Extra copy for Lesson 2 – So teacher can review this info at the beginning of Lesson 2

FORMS OF ENERGY

All forms of energy fall under two categories

KINETIC

Kinetic energy is energy in motion

RADIANT ENERGY

Radiant energy travels in transverse waves. Radiant energy includes visible light, x-rays, gamma rays, and radio waves. Solar energy is an example of radiant energy.

THERMAL ENERGY

Thermal energy (or heat) is the internal energy in substances; is it the vibration and movement of atoms and molecules within substances. Geothermal energy is an example of thermal energy.

MOTION

The movement of objects or substances from one place to another is motion. Wind and hydropower are examples of motion.

SOUND

Sound is the movement of energy through substances in longitudinal waves.

ELECTRICAL ENERGY

Electrical energy is the movement of electrons. Lightning and electricity are examples of electrical energy.

POTENTIAL

Potential energy is stored energy

CHEMICAL ENERGY

Chemical energy is the energy stored in the bonds of atoms and molecules. Biomass, petroleum, natural gas, propane and coal are examples of stored chemical energy.

NUCLEAR ENERGY

Nuclear energy is the energy stored in the nucleus of an atom. It is the energy that holds the nucleus together. The nucleus of a uranium atom is an example of nuclear energy.

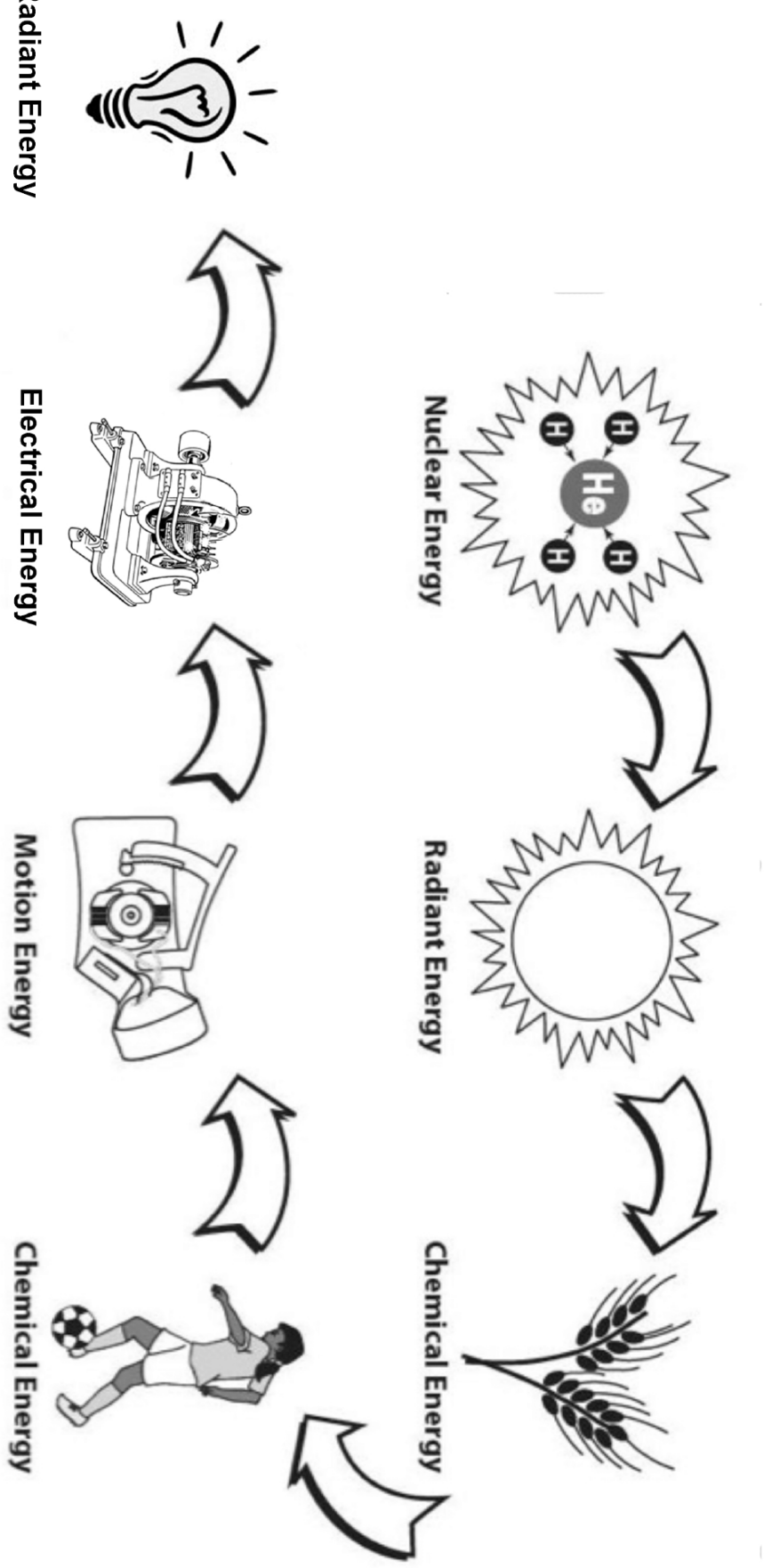
STORED MECHANICAL ENERGY

Stored mechanical energy is energy stored in objects by the application of a force. Compressed springs and stretched rubber bands are examples of stored mechanical energy.

