Kinetic and Potential Energy Worksheet Name KEY.

Classify the following as a type of potential energy or kinetic energy (use the letters K or P)

1. A bicyclist pedaling up a hill K/P
2. An archer with his bow drawn P
3. A volleyball player spiking a ball K/P
4. A baseball thrown to second base K/P
5. The chemical bonds in sugar P
6. The wind blowing through your hair K
7. Walking down the street K
8. Sitting in the top of a tree P
9. A bowling ball rolling down the alley K
10. A bowling ball sitting on the rack P

Formulas:

E_K E_P

KE = 0.5 ·m· v² **OR** **PE = m·g·h**

v = velocity or speed *m = mass in kg* *g = 10 m/s/s* *h = height in meters*

For Questions 11-16, state the type of energy that is described as either kinetic or potential, then calculate its value.

11. You serve a volleyball with a mass of 2.1 kg. The ball leaves your hand with a speed of 30 m/s. The ball has Kinetic energy. Calculate it.

$E_K = \frac{1}{2} m v^2$

$E_K = 0.5(2.1\text{kg})(30.0\text{ m/s})^2$

$E_K = 945\text{ J}$

12. A baby carriage is sitting at the top of a hill that is 21 m high. The carriage with the baby has a mass of 1.5 kg. The carriage has Potential energy. Calculate it.

$E_P = mgh$

$E_P = (1.5\text{kg})(9.8\text{m/s}^2)(21\text{m})$

$E_P = 308.7\text{ J}$

13. A car is traveling with a velocity of 40 m/s and has a mass of 1120 kg. The car has Kinetic Calculate it.

$E_K = \frac{1}{2} m v^2$

$E_K = 0.5(1120\text{ kg})(40\text{ m/s})^2$

$E_K = 896000\text{ J}$

14. A cinder block is sitting on a platform 20 m high. It weighs 7.9 kg. The block has Potential Calculate it.

$E_P = mgh$

$E_P = (7.9\text{kg})(9.8\text{m/s}^2)(20\text{m})$

$E_P = 1548.4\text{ J}$

15. A roller coaster is at the top of a 72 m hill and weighs 134 kg. The coaster (at this moment) has Potential energy. Calculate it.

$E_P = mgh$

$E_P = (134\text{kg})(9.8\text{m/s}^2)(72\text{m})$

$E_P = 94550.4\text{ J}$

16. There is a bell at the top of a tower that is 45 m high. The bell weighs 19 kg. The bell has potential energy. Calculate it.

$E_P = mgh$

$E_P = (19\text{kg})(9.8\text{m/s}^2)(45\text{m})$

$E_P = 8379\text{ J}$

17. Determine the **kinetic** energy of a 100-kg roller coaster car that is moving with a speed of 20.0 m/s.

$$E_k = \frac{1}{2}mv^2$$
$$E_k = 0.5(100\text{ kg})(20.0\text{ m/s})^2$$
$$E_k = 20000\text{ J}$$

18. If the roller coaster car in the above problem were moving with **twice the speed**, then what would be its new **kinetic** energy?

$$E_k = (0.5)(100\text{ kg})(40.0\text{ m/s})^2$$
$$E_k = 80000\text{ J}$$

19. A cart is loaded with a brick and pulled at constant speed along an inclined plane to the height of a seat-top. If the mass of the loaded cart is 3.0 kg and the height of the seat top is 0.45 meters, then what is the **potential** energy of the loaded cart at the height of the seat-top?

$$E_p = mgh$$
$$E_p = (3.0\text{kg})(9.8\text{ m/s}^2)(0.45\text{m})$$
$$E_p = 13.23\text{ J}$$

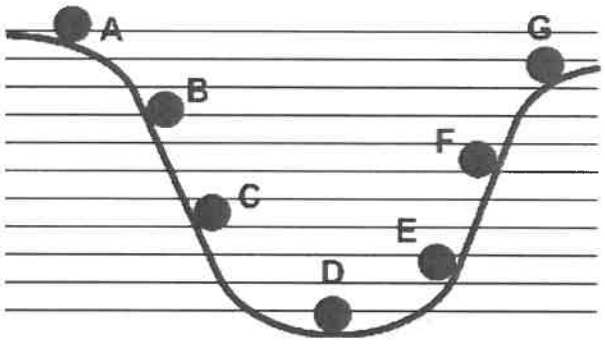
20. A 75-kg refrigerator is located on the 70th floor of a skyscraper (300 meters above the ground) What is the **potential** energy of the refrigerator?

$$E_p = mgh$$
$$E_p = (75\text{kg})(9.8\text{ m/s}^2)(300\text{m})$$
$$E_p = 220500\text{ J}$$

21. The potential energy of a 40-kg cannon ball is 14000 J. How high was the cannon ball to have this much **potential** energy?

$$E_p = mgh$$
$$14000\text{J} = (40\text{ kg})(9.8\text{m/s}^2)h$$
$$14000\text{ J} = 392\,h$$
$$35.7\text{m} = h$$

22. This graph shows a ball rolling from A to G. The ball starts at point A and rolls to point G. Use the graph to answer the following questions.



a. At what letter does the ball have the greatest kinetic energy? D

b. Which letter shows the ball when it has the maximum potential energy? A

c. Which letter shows the ball when it has the least potential energy? D

d. Why is point G slightly lower than point A? In other words, why couldn't the ball go back to the same height at which it started?

Friction.