Reading Info RI7: **Differentiation 2**: Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.	2Thursday
Today you are going to learn more about solar energy.	

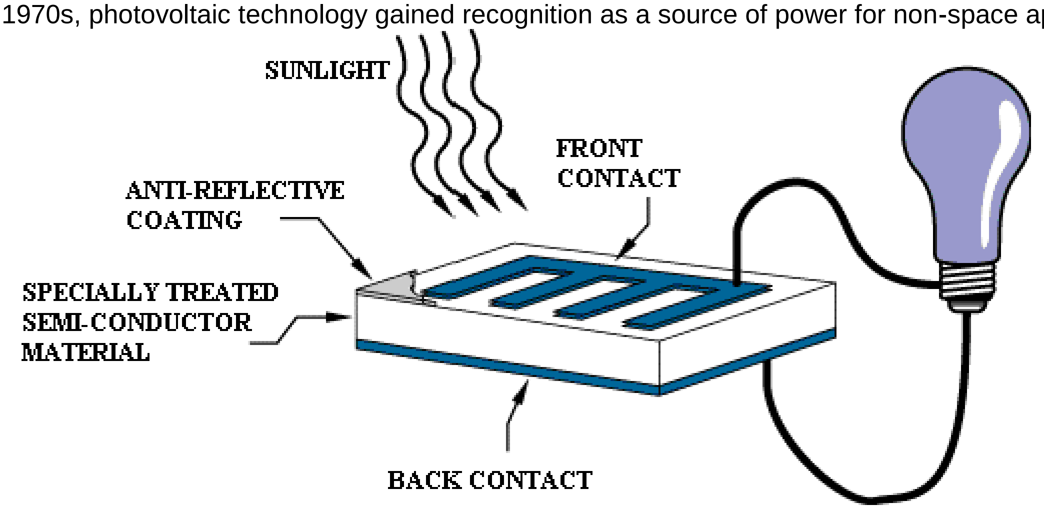
HOW DO PHOTOVOLTAICS WORK?

BY GIL KNIER

back to the Science@NASA story "The Edge of Sunshine"

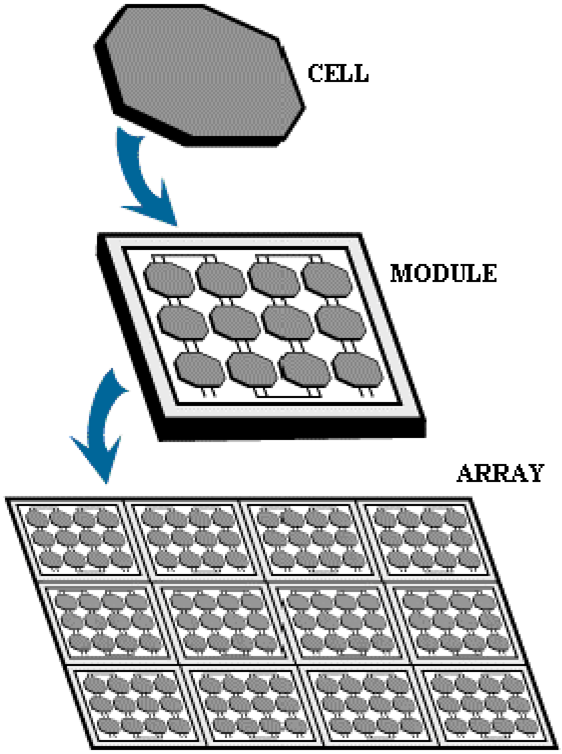
Photovoltaics is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current results that can be used as electricity.

The photoelectric effect was first noted by a French physicist, Edmund Bequerel, in 1839, who found that certain materials would produce small amounts of electric current when exposed to light. In 1905, Albert Einstein described the nature of light and the photoelectric effect on which photovoltaic technology is based, for which he later won a Nobel prize in physics. The first photovoltaic module was built by Bell Laboratories in 1954. It was billed as a solar battery and was mostly just a curiosity as it was too expensive to gain widespread use. In the 1960s, the space industry began to make the first serious use of the technology to provide power aboard spacecraft. Through the space programs, the technology advanced, its reliability was established, and the cost began to decline. During the energy crisis in the 1970s, photovoltaic technology gained recognition as a source of power for non-space applications.

