WELCOME TO 1103
PERIOD 2

Homework Exercise #1 is due at the beginning of class. Please put it on the stool in the front of the classroom.
• How are forms of energy defined?
• What happens when one form of energy is converted into another form?
Energy and motion

Three forms of energy are related to energy of motion:

- Mechanical Energy of Motion
- Thermal Energy
- Sound Energy

These energy forms are associated with moving objects, atoms, and molecules.
Mechanical Energy of Motion

All moving objects exhibit mechanical energy of motion.

Mechanical energy of motion is also called kinetic energy.

Which objects on your table can exhibit mechanical energy of motion?
Thermal Energy

Energy of motion occurs within an object as its atoms and molecules vibrate randomly.

Thermal energy is the unorganized energy of motion of vibrating objects too small to see.

In general, the higher the temperature of an object, the faster its atoms and molecules vibrate.
Sound Energy

When atoms and molecules vibrate in an organized way, their vibrations may travel as a sound wave.

Sound is the transmission of vibrations through a solid, liquid, or gas by vibrating atoms or molecules.
Energy and electric charge

Matter contains positive and negative electric charges.

Energy that results from the forces between these charges is called electromagnetic energy.

Three forms of electromagnetic energy:

- Electrical Energy
- Magnetic Energy
- Radiant Energy
Electrical energy

Electrical energy results from forces between charged particles.

These particles may be in motion or at rest (static).
Magnetic energy

Charges moving within some types of materials produce magnetic forces.

Magnetic energy results from the forces between magnetic materials.
Radiant energy (electromagnetic radiation)

Radiant energy results from vibrations of charges.

As the charges vibrate, they produce waves of energy.
The type of radiant energy depends on the wavelength.

Shorter wavelengths transmit more energy than longer wavelengths.
Forms of stored (potential) energy

Stored energy, which can be used to do work, is called potential energy.

- **Gravitational Potential Energy:**
  Energy stored in a raised object that has the potential to fall, slide or roll to a lower position.

- **Strain Potential Energy:**
  Energy stored in a stretched or compressed spring or elastic.
• **Electrical Potential Energy:**
  Energy stored when static positive and negative charges are separated. Capacitors store electrical potential energy.

• **Chemical Potential Energy:**
  Energy existing because atoms and molecules can take in or give off energy when their chemical bonds are formed or broken. Batteries store chemical potential energy.

• **Nuclear Energy:**
  Energy available in the nuclei of atoms that are radioactive and undergo nuclear changes.
## Summary of the forms of energy

<table>
<thead>
<tr>
<th>Form</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>The energy exhibited by objects in motion.</td>
</tr>
<tr>
<td>Thermal</td>
<td>The unorganized energy of motion of vibrating atoms and molecules.</td>
</tr>
<tr>
<td>Sound</td>
<td>The organized energy of motion of vibrating atoms and molecules.</td>
</tr>
<tr>
<td>Electrical</td>
<td>The energy resulting from forces between charged particles.</td>
</tr>
<tr>
<td>Magnetic</td>
<td>The energy resulting from the forces between magnets.</td>
</tr>
<tr>
<td>Radiant</td>
<td>The energy resulting from vibrations of charges, such as radio waves, microwaves, or visible light.</td>
</tr>
<tr>
<td>Gravitational</td>
<td>The energy stored in raised objects that could fall.</td>
</tr>
<tr>
<td>Strain</td>
<td>The energy stored in a stretched or compressed spring.</td>
</tr>
<tr>
<td>Chemical</td>
<td>The energy available in the chemical bonds binding atoms together.</td>
</tr>
<tr>
<td>Electrical</td>
<td>The energy stored by static electric charges.</td>
</tr>
<tr>
<td>Nuclear</td>
<td>Energy available in the nuclei of radioactive atoms.</td>
</tr>
</tbody>
</table>
Every conversion has some wasted energy!

Efficiency = \frac{\text{Useful energy out}}{\text{Total energy in}} < 100\%

We will discuss efficiency in more detail in Period 8.
BEFORE THE NEXT CLASS…

✓ Read textbook chapter 3
✓ Complete Homework Exercise 2
✓ Watch Video 1: Ring of Truth: Change