

How light bounces, bends and is absorbed

Grade 7 science (Year 8 · Class 7) · Lab answers

The sample readings show reflection angles within 1° of the incidence angles, and refraction angles smaller than the incidence angles. Use these model answers to check your own analysis and graph.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS4-2

Question 1 Differences

$15 - 16 = -1$; $30 - 29 = +1$; $45 - 45 = 0$; $60 - 61 = -1$; $75 - 74 = +1$ (degrees). **Differences of -1° , $+1^\circ$, 0° , -1° , $+1^\circ$**

Question 2 Plotting r against i

The points lie close to a straight line through the origin. Gradient = $(74 - 16) \div (75 - 15) = 58 \div 60 = \mathbf{0.97}$, **about 1.0**.

Question 3 Conclusion

r is equal to i within about 1° , so the measurements support the law of reflection. **$i = r$**

Question 4 Uncertainty

The differences ($\pm 1^\circ$) are the same size as the reading uncertainty, so they are measurement errors, not a failure of the law. **Within uncertainty, $i = r$.**

Question 5 Refraction results

$20 - 13 = 7^\circ$; $40 - 25 = 15^\circ$; $60 - 35 = 25^\circ$. The ray always bends towards the normal and the bend grows as i grows. **7° , 15° , 25°**

Question 6 Prediction

50° is halfway between 40° and 60° , so r is about halfway between 25° and 35° , that is $(25 + 35) \div 2 = \mathbf{30^\circ}$.

Question 7 Light speed

Light travels more slowly in the block than in air, so the ray changes direction towards the normal on entering. **Slower speed gives bending towards the normal.**

Question 8 Improvement

Use a narrower ray; place the dots farther apart; use a larger protractor; repeat each angle and take the mean. **A narrower ray and repeats.**