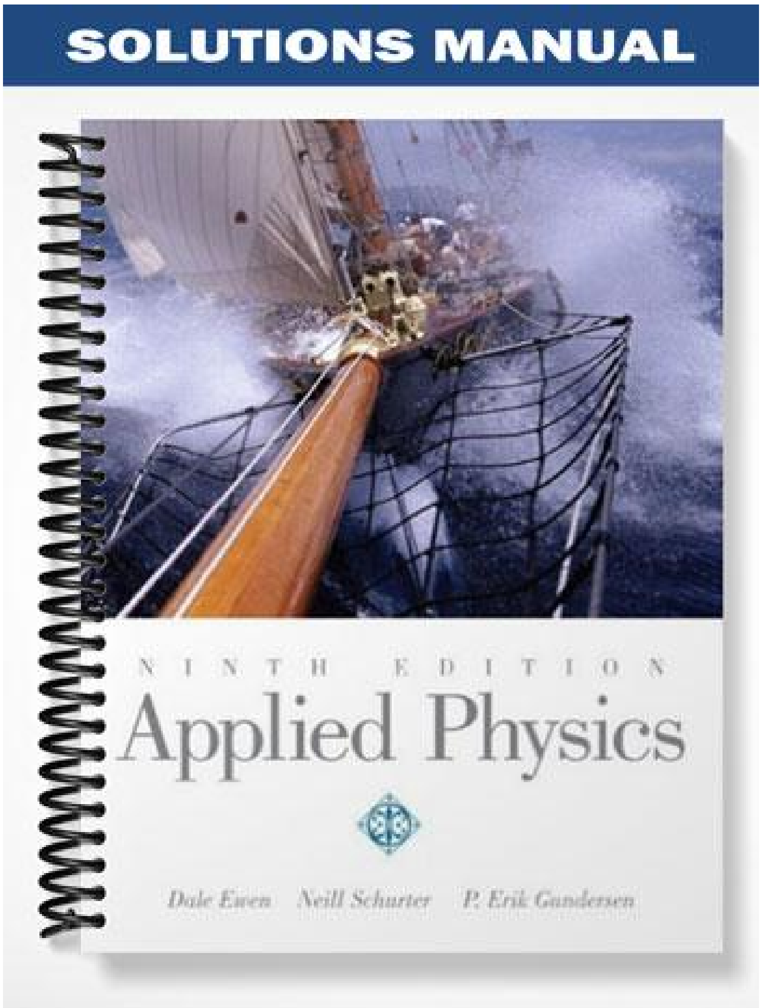
SOLUTIONS MANUAL
NINTH EDITION
Applied Physics
Dale Ewen   Neill Schurter   P. Erik Gundersen

Online Instructor's Manual
to accompany

Applied Physics
Ninth Edition

Dale Ewen
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Chapter 0

Chapter 0 Review Questions

1. d
2. b
3. c
4. b
5. d
6. Archimedes conducted and documented his physical theories.
7. Science is a system of knowledge while technology uses that knowledge to develop material products or processes that satisfy human needs and desires.
8. Behavior of light – Fiber Optics ; Electricity – light bulb.
9. The scientific method is used to discover facts about the natural world. The problem solving method uses the scientific method to create something useful.
10. Knowledgeable of the physical world. It allows one to understand and answer new questions about everyday occurrences. It is also important in many technical fields.

Chapter 1

1.2

1. kilo
2. centi
3. hecto
4. deci
5. milli
6. deka
7. mega
8. micro
9. h
10. k
11. m
12. d
13. M
14. da
15. c
16. μ
17. 135 mm
18. 83 dag
19. 28 kl
20. 52 cm
21. 49 cg
22. 85 mg
23. 75 hm
24. 15 dL
25. 24 metres
26. 185 litres
27. 59 grams
28. 125 kilograms
29. 27 millimeters
30. 25 dicilitres
31. 45 dekametres
32. 27 milligrams
33. 26 megametres
34. 275 micrograms
35. metre
36. kilogram
37. litre and cubic metre
38. ampere
39. second
40. watt

