MEASURING LIGHT AT DIFFERENT DISTANCES

*Taken from the Green Schools Tool Kit Manual to be used in conjunction with the tool kit

Objective: Students will use a light meter to measure the visible light that reaches different distances from a light source as a way to determine appropriate lighting levels.

Time: 1 class period

Suggested Grade Level: Can be modified for grades 2 – 9

Equipment:

- Light meter*
- Desk lamp with a 15-20 watt fluorescent light bulb, or other light source
- Measuring tape*

* From Green Schools Tool Kit

BACKGROUND INFORMATION

The amount of visible light decreases rapidly the further one moves from the light source. The relationship between the distance from a source of light and its apparent intensity is governed by the inverse square law for light. This law states that as the distance between a source of light and its sensor doubles, the light appears to become one quarter as intense. Likewise, as the distance between a source of light and its sensor is halved, the intensity of the light appears to quadruple.

ADVANCED PREPARATION

Set up a flat surface, clear of obstacles, that is approximately 2 meters in length. This may be a workbench, two tables positioned end-to-end, or any other combination of items to create the surface. Position the light source at one end of the surface and mark ½ meter, 1 meter, and 2 meters away from it.

LEADING THE INVESTIGATION

Follow the investigation as described on the student page, conducting it as a class demonstration or as a lab station set up for students.

Student Page

Measuring Light at Different Distances

Question

How does the distance from the light source affect the amount of light?

Your prediction:

Equipment

- Light meter; Desk lamp with a 15-20 watt fluorescent light bulb, or other light source; Measuring tape

Procedure

1. With the light source turned off, set the light meter sensor at the 1 meter point and position it to measure the light source. Take and record the background light level.
2. Turn on the light source and record the light level at 1/2 meter, at 1 meter, and at 2 meters.
3. Subtract the background light level from the reading taken at each of the measured marks.

Data

	Measured Light	Corrected Readings (Measured Light - Background Level
Background level (light source turned off)		
1/2 meter from light source		
1 meter from light source		
2 meters from light source		

Analyzing the Data

1. What happens to the amount of visible light as the distance gets greater?

2. How does doubling the distance affect the amount of visible light?

3. What is the relationship between the distance from a light source and the amount of visible light?

4. What does this investigation tell you about the optimal place to put a light source?

How would this placement save energy?