Physics 160 Work and Energy worksheet

1) What is the correct unit of work expressed in SI units? 1) _______
A) kg m^2/s B) kg m^2/s^2 C) kg m/s^2 D) kg^2 m/s^2

2) Can work be done on a system if there is no motion? 2) _______
A) No, since a system which is not moving has no energy.
B) Yes, if an outside force is provided.
C) No, because of the way work is defined.
D) Yes, since motion is only relative.

3) If you walk 5.0 m horizontally forward at a constant velocity carrying a 10-N object, the amount of work you do is 3) _______
A) less than 50 J, but more than 0 J. B) zero.
C) equal to 50 J. D) more than 50 J.

4) 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. 4) _______
A) Work is - on the way up and + on the way down.
B) Work is - on the way up and - on the way down.
C) Work is + on the way up and + on the way down.
D) Work is + on the way up and - on the way down.

5) The quantity \( \frac{1}{2} mv^2 \) is 5) _______
A) the potential energy of the object.
B) the work done on the object by the force.
C) the power supplied to the object by the force.
D) the kinetic energy of the object.

6) 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? 6) _______
A) All that can be said is that the truck has more kinetic energy.
B) The truck has 8 times the kinetic energy of the car.
C) The truck has 4 times the kinetic energy of the car.
D) The truck has twice the kinetic energy of the car.

7) The quantity \( mgy \) is 7) _______
A) the gravitational potential energy of the object.
B) the work done on the object by the force.
C) the kinetic energy of the object.
D) the power supplied to the object by the force.

8) 9) Is it possible for a system to have negative potential energy? 9) _______
A) Yes, since the choice of the zero of potential energy is arbitrary.
B) No, because the kinetic energy of a system must equal its potential energy.
C) No, because this would have no physical meaning.
D) Yes, as long as the total energy is positive.

10) An acorn falls from a tree. Compare its kinetic energy \( K \), to its potential energy \( U \). 10) ______
A) \( K \) increases and \( U \) decreases. B) \( K \) decreases and \( U \) increases.
C) \( K \) increases and \( U \) increases. D) \( K \) decreases and \( U \) decreases.

11) An object is lifted vertically 2.0 m and held there. If the object weighs 90 N, how much work was done in lifting it? 11) ______
A) 360 J B) 180 J C) 0 J D) 90 J

12) 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 weight of the elevator? 12) ______
A) \(-5.20 \times 10^5 \) J B) \(-2.45 \times 10^5 \) J
C) \(3.00 \times 10^4 \) J D) \(2.75 \times 10^5 \) J

13) 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? 13) ______
A) 1176 J B) 1030 J C) zero D) 1910 J

14) omit
15. A boy holds a 40-N weight at arm's length for 10 s. His arm is 1.5 m above the ground. The work done by the force of the boy on the weight while he is holding it is:
   A) 0
   B) 6.1 J
   C) 40 J
   D) 60 J
   E) 90 J

16. A 2-kg object is moving at 3 m/s. A 4-N force is applied in the direction of motion and then removed after the object has traveled an additional 5 m. The work done by this force is:
   A) 12 J
   B) 15 J
   C) 18 J
   D) 20 J
   E) 38 J

17. A 1-kg block is lifted vertically 1 m by a boy. The work done by the boy is about:
   A) 1 ft·lb
   B) 1 J
   C) 10 J
   D) 0.1 J
   E) zero