1.3

1. 3.26×10^2
2. 7.98×10^2
3. 2.65×10^3
4. 1.45×10^4
5. 8.264×10^2
6. 2.497×10^1
7. 4.13×10^{-3}
8. 5.3×10^{-4}
9. 6.43×10^0
10. 4.823×10^5
11. 6.5×10^{-5}
12. 2.24×10^{-3}
13. 5.4×10^5
14. 1.4×10^6
15. 7.5×10^{-6}
16. 9×10^{-7}
17. 5×10^{-8}
18. 3.5×10^9
19. 7.32×10^{17}
20. 6.18×10^{-16}
21. 86,200
22. 867
23. 0.000631
24. 5410
25. 0.768
26. 99.4
27. 777,000,000
28. 0.00000419
29. 69.3
30. 0.0378
31. 96,100

32. 7330
33. 1.4
34. 0.000096
35. 0.0000084
36. 900,000,000
37. 700,000,000,000
38. 4.05
39. 0.00000072
40. 0.000000008
41. 4,500,000,000,000
42. 150,000,000,000
43. 0.000000000055
44. 0.000000000872

1.4

1. 1 metre
2. 1 metre
3. 1 kilometre
4. 1 centimetre
5. 1 kilometre
6. 1 kilometre
7. cm
8. mm
9. m
10. cm
11. mm
12. km
13. km
14. m
15. mm
16. m
17. m
18. cm
19. km
20. mm
21. cm
22. m
23. km
24. mm
25. cm
26. cm
27. km
28. cm
29. mm
30. cm
31. cm
32. cm,cm
33. 1000
34. 0.001
35. 100
36. 0.01
37. 0.1
38. 10
39. 1000
40. 10
41. 100
42. 0.01
43. 0.001
44. 0.1
45. 10
46. 25,000 cm
47. 0.25 km
48. 54.6 cm
49. 178,000 m
50. 0.35 dam
51. 8.3 m
52. 7.5 km
53. 3750 mm
54. 7500 μm
55. 4,000,000μm
56. Answers vary
57. (a) 9 ft (b) 3 yd
58. (a) 8.2 mi (b) 14,432 yd
59. (a) 11,000 yd (b) 33,000 ft
60. 17.78 cm
61. 412.16 km
62. 19.4 ft
63. 2.80 in.
64. 3.048 cm
65. 6.1 m
66. Smaller
67. 20 cm = 200 mm, ea. cut = $\frac{3mm}{203mm}$, therefore 6 ft $\times \frac{305mm}{1ft} \times \frac{reamercut}{203mm} = 9$ reamers
68. $\frac{1}{8}$ in. $\times \frac{2.54\text{ cm}}{1\text{ in.}} = 0.318cm$ waste, therefore (214 pcs)(47 cm + 0.318 cm) = 10,126 cm= 101.26m

1.5

1. (8cm) (5 cm) = $40cm^2$
2. (28 cm) (15 cm)= $420cm^2$
3. (8 in.)(3in.) + (3 in.)(5in) = $39in^2$
4. (15cm)(12cm) – (6cm)(7cm) = $138cm^2$
5. (8 in.)(1 in.) + (1 in.)(6 in.) + (8 in.)(1 in.) = $22in^2$
6. (40 cm)(35 cm) – (15 cm)(20 cm) = $1100cm^2$
7. (6 in.)(3 in.)(4 in.) = $72in^3$
8. $[(7cm)(7cm)-(3cm)(3cm)](3cm)=120cm^3$
9. (5cm)(2cm)(4cm)= $40cm^3$
10. (20 in.)(20 in.)(20 in.) = $8000in^3$
11. 1 litre
12. 1 kilolitre
13. 1 cubic centimeter
14. $1m^3$
15. 1 square kilometre
16. $1dm^2$
17. L
18. L
19. m^2
20. cm^2
21. m^3
22. L
23. ha
24. cm^2
25. mL
26. ha
27. m^3
28. L
29. L
30. L
31. mL
32. ha
33. L
34. mL
35. m^2
36. cm^2
37. L
38. L
39. ha
40. cm^2
41. m^3
42. m^3
43. m^2
44. ha
45. L
46. mL
47. 1000
48. 1000
49. 0.1
50. 0.001
51. 0.01
52. 10
53. 10
54. 0.001
55. 1
56. 1000
57. 1,000,000
58. 1
59. 0.001
60. 1
61. 10,000
62. 10^6
63. 100
64. 10^{-6}
65. 0.01
66. 10,000
67. 100
68. 0.01
69. 7.5 L
70. 850 mL

