Solution Manual for Applied Physics 11th Edition Ewen Schurter Gundersen 9780134159386

Chapter 2

2.1

1. s = vt
2. v = at
3. $m = \frac{W}{g}$
4. $a = \frac{F}{m}$
5. $R = \frac{E}{I}$
6. $W = \frac{V}{1h}$
7. $g = \frac{PE}{mh}$
8. $h = \frac{PE}{mg}$
9. $h = \frac{v^2}{2g}$
10. $f = \frac{x_L}{2\nu L}$
11. w = Pt
12. F = pA
13. $t = \frac{W}{P}$
14. $A = \frac{F}{P}$
15. $m = \frac{2(KE)}{v^2}$
16. $v^2 = \frac{2(KE)}{m}$
17. $s = \frac{W}{F}$
18. $a = \frac{v_f - v_i}{t}$
19. $I = \frac{V - E}{-r}$ or $I = \frac{E - V}{r}$
20. $t = \frac{v_2 - v_1}{a}$
21. $P = \frac{\nu}{2R}$
22. $L = \frac{Rd^2}{k}$
23. $C = \frac{5F - 160}{9}$ or $C = \frac{5(F - 32)}{9}$
24. $F = \frac{9}{5}C + 32$
25. $f = \frac{1}{2\nu C x_C}$
26. $L = \frac{RA}{\rho}$
27. $R_3 = R_T - R_1 - R_2 - R_4$
28. $Q_2 = \frac{Q_1 + Q_1 P}{P}$ or $Q_2 = \frac{Q_1}{P} + Q_1$
29. $I_P = \frac{I_S N_S}{N_P}$
30. $N_S = \frac{V_S N_P}{V_P}$
31. $v_i = 2v_{avg} - v_f$
32. $a = \frac{v - v_i}{2(s - s_i)}$ or $\frac{v - v_i}{2s - 2s_i}$
33. $s = \frac{v^2 - v_i^2 + 2as_i}{2a}$
34. $V_1 = V_2 - \frac{Ft}{m}$ or $V_1 = \frac{mV_2 - Ft}{m}$
35. $R = \frac{QJ}{I^2 t}$
36. $x_i = x - v_i t - \frac{1}{2}at^2$
37. $r = \sqrt{\frac{A}{\nu}}$
38. $r = \sqrt{\frac{V}{\nu h}}$
39. $d = \sqrt{\frac{kL}{R}}$
40. $r = \sqrt{\frac{3V}{\nu h}}$
41. $I = \pm\sqrt{\frac{QJ}{Rt}}$
42. $I = \pm\sqrt{\frac{Fr}{m}}$

2.2

1. (a) A= bh (b) 162 cm^2
2. (a) V= lwh (b) $4420 m^3$
3. (a) $b = \frac{A}{h}$ (b) 7.50 cm
4. (a) $b = \frac{P}{4}$ (b) 105 in.
5. (a) c = P – a – b (b) 6.0 cm
6. (a) $d = \frac{C}{\nu}$ (b) 158 ft
7. (a) $r = \frac{C}{2\nu}$ (b) 10.9 yd
8. (a) $h = \frac{2A}{b}$ (b) 26.0 m
9. (a) $b = \frac{P - 2a}{2}$ (b) $b = \frac{P}{2} - a$ (b) 33.2 km
10. (a) $V = \nu r^2 h$ (b) $1{,}460{,}000\, m^3$
11. (a) $h = \frac{V}{\nu r^2}$ (b) 6.11 m
12. (a) $h = \frac{A}{2\nu r}$ (b) 5.80 cm
13. (a) $B = \frac{V}{h}$ (b) 154 m^2
14. (a) $r = \sqrt{\frac{A}{\nu}}$ (b) 12.15 m
15. (a) $b = \sqrt{A}$ (b) 21.6 in.
16. (a) $r = \sqrt{\frac{3V}{\nu h}}$ (b) 13.2 m
17. (a) $C = 2\nu r$ (b) 121.6 m
18. (a) $V = \frac{4}{3}\nu r^3$ (b) $70{,}690\, m^3$
19. (a) $B = \frac{3V}{h}$ (b) 122.4 ft^2
20. (a) $h = \frac{2A}{a + b}$ (b) 11.40 m

2.3

1. $V = lwh = (36.0cm)(30.0cm)(24.0cm) = 25,900cm^3$

2. $V = \pi r^2 h = \pi (2.10in.)^2 (7.50in.) = 104in^3$ 3. $V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi (5.40cm)^2 (9.30cm) = 284cm^3$

