

## A1. 5

conduct inquiries, controlling variables, safely \& accurately to collect observations \& data

## A1.6

gather data from laboratory sources, and organize and record the data
A1.10
draw conclusions based on inquiry results and justify their conclusions

A1.12
use appropriate numeric, symbolic, and graphic modes of representation

## E2.1

use appropriate terminology related to light and optics

## E2.4

investigate the refraction of light as it passes through different media, compiling and analysing data to determine if there is a trend


## Refraction Lab

Geometric Optics

identify the factors that affect the refraction of light


## Recording Glass-Air Refraction

Place your prism on the indicated location on this page.
Shine a single ray along each incident angle on the diagram.
Mark the position of each refracted ray on the protractor. Label it with the corresponding incident angle so you don't mix it up with the other rays.



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## Exploring the Data


Record incident and refracted angles on the following tables.

| Air-Glass |  |
| :---: | :---: |
| Incident Angle | Refracted Angle |
| 0 |  |
| 10 |  |
| 20 |  |
| 30 |  |
| 40 |  |
| 50 |  |
| 60 |  |
| 70 |  |
| 80 |  |


| Glass-Air |  |
| :---: | :---: |
| Incident Angle | Refracted Angle |
| 0 |  |
| 10 |  |
| 20 |  |
| 30 |  |
| 40 |  |
| 50 |  |
| 60 |  |
| 70 |  |
| 80 |  |

What do you notice about the refracted angles?

Plot the angle of refraction as a function of the angle of incidence. What do you notice about the graphs?


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| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
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Quantifying Snell's Law


The Law of Refraction (also called Snell's Law) says that the ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant.

When measurements contain angles it is very common for relationships to involve the trigonometric functions: sine, cosine, and tangent. This graph paper is marked using the sine of each angle, so it is easy to compare the ratio of their sines.


# Calculating the Index of Refraction 

Compare the two graphs you just drew on sine-sine graph paper.
What do you notice about them?

Compute the slope of each graph using the following formula: slope $=\frac{\sin \theta_{r}}{\sin \theta_{i}}$
What do you notice about the two numbers?