71. 1600 mL
72. 0.009 L
73. 275,000 mm^3
74. $5 \times 10^6 cm^3$
75. $4 \times 10^9 mm^3$
76. 0.52 cm^3
77. 275 mL
78. 0.125 L
79. 1000 L
80. $1.5 \times 10^{-4} L$
81. 7500 cm^3
82. $0.45m^3$
83. $50cm^2$
84. $1.75 \times 10^6 m^2$
85. 50,000 cm^2
86. 25,000 mm^2
87. 400 km^2
88. $5 \times 10^3 m^2$
89. $45 ft^2$
90. $20.9m^2$
91. $13{,}935cm^2$
92. $1944 ft^2$
93. $0.75 ft^2$
94. $7.91in^2$
95. $156{,}816in^2$
96. 1.858 m^2
97. 513 ft^3
98. $1.769in^3$
99. 30.1 yd^3
100. 1442 cm^3
101. 13,824 in^3
102. 732,000 in^3
103. 623.3 cm^3
104. $12ft^3 \times \frac{2.83 \times 10^4 cm^3}{1 ft^3} \div 14cm^3 = 24{,}257$
105. $2(5cm)(2cm) + 2(4cm)(2cm) = 36cm^2$
106. $4(20in.)(20in.) = 1600in^2$
107. $36cm^2 + 2(5cm)(4cm) = 76cm^2$
108. $6(20in.)(20in.) = 2400in^2$
109. $(5\text{cm})(4\text{cm})(2\text{cm}) \times \frac{1mL}{cm^3} = 40mL$
110. $120cm^3 \times \frac{1mL}{cm^3} = 120mL$

1.6

1. 1 gram
2. 1 gram
3. 1 kilogram
4. 1 centigram
5. 1 kilogram
6. 1 kilogram
7. kg
8. mg
9. kg
10. g
11. metric ton
12. mg
13. g
14. kg
15. mg
16. kg
17. kg
18. kg
19. g
20. metric ton
21. kg
22. g
23. g
24. kg

25. g
26. g
27. kg
28. g
29. kg
30. g
31. metric ton
32. g
33. kg
34. mg
35. 1000
36. 0.001
37. 100
38. 0.01
39. 0.1
40. 10
41. 1000
42. 10
43. 100
44. 0.01
45. 0.001
46. 0.1
47. 1,000,000
48. 1000
49. 575,000 mg
50. 0.575 kg
51. 0.65 g
52. 375,000 g
53. 5 g
54. 48,500 dg
55. 30,000,000 mg
56. 4000 kg
57. 2.5 kg
58. $5.8 \times 10^{-5} g$
59. 0.4 mg
60. 30 metric tons
61. $750mL \times \frac{1g}{mL} = 750g$
62. $1m^3 \times \frac{1g}{cm^3} \times \frac{10^6 cm^3}{1m^3} \times \frac{1kg}{10^3 g} = 1000kg$
63. 3500 lb $\times \frac{4.45N}{1lb} = 15{,}575N$
64. 150,00 lb $\times \frac{4.45N}{1lb} = 667{,}500N$
65. $200lb \times \frac{4.45N}{1lb} = 890N$
66. $80lb \times \frac{4.45N}{1lb} = 356N$
67. $2000N \times \frac{0.225lb}{1N} = 450lb$
68. $2000lb \times \frac{4.45N}{1lb} = 8900N$
69. $120oz \times \frac{1lb}{16oz} = 7.5lb$
70. $3.5lb \times \frac{16oz}{1lb} = 56oz$
71. $10N \times \frac{0.225lb}{1N} \times \frac{16oz}{1lb} = 36oz$
72. $25oz \times \frac{1lb}{16oz} \times \frac{4.45N}{1lb} = 6.95N$
73. $94lb \times \frac{4.45N}{1lb} = 418.3N$
74. $500 \times 3lb \times \frac{4.45N}{1lb} = 6675N$
75. second, s
76. kilogram, kg
77. newton, N
78. 1 second
79. 1 millisecond
80. 1 μs
81. 1 ms
82. 8.6 μs
83. 45 ns
84. 75 ps
85. $345\mu s \times \frac{1s}{10^6 \mu s} = 3.45 \times 10^{-4} s$
86. $1h \times \frac{60\min}{1h} + 25\min = 85\min$

87. $4h \times \frac{3600s}{1h} + 25\min \times \frac{60s}{1\min} + 15s = 15{,}915s$

