Name Answer Key Date _____

Honors Physics Energy WS #8H

Period _____ Mrs. Nadworny

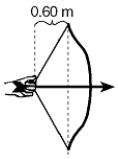
Work Energy Theorem

Directions: Read online textbook pages 181 – 186. Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

1. A force is applied to a block, causing it to accelerate along a horizontal, frictionless surface. The energy gained by the block is equal to the

   (A) power applied to the block
   (B) work done on the block
   (C) impulse applied to the block
   (D) momentum given to the block

2. In the diagram below, an average force of 20. newtons is used to pull back the string of a bow 0.60 meter. As the arrow leaves the bow, its kinetic energy is

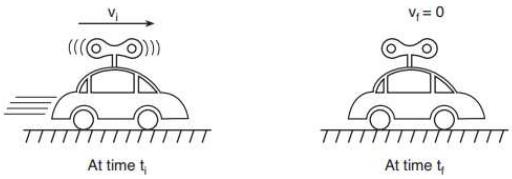


   (A) 3.4 J (B) 6.0 J (C) 12 J (D) 33 J

3. A block slides across a rough, horizontal tabletop. As the block comes to rest, there is an increase in the block-tabletop system's

   (A) gravitational potential energy
   (B) elastic potential energy
   (C) kinetic energy
   (D) internal (thermal) energy

4. A wound spring provides the energy to propel a toy car across a level floor. At time t_i ,the car is moving at speed vi across the floor and the spring is unwinding, as shown below. At time t_f , the spring has fully unwound and the car has coasted to a stop.



Which statement best describes the transformation of energy that occurs between times t_i and t_f ?

   (A) Gravitational potential energy at t_i is converted to internal energy at t_f.
   (B) Elastic potential energy at t_i is converted to kinetic energy at t_f.
   (C) Both elastic potential energy and kinetic energy at t_i are converted to internal energy at t_f.
   (D) Both kinetic energy and internal energy at t_i are converted to elastic potential energy at t_f.

5. A block initially at rest on a horizontal, frictionless surface is accelerated by a constant horizontal force of 5.0 newtons. If 15 joules of work is done on the block by this force while accelerating it, the kinetic energy of the block increases by

   (A) 3.0 J (B) 15 J (C) 20. J (D) 75 J

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6. A 25-gram paper cup falls from rest off the edge of a tabletop 0.90 meter above the floor. If the cup has 0.20 joule of kinetic energy when it hits the floor, what is the total amount of energy converted into internal (thermal) energy during the cup's fall?

(A) 0.02 J (B) 0.22 J (C) 2.2 J (D) 220 J

7. A motor does 20. joules of work on a block, accelerating the block vertically upward. Neglecting friction, if the gravitational potential energy of the block increases by 15 joules, its kinetic energy

(A) decreases by 5 J (B) decreases by 35 J (C) increases by 5 J (D) increases by 35 J

8. As a box is pushed 30. meters across a horizontal floor by a constant horizontal force of 25 newtons, the kinetic energy of the box increases by 300. joules. How much total internal energy is produced during this process?

(A) 150 J (B) 250 J (C) 450 J (D) 750 J

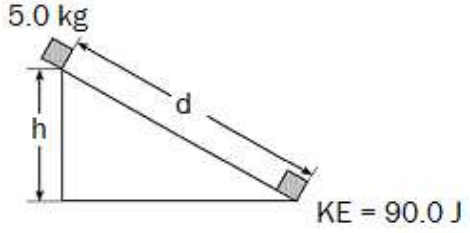
9. A block is pushed across a smooth table top so that it is traveling with 175 joules of kinetic energy. It encounters a rough patch where friction does 92 joules of work on the block. Calculate the kinetic energy of block after traveling over the rough patch.

$$W = \Delta E_T = KE_f - KE_i$$
$$KE_f = W + KE_i = (-92J) + 175J = 83J$$

10. A 0.15 kilogram acorn falls 3.45 meters from a tree. It possesses 4.95 joules of kinetic energy just before striking the ground. Calculate the amount of work done by air resistance as the acorn fell.

$$W = \Delta E = KE_f - PE_i = 4.95J - mgh$$
$$W = 4.95J - (0.15kg)\left(9.81\tfrac{m}{s^2}\right)(3.45m)$$
$$W = -0.13J$$

11. A 5.0 kilogram block is placed at the top of an incline with a height of h. It slides a distance, d, down the incline. It gains 90.0 joules of kinetic energy by the time it reaches the bottom. The work done by friction is 8.0 joules. Calculate the height of the incline.



$$W = \Delta E = KE_f - PE_i$$
$$mgh = KE_f - W_f$$
$$h = \frac{KE_f - W_f}{mg} = \frac{90.0J - (-8.0J)}{(5.0kg)(9.81\frac{m}{s^2})} = 2.0m$$

Answers in size order: 0.13, 2.0, 83