Energy Transformations Outline
Station 4

**Forms of Energy Station**

**Materials:** Die with Energy Forms Various Toys

 Energy Forms Picture Cards Energy Equation Cards

 Energy Forms Definition Cards

**Introduction to Forms of Energy:**

* Everything in the universe is either matter or energy. What is matter? *Anything that has mass (weight) and volume (takes up space).*
* What are examples of matter in this room? *Various answers: table, toy car, air, etc.*
* What is energy? *Energy is anything that causes a change in the matter. It can be a change in location (moving), shape or state of matter. Energy makes change.*

**Activity #1: Forms of Energy Definitions & Examples**

* There are several different forms of energy. Let’s review what they are…*Lay out definitions of a form of energy and have the students match up the name. Leave the cards on the table for the next activity.*
	+ Radiant-electromagnetic energy that travels in waves.
	+ Chemical-energy stored in the bonds of atoms and molecules.
	+ Mechanical-energy of motion. Sound is vibrating particles included in mechanical energy.
	+ Electrical-energy of moving electrons.
	+ Thermal/Heat-internal energy of an object, vibrations of atoms and molecules.
	+ Nuclear-energy in the nucleus of an atom.
* Now let’s look at some examples of the different forms of energy. *Pick a student to roll the die.*
	+ When the die lands on one of the energy forms, work together as a group to choose a picture that represents that form of energy. *After the group selects a picture, put it with the correct form and definition.*
	+ *Choose a different group member to roll the die and repeat the process until every form has at least one picture example.*
* You have noticed that some of these cards can be used to give an example of more than one form of energy.
	+ *Discuss other pictures that could represent more than one source of energy.*

**Activity #2: Energy Transformations Using Toys**

*Note to Leaders: Set aside the picture cards and definitions. For Activity #2 you will use the blue Energy Forms cards. With each toy you will lay down the transformation equation and the students will determine which toy matches that equation.*

* Toy #1

Equation: **R E M + T**

* + Where does this toy get its energy? *Sun or light*
	+ Which toy do you think it is? *Solar Toy*
	+ What does the toy convert this energy to? *Electrical then Motion*
	+ Why is thermal included? *Whenever things move, there is friction and some energy is lost to heat.*
* Toy #2

Equation: **C E M + S + R + T**

* + Where does this toy get its’s energy? *Chemical energy in the batteries*
	+ Batteries transfer chemical energy into what kind of energy? *Electrical in the circuit.*
	+ Which toy do you think it is? *Toy Car or Spinning Top*
	+ Electrical energy is transformed into what forms? *Sound, radiant, mechanical & thermal*
* Toy #3

Equation: **M M + T**

* + Which toy is this? *The pull back car.*
	+ Where does this toy get its’s energy? *From pulling the wheels back.*
	+ With the wheels pulled back, is the energy in the wheels kinetic (moving) or potential (stored)? *Potential*
	+ When you let go of the wheels and the car is moving forward, is the energy kinetic or potential? *Kinetic*
* Toy #4

Equation: **M S + T**

* + Which toy is this? *Steel Spheres. These aren’t really a toy but are ball bearings used in large trucks and construction equipment. They have a lot of mass, therefore can exert of kinetic energy.*
	+ When I strike the balls together, what is the mechanical energy transformed into? *Sound*
	+ Is it transformed into anything besides sound? *Have a student hold a sheet of paper between the balls as you strike them together.*
	+ What do you see on the paper? *A burn mark.* Have students sniff the paper. *You can smell the burned paper*. So what form of energy is that? *Thermal.*
* Toy #5

Equation: **M E R + T + S**

* Which toy is this? *No Battery Flashlight*
* What energy goes into this device? *Mechanical which came from your muscles.*
* What energy comes out of this device? *Radiant (light).*
* *Show the students the insides of the flashlight as you squeeze the handle. Point out that there is a small generator (spinning magnet with a coil of wire). This produces electrical energy.*
* What energy forms are by-products when using the flashlight? *Sound and thermal (heat).*

**Complete Student Worksheet Questions:**

Note to Leaders: Ask these questions to the students. Do not just give them the answer. If incorrect answers are given, talk the students through the correct answer. You may need to refer back to the definition.

 Which form of energy is a girl riding her bike? **MECHANICAL**

 Which form of energy is the light from the sun? **RADIANT**