GRAVITATIONAL ENERGY

Gravitational energy is the energy of place or position. Water in a reservoir behind a hydropower dam is an example of gravitational potential energy. When the water is released to spin the turbines, it becomes kinetic energy.

Adapted from The NEED Project, Manassas, VA



Adapted from The NEED Project, Manassas, VA

The Law of the Conservation of Energy

Energy cannot be created *or* destroyed it can only change form.

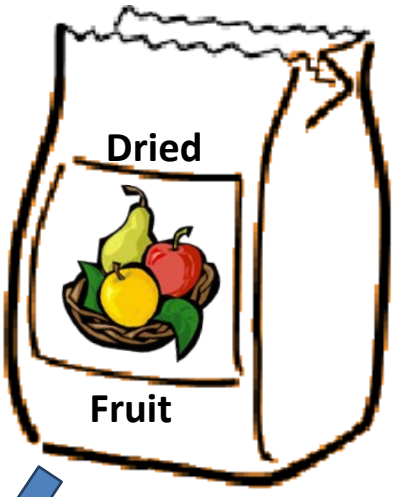
- Einstein

Energy Flow Diagram: Dried Fruit

Box 1

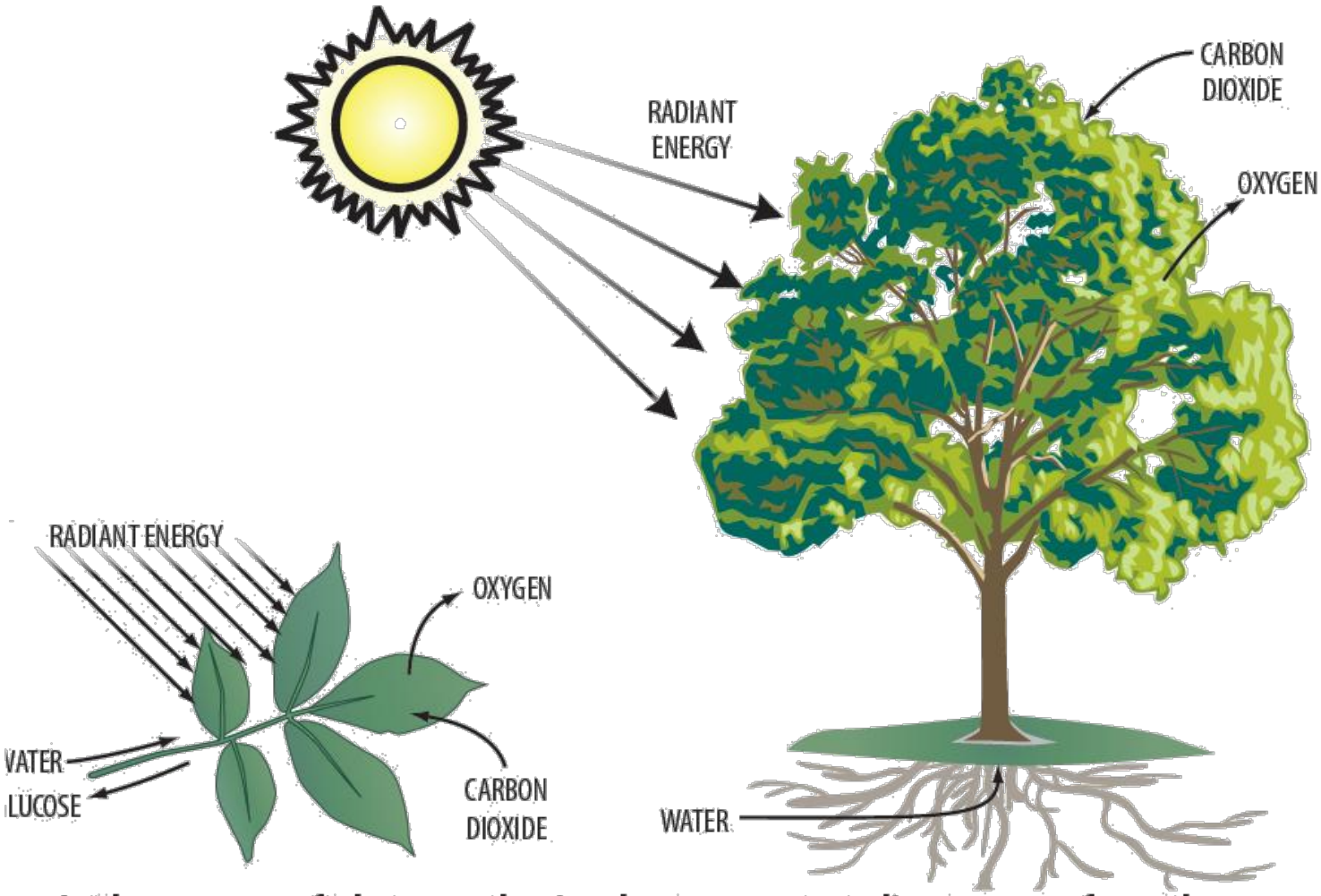
Box 2

Box 3



Add real pictures to each box on the previous page; cut & laminate. Use as a Sort Activity

Photosynthesis



In the process of photosynthesis, plants convert radiant energy from the sun into chemical energy in the form of glucose (or sugar).

water + carbon dioxide + sunlight ⟶ glucose + oxygen

$6\ H_2O + 6\ CO_2 + \text{radiant energy} \longrightarrow C_6H_{12}O_6 + 6\ O_2$

Science Investigation Report: Glow Sticks

Name _____

Challenge: Using the materials provided, investigate the effect of thermal energy on a chemical reaction.

Background research:

Light sticks have two chemicals inside them (hydrogen peroxide and phenyl oxalate ester with a fluorescent dye). The hydrogen peroxide is in the plastic tube. The ester is in the glass container inside the plastic tube. If you bend the light stick and break the glass container, the chemicals begin to react and form a new chemical. The chemical reaction also produces light by energizing the dye.

What is your question?

(Example: *How does change in temperature affect the brightness of the Glow Stick?)*

_____

_____

Hypothesis

What is your hypothesis?

If *Glow Sticks are place in the hot and cold water*

then the Glow Stick in the _____water will be_____

because _____

Materials

_____

_____

Procedure

List the steps in the design of your investigation.

1. _____
2. _____
3. _____
4. _____

Science Investigation Report

Data (sample graph)

	Dim	**Bright**	**Dazzling/Brilliant**
