

**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question

- 1) A 10-kg mass, hung onto a spring, causes the spring to stretch 2.0 cm. What is the spring constant? 1) \_\_\_\_\_

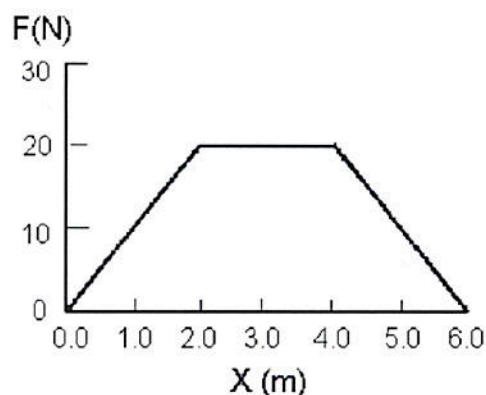


FIGURE 6-1

- 2) A force moves an object in the direction of the force. The graph in Fig. 6-1 shows the force versus the object's position. Find the work done when the object moves from 0 to 2.0 m. 2) \_\_\_\_\_
- 3) A force moves an object in the direction of the force. The graph in Fig. 6-1 shows the force versus the object's position. Find the work done when the object moves from 2.0 to 4.0 m. 3) \_\_\_\_\_
- 4) If the net work done on an object is positive, then the object's kinetic energy 4) \_\_\_\_\_
- 5) A horizontal force of 200 N is applied to move a 55-kg cart (initially at rest) across a 10 m level surface. What is the final speed of the cart? 5) \_\_\_\_\_
- 6) A 12-kg object is moving on a rough, level surface. It has 24 J of kinetic energy. The friction force on it is a constant 0.50 N. How far will it slide? 6) \_\_\_\_\_

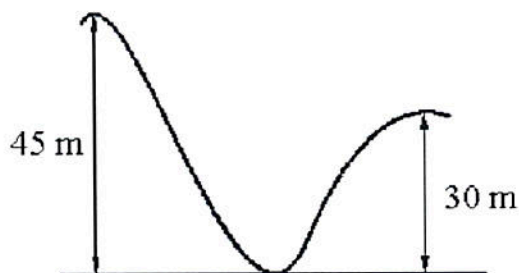


FIGURE 6-2

- 7) A roller coaster starts with a speed of 5.0 m/s at a point 45 m above the bottom of a dip (See Fig. 6-2). Neglect friction, what will be the speed of the roller coaster at the top of the next slope, which is 30 m above the bottom of the dip? 7) \_\_\_\_\_

- 8) A roller coaster starts from rest at a point 45 m above the bottom of a dip (See Fig. 6-2). Neglect friction, what will be the speed of the roller coaster at the top of the next slope, which is 30 m above the bottom of the dip? 8) \_\_\_\_\_
- 9) A roller coaster starts at a point 30 m above the bottom of a dip with a speed of 25 m/s (See Fig. 6-2). Neglect friction, what will be the speed of the roller coaster at the top of the next slope, which is 45 m above the bottom of the dip? 9) \_\_\_\_\_
- 10) A 60-kg skier starts from rest from the top of a 50-m high slope. What is the speed of the skier on reaching the bottom of the slope? (Neglect friction.) 10) \_\_\_\_\_
- 11) A cyclist does work at the rate of 500 W while riding. How much force does her foot push with when she is traveling at 8.0 m/s? 11) \_\_\_\_\_
- 12) A 10-N force is needed to move an object with a constant velocity of 5.0 m/s. What power must be delivered to the object by the force? 12) \_\_\_\_\_
- 13) If the net work done on an object is negative, then the object's kinetic energy 13) \_\_\_\_\_
- 14) Matthew pulls his little sister Sarah in a sled on an icy surface (assume no friction), with a force of 60.0 N at an angle of  $37.0^\circ$  upward from the horizontal. If he pulls her a distance of 12.0 m, what is the work done by Matthew? 14) \_\_\_\_\_
- 15) A spring-driven dart gun propels a 10-g dart. It is cocked by exerting a force of 20 N over a distance of 5.0 cm. With what speed will the dart leave the gun, assuming the spring has negligible mass? 15) \_\_\_\_\_
- 16) If you walk 5.0 m horizontally forward at a constant velocity carrying a 10-N object, the amount of work you do is 16) \_\_\_\_\_
- 17) A 400-N box is pushed up an inclined plane. The plane is 4.0 m long and rises 2.0 m. If the plane is frictionless, how much work was done by the push? 17) \_\_\_\_\_
- 18) How many joules of energy are used by a 1.0 hp motor that runs for 1.0 hr? (1 hp = 746 W) 18) \_\_\_\_\_
- 19) A spring with a spring constant of 15 N/m is initially compressed by 3.0 cm. How much work is required to compress the spring an additional 4.0 cm? 19) \_\_\_\_\_
- 20) A 15.0-kg object is moved from a height of 7.00 m above a floor to a height of 13.0 m above the floor. What is the change in gravitational potential energy? 20) \_\_\_\_\_
- 21) Does the centripetal force acting on an object do work on the object? 21) \_\_\_\_\_
- 22) A horizontal force of 200 N is applied to move a 55-kg cart (initially at rest) across a 10 m level surface. What is the final kinetic energy of the cart? 22) \_\_\_\_\_
- 23) A 500-kg elevator is pulled upward with a constant force of 5500 N for a distance of 50.0 m. What is the work done by the 5500 N force? 23) \_\_\_\_\_

