

## Triangle Game

### Student Objective

The student

- will be able to explain in his or her own words the meaning of the fundamental terms and concepts of solar energy

### Materials

- Triangle game board
- instructions
- playing pieces
- tape

### Procedure (prior to class)

1. Cut out game pieces
2. Print out Key Words/Definitions page
3. Game board may be enlarged or laminated

### Procedure (in class)

1. Assign students to small groups.
2. Distribute a triangle game board and instruction sheet to each group.
3. Place the terms at the front of the class for the teams to refer to if there are disputed answers.
4. Discuss the rules of the game with the class and demonstrate a completed triangle using non-technical terms.
5. Allow 30-40 minutes for game time.

### Key Words:

(Key words depend on game vocabulary used. Below are the key words used in this solar energy version)

conduction  
convection  
desalinization  
direct current electricity  
electromagnetic spectrum  
energy system  
energy efficient  
evaporation  
hydrogen  
insulation  
irradiance  
kilowatt  
photon  
photovoltaic  
radiation  
renewable energy  
solar collector  
solar oven  
solar spectrum  
solar still  
solar thermal  
water cycle

### Time:

1 hour

## Key Words & Definitions

Key Words will vary depending on the vocabulary used. Below are the key words/definitions for the solar energy game pieces included in this unit.

- **conduction** - the movement of heat or cold through materials that are solid
- **convection** - the movement of heat through air or in liquids
- **direct current electricity (DC)** - an electric current flowing in one direction only. This type of electricity is typically used in battery operated devices, automobiles and boats
- **desalinization** - process of removing salt and other chemicals and minerals from water
- **electromagnetic spectrum** - the radiant energy that is emitted from the sun which is made up of varying wavelengths. From longest to shortest, these are: radio waves, radar/microwave, infrared, visible light, ultraviolet, x-rays and gamma rays.
- **energy system** - an interacting group of items forming a unified whole
- **energy efficient** - not wasteful of energy, more of the energy goes to the desired work
- **evaporation** - process of changing a liquid into vapor
- **hydrogen** - the element composed of two hydrogen atoms. Hydrogen is useful as a combustible fuel, and can also be used with a fuel cell to generate electricity.
- **insulation** - material used to reduce heat loss or gain
- **irradiance** - the measure of the power density of sunlight. Expressed in watts per square meter.
- **kilowatt** - standard measure of electric usage
- **photon** - the unit of energy emitted by the sun
- **photovoltaic** - the effect of producing electric current using light
- **radiation** - the way we receive heat from the sun each day. The energy is emitted in the form of waves/particles, and can move from one object to another without heating the area in between.
- **renewable energy** - fuel sources that can be replenished
- **solar collector** - a device that collects and traps solar energy
- **solar oven** - a device that uses the heat from the sun to cook food
- **solar spectrum** - the spectrum of colors in the visible light from the sun
- **solar still** - a device that uses solar energy to evaporate a liquid
- **solar thermal** - using the sun's energy to heat something. Common uses include water heaters and pool heaters.
- **water cycle** - the system of water recycling on our earth - water, evaporation, clouds, precipitation

## Internet Sites

<http://www.wordcentral.com/>

Merriam Webster, Word Central student dictionary

## Triangle Game

Benchmarks will vary according to vocabulary used. Below are the benchmarks covered by using the solar energy key words included with this activity.

			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
<b>Grade 6</b>														
Earth Systems & Patterns	# 7	SC.6.E.7	X											
<b>Grade 7</b>														
Earth Structures	# 6	SC.7.E.6						X						
Forms of Energy	# 10	SC.7.P.10	X	X										
Energy Transfer & Transformations	# 11	SC.7.P.11	X	X										
<b>Grade 8</b>														
Earth in Space & Time	# 5	SC.8.E.5											X	

### Sixth Grade Benchmarks

#### Science–Big Idea 7: Earth Systems and Patterns

- SC.6.E.7.1 - Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth’s system.

### Seventh Grade Benchmarks

#### Science–Big Idea 6: Earth Structures

- SC.7.E.6.6 - Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

#### Science–Big Idea 10: Forms of Energy

- SC.7.P.10.1 - Illustrate that the Sun’s energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
- SC.7.P.10.2 - Observe and explain that light can be reflected, refracted, and/or absorbed.

#### Science–Big Idea 11: Energy Transfer and Transformations

- SC.7.P.11.1 - Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
- SC.7.P.11.2 - Investigate and describe the transformation of energy from one form to another.

## **Eighth Grade Benchmarks**

### **Science–Big Idea 5: Earth in Space and Time**

- SC.8.E.5.11 - Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.

## Triangle Game

A game to demonstrate connections between vocabulary terms

### **Individual Player Version**

The Object: To be the player with the most points at the end of the game.

The Set Up: Vocabulary terms are placed on small slips of paper and turned face down on the playing surface. Each player writes their name on the back of the triangle game board.

The Play:

1. The first player randomly chooses a term, defines that term, and uses it in a sentence.
2. The player then attaches (glue or tape) the term to any intersection point on the game board.
3. The next player randomly chooses a term, defines the term and uses it in a sentence. If the player is able to demonstrate a relationship between his/her term and another term, they place their term on another point of that same triangle. If the player can not demonstrate a relationship with any of the other terms on the game board they must attach their term to an intersection point on any open triangle.
4. Play continues with terms being attached to the game board.
5. When a player is able to explain a relationship between his/her term and the other two terms on the points of a triangle he/she initials the completed triangle and receives a game point.

The Winner: When the time allotted for play is complete, the player with the most game points (or completed triangles) wins.

### **Team Version**

The Object: To be the team with the most completed triangles at the end of the game.

The Set Up: Same as Individual Player Version

The Play: The same as Individual Player Version, except that cooperation between team members is encouraged and players do not put their initials in completed triangles.

The Winner: When the time allotted for play is complete, the team with the most completed triangles wins.

A large triangular grid for a game board. It consists of four horizontal rows of triangles. The top row has four upward-pointing triangles. The second row has three downward-pointing triangles. The third row has four upward-pointing triangles. The bottom row has three downward-pointing triangles. A title box is centered at the top, and a footer is at the bottom.

**Triangle Game Board**

## Triangle Game

<b>electromagnetic spectrum</b>	<b>photovoltaic</b>
<b>radiation</b>	<b>solar thermal</b>
<b>renewable energy</b>	<b>desalinization</b>
<b>evaporation</b>	<b>solar still</b>
<b>conduction</b>	<b>convection</b>
<b>insulation</b>	<b>solar collector</b>
<b>direct current electricity</b>	<b>irradiance</b>
<b>energy efficient</b>	<b>hybrid</b>
<b>compact fluorescent</b>	<b>kilowatt</b>
<b>energy system</b>	<b>water cycle</b>
<b>solar oven</b>	<b>solar spectrum</b>