Hot H_2O _____ Temp			
Cold H_2O _____ Temp			
Control _____ Temp			

Analysis:

How does temperature affect the brightness of a Glow Stick?_____

_____

_____

Why does the brightness change with a change in temperature? _____

_____

_____

Was your hypothesis correct? _____

CHEMICAL REACTIONS: LIGHT STICKS

BACKGROUND: Light sticks have two chemicals inside them (hydrogen peroxide and phenyl oxalate ester with a fluorescent dye). The hydrogen peroxide is in the plastic tube. The ester is in the glass container inside the plastic tube. If you bend the light stick and break the glass container, the chemicals begin to react and form a new chemical. The chemical reaction also produces light by energizing the dye.

PURPOSE: To investigate the effect of heat on a chemical reaction.

QUESTION: If you put a light stick into cool water, then into hot (not boiling) water, how does the amount of light produced by the light stick change?

PREDICTION:

MATERIALS: 3 light sticks of the same color, 3 - 250 ml beakers, 3 thermometers, hot, room temperature, and cool water

PROCEDURE:

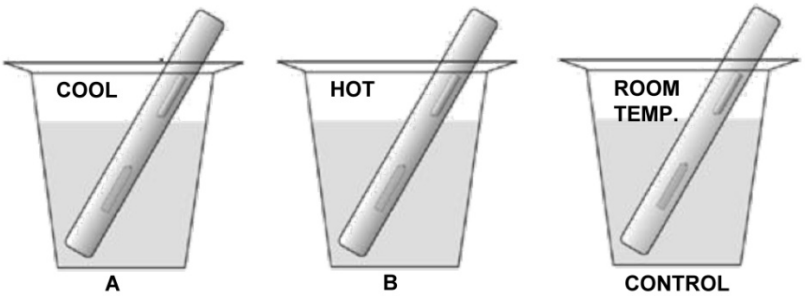
1. Bend the light stick until the glass container inside breaks, and then shake it to mix the chemicals.
2. Observe the amount of light the light stick produces.
3. Fill one beaker with 150 ml of hot water, one with 150ml of room temperature and one with 150 ml of cool water and record the temperatures.

   HOT WATER: _____ °F _____°C COOL WATER: _____ °F _____°C

   ROOM TEMP WATER _____ F _____C
4. Place the light stick in the cool water and observe the amount of light the light stick produces.
5. Place the other light stick in the hot water and observe the amount of light the light stick produces. Remove the light stick from the hot water.
6. Place the third light stick in the room temperature water and observe the amount of light the light stick produces.

OBSERVATIONS:

CONCLUSION: How does heat affect a chemical reaction?



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