Serway & Vuille 8th Edition
Chapter 1 Homework

1) $T = 2\pi\sqrt{\frac{l}{g}}$ $\qquad T = \sqrt{\frac{L}{L/T^2}} = \sqrt{T^2} = T$

5) $F = \frac{GMm}{r^2}$ $\qquad$ units: $\frac{kg \cdot m}{s^2} = \frac{G(kg)(kg)}{m^2}$

$\therefore$ G has units $= \frac{m^3}{kg\,s^2}$

10) $C = 2.997\,924\,58 \times 10^8$ m/s

a) 3 significant figures 3.00×10^8 m/s

b) 5 " " $2.997\,9 \times 10^8$ m/s

c) 7 " " $2.997\,92_5 \times 10^8$ m/s

13) a) $756 + 37.2 + 0.83 + 2.5 = 797$ (no decimal places)

b) $(0.0032)(356) = 1.1$ (only keep 2 significant figures)

c) $5.620\,\pi = 17.66$ (Keep 4 significant figures)

23) $c = 3.00 \times 10^8$ m/s

1 mile = 1.609 Km = 1609 m

$$\left(3.00 \times 10^8 \frac{m}{s}\right)\left(\frac{3600\,s}{h}\right)\left(\frac{1\,mile}{1609\,m}\right) = 6.71 \times 10^8 \text{ miles/h}$$

24) L = 50.0 ft

W = 26 ft

H = 8.0 ft

$$V = LWH = (50.0)(26)(8.0)\,ft^3\left(\frac{1\,m}{3.281\,ft}\right)^3$$

$$= 2.9 \times 10^2\,m^3$$

Convert to cm^3:

$$V = 2.9 \times 10^2\,m^3\left(\frac{100\,cm}{1\,m}\right)^3$$

$$= 2.9 \times 10^8\,cm^3$$

26) $V = \frac{1}{3}bh$ $\quad b = 13.0 \text{ acres}$

where b = area of the base

h = height $\quad h = 481 \text{ ft}$

1 acre = 43 560 ft^2

1 m = 3.281 ft

$$V = \frac{1}{3}\left(13.0 \text{ acres}\right)\left(\frac{43\,560 \text{ ft}^2}{\text{acre}}\right)\left(481 \text{ ft}\right) = 9.08 \times 10^7 \text{ ft}^3$$

$$1.08 \times 10^7 \text{ ft}^3 \left(\frac{1 \text{ m}}{3.281 \text{ ft}}\right)^3 = 2.57 \times 10^6 \text{ m}^3$$

35) $r = 2.5\text{m}$ $\quad x = r\cos\theta = 2.5\text{m}\cos 35^\circ = 2.0\text{m}$

$\theta = 35^\circ$ $\quad y = r\sin\theta = 2.5\text{m}\sin 35^\circ = 1.4\text{m}$

38) (5.0, 3.0) and (−3.0, 4.0)

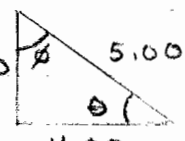
$x_1 = 5.0\text{cm}$ $\quad x_2 = -3.0\text{cm}$ $\quad \therefore \Delta x = -3.0\text{cm} - 5.0\text{cm} = -8.0\text{cm}$

$y_1 = 3.0\text{cm}$ $\quad y_2 = 4.0\text{cm}$ $\quad \therefore \Delta y = 4.0\text{cm} - 3.0\text{cm} = 1.0\text{cm}$

$|\Delta x| = 8.0\text{cm}$ and $|\Delta y| = 1.0\text{cm}$

Using the Pythagorean Theorem:

$$d = \sqrt{(8.0\text{cm})^2 + (1.0\text{cm})^2} = 8.1\text{cm}$$

45) 

a) 3.00 b) 3.00 c) $\cos\theta = \frac{4.00}{5.00} = 0.800$

d) $\sin\phi = \frac{4.00}{5.00} = 0.800$ e) $\tan\phi = \frac{4.00}{3.00} = 1.33$

58) Sphere 1 A_1, V_1 $\quad R_2 = 2R_1$ $\quad A = 4\pi R^2$ and $V = \frac{4}{3}\pi R^3$

Sphere 2 A_2, V_2

a) $A_2/A_1 = 4\pi R_2^2 / 4\pi R_1^2 = \frac{(2R_1)^2}{R_1^2} = 4$

b) $V_2/V_1 = \frac{4}{3}\pi R_2^3 / \frac{4}{3}\pi R_1^3 = \frac{(2R_1)^3}{R_1^3} = 8$