Chapter 9 Answers to Problems

1. 49 atm  2. 140 N  3. 22 kPa  4. (a) 1.0×10^5 N (b) 2.2×10^4 lb  (c) The pressure of the air under the desktop pushes upward counteracting the downward force.  5. The baby applies 2.0 times as much pressure as the adult.  6. (a) 420 N (b) No force is needed.  7. 4.0 kN southward  8. 88.0 kPa  9. 1.0 m  10. (a) 625 N (b) 6.25 mm (c) 16.0  11. (a) 30 N (b) 5.8 N·m  12. 31 m  13. 2.0 atm  14. 1.0 m  15. 0.126  16. 2.9 N  17. 1.0 MN  18. 10 km  19. (a) 343 kPa (b) 410 Pa  20. (a) 21 kPa (b) 3.1 lb/in^2 (c) 0.21 atm (d) 160 torr  21. (a) 2.2×10^5 Pa (b) 1700 torr (c) 2.2 atm  22. 15 cm  23. 114.0 cm Hg  24. 390 Pa  25. (a) 5.6 cm (b) 0.37 cm  26. 211 mm Hg  27. 250 kg/m^3  28. 1.5 m  29. (a) 91.7% (b) 0.917  30. (a) 140 kg/m^3 (b) 18%  31. (a) 8.8 N upward (b) 9.6 N upward  32. 0.74 g/cm^3  33. 100%  34. (a) 0.910 (b) 1.28 cm (c) 0.13 cm  35. 0.78  36. 0.17 cm^3  37. Yes  38. 1080 kg/m^3  39. (a) 9.8 m/s^2 upward (b) 3.3 m/s^2 upward (c) 68.6 m/s^2 upward  40. 0.80 g downward  41. 50 m/s  42. 28 cm/s  43. (a) 39.1 cm/s (b) 78.5 cm^3/s (c) 78.5 g/s  44. 3.2 m/s  45. 1.12×10^5 Pa  46. 5.0×10^5 N  47. 1.9×10^5 N  48. (a) 1.0×10^5 N (b) 85 m/s  49. 310 kPa  50. 1.82 m/s  51. 8.6 m  52. (a) 78 W (b) 392 kPa (c) At the bottom  53. 1/8 the original flow rate  54. (a) 6850 Pa (b) 0.685 N  55. 12 m/s  56. 0.040 m^3/s  57. 17×10^5 Pa  58. (a) 50 Pa (b) 1100 Pa (c) 13 kPa  59. (b) R = 8ηL/πr^4  60. 0.4 Pa·s  61. 2.4 Pa·s  62. (a) 1.3×10^-10 N (b) 2.6×10^-14 W  63. 1.5 cm/s  64. Since m/v^2 is constant, the drag force is primarily viscous.  65. Since m/v^2 is constant, the drag force is primarily turbulent.  66. 7.0 mm/s  67. 2.9 cm/s  68. 5 Pa  69. (a) 9×10^-6 N (b) 5 mg  70. (a) γLΔs (b) ΔE = γAA  71. (a) 1.54 N (b) 1.54×10^4 N (c) For a given depth, the pressure is the same everywhere, so the very tall, narrow column of water is as effective as having a whole barrel of water filled to the same height and pushing upward on the barrel top.  72. (a) 0.794 N (b) 0.544 N  73. (a) 7.43% (b) 1060 kg  74. The scale reading for the pine doesn’t change.  75. (a) 5.94 m/s (b) As long as we can assume that Bernoulli’s equation applies, it doesn’t matter what fluid is in the vat. (c) The speed would be reduced by a factor of 0.40.  76. 12.5 N/m  77. 230 kg  78. (a) 1.10×10^8 Pa (b) 1.1×10^8 N  79. 23.0 m  80. 20%  81. 110 m  82. (a) 0.600W (b) 0.64W  83. 1.1 cm  84. 0.4 mm/s  85. 87. 27 kPa  86. 76 Pa  87. (a) 2.2 m/s up (b) 21 kPa/s  88. (a) 10.3 m (b) A pump at the bottom of the well does not rely on a pressure difference to bring the water to the surface; it pushes the water up from below.  89. (a) 1.4 N (b) 0.43 N upward (c) 6.8 m/s^2 downward  90. 8.7 kg  91. d is not a linear function of ρ; d = m/πρr^2  92. 10.0 cm (b) 0.814 (c) 0.545  93. (a) 26 m/s (b) 2.6 m/s  94. 270 m/s  95. 0.83 g/cm^3  96. (b) 8.0 km (c) lower limit  97. (a) 5.2 kPa = 0.051 atm (b) 11.8 Pa/m (c) 8.61 km (d) A decreasing air density means that atmosphere extends to a higher altitude.  98. 220% (b) 0.68