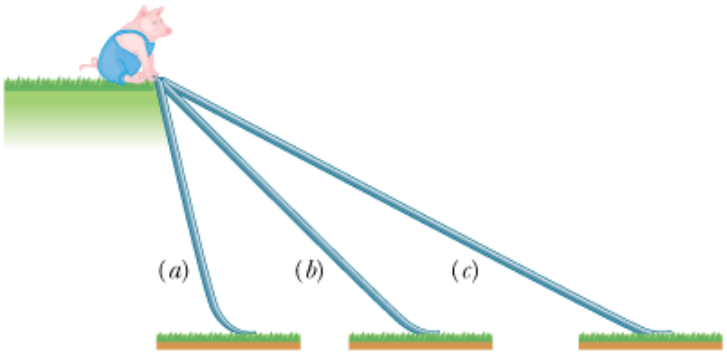
Name: _____

Chapter 7 Test 2015-2016

I. MULTIPLE CHOICE – Assume g = 10 m/s^2 for the multiple choice questions.

1. A greased pig has a choice of three frictionless slides along which to slide to the ground. On which slide will the pig have the greatest velocity at the bottom.
   A. Slide A
   B. Slide B
   C. Slide C
   D. The pig's velocity will be the same at the bottom of all three slides.



2. A man pulls a sled along a rough horizontal surface by applying a constant force F at an angle θ above the horizontal. In pulling the sled a horizontal distance d, the work done by the man is:
   A. Fd B. Fd cos θ C. Fd sin θ D. Fd/cos θ E. Fd/sin θ

3. Power is
   A. joules per second.
   B. work per unit of time.
   C. the rate at which work is done.
   D. all of the above.

4. The amount of work (done by an external force) required to stop a moving object is equal to the:
   A. velocity of the object.
   B. mass of the object times its acceleration.
   C. kinetic energy of the object.
   D. mass of the object times its velocity.
   E. square of the velocity of the object.

5. A woman lifts a barbell 2.0 m in 3.0 s. If she now lifts the same barbell the same distance in 6.0 s, the work done by her is:
   A. four times as great
   B. two times as great
   C. the same
   D. half as great
   E. one-fourth as great

6. A woman lifts a barbell 2.0 m in 3.0 s. If she now lifts the same barbell the same distance in 6.0 s, the power of this lift is:
    A. one-fourth as great
    B. half as great
    C. the same
    D. two times as great
    E. four times as great

7. A 2.0 kg ball is raised to a height of 3.0 m above the ground and then released. (Assume that U = 0 at ground level.) After the ball hits the ground, bounces a few times and then comes to rest, which statement is true? [U=PE, K=KE, and OE= Other Energy]
    A. U = 0 J, K = 0 J and OE = 0 J
    B. U = 60 J, K = 0 J and OE = 60 J
    C. U = 0, K = 0 and OE = 60 J
    D. U = 0 J, K = 60 J and OE = 0

8. [Same conventions as #7]. A simple pendulum with a string length of 0.60 m and a mass of 2.0 kg swings back and forth. At the lowest point in the swing,
    A. U is a maximum and K is a minimum.
    B. U is a minimum and K is a minimum.
    C. U is a maximum and K is a maximum.
    D. U is a minimum and K is a maximum.

9. The potential energy of a box on a shelf, relative to the floor, is a measure of
    A. the work done putting the box on the shelf from the floor.
    B. the weight of the box times the distance above the floor.
    C. the energy the box has because of its position above the floor.
    D. all of these.

10. What does the area under a force versus position (F vs. x) graph represent?
    A. work
    B. kinetic energy
    C. power
    D. potential energy

11. A truck weighs twice as much as a car, and is moving at twice the speed of the car. Which statement is true about the truck's kinetic energy compared to that of the car?
    A. All that can be said is that the truck has more kinetic energy.
    B. The truck has 8 times the kinetic energy of the car.
    C. The truck has 4 times the kinetic energy of the car.
    D. The truck has twice the kinetic energy of the car.

12. A body of mass 2.0 kg is launched upwards with a velocity 20 m/s. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction?
    A. 20 J
    B. 40 J
    C. 60 J
    D. 80 J

13. A planet of constant mass orbits the Sun in an elliptical orbit. What happens to the planet's kinetic energy?
    A. It remains constant.
    B. It increases continually.
    C. It decreases continually.
    D. It increases when the planet approaches the Sun, and decreases when it moves farther away.

