Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_

Conservation of ENERGY

The BIG Idea:

Law of Conservation of ENERGY: Energy CANNOT be created NOR destroyed – It can only be transferred.

Potential Energy = stored energy Kinetic Energy = energy of motion

If an object is given Potential Energy and then set in motion, the object’s energy will transfer from Potential Energy to Kinetic Energy. However, the Total Energy will always stay the same. This is the Law of Conservation of Energy.

***Steps to solve motion problems using the Law of Conservation of Energy:***

1. *Calculate the Potential Energy of the object at the first location.*
2. *Calculate the Kinetic Energy of the object at the first location.*
3. *Add PE and KE to determine the total Energy at the first location.*
4. *No matter where the object goes, it MUST maintain this same total Energy at ALL other locations.*
5. *Based on given information, calculate either the PE or KE of the object at a second location.*
6. *Subtract this value from the total Energy to calculate the other energy.*

PRACTICE PROBLEMS:

1. A 78kg man climbs to the top of a roof 9 meters high (FYI: that’s about 3 stories up). Unfortunately he slides off the roof to the ground below.
   1. What was his potential energy while still on the roof?
   2. What was his kinetic energy while still on the roof?
   3. What was his total energy while still on the roof?
   4. What is the potential energy as he hits the ground below?
   5. What is the kinetic energy as he hits the ground below?
   6. What is the total energy as he hits the ground below?
   7. Did he gain or lose total energy in falling from the roof to the ground?
   8. How fast was he going as he hit the ground below?
   9. Use Kinematic Equations to solve for his velocity as he hits the ground.
   10. Did your calculation match the value from part h? hint: if it did not match, check your work for errors.
   11. Describe in words how energy was conserved in the following parts of this problem:
       1. A man climbs to the top of a roof 9meters high:
          1. Where did the Energy come from? (Answer this)
          2. Where did the Energy go? (Answer this)
       2. He slide off the roof to the ground below:
          1. Where did the Energy come from? (Answer this)
          2. Where did the Energy go? (Answer this)
2. A 15kg metal ball is dropped from the top of a building 60m high (FYI: that’s about a 20 story building) Use the space provided to calculate the Potential Energy, Kinetic Energy and velocity at each location specified and complete the chart:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Height | Potential Energy (PE) | Kinetic Energy (KE) | Total Energy (TE) | Velocity of metal ball |
| 60m |  |  |  |  |
| 50m |  |  |  |  |
| 40m |  |  |  |  |
| 30m |  |  |  |  |
| 20m |  |  |  |  |
| 10m |  |  |  |  |
| 0m  (hitting ground) |  |  |  |  |

h=60m

h=50m

h=40m

h=30m

h=20m

h= 10m

h=0 (ground)