Kinetic and Potential Energy Worksheet

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___
2. An archer with his bow drawn _P____
3. A volleyball player spiking a ball __K___
4. A baseball thrown to second base __K___
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__

What examples can you find in your home that are examples of kinetic and potential energy? (name two for each type of energy)

11. Kinetic: _____Washing Machine_____
12. Kinetic: _____Ceiling Fan_____
13. Potential: _____Snow sitting on my roof_____
14. Potential: _____All the junk on my top shelf in my office_____

Kinetic Energy – what does it depend on?

- The more __mass_____ an object moves, the more ____potential energy_____it has.
- The greater the ___velocity_____ of a moving object, the more __kinetic energy_____it has.
- Kinetic energy depends on both ___mass_____ and ___velocity_____.

Solve the following word problems using the kinetic and potential energy formulas (Be sure to show your work!)

Formulas:

$KE = 0.5 \times m \times v^2$ **OR** **$PE = m \times g \times h$**

v = velocity or speed *m = mass in kg* *$g = 9.81 m/s^2$* *h = height in meters*

15. 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 and show your work.

    $KE = 0.5 \times 2.1 \times 30^2$ $KE = 945J$

16. 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 and show your work.

    $PE = 1.5 \times 9.81 \times 21$ $PE = 309.015J$

17. A car is traveling with a velocity of 40 m/s and has a mass of 1120 kg. The car has _KINETIC_____ energy. Calculate it and show your work.

    KE = 0.5 x 1120 x 40^2 KE = 896 000J

18. A cinder block is sitting on a platform 20 m high. It weighs 7.9 kg. The block has _____POTENTIAL_____ energy. Calculate it and show your work.

    PE = 7.9 x 9.81 x 20 PE = 1549.98J

19. A roller coaster is sitting at the top of a 72 m hill and has 94646J. The coaster (at this moment) has __POTENTIAL_____ energy. What is its mass? Calculate it and show your work.

    M = PE / G x H M = 94646 / (9.81 x 72) M = 134kg

20. There is a 19kg bell at the top of a tower that is storing 15745J of energy. The bell has __POTENTIAL_____ energy. What is the height of the tower? Calculate it and show your work.

    H = PE / G x M H = 15745J / (9.81 x 19) H = 84.47m

21. Determine the **kinetic** energy of a 1000-kg roller coaster car that is moving with a speed of 20.0 m/s.

    KE = 0.5 x 1000 x 20^2 KE = 200 000J

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

    KE = 0.5 x 1000 x 40^2 KE = 3 200 000J

23. 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?

    PE = 3.0 x 9.81 x 0.45 PE = 13.24J

24. 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?

    PE = 75 x 9.81 x 300 PE = 220 725J

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

    H = PE / (G x M) H = 14000 / (9.81 x 40) H = 35.68M

The Law of Conservation of Energy states that:

- Energy can be neither __CREATED_____ nor ___DESTROYED_____.
- Energy can be __TRANSFORMED_____ from one form to another.
- The Total amount of _____ENERGY _____ is the __SAME__ before and after any energy transformation