88. $7 \times 10^6 s \times \frac{1h}{3600s} = 1944h$

89. $4s \times \frac{1ns}{10^{-9}s} = 4 \times 10^9 ns$

90. $1h \times \frac{3600s}{1h} \times \frac{10^{12} ps}{1s} = 3.6 \times 10^{15} ps$

1.7

1. 3
2. 4
3. 4
4. 3
5. 2
6. 4
7. 3
8. 3
9. 5
10. 2
11. 3
12. 4
13. 5
14. 3
15. 4
16. 4
17. 3
18. 3
19. 2
20. 3
21. 1
22. 2
23. 4
24. 1
25. 2
26. 3
27. 3
28. 2
29. 4
30. 1

1.8

1. 1 ft.
2. 0.1 mi
3. 1 m
4. 0.01cm
5. 0.0001 in.
6. 0.001 cm
7. 10km
8. 10 ft
9. 0.01 m
10. 10g
11. 0.00001 in.
12. 0.01 cm
13. 0.01m
14. 0.01mi.
15. 1 kg
16. 0.01 mm
17. 0.0001 in.
18. 1 lb
19. 1000 N
20. 10 ft^3
21. 1 N
22. 1000 tons
23. 0.01 m^2
24. 0.001m
25. 100 kg
26. $1 \times 10^{-7} ms$
27. 0.000001A or $1 \times 10^{-6} kg$
28. $1 \times 10^5 ft$
29. 10,000 V or $1 \times 10^4 kg$
30. $1 \times 10^9 m$
31. (a) 15.7 in. (b) 0.018 in.
32. (a) 368 ft (b) 368 ft
33. (a) 16.01 cm (b) 0.734 cm
34. (a) All have 3 significant digits (b) All have precision of 0.01 m.
35. (a) 0.0350 s (b) 0.00040 s
36. (a) 125.00g (b) 9.000 g
37. (a) $27{,}0\bar{0}0L$ (b) 4.75 L
38. (a) All have 2 significant digits (b) 0.40 m
39. (a) All have one significant digit (b) 50 N
40. (a) 120.0 ms (b) All have precision of 0.1 ms
41. (a) 0.05 in. (b) 16.4 in.

42. (a) 300 ft (b) 300 ft
43. (a) 0.65 m (b) 27.5 m
44. (a) All have 2 significant digits (b) 120 kg
45. (a) 0.00005 g (b) 0.75 g
46. (a) 0.09 m (b) 185.0 m
47. (a) 3 N (b) 45,000 N
48. (a) All have 3 significant digits. (b) $15\bar{0}kg$
49. (a) 20 kg (b) $40\bar{0},000kg$
50. (a) 80 ft (b) All have precision of 10 ft

1.9

1. 14,200 ft
2. 124,000 m
3. 83.3 cm
4. 2.83 g
5. $7\bar{0},000N$
6. 15,600 ft
7. 802 m or 80,200 cm
8. 166.2 m or 16,620 cm
9. 18 s
10. $5\bar{0}0,000N$
11. 500 kg
12. 5.35 m
13. 41.0 g
14. 25,00 kg
15. 3200 km
16. 55.24 g
17. 900,000 kg
18. 7 cm or 70 mm
19. 0.40 m or $4\bar{0}cm$
20. 0.69 ms
21. 4900 m^2
22. $560,000\ ft^2 or\ 5.6 \times 10^5\ ft^2$
23. $1,4\bar{0}0,000km^2 or 1.40 \times 10^6 km^2$
24. $5,500,000m^2 or\ 5.5 \times 10^6\ m^2$
25. $737.7m^2$
26. $1\bar{0}0,000cm^2 or 1.0 \times 10^5\ cm^2$
27. 5560 cm^3
28. $6.4 \times 10^5 m^3$
29. $2.91 \times 10^7 in^3$
30. 4060 kg m
31. $3\bar{0}\ ft$
32. 42 m
33. 3.06 cm
34. 41 mi/h
35. 75 km/h
36. 3.0 m
37. $1\bar{0}00mi / h$
38. 1680 ft/s
39. 1100 ft lb/s
40. 4.41 kg m/s
41. 370 mi/h
42. $1\bar{0}kg / m^2$
43. 43.2 m
44. $36,000kgm^2 / s^2$
45. 4530 kg m/s^2
46. 88.2 kg m/s^2
47. 10,300 m^3
48. 2.6 g/cm^3
49. 6100 m^2
50. 560 ft^3
51. 28,800 ft
52. 62,700 m^2

Chapter 1 Review Questions

1. c
2. b
3. b
4. c
5. a
6. (1) Pieces made separately may not fit together (2) Workers could not communicate directions to each other (3) Workers could not tell each other how much material to buy.
7. It is based on the decimal system
8. (1)The distance to the moon (2) The thickness of the aluminum foil.

