

Triangle Game

Student Objectives

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. 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 definitions 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
desalination
direct current electricity
electromagnetic spectrum
energy system
energy efficient
evaporation
greenhouse effect
insulation
irradiance
kilowatt
photon
photovoltaic
radiation
renewable energy
solar collector
solar oven
solar spectrum
solar still
solar thermal
water cycle

Time:

1 hour

Internet Sites

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

Merriam Webster, Word Central student dictionary

Triangle Game

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
- **greenhouse effect** – the trapping of the Sun’s warmth in our lower atmosphere, due to the trapping of the longer wave radiation (heat) emitted from the Earth’s surface
- **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

Triangle Game

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

Florida NGSS Standards & Related Subject Common Core

			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
Grade 6														
Earth Systems & Patterns	# 7	SC.6.E.7	X											
Grade 7														
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										
Grade 8														
Earth in Space & Time	# 5	SC.8.E.5											X	
Language Arts Standards	Sixth Grade: LAFS.6.L.3.4, LAFS.6.L.3.6 Seventh Grade: LAFS.7.3.4, LAFS.7.L.3.6 Eighth Grade: LAFS.8.3.4, LAFS.8.L.3.6													

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.

Language Arts–Language Standards

- LAFS.6.L.3.4 - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies.
- LAFS.6.L.3.6 - Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

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.

Language Arts–Language Standards

- LAFS.7.L.3.4 - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.
- LAFS.7.L.3.6 - Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

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.

Language Arts–Language Standards

- LAFS.8.L.3.4 - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies.
- LAFS.8.L.3.6 - Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

National Next Generation Standards - Sixth to Eighth Grade

Note: Related Common Core Language Arts Standards are listed in the Florida section above.

Triangle Game

The Triangle Game is 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 (with 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, by using both terms in a sentence, they place their term on another point of that same triangle. If the player cannot 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

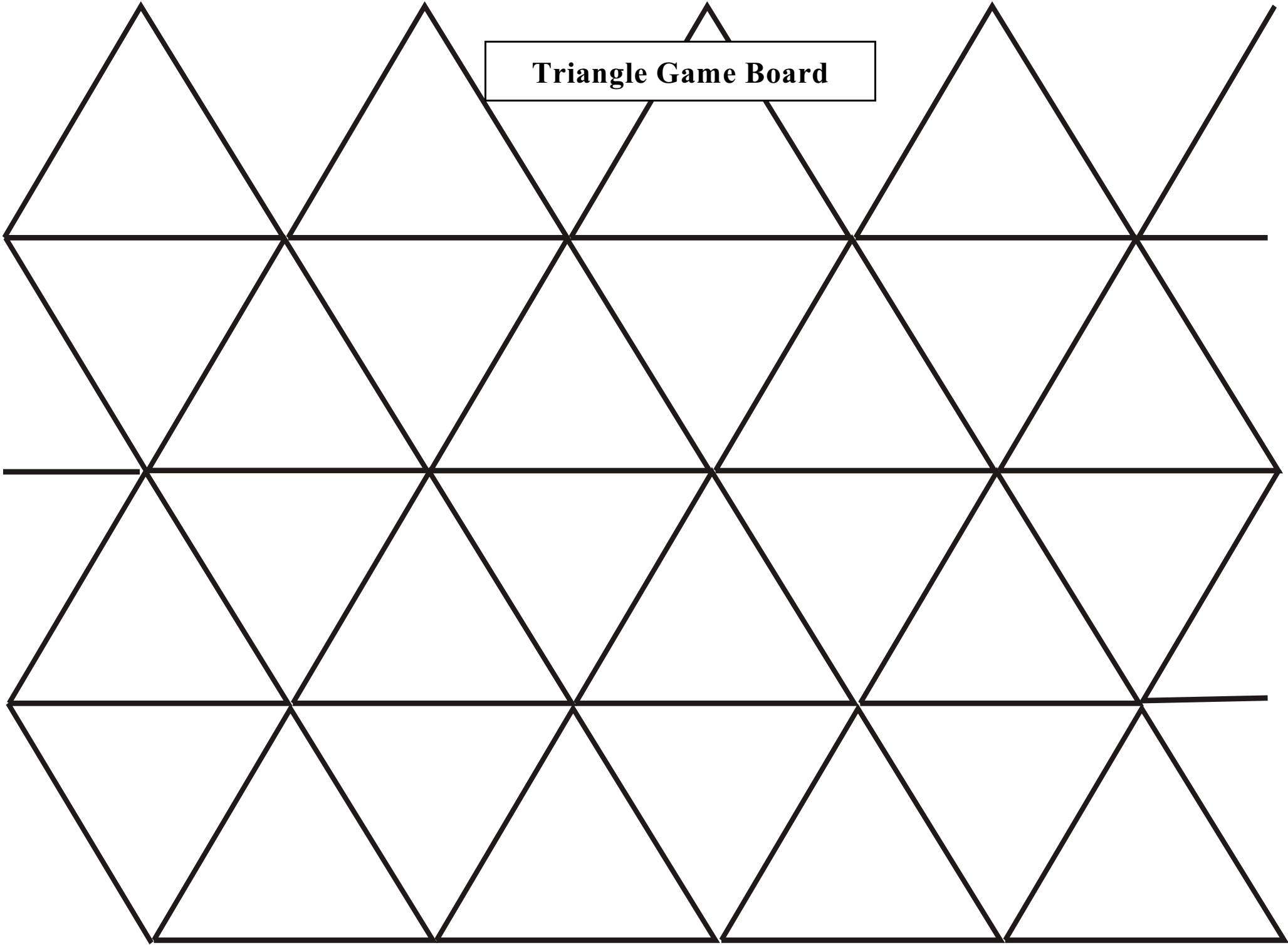
The Object: To be the team with the most completed triangles at the end of the game.

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 put an identifying mark in completed triangles.

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

Triangle Game Board



Triangle Game

electromagnetic spectrum

photovoltaic

radiation

solar thermal

renewable energy

desalinization

evaporation

solar still

conduction

convection

insulation

solar collector

direct current electricity

irradiance

energy efficient

photon

greenhouse effect

kilowatt

energy system

water cycle

solar oven

solar spectrum

