4. Quiz

Some questions might have more than one correct answer.

1. Four objects have the following masses (m) and speeds (v):

   I. $m = 2\,kg,\ v = 2\,m/s$
   II. $m = 4\,kg,\ v = 2\,m/s$
   III. $m = 2\,kg,\ v = 4\,m/s$
   IV. $m = 2\,kg,\ v = 1\,m/s$

   Order them according to their kinetic energies, least to greatest.

   A. I, II, III, IV
   B. IV, II, I, III
   C. IV, III, I, II
   D. IV, I, II, III
   E. III, II, I, IV

2. The work done by any force on an object is

   A. proportional to the displacement of the object
   B. proportional to the distance traveled by the object
   C. positive
   D. zero
   E. none of the above

3. Which of the following forces do work as a boy pushes a crate up an incline with constant velocity?

   A. the force of the boy on the crate
   B. the gravitational force of Earth on the crate
   C. the normal force of the incline on the crate
   D. the frictional force of the incline on the crate
   E. none of the above

4. Which of the following forces do work as a girl carries a suitcase across a room, keeping the suitcase at a constant height above the level floor?

   A. the gravitational force of Earth on the suitcase
   B. the upward component of the force of the girl on the suitcase
   C. the frictional force of the air on the suitcase
   D. the horizontal component of the force of the girl on the suitcase
   E. none of the above

5. A car of mass m travels a distance d up a hill, ending a vertical distance h above the starting point. The work done by the gravitational force of Earth on the car during the trip is

   A. mgd
   B. $-mgd$
   C. mgh
   D. $-mgh$
   E. $mg(d + h)$

6. A block of mass m is attached to one end of a horizontal ideal spring with spring constant k. The other end of the spring is held fixed as a student uses a horizontal constant force F to pull the block horizontally a distance d from

its equilibrium position. The work done by the force of the student is

A. $\frac{1}{2}kd^2$
B. $-\frac{1}{2}kd^2$
C. Fd
D. $-Fd$
E. $-\frac{1}{2}kd^2 + Fd$

7. For which of the following situations is negative net work done on a block?

   A. the block is whirled by means of a string around a circle with constant speed
   B. the block slides a distance d up an incline with decreasing speed
   C. the block slides a distance d down an incline with increasing speed
   D. the block is held on an airplane that is decelerating as it comes to a stop at a terminal
   E. the block is carried from rest to the top of a hill, where it is again at rest

8. A block of mass m on a level table top is attached to one end of a horizontal spring with spring constant k. The other end of the spring is fixed. The x axis is along the spring and when the spring has its equilibrium length the block is at $x = 0$. As the block moves from $x = -d$ to $x = +d$ the work done by the force of the spring is:

A. zero
B. $2kd$
C. $2kd^2$
D. kd^2
E. $2d^2/k$

9. A block of mass m on a level table top is attached to one end of a horizontal spring with spring constant k. The other end of the spring is fixed. At one instant the block has speed v. It comes to rest after traveling a distance d. What net work was done on the block to bring it to rest?

A. kd^2
B. $\frac{1}{2}kd^2$
C. mgd
D. mgv
E. $\frac{1}{2}mv^2$

10. A block of mass m on a level table top is attached to one end of a horizontal spring with spring constant k. The other end of the spring is fixed. At one instant the block is displaced a distance d from its equilibrium point, is moving toward the equilibrium point, and has speed v. At that instant the rate with which the spring is doing work on the block is given by

A. $\frac{1}{2}kdv$
B. kdv
C. $-\frac{1}{2}kdv$
D. $-kdv$
E. kv

11. A circular path of radius R lies in the xy plane and is centered at the origin. As a particle goes halfway around from $x = -R$ to $x = +R$ the one of the forces on it is the constant force $\vec{F}$. The magnitude of the work done by this force is:

A. zero
B. $2\pi RF$
C. $\pi R^2 F$
D. RF
E. $2RF$

12. A golf ball is hit from an elevated tee to a green that is below the level of the tee. If air resistance can be neglected the ball has the greatest kinetic energy

    A. just after it is hit
    B. when it reaches the highest point on its path
    C. when it reaches the same level as the tee, on the way down
    D. just before it hits the green
    E. none of the above

13. Baseball pitcher A throws a $97 \, mi/h$ fastball and pitcher B throws a $92 \, mi/h$ fastball. Which of the following statements are true?

    A. A must have exerted a greater force on the ball than B
    B. B must have exerted a greater force on the ball than A
    C. A must have moved the ball through a greater distance thanB
    D. B must have moved the ball through a greater distance thanA
    E. none of the above

Answers: (1) D; (2) E; (3) A, B, D; (4) C, D; (5) D; (6) C; (7) B, D; (8) A; (9) E; (10) B; (11) E; (12) D; (13) E