

Plastic block lab: Determining the velocity of light in plastic

Purpose: To trace the path of light as it passes into a plastic block and out the other side. To use this data to determine the speed of light traveling through the plastic.
To use class data to analyze larger group data.

Materials: 1 pin, 1 plastic block, 1 piece of cardboard, some paper, a pencil, your brain.

Procedure:

1. Place the paper on the cardboard.
2. Place the plastic block on a piece of paper and trace the block.
3. Place a pin about 8-10 cm from the block.
4. Look through the block at the pin.
5. Have your lab partner hold a pencil next to the block and draw dots where the light from the pin enters and leaves the block. Also place a dot where the light leaves the paper to reach your eye.
6. Remove the block and pin, and trace the path of the light. Measure and label all important angles (see drawing to right). Include an estimated error for each measurement.
7. Repeat steps 1–6 in another space on your paper.

Data analysis:

8. Using the law of refraction, calculate the speed of light in plastic. Repeat this for both the light entering and exiting the block, and for each trial. (Speed of light in air = 3.00×10^8 m/s.)
9. Calculate your percent error, and determine if your four values for v_{plastic} are within experimental error.
10. Calculate your average v_{plastic} , and your experimental error for this average. Write these figures on the board.
11. When all the class values are on the board, take notes of the discussion and analysis of these values.
12. Write all your group members' names on your drawing, and staple all your write-ups behind the drawing. Turn in your labs before you leave.

