Name Answer Key Period ____ Date _____

WORKSHEET: KINETIC AND POTENTIAL ENERGY PROBLEMS

1. Stored energy or energy due to position is known as potential energy.
2. The formula for calculating potential energy is $E_p = mgh$.
3. The three factors that determine the amount of potential energy in an object are mass, acceleration due to gravity, and height.
4. Potential energy is measured in units of joules (J).
5. Mass must be measured in units of kg.
6. Gravitational pull must be measured in units of m/s^2.
7. Height must be measured in units of m.
8. Calculate the **potential energy** of a rock with a mass of 55 kg while sitting on a cliff that is 27 m high.

$E_p = mgh = (55kg)(9.8\frac{m}{s^2})(27m) = 14553\ J$

9. What **distance** is a book from the floor if the book contains 196 Joules of potential energy and has a mass of 5 kg?

$W = Fd$ or $\frac{E_p}{mg} = \frac{mgh}{mg} = \frac{196\ J}{(5kg)(9.8\ m/s^2)} =$ 4m high

10. An automobile is sitting on a hill which is 20 m higher than ground level. Find the **mass** of the automobile if it contains 362,600 J of potential energy.

$\frac{E_p}{gh} = \frac{mgh}{gh} = \frac{362\,600\ J}{(9.8\ m/s^2)(20m)} =$ 1850 kg of mass

11. Energy of motion is known as kinetic energy.
12. The formula for calculating kinetic energy is $E_K = \frac{1}{2}mv^2$.
13. The two factors that determine the amount of kinetic energy in an object are mass and velocity.
14. Kinetic energy is measured in units of J.
15. Mass must be measured in units of kg.
16. Velocity must be measured in units of $\frac{m}{s}$.

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17. Calculate the **kinetic energy** of the rock in problem #8 if the rock rolls down the hill with a velocity of 8 m/s.

$E_K = \frac{1}{2}mv^2 = \frac{1}{2}(55\,kg)(8\,\frac{m}{s})^2 = 1760\,J$

18. Calculate the **kinetic energy** of a truck that has a mass of 2900 kg and is moving at 55 m/s.

$E_K = \frac{1}{2}mv^2 = \frac{1}{2}(2900\,kg)(55\,\frac{m}{s})^2 = 4.4 \times 10^6\,J$

19. Find the **mass** of a car that is traveling at a velocity of 60 m/s North. The car has 5,040,000 J of kinetic energy.

$2 \cdot \frac{E_K}{v^2} = \frac{1}{2}\frac{mv^2}{v^2} \times 2 = \frac{2 \cdot (5\,040\,000\,J)}{(60\,m/s)^2} = 2800\,kg$

20. **How fast** is a ball rolling if it contains 98 J of kinetic energy and has a mass of 4 kg?

m $\quad v = ?$ $\quad E_K$

$$\sqrt{2 \cdot \frac{E_K}{m}} = \sqrt{\frac{\frac{1}{2}mv^2 \cdot 2}{m}}$$

$$\sqrt{\frac{2E_K}{m}} = v$$

$$\sqrt{\frac{2(98\,J)}{(4\,kg)}} = v = 7\,\frac{m}{s}$$