

## Activity 15

# Worm Behavior with Light

**Rationale:** White light will have a negative effect on worm behavior and it is possible that worms may not react to different colors of light. Counting and sorting worms can be frustrating and if the worms do not avoid one or more colors of light that result could be used to the students' advantages.

### Objective

- 1) Determine if different colors of light effect worms differently.
- 2) Determine if one color has little or no effect on the worms.
- 3) Determine one or more methods to determine the color with the least negative effect.

### PDE Standards

#### Science and Technology

3.1.7. A,B,C

3.2.7. A,B,C,D,E,F

3.4.7. B

3.6.7. A,B

3.7.7. A,B,C,D

#### Environment and Ecology

4.1.7. A,B,C

4.2.7. A,C

4.6.7. A,B,C

#### Math

2.1.8. A,B,D,G

2.2.8. A,B,F

2.3.8. A,B,D

2.4.8. A,B,D,F

2.5.8. A,B,C,D

2.6.8. A,B,C,E,F

2.7.8. B,C,D

2.8.8. F,G,H,I,J

2.11.8. A,B

### Materials (depend on students experiments)

CBL2

TI 83/84

Graphical Analysis

Computer

Stopwatch

Various colored LEDs OR

Flashlights and colored cellophane

Light sensor (used camera shop)

Vernier light sensor

### Introduction

The students will have determined that worms avoid bright white light in Activity 11. To some extent, moisture should have shown a positive reaction, also. However, in

this activity, the focus is on the color(s) of light that have the least effect. The commonly used worms for vermiculture are most sensitive to blue light and least sensitive to red light.

**Strategies**

The students should be able to set up the experiment for this activity without a lot of teacher assistance. However, it is a good idea to ask the students if they feel the intensity is the same for each LED or cellophane covered light beam. Or does the intensity affect the results in this activity? The students should decide that it does and they should be able to set up the experiment so the intensities are the same for each color trial.

**Procedure**

- 1) Set up the equipment for this activity.
- 2) Set up the CBL2 and have the light sensor ready to make an intensity measurement. Use the dimmest LED placed at an appropriate distance.
- 3) Record the intensity in the journal and Data Table 1.
- 4) Place four mature worms on a flat pile of vermicompost and turn on the light at the same time.
- 5) Record the burying time.
- 6) Repeat two more trials.
- 7) Record burying times.
- 8) Replace the original LED with an LED of a different color.
- 9) Adjust the distance to obtain the same intensity as the first LED.
- 10) Repeat two more trials.
- 11) Record the burying times.
- 12) Repeat with all other colors of LEDs.
- 13) Record all measurements in the journal and in Data Table 1.
- 14) Draw conclusions from the results.

**Expectations**

The students should be able to:

- 1) set up the equipment and discern what data are needed.
- 2) use a calculator to perform basic calculations.
- 3) determine which color of light has the least avoidance effect.
- 4) determine which color of light has the greatest avoidance effect.

**Table Data 1 for Group \_\_\_\_\_**

<b>Times (s)</b>	<b>1<sup>st</sup></b>	<b>2<sup>d</sup></b>	<b>3<sup>rd</sup></b>	<b>Ave</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>Ave</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>Ave</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>Ave</b>
<b>Violet</b>																
<b>Blue</b>																
<b>Green</b>																
<b>Orange</b>																
<b>Yellow</b>																
<b>Red</b>																

**Data Table 1** *(Typical Table)*

**Time vs. Color**

<b>Time (s) (Ave)</b>	<b>Violet</b>	<b>Blue</b>	<b>Green</b>	<b>Orange</b>	<b>Yellow</b>	<b>Red</b>
<b>Group 1</b>						
<b>Group 2</b>						
<b>Group 3</b>						
<b>Group 4</b>						
<b>Group 5</b>						
<b>Average</b>						