

Lesson 2: Kinetic Energy



Key Concepts:

- What is **kinetic energy**?
- What factors might contribute to an object's kinetic energy?

Kinetic Energy is the energy associated with _____.
_____ kinetic energy this deals with a _____
moving.

$$E_k = \frac{1}{2} mv^2$$

For heat, we look at the movement of _____ within a mass. If you recall the kinetic molecular theory, the _____ an object gets, the _____ the atoms are moving. This is a type of kinetic energy as well that we will deal with later. Like all Energy, Kinetic energy is measured in _____ (J)

The units that make up Joules are _____ which is:

- Mass $\times$ acceleration $\times$ distance

To calculate _____ Kinetic Energy, you need a _____ in kg, moving at a _____ (speed with direction) measured in m/s.

The easiest questions look like:

Calculate the mechanical kinetic energy of a 2.3kg mass moving at 3.8 m/s

$E_k =$

$=$

$=$

Shortcut for converting grams (g) into Kg:

Before you can find the E_k , you need to convert the _____ by **dividing** the grams, g by **1000**:

200 g =

3 g =

Example: Calculate the kinetic energy of a 25g paint ball moving at 33m/s.

Write Equation:

Convert into correct units:

List all Variables and values:

Substitution into Eq. and solve:

Shortcut for converting km/hr into m/s:

Before you can find the E_k , you need to convert the _____ by **dividing** the km/h by **3.6**:

100 km/h =

30 km/h =

Example: Calculate the kinetic energy of a 5.3 kg bowling ball moving at 18 km/h.

Practice Problems

1. A freight elevator with a mass of 120 kg is moving with a speed of 2.50 m/s. What is its kinetic energy?
2. A car with a mass of 1500 kg is moving at a speed of 50 km/h. What is its E_k ? (remember to convert km/h into m/s!)
3. A student with a mass of 55 kg is jogging at a speed of 1.6 m/s. What is the student's kinetic energy?

4. A wrecking ball, as seen in the diagram below, has a mass of 315 kg. If it is moving at a speed of 5.12 m/s, what is its kinetic energy?



5. A hockey puck has a mass of 210 g. If the hockey puck has 73 J of kinetic energy, what is its speed? (remember to convert g into kg!)

6. An electron with a mass of 9.11×10^{-31} kg is moving at a speed of 2.19×10^7 m/s. What is the kinetic energy of the electron?

7. A basketball that is moving with a speed of 6.1 m/s has 8.4 J of kinetic energy. What is the mass of the basketball?

8. A bowling ball is moving at a speed of 2.21 m/s. If the kinetic energy of the bowling ball is 15.7 J, what is its mass?

9. What is the speed of a 0.155 kg billiard ball that has 12.0 J of kinetic energy?

10. You are paddling a canoe. The combined mass of the canoe and your body is 115 kg. If you and the canoe have a kinetic energy of 75 J, how fast are you paddling the canoe?

11. A 15 kg child is sliding down a playground slide. If the child's kinetic energy is 77J, how fast is the child sliding?