

ENERGY OF MOTION--Ek or KE

<http://cochrane.rockyview.ab.ca/Members/lynnmmoore/science-10/unit-2-energy-flow-in-technological-systems-ch-4-6/ch-5-energy-and-motion/s10-lesson-7-kinetic-energy/s10-notes-kinetic-energy/view>

What is energy?

• the ability to do work

What are some examples of different types of energy?

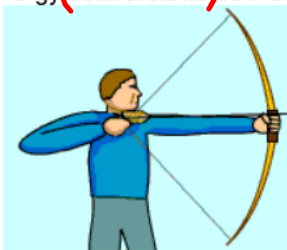
- sound E
- light E
- thermal
- elec E

2 types = E_k & E_p

1st Law of Thermodynamics:

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

What energy ^(change) conversions do these pictures depict?



pot chem E \rightarrow mech E \rightarrow E_k
(food) work

pot E



pot E \rightarrow kin E = wanted
 \rightarrow thermal E = dissipated
 \rightarrow sound E = LOSS

What is kinetic energy?

• E of motion

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

m & v or u } mass & velocity / speed
Mingji

J

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

kg NOT $\frac{km}{h}$

What are the units of kinetic energy? $(J) = \frac{1}{2} (kg) \left(\frac{m}{s}\right)^2$

Practice Problems "exercises"

1. A car with a mass of 1500 kg is moving at a speed of 50 km/h.
 What is its E_k ? m $v \rightarrow \frac{m}{s}$ $\times \frac{km}{h} \times$
 Convert to $\frac{m}{s}$!

start w formula
 and always
 rearrange!
 if nec.

2. A hockey puck has a mass of 210 g. $m \rightarrow kg$
 If the hockey puck has 73 J of kinetic energy, what is its speed? $v?$

$$\frac{2 \cdot E_k}{m} = \frac{\frac{1}{2} m v^2 \cdot 2}{m}$$

$$v = \sqrt{\frac{2 E_k}{m}}$$

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?