

_____ Name _____ Period _____

WS R

Final answers given.

Work & Energy Review

show all work necessary to achieve them.

1. Whenever work is done, the energy of a system _____.

2. True or False Work is a vector quantity. **Explain.**

3. The area under a force vs. displacement graph yields _____.

4. The rate of doing work is known as _____.

5. A force of 20 N is applied for a distance of 2 meters in 4 seconds.

a. How much work was done by the force?

b. How much power was developed?

10 Watts

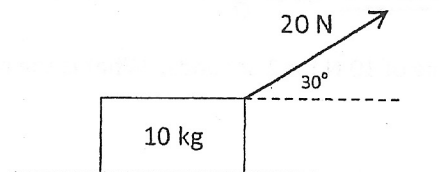
6. How much work does it take to accelerate a 5 kg object from rest to a speed of 10 m/s?

$W = 250 \text{ J}$

7. The block below is pulled by the force for a distance of 5 m. The surface is frictionless. Determine:

a. The total work done on the block.

b. The speed of the block after the force is applied.



4.2 m/s

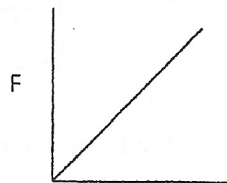
8. A 5 kg mass is at a height of 5 meters above the floor. What is the gravitational potential energy of the mass with respect to the floor?

250 Joules

9. The graph below shows the force exerted on a spring vs. displacement (amount of stretch).

a. The slope of this graph yields _____.

b. The area under this graph yields _____.



10. A 1 kg mass is released directly upward from a spring that is compressed 0.2 m. The spring constant of the spring is 1000 N/m. Determine:

a. The speed of the mass the instant it separates from the spring.

b. The maximum height the mass will reach.

a) $\frac{1}{2} kx^2 = \frac{1}{2} mv^2$

b) $\frac{1}{2} kx^2 = mgh$

6.3 m/s

2 m

11. A planet has a mass of 6×10^{24} kg and a radius of 6.5×10^6 m. What is the gravitational potential energy of a 1000 kg mass at an altitude of 1.0×10^6 m?

$$r = \text{radius} + \text{altitude}$$

$$5.3 \times 10^{10} \text{ Joules}$$

12. A 5 kg mass is dropped from a height of 10 meters. What is the speed of the mass at a height of 5 meters?

$$PE_{\text{top}} = KE + PE$$

$$10 \text{ m/s}$$

13. 200 Joules of total work are done in pulling a 1 kg mass across a horizontal floor a distance of 5 meters. The force of friction on the mass is 20 N. What is the speed of the mass at the end of the 5 meters?

$$V = 14.1 \text{ m/s}$$

Momentum & Impulse Review

1. What is the momentum of a 2 kg mass moving with a velocity of 10 m/s?

$$20 \text{ kg m/s}$$

2. The area under a Force vs. time graph yields _____ change.

3. A 2 kg mass is moving 5 m/s when it experiences an average force of 10 N for 2 seconds. What is the new velocity of the mass?

$$15 \text{ m/s}$$

4. A perfectly bouncy ball of mass m is moving with speed v when it strikes a wall and bounces back in the other direction with speed v . What is the impulse experienced by the ball?

$$J = 2mv$$

5. A .05 kg bullet is fired with a speed of 400 m/s from a 5 kg rifle. What is the recoil speed of the gun?

$$4 \text{ m/s}$$

6. A 0.05 kg bullet is fired into a 5 kg block. The block and the bullet fly off with a velocity of 5 m/s. What was the velocity of the bullet just before it entered the block?

$$505 \text{ m/s}$$