4. $V = \pi r^2 h = \pi \left(\frac{11.40cm}{2}\right)^2 (24.00cm) = 2450cm^3$ 5. $A = \pi r^2 = \pi \left(\frac{11.40cm}{2}\right)^2 = 102.1cm^2$

6. $A = \pi dh = \pi(11.40cm)(24.00cm) = 859.5cm^2$

7. $V = \left(1W + \frac{1}{2}bh\right)h' = \left[(22.0\,ft)(10.0\,ft) + \frac{1}{2}(22.0\,ft)(4.70\,ft)\right](37.0\,ft) = 10{,}100\,ft^3$

8. $A = \left[\frac{a+b}{2}\right]h = \left[\frac{3.70\,ft + 6.80\,ft}{2}\right](19.3\,ft) = 101\,ft^2$

9. $V = 1Wh = (9.00\,ft)(12.0\,ft)(8.00\,ft) = 864\,ft^3$

10. $A = \pi r^2 = \pi\left[\frac{3.25cm}{2}\right]^2 = 8.30cm^2$

11. $A = \frac{1}{2}bh = \frac{1}{2}(4.00cm)(6.00cm) = 12.0cm^2$

12. $c = \sqrt{a^2 + b^2} = \sqrt{(4.00cm)^2 + (6.00cm)^2} = 7.21cm$

13. $A = \pi\left(r_1^2 - r_2^2\right) = \pi\left[\left(\frac{3.50cm}{2}\right)^2 - \left(\frac{3.20cm}{2}\right)^2\right] = 1.58cm^2$

14. $V = \frac{4\pi r^3}{3} = \frac{4}{3}\pi(8.00\,m)^3 = 2140m^3$

15. $W = \frac{A}{1} = \frac{900m^2}{25.0m}\,36.0m$

16. $h = \frac{V}{1W} = \frac{192m}{(8.00m)(4.00m)} = 6.00\,m$

17. $V = \pi r^2 h = \pi(2.00cm)^2(4.20cm) = 52.8cm^3$

18. $V = \pi r^2 h = \pi(3.90cm)^2(8.00cm) = 382cm^3$

19. $d = \frac{C}{\pi} = \frac{29.5m}{\pi} = 9.39\,m$

20. $h = \frac{V}{\pi r^2} = \frac{1000m^3}{\pi\left(\frac{9.39m}{2}\right)^2} = 14.4m$

21. Distance=C $(no.of\ rev) = \pi d(no.of\ rev) = \pi(30.0cm)(145)\left(\frac{1m}{100cm}\right) = 137m$

22. $A = Ch = (29.5m)(14.4m^2)\left(\frac{1L}{5.0m^2}\right) = 85L$

23. $h = \frac{V}{\pi r^2} = \frac{500{,}000\,gal\left(\frac{1ft^3}{7.50gal}\right)}{\pi(18.0\,ft)^2} = 65.5\,ft$

24. $r = \sqrt{\frac{V}{\pi h}} = \sqrt{\frac{500{,}00gal\left(\frac{1ft^3}{7.50gal}\right)}{\pi(42.0\,ft)}} = 22.5\,ft$

25. $\frac{A_1}{A_2} = \frac{(12.0\,ft)(15.0\,ft)}{(1.00\,ft)(3.00\,ft)} = \frac{180\,ft^2}{3.00\,ft^2} = 60\,panels$

$(1.90cm + 2.20cm)$

26. $A_{total} = A_{rectangle} - A_{trapezoid}$ $A = (3.50cm)(2.00cm) - \left(\frac{}{2}\right)(0.400cm) = 6.18cm^2$

27. $V = V_{cylinder} + V_{cone}$ $V = \pi(1.50m)^2(2.75) + \frac{1}{3}\pi(1.50m)^2(2.00m) = 24.1m^3$

28. $r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{3.05m^2}{\pi}} = 0.985m; yes$

29. $V = lwh = (12.0\,ft)(20.0\,ft)(0.500\,ft)\left(\frac{1yd^3}{27\,ft^3}\right) = 4.44\,yd^3$

30. $1 = \frac{V}{Wth} = \frac{2.00\,yd^3}{(4.00\,ft)(0.333\,ft)} \times \frac{27\,ft^3}{1\,yd^3} = 40.5\,ft$

31. $V = lWth - \pi r^2 th = (8.00in.)(8.00in.)(6.00in.) - \pi(2.50in.)^2(6.00in.) = 266in^3$

32. $V = \pi r^2 th - \pi r^2 th = \pi(25.0cm)^2(60.0cm) - \pi(10.0cm)^2(60.0cm) = 99,000cm^3$

Chapter 2 Review Questions

1. c 2. b 3. a 4. (1) To find the volume of liquid storage tanks. (2) To determine the amount of concrete needed for a driveway. 5. As a shorthand way to designate different measured quantities of the same type. 6. Most mistakes are made in problem solving by missing needed information or misinterpreting the information given. 7. Making a sketch helps visualize what is happening in the problem. 8. The basic question. 9. The working equation is found by solving the basic equation for the unknown quantity. 10. Carrying the units through a problem shows whether the answer is the kind expected. 11. Making an estimate of the correct answer shows whether the solution is reasonable.

