

SOL 5.2 & 5.3 FORCE, MOTION, AND ENERGY

SOL 5.2 - Force, Motion, and Energy --Energy can take many forms. Key ideas include

- energy is the ability to do work or to cause change;
- there are many different forms of energy;
- energy can be transformed;
- energy is conserved.

SOL 5.3 Motion -- Key concepts:

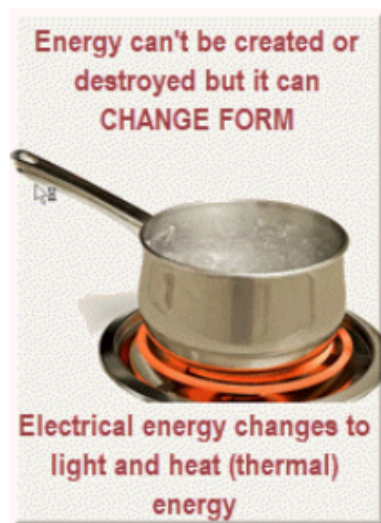
- moving objects have kinetic energy;
- motion is described by an object's direction and speed;
- changes in motion are related to net force and mass;
- when objects collide, the contact forces transfer energy and can change objects' motion;
- friction is a force that opposes motion.

CENTRAL IDEA --Energy can occur in different forms, can be transformed from one form to another, but it cannot be created or destroyed.

ENERGY CAUSES CHANGE & CAN BE TRANSFORMED.

Energy is the ability to cause **change** or **do work**. **Energy** can be **transferred** in various ways and between objects.

- Energy** is the ability to **cause change** and that change can take multiple forms.
- Energy takes **many forms** such as **motion**, **light**, **sound**, **electrical** and **magnetic fields**, and **thermal** energy.
- Energy **cannot be created or destroyed**; however, it can **transform** from one form into another.
- Energy can take many **forms** such as **thermal**, **radiant**, **mechanical**, and **electrical**.
- Energy can **change forms** but **cannot be created or destroyed**.
 - For example, **electrical** energy is transformed into **thermal** energy when a **stove** is turned on.
 - The electrical energy **does not just disappear** and thermal energy does not just appear out of nowhere.



WORK

- Energy can be **transformed** from one form to another to do **work**.
- Work**, in a scientific sense, is **defined as a force acting upon an object**, causing that object to **move** in the **direction** of the force.
- Energy can be **moved** from place to place by **moving objects**, or through **sound**, **light**, or **electric currents**.

Central Idea: An object's motion is described by its direction and the speed.

Forces between objects can cause a change in motion. When two objects interact, each exerts a force on the other. These forces can transfer energy between objects which can cause changes in their motion.

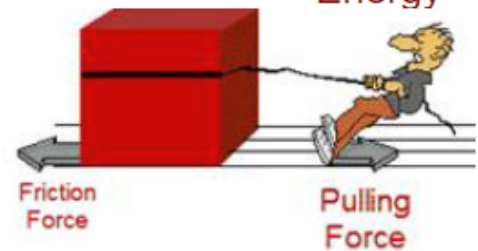
- **Moving** objects have **kinetic** energy, which is the **energy of motion**.
 - The motion of an object is described by its **direction** and **speed**.
 - A **change** in motion is related to net **force** and **mass**.



Motion = Kinetic Energy

FORCES

- The **net force** is the **combination of all the forces** acting on an object.
- Whether an object stays **still** or **moves** often depends on the effects of **multiple pushes or pulls**.
 - An object **at rest** typically has multiple forces acting on it, but they add to give **zero net force** on the object.
 - Forces that do not sum to zero net force can cause **changes** in the object's **speed** or **direction** of motion.
- When objects **collide**, the energy from one object **transfers** to another object.
 - That **transfer in energy** can change an object's **speed** and or **direction**.
- **Motion** is described as an object's **direction** and **speed**.



Car		Truck	
mass (kg)	1000	mass (kg)	3000
vel. (m/s)	-40.0	vel. (m/s)	0.0
mom. (kg m/s)	-40 000	mom. (kg m/s)	0

The more massive an object, the less effect a given force will have on that object.

- **Speed** describes how **fast** an object is moving.
- Unless acted on by a force, **objects in motion tend to stay in motion** and **objects at rest remain at rest**.
- A **force** is any push or pull that causes an object to **move**, **stop**, or **change speed** or **direction**.
- With objects of the same mass, the **greater the force**, the greater the **change in motion**.
 - The more **massive** an object, the **less effect** a given force will have on that object.



FRICTION

- Friction is a force that **opposes the motion** of an object.