- 24) A 4.00-kg box of fruit slides 8.0 m down a ramp, inclined at  $30.0^\circ$  from the horizontal. If the box slides at a constant velocity of 5.00 m/s, what is the work done by the weight of the box? 24) \_\_\_\_\_
- 25) Calculate the work required to compress an initially uncompressed spring with a spring constant of 25 N/m by 10 cm. 25) \_\_\_\_\_
- 26) An acorn falls from a tree. Compare its kinetic energy  $K$ , to its potential energy  $U$  26) \_\_\_\_\_
- 27) If it takes 50 m to stop a car initially moving at 25 m/s, what distance is required to stop a car moving at 50 m/s under the same condition? 27) \_\_\_\_\_
- 28) An object slides down a frictionless inclined plane. At the bottom, it has a speed of 9.80 m/s. What is the vertical height of the plane? 28) \_\_\_\_\_
- 29) A 50-N object was lifted 2.0 m vertically and is being held there. How much work is being done in holding the box in this position? 29) \_\_\_\_\_
- 30) A skier, of mass 40 kg, pushes off the top of a hill with an initial speed of 4.0 m/s. Neglecting friction, how fast will she be moving after dropping 10 m in elevation? 30) \_\_\_\_\_
- 31) What is the minimum speed of the ball at the bottom of its swing (point B) in order for it to reach point A, which is 1.0-m above the bottom of the swing? 31) \_\_\_\_\_

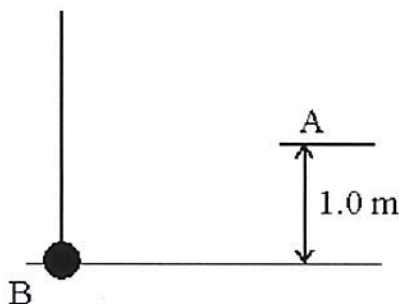


FIGURE 6-3

- 32) The kinetic friction force between a 60.0-kg object and a horizontal surface is 50.0 N. If the initial speed of the object is 25.0 m/s, what distance will it slide before coming to a stop? 32) \_\_\_\_\_
- 33) A driver, traveling at 22 m/s, slows down her 2000 kg car to stop for a red light. What work is done by the friction force against the wheels? 33) \_\_\_\_\_
- 34) 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? 34) \_\_\_\_\_
- 35) At what rate is a 60.0-kg boy using energy when he runs up a flight of stairs 10.0-m high, in 8.00 s? 35) \_\_\_\_\_
- 36) A 10-kg mass is moving with a speed of 5.0 m/s. How much work is required to stop the mass? 36) \_\_\_\_\_

- 37) You throw a ball straight up. Compare the sign of the work done by gravity while the ball goes up with the sign of the work done by gravity while it goes down. 37) \_\_\_\_\_
- 38) An arrow of mass 20 g is shot horizontally into a bale of hay, striking the hay with a velocity of 60 m/s. It penetrates a depth of 20 cm before stopping. What is the average stopping force acting on the arrow? 38) \_\_\_\_\_
- 39) Can work be done on a system if there is no motion? 39) \_\_\_\_\_
- 40) A spring is characterized by a spring constant of 60 N/m. How much potential energy does it store, when stretched by 1.0 cm? 40) \_\_\_\_\_
- 41) If you push twice as hard against a stationary brick wall, the amount of work you do 41) \_\_\_\_\_



## Answer Key

### Testname: AP1 ENERGY REVIEW

- 1)  $4.9 \times 10^3 \text{ N/m}$
- 2) 20 J
- 3) 40 J
- 4) increases.
- 5) 8.5 m/s
- 6) 48 m
- 7) 18 m/s
- 8) 17 m/s
- 9) 18 m/s
- 10) 31 m/s
- 11) 63 N
- 12) 50 W
- 13) decreases.
- 14) 575 J
- 15) 14 m/s
- 16) zero.
- 17) 800 J
- 18)  $2.7 \times 10^6 \text{ J}$
- 19) 0.030 J
- 20) 1176 J
- 21) No, because the force and the displacement of the object are perpendicular
- 22)  $2.0 \times 10^3 \text{ J}$
- 23)  $2.75 \times 10^5 \text{ J}$
- 24) 157 J
- 25) 0.13 J
- 26) K increases and U decreases.
- 27) 200 m
- 28) 4.90 m
- 29) 0 J
- 30) 15 m/s
- 31) 4.4 m/s
- 32) 375 m
- 33)  $-4.84 \times 10^5 \text{ J}$
- 34) The truck has 8 times the kinetic energy of the car.
- 35) 735 W
- 36) 125 J
- 37) Work is - on the way up and + on the way down.
- 38) 180 N
- 39) No, because of the way work is defined.
- 40)  $3.0 \times 10^{-3} \text{ J}$
- 41) remains constant at zero.