

Blinded by the Light

Physical Science
Middle
Regressions / Data Collection

Introduction: You see something because it either gives off light or reflects it. Moving objects at night are difficult to see without a light source. We solved the problem with cars by installing headlights and taillights. This is not practical with bikes, so we need to use the best reflectors possible. The amount of light reflected changes depending on the surface from which the light is reflected.

Objectives: Students will be able to...

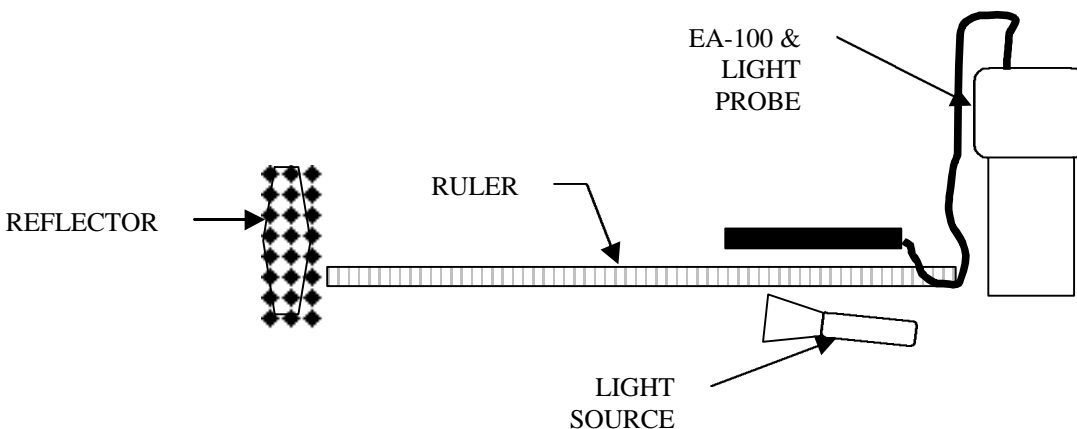
1. Collect data by following an experimental procedure.
2. Input data in a graphing calculator.
3. Compare results.
4. Draw conclusions.
5. Determine the governing math model
6. Discuss applications of results.

Related Key Words:

light rays	Law of Reflection	incident ray
reflected ray	normal line	opaque
translucent	transparent	rods and cones

Materials: CASIO EA100 CASIO Data Analyzer (CDA)
Light probe
Meter stick
Incandescent light bulb with plug-in
3 different colored bike reflectors
pencil and paper

Purpose: We are going to use the EA100 to determine which color bike reflector is most effective.



STEP 1— Turn on your light source and hold it 12 cm from reflector #1. Hold the light probe 10 cm away from the reflector as shown in the picture.

STEP 2—

Set up the EA-100 to collect data. With the data collector on, push the [SHIFT] key followed by the [MODE] key for SET UP. The time interval for data collection should be .000 for manual triggering. Press the [DataLOG] for NEXT until this option appears on the screen. Press [TRIGGER] key for ENTER to save the setting. Input the number data points to be collected at 10. Press the [DataLOG] for NEXT until this option appears on the screen. Press [TRIGGER] key for ENTER to save the setting. Time is not a variable in this experiment, so it can be left at one.

STEP 3—

Read the value on the data analyzer and record in on a data table. Move the probe two more centimeters away and record the new value. Continue this procedure until the ten data points are collected.

STEP 4—

Repeat and record data for each reflector.

Stan Gann, Warren Kimmerly, and Kathy Roberts of Lakeside High School, Hot Springs, AR developed this activity.

DATA

1. Transfer the data after each reflector to the calculator and save the raw data graphs a picture to compare later.
2. What was the shape if the curve for each color reflector?
3. Which color reflected the most light?
4. Which color reflected the least light?
5. How might the color effect the results?

CONCLUSION

1. Relate your conclusions to your original hypothesis.
2. How do the three graphs of the raw data compare to each other? What conclusions can you make about the reflectors?

Optional Activities

1. Try the experiment using different distances and graph the result.
2. Try the experiment using different materials (reflective tape, car reflectors, etc.).
3. Transfer the data collected to the Casio CFX9850G calculator and graph using the computer.