9. Yes
10. The surface that would be seen by cutting a geometric solid with a thin plate.
11. Yes
12. hectare
13. litre
14. (1) medicines (2) perfumes (3) wine
15. Mass measures the quantity of matter. Weight measures the gravitational pull on an object.
16. Newton (N)
17. millionth
18. Because nearly all measurements are approximate numbers rather than exact numbers.
19. No
20. Yes

Chapter 1 Review Problems

1. k 2. m 3. μ 4. M 5. 45 mg 6. 138 cm 7. 1 L 8. 1 kg

9. 1 m^3 10. $250m \times \frac{1km}{10^3 m} = 0.25km$ 11. $850mL \times \frac{1L}{10^3 mL} = 0.85L$

12. $5.4kg \times \frac{10^3 g}{1kg} = 5400g$ 13. $0.55s \times \frac{1\mu s}{10^{-6} s} = 550{,}000\mu s$ 14. $25kg \times \frac{10^3 g}{1kg} = 25{,}000g$

15. $75\mu s \times \frac{10^{-6} s}{1\mu s} \times \frac{1ns}{10^{-9} s} = 75{,}000ns$ 16. $275\text{cm}^2 \times \left(\frac{10mm}{1cm}\right)^2 = 27{,}500mm^2$

17. $350cm^2 \times \left(\frac{1m}{100cm}\right)^2 = 0.035m^2$ 18. $0.15m^3 \times \left(\frac{100cm}{1m}\right)^3 = 150{,}000cm^3$

19. $500cm^3 \times \left(\frac{1mL}{1cm^3}\right) = 500mL$ 20. $150lb \times \frac{1kg}{2.20lb} = 68.2kg$

21. $36\text{ft} \times \frac{1m}{3.28ft} = 11.0m$ 22. $250cm \times \frac{1in.}{2.54cm} = 98.4in.$

23. $150in^2 \times \left(\frac{2.54cm}{1in.}\right)^2 = 968cm^2$ 24. $24yd^2 \times \left(\frac{3ft}{1yd}\right)^2 = 216ft^2$

25. $6m^3 \times \left(\frac{3.28ft}{1m}\right)^3 = 212ft^3$ 26. $16\text{lb} \times \frac{4.45N}{1lb} = 71.2N$

27. $15{,}600s \times \frac{1\min}{60s} = 260\min$ $260\min \times \frac{1hr}{60\min} = 4\frac{1}{3}h = 4h20\min$ 28. 3 29. 4

30. 2
31. 3
32. 0.1ft
33. 0.0001s
34. 1000mi
35. 100,000N

36. (a) 12.00 m (b) 0.008m (c) 0.150m (d) 2600m

37. (a) 18,050 L (b) 0.75L (c) 0.75 L (d) 18.050 L

38. 0.125s

39. 63,000 N

40. 1,800,000 cm^3

41. 150m^2

42. $9.73 kgm/s^2$

43. $(4.50m)(2.20cm) = 9.90m^2$

44. $(9.0cm)(6.0cm)(13cm) = 7\bar{0}0cm^3$

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. $f = \frac{X_L}{2\pi L}$ 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. $P = \frac{\pi}{2R}$ 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. $f = \frac{1}{2\pi C X_C}$

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. $a = \frac{v^2 - v_i^2}{2(s - s_i)}$ or $\frac{v^2 - v_i^2}{2s - 2s_i}$

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. $r = \sqrt{\frac{A}{\pi}}$ 38. $r = \sqrt{\frac{V}{\pi h}}$ 39. $d = \sqrt{\frac{kL}{R}}$ 40. $r = \sqrt{\frac{3V}{\pi h}}$

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) $4420m^3$ 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) $d = \frac{C}{\pi}$

(b) 158 ft 7. (a) $r = \frac{C}{2\pi}$ (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) $V = \pi r^2 h$ (b) 1,460,000 m^3

11. (a) $h = \frac{V}{\pi r^2}$ (b) 6.11 m 12. (a) $h = \frac{A}{2\pi r}$ (b) 5.80 cm 13. (a) $B = \frac{V}{h}$ (b) 154 m^2

