**Kinetic and Potential Energy Worksheet** Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Classify the following as a type of potential energy or kinetic energy (use the letters EK,EPE ). Where both words may be used, choose the one which describes the situation the “best”.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. A bicyclist pedalling 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)

1. Kinetic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Kinetic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Potential: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 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 working in three steps like the examples in your notebook!). Use one of the two formulas shown below for each of the questions

**EK = 0.5 x m x v2 and EGPE = m x g x h**

***v*** *= velocity (speed) in metres/second,m/s*

***m*** *= mass in kilograms,kg*

***g*** *= 10 metres/second/second, m/s/s*

***h*** *= height in meters,m*

1. 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.

1. 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.

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

1. 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.

1. 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.

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

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

1. 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?

1. 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?

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

Questions on **ENERGY TRANSFER** and **ENERGY** **TRANSFORATION**

1. IF most of the energy we use on earth comes from the sun – that energy (light and heat) end up:
2. As energy in our food
3. As energy of wind or moving water
4. As energy that powers our lights
5. As energy when we move around

**Law of Conservation of Energy**

1. Energy can be neither , only transformed from one type to another.

**Energy Transfer**

1. Energy **TRANSFER** is the from one object to another object.
2. **Example**: A cup of hot tea has energy. Some of this thermal energy is to the particles in cold milk, which you put in to make the coffee cooler.

**Energy Transformation** = A change from one form of energy to another.

1. Single Transformations ccur when form of needs to be into another to get work done.
2. Multiple Transformations occur when a of energy transformations are needed to do work.
3. As velocity kinetic energy , and potential energy .
4. As velocity kinetic energy , and potential energy .
5. Describe the mathematical relationship between Kinetic energy and gravitaional potential energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Roller Coasters**

**Does energy get transferred or transformed?**

1. 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 .

1. At the top of the first hill you have the Gravitational Potential Energy
2. As you begin your trip down the hill you your speed resulting in a transformation from to .
3. At the bottom of the hill right before it goes back upward the energy is the , but the energy is the lowest .

1. On the following diagram label points which correspond to where the rollercoaster cart would have the most EGPE, the least EGPE, the highest EK, the lowest EK, approximately half EGPE and half EK.
2. Can you identify a problem with the flowing rollercoaster design? Explain you reasoning.

