

ENERGY OF MOTION--Ek or KE

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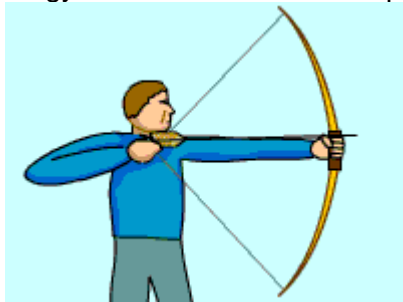
What is **energy**?

What are some examples of different types of energy?

1st Law of Thermodynamics:

Energy is neither created nor destroyed, it simply converts from one form to another.

What energy **conversions** do these pictures depict?



What is **kinetic energy**?

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

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

What are the units of kinetic energy?

Practice Problems

1. A car with a mass of 1500 kg is moving at a speed of 50 km/h.

What is its E_k ?

2. A hockey puck has a mass of 210 g.

If the hockey puck has 73 J of kinetic energy, what is its speed?

Work and potential energy

If work is done on an object to set that object in motion (example: throwing a baseball), then this is considered **positive work**.

If work removes kinetic energy from the object (example: catching the baseball), then this is considered **negative work**.

Other examples of negative work -

Practice Questions

1. 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?



2. A freight elevator with a mass of 120 kg is moving with a speed of 2.50 m/s.

What is its kinetic energy?

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. 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?

5. 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?

6. 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?

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

8. 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?

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