Name Answer Key Date _____

Honors Physics Energy WS #5H

Period _____ Mrs. Nadworny

Energy

Directions: Read online textbook pages 172 – 179. Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

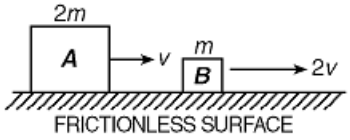
1. As the speed of a bicycle moving along a level horizontal surface changes from 2 meters per second to 4 meters per second, the magnitude of the bicycle's gravitational potential energy

   (A) decreases (B) increases (C) remains the same

2. If the speed of a car is doubled, the kinetic energy of the car is

   (A) quartered (B) quadrupled (C) doubled (D) halved

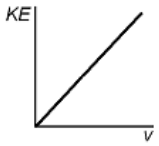
3. The diagram below shows block A, having mass 2m and speed v, and block B, having mass m and speed 2v.

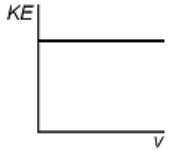


   Compared to the kinetic energy of block A, the kinetic energy of block B is

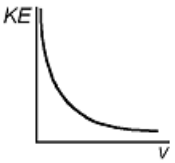
   (A) four times as great (B) the same (C) one-half as great (D) twice as great

4. Which graph best represents the kinetic energy of an object as a function of its speed?

   (A) 

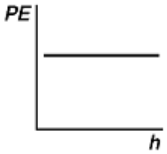
   (C) 

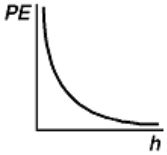
   (B) 

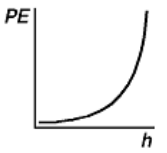
   (D) 

5. Which graph best represents the gravitational potential energy of an object as a function of its height?

   (A) 

   (C) 

   (B) 

   (D) 

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6. A 60.0 kilogram runner has 2170 joules of kinetic energy. Calculate the speed of the runner.

$$v = \sqrt{\frac{2KE}{m}} = \sqrt{\frac{2(2170J)}{60.0kg}} = 8.50\,\tfrac{m}{s}$$

7. Carole Singers, whose mass is 74.1 kg, is standing on a hill at a point that is 2.50 meters from level ground. If she walks to a point that is 13.6 meters above level ground, what is her change in potential energy?

$$\Delta PE = mg\Delta h = (74.1kg)(9.81\,\tfrac{m}{s^2})(11.1m) = 8070J$$

8. It takes a force of 24.7 N to hold a spring stretch a distance of 41.9 cm. What is the elastic potential energy of the spring in this position? [Hint: Watch your units!]

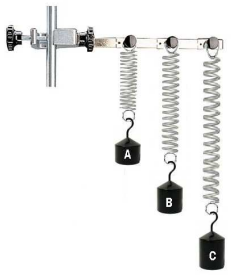
$$k = \frac{F}{x} = \frac{24.7N}{0.419m} = 58.9\,\tfrac{N}{m}$$

$$PE_{elastic} = \frac{1}{2}kx^2 = \frac{1}{2}(58.9\,\tfrac{N}{m})(0.419m)^2 = 5.17J$$

9. A person who weighs 645 newtons rides an elevator upward at a constant speed of 3.0 meters per second for 5.0 second. Calculate the change in the person's gravitational potential energy.

$$h = vt = (3.0\,\tfrac{m}{s})(5.0s) = 15m$$
$$PE = mgh = (645N)(15m) = 9700J$$

10. A 0.250 kg mass is attached to a spring which has a spring constant of 35 N/m, as shown. It is pulled down and released so that it bobs up and down. Position A is the mass' highest point. Position C is the mass' lowest point. Position B is the mass' equilibrium position.



a. Where does the mass have the most gravitational potential energy? A

b. Where does the spring have the most elastic potential energy? C

c. Where is the mass traveling the fastest? B

d. Where does the mass have the most kinetic energy? B

Answers in size order: 5.17, 8.50, 8070, 9700, 6 x 10^5, 6.3 x 10^5