

# 1 ☐ *Energy*

Physical Science

## 2 ☐ *Nature of Energy*

Energy is all around you.

- You hear energy as sound, you see energy as light, you can feel energy in wind.
- Living organisms need energy for growth and movement.
- You use energy when you hit a tennis ball, compress a spring, or lift a grocery bag.
- Energy is the ability to do work.

## 3 ☐ *Energy*

- The energy released by a supernova is capable of destroying a nearby solar system in just a few hours. A supernova is one of the greatest concentrations of energy in the universe.

## 4 ☐ *Forms of Energy*

- Energy appears in many forms. There are five main forms of energy.
- Mechanical
- Heat
- Chemical
- Electromagnetic
- Nuclear

## 5 ☐ *Mechanical Energy*

Energy of motion.

Examples:

- Water in a waterfall
- Wind
- Moving vehicles
- Sound
- Blood traveling through your body

## 6 ☐ *Heat Energy*

- The internal motion of atoms.
- The faster the molecules move, the more heat energy is produced.

Examples:

Friction

Changes in state of matter

## 7 ☐ *Chemical Energy*

- Energy that exists in the bonds that hold atoms together.

- When bonds are broken, chemical energy is released.

Examples:

- Digesting food...bonds are broken to release energy for your body to store and use.
- Sports... your body uses energy stored in your muscles obtained from food.
- Fire-a chemical change.

## 8 ☐ *Electromagnetic Energy*

Moving electric charges.

Examples:

- Power lines carry electricity
- Electric motors are driven by electromagnetic energy
- Light is this form of energy (X-rays, radio waves, laser light etc.)

## 9 ☐ *Nuclear Energy*

- When the nucleus of an atom splits, nuclear energy is released.
- Nuclear energy is the most concentrated form of energy.
- Fission/fusion

## 10 ☐ *Questions*

- What is energy?
- Can energy be transferred from one object to another?
- What are the different forms of energy?

## 11 ☐ *States of Energy*

There are two states of energy:

Potential and Kinetic

## 12 ☐ *Potential Energy*

- Stored energy - energy of position.
- Not always mechanical energy - can be other forms.
- Gravitational Potential energy - dependent on height and weight.
- $GPE = \text{Weight} \times \text{Height}$
- Units - Newton\*meter

## 13 ☐ *Kinetic Energy*

- The energy of motion.
- The faster the object moves - the more kinetic energy.
- Kinetic energy depends on both mass and velocity.
- $KE = \frac{1}{2}(\text{mass} \times \text{velocity}^2)$
- $\text{Kg m}^2/\text{s}^2 = \text{Newton} \times \text{meter} = \text{Joules}$

## 14 ☐ *Energy Conversions*

- The most common energy conversion involves the changing of potential energy into kinetic energy or vice-versa.

Examples:

Ball thrown in the air

Roller coaster

## 15 ☐ *More Conversions*

- All forms of energy can be converted to other forms.
- Law of Conservation of Energy: Energy cannot be created or destroyed.
- Einstein - If matter is destroyed, energy is created, if energy is destroyed, matter is created. The total amount of mass and energy is conserved.

16 ☐

## 17 ☐ *Writing Assignment*

- Identify the various energy conversions involved in the following events:
- An object is raised and then allowed to fall. As it hits the ground it stops, produces a sound and becomes warmer.
- Due tomorrow at the beginning of class.

## 18 ☐ *Resources*

Roller coaster Animation:

<http://www.glenbrook.k12.il.us/gbssci/phys/mmedia/energy/ce.html>

Mouse Trap animation

<http://communities.msn.com/Vicksi/ClinArtandAnimationStorage/mimichar.msns?action=ShowPhoto&PhotoID=4571>

Chevy animation

<http://communities.msn.com/Vicksi/ClinArtandAnimationStorage/angelfirepics.msns?action=ShowPhoto&PhotoID=4601>

Pics

<http://www.glenbrook.k12.il.us/gbssci/phys/Class/energy/u511e.html>

<http://www.glenbrook.k12.il.us/gbssci/phys/Class/energy/u511b.html>

<http://www.glenbrook.k12.il.us/gbssci/phys/Class/energy/u511d.html>

<http://library.thinkquest.org/20331/types/>

<http://library.thinkquest.org/20331/history/timeline1600.html>

<http://library.thinkquest.org/20331/history/timeline1900.html>

<http://library.thinkquest.org/2745/data/loops.htm>

[http://www.sunvbroome.edu/~cet\\_dept/POWERPIX.html](http://www.sunvbroome.edu/~cet_dept/POWERPIX.html)

<http://www.st-aunes.org/~lehinson/webpages/kinpot.htm>

<http://www.rz.uni-frankfurt.de/~schaudet/>

<http://radar.metr.tu.edu/OK31/meteorology/HeatTransfer.html>

[http://hrsti.paf.uni-ij.si/dices/en/web-based\\_education/mfodist/tutorial/simulate/off.htm](http://hrsti.paf.uni-ij.si/dices/en/web-based_education/mfodist/tutorial/simulate/off.htm)

<http://heritage.stsci.edu/2000/15/index.html>

<http://csep10.phys.utk.edu/guidry/violence/cemnants-save.html>

Text

*Exploring Physical Science*, Prentice Hall, chapter 16.