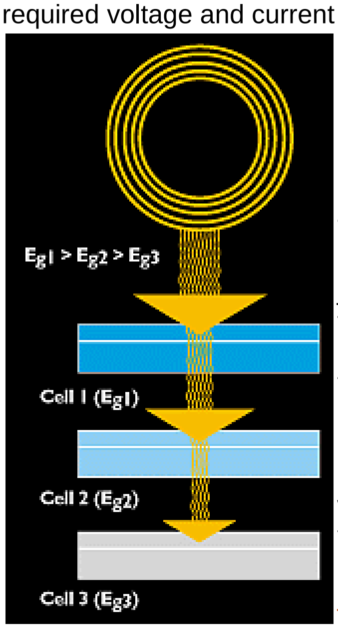


The diagram above illustrates the operation of a basic photovoltaic cell, also called a solar cell. Solar cells are made of the same kinds of semiconductor materials, such as silicon, used in the microelectronics industry. For solar cells, a thin semiconductor wafer is specially treated to form an electric field, positive on one side and negative on the other. When light energy strikes the solar cell, electrons are knocked loose from the atoms in the semiconductor material. If electrical conductors are attached to the positive and negative sides, forming an electrical circuit, the electrons can be captured in the form of an electric current -- that is, electricity. This electricity can then be used to power a load, such as a light or a tool.

A number of solar cells electrically connected to each other and mounted in a support structure or frame is called a photovoltaic module. Modules are designed to supply electricity at a certain voltage, such as a common 12 volts system. The current produced is directly dependent on how much light strikes the module.



Multiple modules can be wired together to form an array. In general, the larger the area of a module or array, the more electricity that will be produced. Photovoltaic modules and arrays produce direct-current (dc) electricity. They can be connected in both series and parallel electrical arrangements to produce any required voltage and current combination.



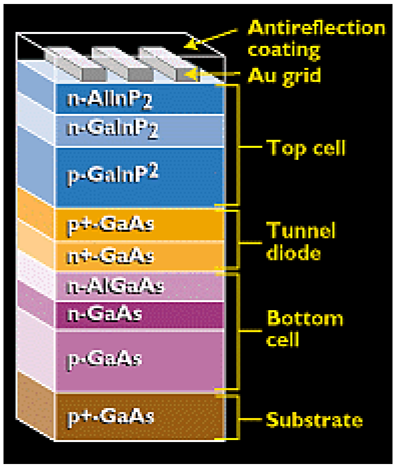
Today's most common PV devices use a single junction, or interface, to create an electric field within a semiconductor such as a PV cell. In a single-junction PV cell, only photons whose energy is equal to or greater than the band gap of the cell material can free an electron for an electric circuit. In other words, the photovoltaic response of single-junction cells is limited to the portion of the sun's spectrum whose energy is above the band gap of the absorbing material, and lower-energy photons are not used.

One way to get around this limitation is to use two (or more) different cells, with more than one band gap and more than one junction, to generate a voltage. These are referred to as "multijunction" cells (also called "cascade" or "tandem" cells). Multijunction devices can achieve a higher total conversion efficiency because they can convert more of the energy spectrum of light to electricity.

As shown below, a multijunction device is a stack of individual single-junction cells in descending order of band gap (Eg). The top cell captures the high-energy photons and passes the rest of the photons on to be absorbed by lower-band-gap cells.

Much of today's research in multijunction cells focuses on gallium arsenide as one (or all) of the component cells. Such cells have reached efficiencies of around 35% under concentrated sunlight. Other materials studied for multijunction devices have been amorphous silicon and copper indium diselenide.

As an example, the multijunction device below uses a top cell of gallium indium phosphide, "a tunnel junction," to aid the flow of electrons between the cells, and a bottom cell of gallium arsenide.



6L3.a-b **Differentiation 1**: Use knowledge of language and its conventions when writing, speaking, reading, or listening. a. Vary sentence patterns for meaning, reader/listener interest, and style. b. Maintain consistency in style and tone.
Today you are going to work on paragraphs for your report. Here are the steps you are going to follow: 1. Come up with a part of your report (a set of cards) that you want to start with. 2. Write the paragraph. 3. Take each sentence and see if you can combine sentences, change the ways sentences are written, and make the writing clearer and more descriptive.

