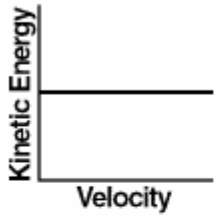
Chapter 5 Work and Energy Summary

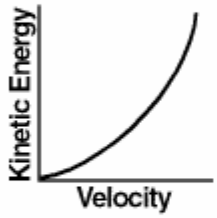
Directions: The problems below will help prepare you for the Chapter 5 Work and Energy Test. Show all work when answering the questions; this includes multiple choice and free response questions.

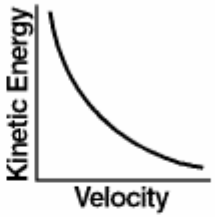
1) If the speed of a car is doubled, the kinetic energy of the car is

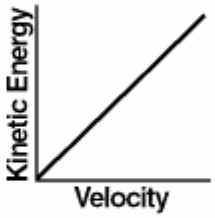
A) quartered B) halved C) quadrupled D) doubled

2) Which graph *best* represents the relationship between the kinetic energy of a moving object and its velocity?

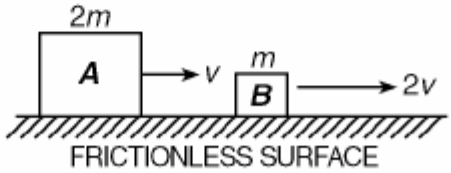
A) 

B) 

C) 

D) 

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



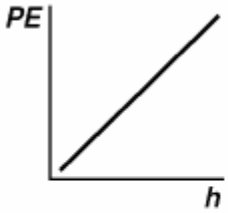
Compared to the kinetic energy of block *A*, the kinetic energy of block *B* is

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

4. An object moving at a constant speed of 25 meters per second possesses 450 joules of kinetic energy. What is the object's mass?

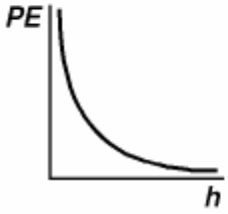
5. Which graph *best* represents the relationship between gravitational potential energy (*PE*) and height (*h*) above the ground for an object near the surface of Earth?

A)

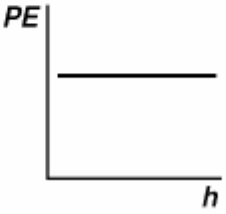


C)

B)



D)



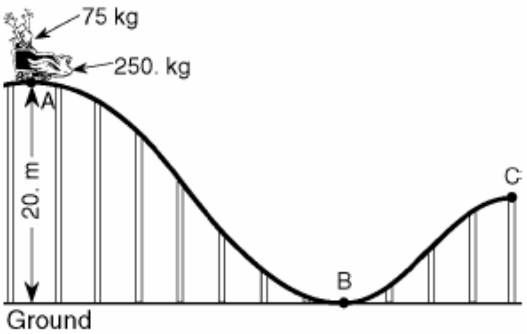
6. The diagram below shows a moving, 5.00-kilogram cart at the foot of a hill 10.0 meters high. For the cart to reach the top of the hill, what is the minimum kinetic energy of the cart in the position shown? [*Neglect energy loss due to friction.*]

A) 491 J B) 50.0 J C) 250. J D) 4.91 J

7. A 0.50-kilogram ball is thrown vertically upward with an initial kinetic energy of 25 joules. Approximately how high will the ball rise? [*Neglect air resistance.*]

Questions 8 through 10 refer to the following:

A 250.-kilogram car is initially at rest at point *A* on a roller coaster track. The car carries a 75-kilogram passenger and is 20. meters above the ground at point *A*. [*Neglect friction.*]

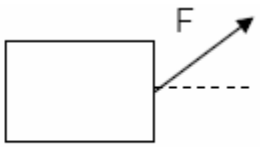


8. (a) Calculate the total gravitational potential energy, relative to the ground, of the car and the passenger at point *A* in the diagram. [*Show all work, including the equation and substitution with units.*]

9. (b) Calculate the speed of the car and passenger at point *B* in the diagram. [*Show all work, including the equation and substitution with units.*]

10. Compare the total mechanical energy of the car and passenger at points *A*, *B*, and *C* in the diagram.

11. _How much work is done on a bookshelf being pulled 5.00 m at an angle of 37.0° from the horizontal? The magnitude of the component of the force that does the work is 43.0 N.



a. 172 J b. 34 J
c. 215 J c. 400 J

12. _In which of the following sentences is *work* used in the scientific sense of the word?

a. Holding a heavy box requires a lot of work.
b. A scientist works on an experiment in the laboratory.
c. Sam and Rachel pushed hard, but they could do no work on the car.
d. John learned that shoveling snow is hard work.

13. A 1000 kg roller-coaster is 90 meters high at the top of the first hill. How much work was done by the motor in the track to pull the car to the top of this first hill?

14. _What is the average power output of a weightlifter who can lift 250 kg a height of 2.0 m in 2.0 s?

a. 4900 W b. 2450 W
c. 250 W d. 400 W

15 . A student wearing ice skates on a rink is pushed by a friend with a constant force. If the student does 450 J of work pushing his friend a distance of 20 m, how much force did he apply? Assume no friction.

16 . A 1.8×10^3 kg dragster accelerates from rest during a race and reaches a final speed of 70 m/s.

a) determine the final kinetic energy of the dragster

b) How much net work is being done horizontally on the dragster?

c) if the dragster covers a distance of 100m, determine the net force acting on the dragster in the horizontal direction.

d) If the force of friction is 2000 N, determine the force applied by the engine