

INTEGRATING PHYSICS**● Solar Cells**

Have you ever used a calculator that didn't need batteries? Battery-free calculators use a *solar cell* to generate electricity. The solar cell captures energy from sunlight and converts it into electricity, which is then used to power the calculator.

How does a solar cell work? When sunlight strikes the cell, packets of light, called *photons*, strike electrons on the cell's surface with enough energy to release them from the surface. An electric field sets these free electrons in motion, generating an electric current. This current is transferred to an external circuit where it can perform useful work, such as operating a calculator.

Where Solar Cells Can Be Used

Large arrays of solar cells are a convenient way to generate electricity where power lines do not exist, such as in very rural areas or even in space. Most satellites currently in orbit are powered by solar cells. In 1997, Mars Pathfinder was the first solar-powered spacecraft to land on Mars. NASA plans to use solar-powered spacecraft on its upcoming missions to Mars as well.

Solar cells may become more widely used on Earth in the future, as the depletion of fossil fuels makes new energy sources even more important. Sunlight is a free, renewable resource, and the conversion from sunlight to electricity does not pollute the environment. At this time, however, solar cells are expensive. In addition, they are not practical in locations that do not receive much sunlight. Many researchers are working to make solar cells better and more practical.

Your Turn to Think

1. What is a solar cell, and how does it work?
2. Would a solar-powered calculator work in a dark room? Why or why not?
3. Do solar cells work equally well in different locations? Explain.