

Kinetic and Potential Energy Worksheet

Name _____

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

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: _____
12. Kinetic: _____
13. Potential: _____
14. Potential: _____

Kinetic Energy – what does it depend on?

- ◆ The _____ an object moves, the _____ it has.
- ◆ The greater the _____ of a moving object, the _____ it has.
- ◆ Kinetic energy depends on both _____.

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

Formulas:

$$\mathbf{KE = 0.5 \cdot m \cdot v^2} \quad \mathbf{OR} \quad \mathbf{PE = m \cdot g \cdot h}$$

$v = \text{velocity or speed}$ $m = \text{mass in kg}$ $g = 10 \text{ m/s/s}$ $h = \text{height in meters}$

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

18. A cinder block is sitting on a platform 20 m high. It weighs 7.9 kg. The block has _____ energy. Calculate it.
19. A roller coaster is at the top of a 72 m hill and weighs 134 kg. The coaster (at this moment) has _____ energy. Calculate it.
20. There is a bell at the top of a tower that is 45 m high. The bell weighs 19 kg. The bell has _____ energy. Calculate it.
21. Determine the **kinetic** energy of a 1000-kg roller coaster car that is moving with a speed of 20.0 m/s.
22. If the roller coaster car in the above problem were moving with **twice the speed**, then what would be its new **kinetic** energy?
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?
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?
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?

- ◆ IF most of the energy we use on earth comes from the sun – how does that energy (light and thermal) end up
- ◆ As _____ energy in our food
 - ◆ As _____ energy of wind or moving water
 - ◆ As _____ energy that powers our lights
 - ◆ As _____ energy when we move around

Law of Conservation of Energy

- ◆ Energy can be neither _____ by ordinary means.
- ◆ Energy can be _____ from one form to another.
- ◆ The total amount of _____ is the _____ before and after any energy transformation.

Energy Transfer

Energy **TRANSFER** is the _____ from one object to another object.

Example: A cup of hot tea has _____ energy. Some of this thermal energy is _____ to the particles in cold milk, in which you put to make the coffee cooler.

Energy Transformation

- ◆ A change from one form of energy to another.
- ◆ Single Transformations
 - ◆ Occur when _____ form of _____ needs to be _____ into another to get work done.
- ◆ Multiple Transformations
 - ◆ Occur when a _____ of energy transformations are needed to do work
 - ◆ An objects energy can be:
 - ◆ As velocity _____ kinetic energy _____ and potential energy
 - ◆ As velocity _____ kinetic energy _____ and potential energy

WHAT IS THE TYPE OF RELATIONSHIP KE AND PE HAVE? _____

Roller Coasters

Does energy get transferred or transformed?

- ◆ As you move up to the first hill on a roller coaster the distance between the coaster and the Earth _____, resulting in an increase of _____.
- ◆ At the top of the first hill you have the _____ Gravitational Potential Energy
- ◆ As you begin your trip down the hill you _____ your speed resulting in a transformation from _____.
- ◆ At the bottom of the hill right before it goes back upward the _____, but the _____.
- ◆ As it starts to move up the next hill or loop KE is _____ back into GPE

