

Honors Problems

Kinetic and Gravitational Energy Transformations Name: _____ P: _____

Determine whether the objects in the following problems have kinetic or gravitational potential energy. Choose the correct formula and solve for the energy.

- **Kinetic Energy:** $K = \frac{1}{2} \times m \times v^2$
- **Gravitational potential energy:** $PE_g = \text{mass} \times \text{force of gravity} \times \text{height}$

Energy= joules

Mass= kilograms

Velocity= m/s

Force of gravity = (10 N/kg)

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 stored as _____. Calculate it below:

2. 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 12 kg. The carriage has energy stored as _____. Calculate it below:

3. A car is traveling with a velocity of 40 m/s and has a mass of 1,120 kg. The car has energy stored as _____. Calculate it below:

4. A cinder block is sitting on a platform 20 m high. It has a mass of 8 kg. The block has energy stored as _____. Calculate it below:

5. There is a bell at the top of a tower that is 45 m high. The bell has a mass of 19 kg. The bell has energy stored as _____. Calculate it below:

6. A roller coaster is at the top of a 72 m hill and has a mass of 97 kg. The coaster (at this moment) has energy stored as _____ . Calculate it below:
7. Calculate the kinetic energy of a 3 kg ball that is rolling at 2 meters per second.
8. Two boxes were lifted by a machine. Box A had a mass of 2 kg, and was lifted at a speed of 2 m/sec. Box B had a mass of 4 kg and was lifted at a rate of 3 m/sec.
- a. Which box had more kinetic energy while it was being lifted? Show your calculations.
- b. Which box had more gravitational potential energy when it was lifted to a distance of 10 meters? Show your calculations.