Name:

Mechanical Energy Practice

Part 1:

1. An object is lifted to some height and then dropped. During the drop, which of the following is decreased?
   A. gravitational potential energy
   B. kinetic energy
   C. total mechanical energy
   D. both A and B

2. A student uses a force of 20 N to push a book 1.0 m along a table. A frictional force of 10 N opposes the motion of the book. The work done by the student is:
   A. 0 J
   B. 10 J
   C. 20 J
   D. 30 J

3. The total mechanical energy of an object is the _____.
   A. KE minus the PE of the object
   B. PE minus the KE of the object
   C. the initial KE plus the initial PE of the object
   D. KE plus the PE of the object at any instant during its motion
   E. final amount of KE and PE minus the initial amount of KE and PE

4. If an object moves in such a manner as to conserve its total mechanical energy, then _____.
   A. the amount of kinetic energy remains the same throughout its motion
   B. the amount of potential energy remains the same throughout its motion
   C. the amount of both the kinetic and the potential energy remains the same throughout its motion
   D. the sum of the kinetic energy and the potential energy remains the same throughout its motion

5. A toy car is moving along with 0.40 joules of kinetic energy. If its speed is doubled, then its new kinetic energy will be
   A. 0.10 J
   B. 0.20 J
   C. 0.80 J
   D. 1.60 J
   E. still 0.40 J

6. A young boy's glider is soaring through the air, possessing 0.80 joules of potential energy. If its speed is doubled and its height is doubled, then the new potential energy will be
   A. 0.20 J
   B. 0.40 J
   C. 1.60 J
   D. 3.20 J
   E. still 0.80 J

7&8, Choose all that applies:

7. Which would ALWAYS be true of an object possessing a kinetic energy of 0 joules?
   A. It is on the ground.
   B. It is at rest.
   C. It is moving on the ground
   D. It is moving.
   E. It is accelerating.
   F. It is at rest above ground level
   G. It is above the ground.
   H. It is moving above ground level.

8. Which would ALWAYS be true of an object possessing a potential energy of 0 joules?
   A. It is on the ground.
   B. It is at rest.
   C. It is moving on the ground
   D. It is moving.
   E. It is accelerating.
   F. It is at rest above ground level
   G. It is above the ground.
   H. It is moving above ground level.

Part 2: Identify the following statements with the energy form that they invlovle: kinetic energy (KE), potential energy (PE) or both.

1. If an object is at rest, it certainly does NOT possess this form of energy.

2. Depends upon object mass and object height.

3. The energy an object possesses due to its motion.

4. The amount is expressed using the unit joule (abbreviated J).

5. The energy stored in an object due to its position (or height).

6. The amount depends upon the arbitrarily assigned zero level.

7. Depends upon object mass and object speed.

8. If an object is at rest on the ground (zero height), it certainly does NOT possess this form of energy.

Part 3:

1. Which one of the following is an example of an object with kinetic energy not equal to zero?

A) a satellite in geosynchronous orbit
B) a boulder resting at the bottom of a cliff
C) a car parked at the top of a hill
D) a stationary pendulum
E) a drum of diesel fuel on a parked truck

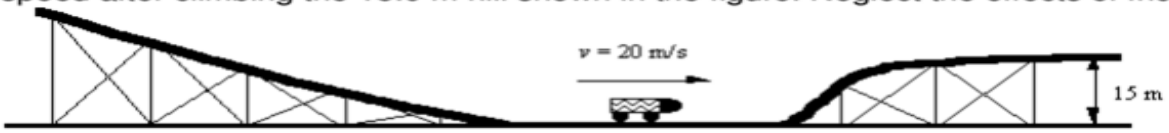
2. Which one of the following statements concerning kinetic energy is true?

A) It is directly proportional to velocity.
B) It is measured in Newton's / kilogram.
C) It is a quantitative measure of inertia.
D) It is always equal to the potential energy
E) It is always positive.

