Chapter 39 Even Answers

2. (a) 60.0 m/s (b) 20.0 m/s (c) 44.7 m/s

6. $0.866c$

8. $0.950c$

10. (a) 1.38 yr (b) 1.31 ly

12. $v/c = L_p\left(c^2t^2 + L_p^2\right)^{-1/2}$

14. (a) 39.2 μs (b) Accurate to one digit

16. $0.140c$

18. (a) 21.0 yr (b) 14.7 ly

(c) 10.5 ly (d) 35.7 yr

20. (a) See solution (b) See solution

(c) 2.00 kHz (d) $\pm 0.0750 \text{ m/s} \approx 0.2 \text{ mi / h}$

22. $0.696c$

24. (a) 17.4 m (b) 3.30°

26. (a) 2.50×10^8 m/s (b) 4.97 m (c) -1.33×10^{-8} s

28. (a) $0.141c$ (b) $0.436c$

32. (a) 0.582 MeV (b) 2.45 MeV

36. (a) 3.07 MeV (b) $0.986c$

38. 8.84×10^{-28} kg and 2.51×10^{-28} kg

40. (a) 2.72×10^{-17} kg · m/s (b) 2.9995×10^8 m/s

42. (a) 3.91×10^4 (b) $u = 0.999\,999\,999\,7\,c$ (c) 7.67 cm

44. $\sim 10^{-15}$

46. (a) 2.25×10^{22} J (b) 2.50×10^5 kg

48. 1.82×10^{-3} eV

50. 1.02 MeV

52. (a) $0.0236c$ (b) $6.18\times10^{-4}c$

54. (a) $0.800c$ (b) $0.929c$

56. $v/c = 1 - 1.12\times10^{-10}$

60. 6.28×10^{7} kg

62. 1.47 km

64. (a) See solution (b) 4.97×10^{7} m/s

66. (a) $\dfrac{2d}{c+v}$ (b) $\dfrac{2d}{c}\sqrt{\dfrac{c-v}{c+v}}$

70. (a) Travelers conclude Tau Ceti exploded 16.0 years before the Sun.

(b) Stationary observer at the midway point concludes they exploded simultaneously.

72. $K_c = 0.990K_r$ when $u = 0.115c$, $K_c = 0.950K_r$ when $u = 0.257c$,

$K_c = 0.500K_r$ when $u = 0.786c$, See solution for graph.