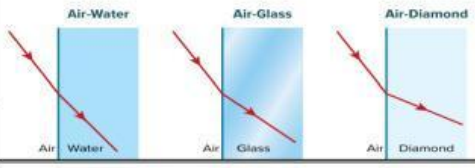
Student name :	**Optics Lab** **Science department** 	
Grde (12 A,B,C)		Day……
Time: - 45min	**Refraction**	date ……

Learning Objectives:

- To verify Snell's Law $n_1\sin\theta_1=n_2\sin\theta_2$ for light passing from air into a transparent block (e.g., glass or acrylic) and to determine the refractive index n_2 of the block relative to air. (If required: also determine the speed of light in the block using $v=c/n$) the glass block on paper and trace around it.

Theory / Background

- When light passes from one medium into another, its direction changes (refraction). Snell's Law relates the angles and refractive indices of the two media:
where:
- Use several angle pairs and average the results to reduce random error. Shine a light ray at an angle into the side of the glass block.

Materials

- Laser/pointer or ray box (low-power, safe for classroom)
- Protractor (or printed protractor sheet)
- semi-circular transparent block
- Plain paper or printed protractor sheet (to mark rays)
- Pencil
- Ruler
- Clamp/stand (optional)
- Calculator, graph paper.

LIVEWORKSHEETS

Safety

- Do not shine the laser or light ray into anyone's eyes.
- Keep the laser at low power and point at the block/paper only.
- Clear the bench of clutter to avoid bumps.
- Trace the incoming ray and the refracted ray inside the block.
- Trace the ray as it exits the block.

Procedure

- Place a sheet of plain paper on the bench and draw the outline of the semi-circular block.
- Mark the center and draw a normal line (perpendicular) at the point where the ray will strike.
- Place the block on the paper so its side is aligned with your drawing.
- Using the laser (or ray box), direct an incident ray at the block so it strikes at the marked point. Trace the incident ray on the paper and the refracted ray emerging from the far face; extend the refracted ray back into the block if needed to find the angle. Mark the angles and label them.
- Using a protractor, measure the angle of incidence (θ1) between the incident ray and the normal and the angle of refraction (θ2) between the refracted ray and the normal. Record to the nearest degree (or to the resolution available).
- Repeat for at least 5 different (θ1) values (e.g., 10°, 20°, 30°, 40°, 50°) ensuring the ray still strikes the block center. Record all measurements.
- Calculate (sinθ1) and (sinθ2) for each pair and compute $n2=n1\sin\theta1/\sin\theta2$.
- (If using air, set $n1=1.00$.)
- Plot sinθ1 (y-axis) vs sinθ2 (x-axis)

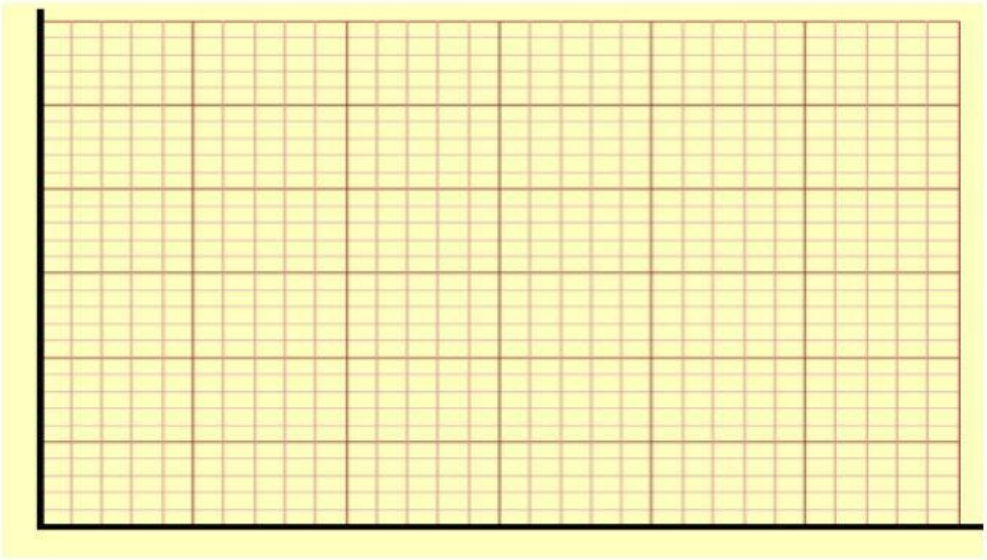
- Results (Diagram):
  n = 1.00 for air.

Data Table

Incident angle Θ1	Refraction angle Θ2	Sin Θ1	Sin Θ2		

LIVEWORKSHEETS

Analyze data:



- Does the graph show a linear or nonlinear relationship?

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- Calculate the slope of your graph.

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- Which is independent variable?.....
- Which is dependent variable?.....
- Which are experimental group?.....
- Which are controlled group?.....

Conclusion:

LIVEWORKSHEETS