Chapter 2 Review Problems

1. (a) $m = \frac{F}{a}$ (b) $a = \frac{F}{m}$ 2. $th = \frac{v^2}{2g}$ 3. $v_f = \frac{2s}{t} - v_i$ 4. $v = \sqrt{\frac{2KE}{m}}$

5. b = P – a – c = 36 ft – 12 ft – 6 ft = 18 ft

6. $a = 2\left(\frac{A}{\lambda_{th}} - \frac{b}{2}\right) = 2\left(\frac{210m^2}{15.0m} - \frac{16.0m}{2}\right) = 12.0m$ 7. $r = \sqrt{\frac{A}{\pi}} = 2.19m$

8. A = ½ b h = ½ (12.2cm) (20.0cm) = 122 cm^2 9. $th = \frac{3V}{\pi r^2} = \frac{3(314cm^3)}{\pi(5.00cm)^2} = 12.0cm$

10. $c = \sqrt{a^2 + b^2} = \sqrt{(41.2mm)^2 + (9.80mm)^2} = 42.3mm$

11. $A = 2\pi rth = 2\pi(7.20cm)(13.4cm) = 606cm$

12. $40.0cm = 2(14.0cm) + 26$
$6 = 6.0cm$

13. $r = \sqrt{\frac{V}{\pi th}} = \sqrt{\frac{2100m^3}{\pi 17.0m}} = 6.27m$

14. $th = \frac{2A}{b} = \frac{2(88.6m^2)}{12.3m} = 14.4m$

15. $V = V_1 - V_2 = (9.0cm \bullet 6.0cm \bullet 12cm) - (6.0cm \bullet 3.0cm \bullet 12cm) = 430cm$

16. $A = A_1 - A_2 = (40.0cm \bullet 120cm) - (10.0cm \bullet 12.0cm) = 4680m^2$

Chapter 2 Applied Concepts

1. $A_{property} - A_{thouse} = l_{prop} W_{prop} - l_{thouse} W_{thouse} = (100\,ft)(200\,ft) - (35.0\,ft)(80.0\,ft) = 17{,}200\,ft^2$
$\frac{\$50.00\left(\frac{9\,ft^2}{1\,yd^2}\right)}{17200\,ft} = \$0.026/yd^2 = 2.62\,¢/yd^2$

2. $V = th \times W \times l = (8.00\,ft)(10.0\,ft)(32.0\,ft) = 2560\,ft^3$; $\frac{2560\,ft^3(1\,\text{min})}{20.0\,\text{min}\,(60\,\text{sec})} = 2.13\,ft^3/s$

3. $V_{SolidBeam} = lWth = (240\,ft)(8.00in.)(8.00in.) = 15400in^3$
$V_{IBeam} = V_{top} + V_{vertical} + V_{bottom} = (1.00in.)(8.00in.)(240in.) + (6.00in.)(1.00in)(240in.) + (1.00in)(8.00in.)(240in.) = 5280in^3$

$$\frac{V_{solid}}{V_{IBeam}} = \frac{15400 in^3}{5280 in^3} = 2.91$$

4. # of balls wide= $\frac{W}{2r} = \frac{16.8in.}{2\xi\ 4.00in.} = 2.10balls$

   # of balls high= $\frac{th}{2r} = \frac{16.8in.}{2\xi\ 4.00in.} = 4.20balls$

   2 balls x 2 balls x 4 balls = 16 balls

   # of balls long= $\frac{l}{2\xi\ r} = \frac{33.6in.}{2\ \xi\ 4.00in.} = 4.20balls$

5. (a) $V_{cylinder} = \nu r^{2}\ th = \nu(1.53m)^{2}\ (0.915m) = 6.73m^{3}$

   (b) $m = DV = \left(7750\ kg/m^{3}\right)\left(6.73m^{3}\right) = 522{,}000kg$

   $F = m\xi\ g = (522,000kg)\left(9.80\ m/s^{2}\right) = 512,000N$