## Chapter 2 Practice Problem Answers

Lesson 2.03 (Update: 10/26/2015)

11 height: B; slope A; base: C

Lesson 2.04 (Update: 10/26/2016)

Practice:

12. a

14. height: B; slope: C; base: D

15. $h_2 = v_1^2/2g$

16. $v_3 = \sqrt{2gh_1 + v_1^2}$

17. $h_4 = 4h_1$

Lesson 2.05 (Update: 10/24/2018 -SJ)

*note using g=10. N/kg but no problem to use 9.8 N/kg!*

Activity:

1. No, energy is lost because $GPE_1=GPE_2$ and $KE_1>KE_2$
2. a. 710 J, b. 1200 J
3. B (20 J for A vs 100 J for B)
4. b
5. 34 J
6. A ($E_{T,A} < E_{T,B}$)

Practice:

11. a.II, b.III, c.I, d.V (depends on ref level chosen)

12. a.II, b.IV,c.I, d.I

13. KE=125,000J

14. m=8.0 kg

15. $GPE_{earth}$= 7.4 J or 7.5 J; $GPE_{moon}$ = 1.2 J; $GPE_{Mars}$=2.9 J

16. v=5.00 m/s, yes very possible

17. a. KE=313,000J b. 31.9 m

18. 0.0453 J

Lesson 2.06 (Update: 10/30/18)

3. Determine marble speed at different heights:

| Height (m) | 1.0 | 0.60 | 0.40 | 0 |
|---|---|---|---|---|
| Speed (m/s) | 0 | 2.8 | 3.5 | 4.5 |

4. (c) $v_2$=6.0 m/s [need to show how you get this value]

Practice

8. c) A>B=C
9. b) $v_2 = v_B$
10. A) Possible
    B) Possible
    C) Not possible
11. v=7.7 m/s
12. a) 24.98 m → 25.0 m
    b) False - must quadruple the height
    c) False - will not change since mass cancels out
13. v=44.4 m/s
14. a) 8.2 m b) 10. m/s c) 10. m/s d) explain in class.
15. a) 31.6 m/s b) 20.0 m/s
16. 17.8 m/s
17. 21 m/s
18. a) 20.0 m/s b) 14.1 m/s
19. 3.2 m/s
20. ¾ $h_1$
21. a) *(Ramp 4&13 example data)* h =0.147 m, $v_{measured}$ = 1.3 m/s *(data may vary)*
b) $v_{ideal}$=1.69 m/s c) (with rotation) $v_{ideal}$ = 1.43 m/s d) discuss!

Lesson 2.07 (Update: 11/3/2021)
Conceptual Practice:
8. Review in class.
9. a) The arrow has some small GPE relative to the ground b) *An archer pulls back her bow* → She adds EPE to the system. c) *Archer releases the arrow, aiming straight up* → EPE becomes mostly KE and a little bit GPE as the arrow leaves the bow. d) *After leaving the bow, arrow soars in the sky* → KE becomes GPE until no more KE (that is where it stops) e) *Arrow comes back down* → GPE decreases as it falls, becoming KE
10) Review in class.

Practice Problems:
11. 5.7 J
12. 2000 J
13. 10.0 m/s
14. a) 24.9 m b) 4.1 m/s (*or 4.2 m/s depending on rounding*)
15. a) $h_2$=11.3 m; (b) $h_3$=84.7 m

Lesson 2.08 (Update: 9/19/2019)
Conceptual Practice:
11. a) i b) i
12. a) i b) iii

Practice Problems:
13. a) 4.5 N b) 0.34 J
14. 200 N/m
15. a) 50 N/m b) 0.16 J
16. a) 0.346 m (b) 0.946 m c) 17.3 N
17. a) 35 N/m b) quadratic curve graph c) F=35x d) EPE=17.5$x^2$
18. a) 128 N/m b) 128x
19. a) 7.5 N/m; (b) 0.60 J
20. (a) No (explain why); (b) 3.65 J

Lesson 2.09 (Update: 11/8/2019)
2a) 10000 J
2b) 9630 J
3) $x_4$= 25.5 m, $h_4$= 14.5 m
4) k = 2.4 N/m; m = 1.6 kg; L = 6.0 m

Conceptual Practice
9a) ii; 9b) i
10a) iv; 10b) ii
11. d

Practice Problems:
12. a) 20. m/s b) 20. m
13. a) 40000 J b) 200. N/m
14. a) 20.0 m/s b) 52000 J c) 102 N/m
15. 40.0 kg
16. a) 3.6 N/m b) 4.8 J c) 3.5 J
17. 59.8 m
18. $KE_2$ = 14,500 J
19. a) $v_2$ = 15.8 m/s; b) $v_3$ = 18.7 m/s; c) 21.2 m/s
20. a) $EPE_2$ = 400 J; b) x = 2.8 m
21. x = 1.16 m
22a) 100 J; (b) 140 J; (c) 5.0 m
23. a) h=9.25 m (you'll fall 30.75 m) b) h = 8.63 m (go down 31.37 m) (c) h=8.3 m
24. a) Two Answers: $h_2$=1.7 m; $h_3$=4.2 m; (b) $h_4$=9.2 m

Lesson 2.10 (Update: 10/27/2015)
Conceptual Practice:
10. b (you need to explain)

Practice Problems:
13. a) 1.9 N/m (found using best fit line, not the average of the points) b) EPE = 0.95 J

Lesson 2.11 (Update 9/20/2019)
Conceptual Practice
8. a) iv  b) ii  c) v
9. B
10. (a) 50.0 N/m; (b) 2.00 N/m;  (c) 2.86 N/m;  (d) 5.00 N/m

Lesson 2.12 (Update 9/20/2019)
Conceptual Practice
5. a)  Using 10 N/kg causes the GPE calculation to be higher than if one used 9.8 N/kg. Since the cord will absorb slightly less energy than planned, it will stretch less than planned. Using 10 N/kg is less risky.  b) Yes but not necessary.
13. c
14. a) $g_{ground} = 9.80664\frac{N}{kg}$, $g_{drop\ height} = 9.80648\frac{N}{kg}$  b) The difference in *g* from the drop height to the ground is so small that it would not have a significant effect on the bungee drop outcome. This assumption is a good one.  c) Yes

Practice Problems
15. efficiency=67 % with g=9.81 N/kg (Must set $h_2$ = 0 since we are trying to see how well the cord absorbs the change in GPE.)
16. a) $h_2$ = 3.5 m with g=10 N/kg or $h_2$ = 3.5 m with g=9.81 N/kg (using the same $h_2$=0 approach);
16. b) $h_2$=0.0 m with g=10 N/kg → Emma's feet will just touch the ground.  If g=9.81 N/kg $h_2$=0.2 m - very close!

Lesson 2.13 (Update: 10/28/2015)
Chapter Project: Bungee Drop