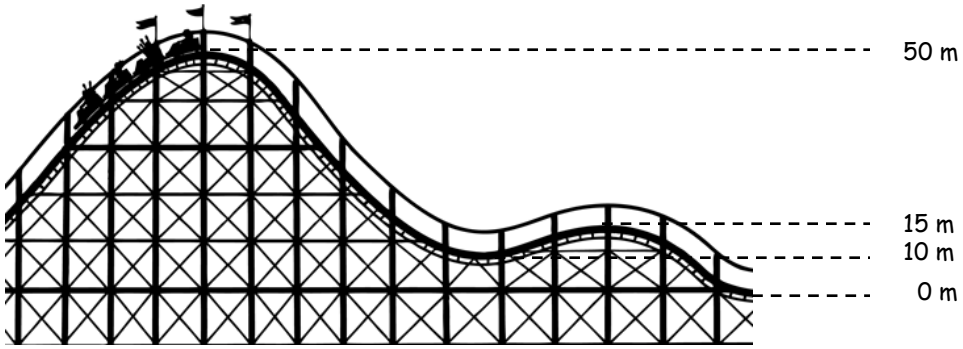
14. An acorn falls from a tree. What can be said about the acorn's kinetic energy K and its potential energy U?
    A. K increases and U decreases.
    B. K decreases and U decreases.
    C. K increases and U increases.
    D. K decreases and U increases.

15. A 8000-N car is traveling at 10 m/s along a horizontal road when the brakes are applied. The car skids to a stop in 4.0 s. How much kinetic energy does the car lose in this time?
    A. 5.0×10^3 J
    B. 6.0×10^6 J
    C. 4.0×10^4 J
    D. 2.0×10^5 J
    E. 8.0×10^5 J

16. A 3-kg object is moving at 9 m/s. A 4-N force is applied in the direction of motion and then removed after the object has traveled an additional 5 m. The work done by this force is:
    A. 20 J
    B. 18 J
    C. 15 J
    D. 12 J
    E. 27 J

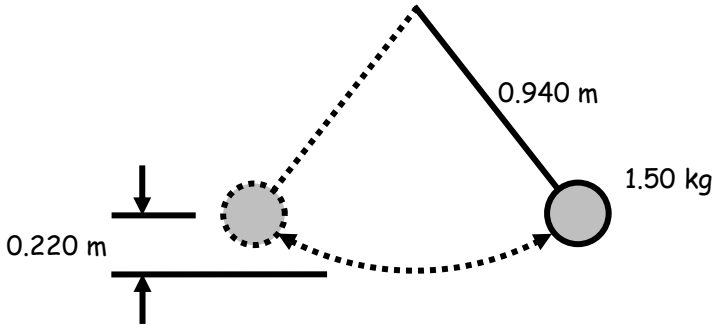
II. PROBLEMS - For full credit, your starting equation(s) must be clearly shown before substituting in numbers. Circle your answer and have the correct number of significant figures. Assume g = 9.80 m/s^2 for these problems. All work must be done on a separate sheet of paper.

1. Roller Coaster



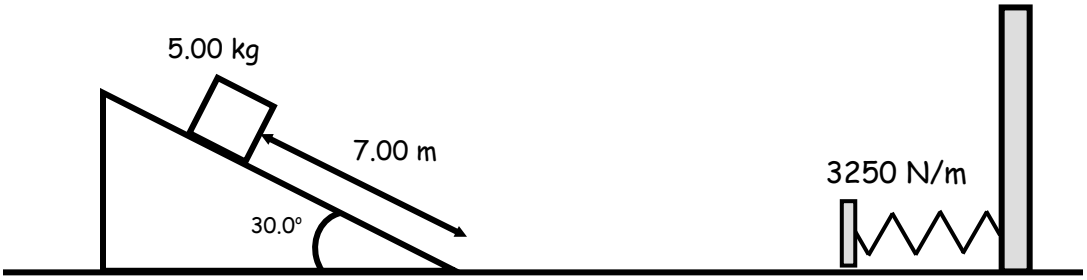
At the top of the roller coaster (h = 50.0 m), v_i = 10.00 m/s. Find the velocity of the roller coaster when h = 15.0 m.

2. Find the velocity of a 1.50-kg the pendulum at its lowest point in the swing given a difference of 0.220 m between the highest point and the lowest point of the swing.



3. A 4.50×10^5-kg subway train is brought to a stop from a speed of 0.500 m/s in 0.660 m by a large spring bumper at the end of its track. What is the force constant k of the spring?

7. Starting at rest, a 5.00-kg block slides 7.00 m down a frictionless ramp. The ramp makes a 30.0° angle with the horizontal. The block then slides along a horizontal frictionless surface until it strikes a spring with a spring constant k = 3250 N/m attached to a rigid wall.



A. What is the speed of the block on the horizontal surface?

B. After the block strikes the spring, how far the spring is compressed from its equilibrium position at maximum compression?