

Chapter 2 Answers to Problems

1. 16 cm east 2. 1.2 m to the right of the starting point 3. (a) 80 m west or -80 m (b) 20 m west or -20 m (c) 80 m east or $+80$ m (d) 240 m 4. 4.50 mi east 5. (a) 8 km north of its position at 3 P.M. (b) 116 km south of the starting point (c) 104 km north of its position at 4 P.M. 6. 30 km/h east 7. 14.3 m/s east 8. 0.408 s 9. 53.1 mi/h due west 10. 32 s 11. 160 m 12. (a) 8 m (b) $t = 10$ s to $t = 14$ s 13. (a) DE (b) 4 s and 5 s (c) 20 m 14. 91.5 mph 15. 27 m/s west 16. he cannot pass the test because he would have to run the last 100 m in 0 s 17. 16.5 m 18. (a) 1.5 m/s (b) 1.2 m/s 19. 1.0 m/s 21. (a) 170 cm to the left (b) 28 cm/s (c) 9.4 cm/s to the left 22. (a) 4.88 m/s (b) 4.90 m/s 23. 1.05 m/s to the north 24. 13 s 25. 7.0 m/s^2 in the direction opposite the car's velocity 26. 4.4 m/s^2 forward 27. 28 m/s^2 toward the paddle 28. (a) 1.4 m/s^2 in the $+x$ -direction (b) 220 m in the $+x$ -direction (c) 55 m/s in the $+x$ -direction 29. 2.5 m/s^2 30. (a) 2 m/s^2 (b) 9.0 m/s (c) 9.8 m/s (d) 2 m/s (e) 69 m 31. (a) -10 m/s^2 (b) 0 (c) 5.0 m 32. (b) yes, 2.43 m/s^2 in the direction of motion 33. (b) 86.4 m (c) 14.4 m/s 34. 1.5 m/s^2 northeast 35. (b) 2.00 m/s^2 north (c) 135 m 36. (a) 9.20 s (b) 212 m 37. (a) 4.0 m/s (b) 5.0 m/s 38. you won't hit the tractor, 52.1 m, 11.5 m 39. no; it takes 236 m for the train to stop 40. (a) $1.7 \times 10 \text{ m/s}$ (b) 290 ns 41. 80 m 42. 5.0 m/s^2 in the $+x$ -direction 43. (b) 11 m/s (c) 130 m 44. 4.32 s 45. 85.0 m/s down 46. (a) 1.6 s (b) 48 m 47. 5.0 m/s 48. 13 m 49. 1.22 s 50. (a) 21.1 m (b) 4.08 s 51. (a) 44 m (b) 7.0 m/s (c) 29 m/s (d) 17.1 m below the top of the tower 52. 30.0 m/s 53. (a) 120 m/s^2 toward Lois (b) 170 m/s 54. 10^{th} 55. 46 m 56. (a) 1.7 m/s (b) The swimmer pushes off from each end of the pool and he goes faster during the push-off than when swimming. 57. (a) 224 m (b) 0.99 m/s^2 58. (a) 12 m/s^2 (b) 24 m (c) 3.0 m/s^2 (d) 4.0 59. (a) 330 m/s up (b) 16 m/s^2 up 60. 68 s 61. $2v$ 62. (a) 17.6 m/s downward (b) 97.0 m 63. (a) 420 m/s^2 opposite the direction of motion (b) 4200 m/s^2 opposite the direction of motion 64. (a) 131 s (b) 3.8 m/s 65. 59 mi north, 96 mi/h north, 11 mi/h² south 66. $a \neq a_{\text{av}}$, so the acceleration is not constant. 67. (a) higher 68. (a) 0.30 s (b) 0.05 s (c) 0.45 m (d) 10 m/s^2 down (e) 120 m/s^2 up 69. (a) 25.0 km (b) 152 s (c) 76.0 km (d) 1220 m/s downward 70. (a) t_3 and t_4 (b) t_0 , t_2 , t_5 , and t_7 (c) t_1 and t_6 (d) t_0 , t_3 , and t_7 (e) t_6 71. 3.0 cm/s^2 parallel to the velocity 72. 3260 ft, 25.5 s 73. (a) 1.0 mm/s (b) 20 ms (c) 100 m/s