14. (a) $r = \sqrt{\frac{A}{\pi}}$ (b) 12.15 m 15. (a) $b = \sqrt{A}$ (b) 21.6 in. 16. (a) $r = \sqrt{\frac{3V}{\pi h}}$ (b) 13.2 m

17. (a) C = 2πr (b) 121.6 m 18. (a) $V = \frac{4}{3}\pi r^3$ (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. $V = \pi r^2 h = \pi\left(\frac{11.40cm}{2}\right)^2(24.00cm) = 245\bar{0}cm^3$ 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. $A = \left[\frac{a+b}{2}\right]h = \left[\frac{3.70ft + 6.80\,ft}{2}\right](19.3\,ft) = 101\,ft^2$

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. $w = \frac{A}{1} = \frac{90\bar{0}m^2}{25.0m}\ 36.0m$

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. $h = \frac{V}{\pi r^2} = \frac{100\bar{0}m^3}{\pi\left(\frac{9.39m}{2}\right)^2} = 14.4m$

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

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

23. $h = \frac{V}{\pi r^2} = \frac{50\bar{0},000gal \times \frac{1ft^3}{7.50gal}}{\pi(18.0ft)^2} = 65.5ft$

24. $r = \sqrt{\frac{V}{\pi h}} = \sqrt{\frac{50\bar{0},00gal \times \frac{1\,ft^3}{7.50gal}}{\pi(42.0ft)}} = 22.5\,ft$

25. $\frac{A_1}{A_2} = \frac{(12.0ft)(15.0\,ft)}{(1.00\,ft)(3.00\,ft)} = \frac{18\bar{0}\,ft^2}{3.00\,ft^2} = 6\bar{0}\,panels$

26. $A_{total} = A_{rec\tan\lg e} - A_{trapezoid}$ $\quad A = (3.50cm)(2.00cm) - \left(\frac{1.90cm + 2.20cm}{2}\right)(0.400cm) = 6.18cm^2$

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

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

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

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

31. $V = 1wh - \pi r^2 h = (8.00in.)(8.00in.)(6.00in.) - \pi(2.50in.)^2(6.00in.) = 266in^3$

32. $V = \pi r^2 h - \pi r^2 h = \pi(25.0cm)^2(60.0cm) - \pi(10.0cm)^2(60.0cm) = 99,\bar{0}00cm^3$

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. $h = \frac{v^2}{2g}$ 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. $a = 2\left(\frac{A}{h} - \frac{b}{2}\right) = 2\left(\frac{2\bar{1}0m^2}{15.0m} - \frac{16.0m}{2}\right) = 12.0m$ 7. $r = \sqrt{\frac{A}{\pi}} = 2.19m$

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

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

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

12. $40.0cm = 2(14.0cm) + 2\omega$
$\omega = 6.0cm$

13. $r = \sqrt{\frac{V}{\pi h}} = \sqrt{\frac{21\bar{0}0m^3}{\pi 17.0m}} = 6.27m$

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

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

16. $A = A_1 - A_2 = (40.0cm \cdot 12\bar{0}cm) - (10.0cm \cdot 12.0cm) = 4680m^2$

Chapter 2 Applied Concepts

1. $A_{property} - A_{house} = l_{prop}w_{prop} - l_{house}w_{house} = (10\bar{0}\,ft)(20\bar{0}\,ft) - (35.0\,ft)(80.0\,ft) = 17,200\,ft^2$

$\frac{\$50.00}{17200ft}\frac{(9\,ft^2)}{(1\,yd^2)} = \$0.026/yd^2 = 2.62\,¢/yd^2$

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

3. $V_{SolidBeam} = lwh = (24\bar{0}\,ft)(8.00in.)(8.00in.) = 15400in^3$

$V_{IBeam} = V_{top} + V_{vertical} + V_{bottom} = (1.00in.)(8.00in.)(24\bar{0}in.) + (6.00in.)(1.00in)(24\bar{0}in.) + (1.00in)(8.00in.)(24\bar{0}in.) = 5280in^3$

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

4. # of balls wide= $\dfrac{w}{2r} = \dfrac{16.8in.}{2 \times 4.00in.} = 2.10balls$

# of balls high= $\dfrac{h}{2r} = \dfrac{16.8in.}{2 \times 4.00in.} = 4.20balls$

2 balls x 2 balls x 4 balls = 16 balls

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

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

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

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