

# Solar Schools for British Columbia

A collection of  
lessons to assist  
teachers and students  
with their exploration  
of solar energy



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## Bright lights

### Solar-powered items

#### What will happen

Students will look at solar-powered items they are familiar with, assess these inventions to isolate those with the greatest impact on people's lives. Building on students' prior knowledge of solar-powered items, the distinction between photovoltaic and solar thermal will be introduced.

#### Students will

- Learn about a variety of solar-powered items in use today;
- Be able to describe how solar has impacted their lives;
- Know that, without the battery, the use of solar energy would be limited to daylight;
- Understand the significance of solar in developing parts of the world, without electricity;
- Understand that solar energy is not just generated by the solar cells (PV or photovoltaic) they may more often associate with, but also by solar thermal processes.

Total Time	Establish what students know	Activity - Part A	Activity - Part B	Debrief what students learned
1 - 1½ hours	5-10 minutes	40 - 50 minutes	5 - 10 minutes	10 - 20 minutes

#### What you need to know

Students will share and support their point of view with others. For example, one student may make a case that bringing light to remote communities without electricity is the most important invention or breakthrough because this dramatically changed the lives of many people throughout rural parts of the world while another places more weight on a different value to make a case for something quite different.

#### What might surprise you

The energy output of a 1 KW solar energy unit is roughly equivalent to the burning of 170 pounds of coal and 300 pounds of carbon dioxide being released into the atmosphere. Source: <http://www.alternate-energy-sources.com/facts-about-solar-energy.html>

#### What you need

- List of solar-powered items or images
- 2 large sheets of chart paper

#### What else students might need

Students may not know of many products that are powered by solar cells. You may wish to gather examples or images they can examine before creating their master list.



### Establish what students know

1. Students name examples of how energy is transferred from the sun to something else. Some examples include: rocks and asphalt heat up in the sun and hold heat long after the sun sets; a garden hose left in the sun will spray warm or even hot water when the hose is turned on; a greenhouse on a sunny day; a solar-powered calculator will operate when held under sufficient light.
2. Identify which items rely on a solar cell and which do not.
3. This is one way to distinguish between different types of solar energy. This lesson is about the solar cell and how it is used to generate electricity. They will complete other activities to discover how solar energy is used to heat water or to heat a space - and what that means for the future.



## Main Activity

### What you do

#### Part A

1. In small groups, have students list as many solar-powered items as possible. As a class create a master list.
2. Have groups review the master list to choose the item they think was:
  - a. the first to be invented,
  - b. the most commonly available and used,
  - c. the responsible for advancing solar energy the most

Refer to the following, to assist you in drawing out students' ideas:

- Calculators
- Golf carts
- Street lighting
- Cooking ovens
- Emergency phones
- Toys and gadgets
- Garden lighting
- Irrigation system

- Lighting for homes without electricity
- Bike
- Satellite spacecraft
- Beach radios
- Emergency lighting
- Batteries
- Backpacks
- Clothing
- Watches

3. Beginning with what item groups thought was the first to be invented, have each group explain what item they chose and why, using 30 seconds or less.
4. Repeat for the other two categories.
5. Debrief as a class by identifying what factors were used to determine the choices made by groups.
6. Tell students that without a battery, solar-powered items would only operate during daylight. Ask them how this information impacts their earlier responses.





7. Ask students to share the questions they have about solar energy. You may wish to record these on a chart to post beside the master list of solar items.
8. Summarize the factors that they used to make their selections and describe the role of the battery in solar inventions.
9. Discuss what students have discovered about solar power using questions such as:
  - a. What are some of the aspects of daily life that have been impacted by solar energy?
  - b. How is the role of solar energy in people's lives different in the developed versus the developing world?
  - c. How has solar energy changed households? Sports? Fashion? Communications? Safety?
  - d. What three solar-powered items will have the greatest impact on future inventions? Why?
  - e. What do you believe holds people back from embracing solar energy power for electricity needs, where electricity is already available?
  - f. How could media influence the popularity of solar energy? Explain.
  - g. This lesson focused on solar-powered items that rely on solar cells. What are some other ways solar energy is used without using solar cells? HINT: How might you heat water for a nice, warm shower if you didn't have natural gas hot water system? (e.g. when you're tent camping) This is an example of solar thermal energy.
  - h. What conclusions might you make about how solar power (photovoltaic) is different from solar thermal?

#### Part B

1. Work through some of the students' questions. These can be used as part of a class discussion or used to direct further study or revisited following a unit of study.

#### Assessment

- Can students explain how without a battery, solar-powered items would only operate during daylight? Can they accurately describe how the role of solar energy in people's lives is different in the developed versus the developing world? How well did students defend the solar item they believe has made the greatest contribution to people's lives?
- Challenge students to suggest what they think it will take for people to adopt solar energy. Make recommendations for the general public to adopt solar energy.

#### Extensions

- Selling Solar. Have students select a solar-powered item and develop a promotional campaign that highlights its features, benefits of the item and of solar energy.
- Solar for the People. Have students design and propose a solar-powered invention for an item that would positively impact the quality of lives somewhere in the world. Check out what a sustainable company called NOON is doing: <http://www.youtube.com/watch?v=03Xy0KjL6Nw&feature=related>

How has  
solar changed  
your life?