of the prism.

a) $\text{Area} = \frac{b \times h}{2}$

$= 2\frac{3}{8} \times 3\frac{1}{4} \div 2$

$= \frac{19}{8} \times \frac{13}{4} \div 2$

$= \frac{247}{32} \div \frac{2}{1}$

$= \frac{247}{32} \times \frac{1}{2}$

$= \frac{247}{64}$

$= 3\frac{55}{64}\ in^2$

b) $\text{Vol} = \text{area}_{\text{base}} \times l$

$= 3\frac{55}{64} \times 5\frac{1}{2}$

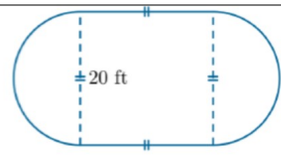
$= \frac{247}{64} \times \frac{11}{2}$

$= \frac{2717}{128}$

$= 21\frac{29}{128}\ in^3$

Apr 9-21:30

**10.** A backyard ice rink consists of a rectangular middle section and semicircular ends, as shown in the diagram on the right.




a) Determine the perimeter of the rink.

b) Determine the area of the rink.

c) If the ice has a thickness of 0.2 feet, determine the volume of ice used for the rink.

a) $P = \text{Semi circle} + 2 \text{ lengths} + \text{Semi circle}$

$= \frac{\pi \times 20}{2} + 2 \times 20 + \frac{\pi \times 20}{2}$

$= 31.42 + 40 + 31.42$

$= 102.8\ ft$

$\text{radius} = \frac{20}{2}$

$= 10ft$

b) $A = \text{Semi circle} + \text{rectangle} + \text{Semi circle}$

$= \frac{\pi \times 10^2}{2} + 20 \times 20 + \frac{\pi \times 10^2}{2}$

$= 157.08 + 400 + 157.08$

$= 714.2\ ft^2$

c) $V = \text{area} \times \text{depth}$

$= 714.2 \times 0.2$

$= 142.8\ ft^3$

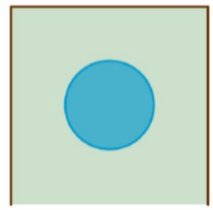
Apr 9-21:31

**11.** A circular pool with a radius of 9' is to be placed in the centre of a square backyard measuring 40' × 40', as shown below. The remainder of the yard will be covered by grass.

a) Determine the area of the yard covered by grass.

b) Three sides of the yard will be fenced. If the homeowner can install fence at a cost of $28 per linear foot, find the total cost of installing the fence.

c) If the depth of the water in the pool is 4', calculate the volume of water in the pool.



a) $\text{Area}_{\text{grass}} = \text{Area}_{\text{yard}} - \text{Area}_{\text{Pool}}$

$= (40 \times 40) - (\pi \times 9^2)$

$= 1600 - 254.5$

$= 1345.5\ ft^2$

b) Length needed $= 3 \times 40$

$= 120\ ft$

Cost = length × $28

$= 120 \times 28$

$= \$3360$

c) Vol = area × depth

$= (\pi \times 9^2) \times 4$

$= 254.5 \times 4$

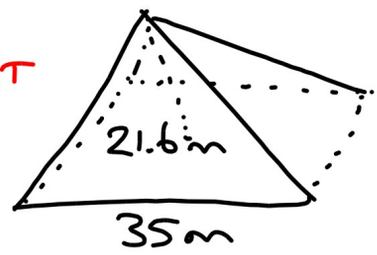
$= 1018\ ft^3$

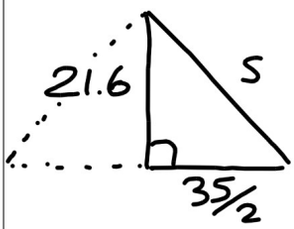
Apr 9-21:31

**14.** The entrance of the Louvre in Paris is a square-based pyramid with a height of 21.6 m. The side length of the square base is 35 m. Calculate the total surface area of the four triangular faces to the nearest square metre.

$\text{Area} = 4 \times \frac{\text{base} \times \text{"height"}}{2}$

"Height" is NOT the actual height, but the SLANT HEIGHT




$s^2 = \left(\frac{35}{2}\right)^2 + 21.6^2$

$s^2 = 17.5^2 + 21.6^2$

$s^2 = 772.81$

$s = \sqrt{772.81}$

$s = 27.8\ m$

$\text{Area} = 4 \times \frac{35 \times 27.8}{2}$

$= 1946\ m^2$

Apr 9-21:33

**18.** A concrete mixing silo consists of cylindrical rings and a conical spout. Each cylindrical ring has a height of 122.5 cm and a diameter of 322.5 cm.

a) How much volume, to the nearest tenth of a cubic metre, does each cylindrical ring add to the silo?

b) Determine, to the nearest tenth of a cubic metre, the volume of the conical spout if its height is 230 cm.

Measuring in $m^3$ so convert dimensions into metres

$\Rightarrow$ Height $= 1.225\,m$, Diameter $= 3.225\,m$

a) $Vol = \pi r^2 h$

$= \pi \times \left(\frac{3.225}{2}\right)^2 \times 1.225$

$= 10.0\,m^3$

b) $Vol = \frac{1}{3}\pi r^2 h$

$h = \frac{230}{100} = 2.3\,m$

$= \frac{1}{3} \times \pi \times \left(\frac{3.225}{2}\right)^2 \times 2.3$

$= 6.3\,m^3$

Apr 9-21:34

**18.** A concrete mixing silo consists of cylindrical rings and a conical spout. Each cylindrical ring has a height of 122.5 cm and a diameter of 322.5 cm.

c) Determine the volume of a silo with 6 rings.

d) Write an equation to model the volume, $V$ (in cubic metres), of a silo that has $n$ rings.

e) If a silo must hold a volume of 110 $m^3$, how many rings are needed?

c) Vol = Vol 6 rings + Vol spout

$= 6 \times 10.0 + 6.3$

$= 66.3\,m^3$

d) $Vol = 10.0n + 6.3$

e) $110 = 10.0n + 6.3$

$110 - 6.3 = 10.0n + 6.3 - 6.3$

$\frac{103.7}{10.0} = \frac{10.0n}{10.0} \Rightarrow n = 10.37$ rings

$\Rightarrow$ Need 11 rings

Apr 9-21:34