Free Response Key

1. Hare will win by 46.67s
2. Speed = 1.85 m/s ; vavg = -0.37 m/s
3. xtotal = 60,000 m ; speed = 29 m/s ; vavg = 0 m/s
4. t = 4 s
5. t = 4 s
6. vf = -24.5 m/s
7. max height = 3.2 m ; t = 0.8 s
8. vi = 19.8 m/s ; t = 2 s
9. a) t = 4.25 s ; b) vf = -26.7 m/s
10. t10 m = 0.68 s ; a) tground = 3.7 s ; vf = - 18 m/s
11. N/A
12. xupiter = 6.8 m ; xEarth = 20.4 m
13. t = 5.1 s
14. vi = 39.24 m/s ; vf = -39.24 m/s
15. a) vf = -19.8 m/s ; b) t = 2.0 s
16. speed = 93.2 m/s
17. a) x = -60 m ; b) d = 360 m ; c) speed = 1.6 m/s ; d) v@150s = -0.3 m/s
18. a) x = 4 m ; b) d = 20 m ; c) aavg 2-8s = -1 m/s2 ; d) a@11s = 1 m/s2 ;

e) rest @ 0 s, 6 s, 12 s ; f) left @ 6-12 s ; g) no accel @ 2-4 s and 8-10 s