6SL4 **Context 2**: Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
Today you will begin your presentation for your writing piece on Solar Energy. You will be presenting, so make it good.

language of the discipline	L. O. D. Tools Skills	Name: Date:
		Name of the piece evaluating: Genre:
		Workspace: Write, Draw, Chart, Create, etc.
details	Parts Factors Attributes	**Reading**
		What is the main theme of your book?
patterns	Repetition Predictability	What in the setting, characters, or plot make you believe that this is the main theme?
rules	Structure Order Hierarchy Explain	How did the main character change in the book?
trends	Influence Forces Direction Course action	
ethics	POV Opinions Judging	Notes:
Institutionalization	Tradition Interest Model	
unanswered questions	Discrepancies Missing parts Unclear Incomplete	
big ideas	Generalize Principle Theory	
PAST • FUTURE • PRESENT • relate over time	Between time Within time	parts and Wholes · Relationships · Structures · A → B Systems · Values · Change
multiple perspectives	Multiple Perspectives Opposing Views	Summary:

Archetypes

Innocent

Victim

Good

Hero

Bad

Wanderer

Warrior

Wizard

Monday: Social Studies	
	TuesdaySS

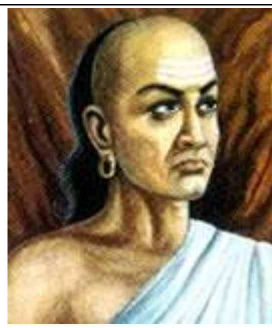
Cornell Notes

Section 2: Topic: Maurya Empire 323-185 B.C.
Standard: 6SS4.6

Section1: Name:
Subject:
Date:

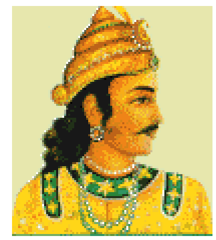
Questions:	Notes:
Section 4:	Section 3:

Who was Candragupta Maurya?



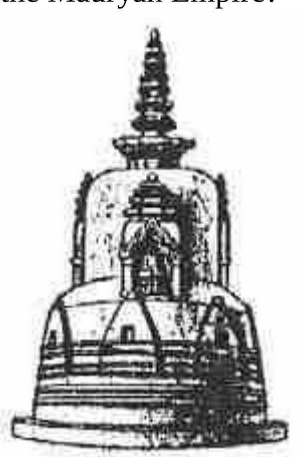
Before the rule of Candragupta Maurya India was a collection of unrelated small states. Alexander the Great conquered Northern India. His empire inspired Maurya to seek his own empire. He developed a great army and began conquering Northern India. He extended trade and built one of the most impressive capital cities in the world. Following the suggestion of his advisor, he sent thousands of spies throughout his empire and ruled with cruelty. Then, in 301 B.C. Candragupta became a Jainist monk, leaving his empire to his son.

What did Candragupta's son, Bindusara, contribute to the Mauryan Empire?



Bindusara extended the Mauryan Empire from Northern India into Central India.

What did Asoka do for the Mauryan Empire?



Stupa, Samath, India

Asoka was one of the seven sons of Bindusara who fought for control of his empire. He converted to Buddhism, dismantled the spy system and cruelty in his empire and began promoting Buddhism throughout the world. He sent out missionaries and built 84,000 stupas to enshrine relics of the Buddha and to commemorate key events in his life. Asoka also improved living conditions of the people of India. He dug wells and planted shade trees to make the people's lives better. After Asoka died, there was a civil war and the economy became unstable in India. His sons ruled for another 48 years, but after them the empire collapsed. The Mauryan empire proved that India could be united under an overriding ruling government.

Vocabulary:	
Consider the origin; syllables; root words, meaning, and spelling of the following words:	Jainism Stupa Commemorate

Summary:

From Alexander the Great's influence, Candragupta Mauryan began an empire throughout Northern India. This was expanded by his son. His grandson, Asoka, influenced by Buddhism, created a more humane government that sought to help make the lives of the people better.

6RH&SS8 Distinguish among fact, opinion, and reasoned judgment in a text.
Textbook Maurya Empire Maurya Gupta Empires

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