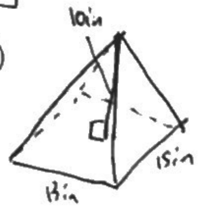
HW 11 Solutions MA 202: 11.4: #14, 18, 28, 30   12.3: #4, 12, 14, 20, 26, 32.

11.4.14

a)

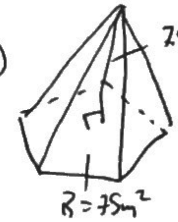


$V = \frac{1}{3}Bh = \frac{1}{3}(13 \cdot 15) \cdot 10 = \boxed{650 \text{ in}^3}$

b)

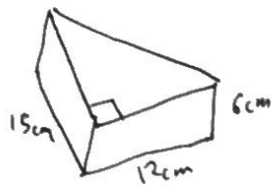
$V = \frac{1}{3}Bh = \frac{1}{3}\left(\frac{1}{2} \cdot 6 \cdot 5\right) \cdot 7 = \boxed{35 \text{ ft}^3}$

c)



$V = \frac{1}{3}Bh = \frac{1}{3}(75)(24) = \boxed{185 \text{ m}^2}$

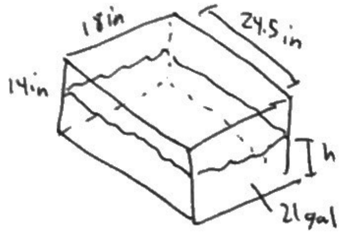
11.4.18



$V = Bh = \left(\frac{1}{2} \cdot 15 \cdot 12\right) \cdot 6 = \boxed{540 \text{ cm}^3}$

11.4.28

1 gal gas = 231 in³ gas.



a) $V_{tank} = Bh = 14 \cdot 18 \cdot 24.5 = \boxed{6174 \text{ in}^3}$

b) $21 \text{ gal} = 21 \cdot 231 \text{ in}^3 = 4851 \text{ in}^3$.

$B = 24.5 \text{ in} \cdot 18 \text{ in} = 441 \text{ in}^2$.

So $Bh = 4851 \Rightarrow h = \frac{4851}{441} = \boxed{11 \text{ in.}}$

11.4.30

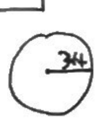
The surface area of the cake is $2(3 \cdot 9) + 2 \cdot (3 \cdot 9) + 2(9 \cdot 9) = 270 \text{ in}^2$.

Covering this area with a thickness of 1/8 in requires $\frac{1}{8} \text{ in} \cdot 270 \text{ in}^2 = 33.75 \text{ in}^3$.

2 cups of frosting is only 28 in³, so it is not enough.

12.3.4

a)



$A = \pi \cdot 3^2 = \boxed{9\pi \text{ ft}^2} \approx \boxed{28.26 \text{ ft}^2}$

b)

$V_1 = Bh = 9\pi \cdot 1 = \boxed{9\pi \text{ ft}^3}$ $\boxed{28.26 \text{ ft}^3}$

c) $V = 4 \cdot V_1 = \boxed{36\pi \text{ ft}^3}$ $\boxed{113.04 \text{ ft}^3}$

12.3.12

a) $V = 314 \text{ in}^3$, $r = 5 \text{ in}$.

$V = \pi r^2 h$

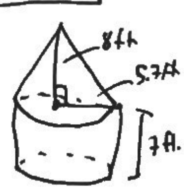
$h = \frac{V}{\pi r^2} = \frac{314}{(3.14)5^2} = \frac{100}{25} = \boxed{4 \text{ in}}$

b) $V = 254 \text{ yd}^3$, $d = 9 \text{ yd}$ $r = 4.5 \text{ yd}$.

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

$h = \frac{3V}{\pi r^2} = \frac{3(254)}{(3.14)(4.5)^2} \approx \boxed{7.99 \text{ in}}$

12.3.14



$V_{cone} = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(5.7)^2 \cdot 8 = \boxed{272.05 \text{ ft}^3}$

$V_{cyl} = \pi r^2 h = \pi(5.7)^2 \cdot 7 = \boxed{714.13 \text{ ft}^3}$

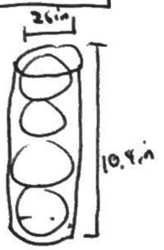
$V_{total} = V_{cone} + V_{cyl} = \boxed{986.18 \text{ ft}^3}$

12.3.20 | $V_{cyl} = Bh = \pi r^2 \cdot r = \pi r^3$

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

* The volume of the cylinder is $\frac{3}{4}$ of the volume of the sphere.

12.3.26 |



a) $d_{ball} = 2.6$ in, so $r_{ball} = 1.3$ in.
Thus the volume of a ball is $V = \frac{4}{3}\pi r_{ball}^3 = \frac{4}{3}\pi (1.3)^3 \approx \boxed{9.20 \text{ in}^3}$

b) The volume of the cylindrical can is $V = Bh = \pi (1.3)^2 \cdot 10.4 \approx 55.19 \text{ in}^3$
The four balls together occupy $4 \cdot 9.20 = 36.8 \text{ in}^3$. So the unoccupied volume is $55.19 - 36.8 = 18.39 \text{ in}^3$. This is $\frac{18.39}{55.19} \cdot 100 = \boxed{33.32\% \text{ of the can}}$.

12.3.32 | The volume of a cylinder is $V = Bh = \pi r^2 h$. So doubling the height gives $V_2 = \pi r^2 \cdot 2h = 2V$, double the original volume. To double the volume by changing the radius, we increase the radius by a factor of $\underline{\sqrt{2}}$: $V_3 = \pi(\sqrt{2}\, r)^2 h = 2\pi r^2 h = 2V$.