

Using the calibrated solar cell to measure the amount of sunlight in a solar weightlifting experiment

Solar insolation (the power of the sun falling on Earth) is measured in Peak Suns. 1 Peak Sun is pretty much the most powerful that the sun gets on Earth. In most places on Earth, most of the time, the power of the sun is only a fraction of 1 Peak Sun.

A calibrated solar cell can be used to find out what fraction of a Peak Sun is falling on your experiment. The ratings of the calibrated solar cell tell you what voltage and current it would produce if the level of sunlight was 1 Peak Sun. In a fraction of 1 Peak Sun, the voltage and current produced by the calibrated cell will be a fraction of the rated voltage and current.

For example, let's say your calibrated cell is rated for a short-circuit current of 200 mA in 1 Peak Sun. Then you know that in $\frac{1}{2}$ Peak Sun it will produce $\frac{1}{2}$ the rated current (100 mA). In $\frac{1}{4}$ Peak Sun, it will produce $\frac{1}{4}$ the rated current (50 mA).

So, there would be two solar cells used in the experiment: the calibrated solar cell, and the working solar cell (see the Figure below). The working solar cell powers a motor that can be used with a pulley to lift weights. A ruler and a stopwatch help you measure how fast the motor can lift different weights in different amounts of sunlight.

The calibrated solar cells are rated for voltage and current. We recommend using the multimeter to measure short-circuit current, rather than voltage, because you will not see much change in voltage. For small solar panels like this, short-circuit current can be safely measured by setting the multimeter to measure current, then clipping the leads to the wires of the calibrated solar cell – just be sure that your multimeter is fused (most are)!

