Reflection and Refraction Worksheet

As you work through the steps in the lab procedures, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Procedure A: Measuring angle of reflection

Complete the table below.

Data Table 1

Left side of beam							
θ_i	15°	25°	35°	45°	55°	65°	75°
θ_r							

Right side of beam							
θ_i	15°	25°	35°	45°	55°	65°	75°
θ_r							

What are the theoretical values of the slope and intercept based on the law of reflection?

slope = _____

intercept = _____°

Analysis of Left Side of Beam

What are the experimental values of the slope, uncertainty in slope, and intercept of the graph of θ_r versus θ_i for data from the left side of the beam?

slope = _____ ± _____

intercept = _____°

What is the percent uncertainty in the slope?

percent uncertainty = _____%

What is the percent error for the slope?

percent error = _____%

Analysis of Right Side of Beam

What are the experimental values of the slope, uncertainty in slope, and intercept of the graph of θ_r versus θ_i for data from the right side of the beam?

slope =   _____ $\pm$ _____

intercept =   _____°

What is the percent uncertainty in the slope?

percent uncertainty = _____%

What is the percent error for the slope?

percent error = _____%

Do the slopes from the left and right sides of the beam agree to within experimental errors?

CHECKPOINT 1: Table values, graph, and calculations

Procedure B: Measuring index of refraction

What was the thickness of your plate?

$t =$ _____

Complete the table below.

Data Table 2

	Left side of beam						
θ_1	15°	25°	35°	45°	55°	65°	75°
d (m)							
θ_2 (°)							
$\sin \theta_1$							
$\sin \theta_2$							

	Right side of beam						
θ_1	15°	25°	35°	45°	55°	65°	75°
d (m)							
θ_2 (°)							
$\sin \theta_1$							
$\sin \theta_2$							

What is the theoretical value for the index of refraction n of the plate?

$n_{\text{theor}} = \underline{\hspace{2cm}}$

Analysis of Left Side of Beam

What is the slope and uncertainty in slope of the graph of $\sin\theta_1$ versus $\sin\theta_2$ for data from the left side of the beam?

slope = _____ ± _____

What is the experimental value for the index of refraction n of the plate as determined from the slope?

n = _____

What is the percent uncertainty in n?

percent uncertainty = _____%

What is the percent error in n?

percent error = _____%

Analysis of Right Side of Beam

What is the slope and uncertainty in slope of the graph of $\sin\theta_1$ versus $\sin\theta_2$ for data from the right side of the beam?

slope = _____ ± _____

What is the experimental value for the index of refraction n of the plate as determined from the slope?

n = _____

What is the percent uncertainty in n?

percent uncertainty = _____%

What is the percent error in n?

percent error = _____ %

Do the values of n for the left and right sides of the beam agree to within experimental errors?

Would d get larger or smaller if n were to increase?

How would d change if the slab were placed in water instead of air?

CHECKPOINT 2: Table values and calculations