3. A 3.00 kg meatloaf freefalls from rest near the surface of the earth. Neglecting the effects of friction, predict the meatloaf's speed after it has fallen 6.00 m downward.
A) 122 m/s B) 8.00 m/s C) 26.0 m/s D) 11.0 m/s E) 13.0 m/s

4. A bicyclist is traveling at a speed of 20.0 m/s as he approaches the bottom of a hill. Neglect the effects of friction and determine the maximum vertical height the bicyclist ascends to.
A) 40.8 m B) 20.4 m C) 3.70 m D) 11.2 m E) 28.5 m

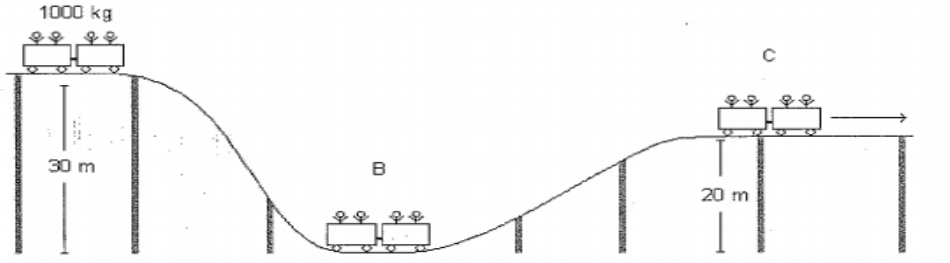
5. A roller-coaster car is moving at 20.0 m/s along a straight horizontal track. Predict its speed after climbing the 15.0 m hill shown in the figure. Neglect the effects of friction.



A) 10.0 m/s B) 5.00 m/s C) 17.0 m/s D) 14.0 m/s E) 7.00 m/s

Part 4:

Problem A, Neglect Friction.



1. Determine the total mechanical energy (PE+KE) at point A (v=0).

2. What is the total mechanical energy at point B?

3. What is the total mechanical energy at point C?

4. What is the velocity of the roller coaster at point B (h=0)?

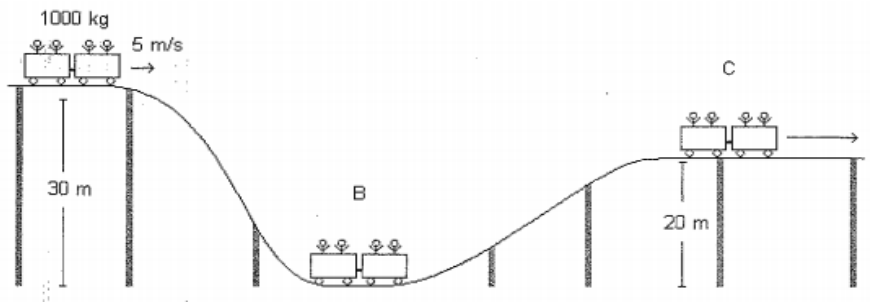
5. What is the gravitational potential energy at point B?

6. What is the gravitational potential energy at point C?

7. What is the kinetic energy of the roller coaster at point C?

8. How fast is the roller coaster going at point C?

Problem B, Neglect Friction.



9. Determine the total mechanical energy (PE+KE) at point A (v=5m/s).

10. What is the total mechanical energy at point B?

11. What is the total mechanical energy at point C?

12. What is the velocity of the roller coaster at point B (h=0)?

13. What is the gravitational potential energy at point B?

14. What is the gravitational potential energy at point C?

15. What is the kinetic energy of the roller coaster at point C?

16. How fast is the roller coaster going at point C?

Part 5:

1. Which requires more work: increasing the speed of an object from 0 m/s to 5 m/s, or from 5 m/s to 10 m/s? Explain why.

2. A person lifted a textbook to a given height above the floor and dropped the textbook onto the floor. Describe the energy transformations that occurred.

Part 6:

1. Calculate the kinetic energy of a 5.2 kg object moving at 2.4 m/s.

2. Calculate the potential energy of a 5.2 kg object positioned 5.8 m above the ground.

3. Calculate the speed of a 5.2 kg object that possesses 26.1 J of kinetic energy.

4. Calculate the total mechanical energy (TME) of a 5.2 kg object moving at 2.4 m/s and positioned 5.8m above the ground.

5. A 65-kg skateboarder applies a force of 120 N over a distance of 4.0 m, and increases the speed of the skateboard from rest to 3.0 m/s. What was the work done by friction?

6. A boy drops a 0.50 kg rock off of a 22 m high bridge into a river below. What is the final speed of the rock just before it hits the water?