9.8 Investigating Refraction

Part A Refraction of Light in water

Aim

To observe the image of objects we see under water and compare to air.

Equipment

Glass beaker
pencil

Method

- stand a pencil inside a glass beaker and gradually fill the beaker with water
- Look at the pencil from all different positions (side, front and top)

Question

- What did you notice about the pencil from different positions?
- What effects were caused by the glass?
- What effects were caused by the water?
- Were all of these the results of refraction?

Part B Refraction of Light in Prisms

Aim

To observe changes that occur when light hits a glass prism.

Equipment

Ray Box and Light source or other light ray sources such as LED ray boxes.
Rectangular and Triangular Glass Prisms
white paper

Method

A. use a Rectangular prism on a flat, white surface like paper.

1. Aim the light at right angles too the prism.
   Q. What did you observe?

2. Aim the light at about 45° to the prism
   Q. What did you observe:
   - about the ray in the glass?
   - about the ray emerging from the glass?
   - about the reflected ray?

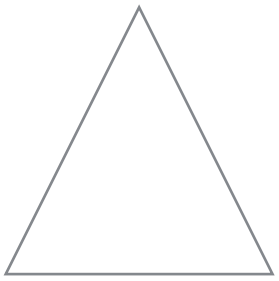
Draw diagram here

B. use an equilateral Triangular prism on a flat, white surface like paper.

1. Aim the light at one side.

   Q. What did you observe:

   - about the ray in the glass?
   - about the ray emerging from the glass?
   - about the reflected ray?



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2. If you have different colours try each one and observe any changes in the angles.

   Q. What did you notice?

   Q. If you have white light did you see any dispersion?

C. Use a right angled Triangle prism on a flat, white surface like paper.

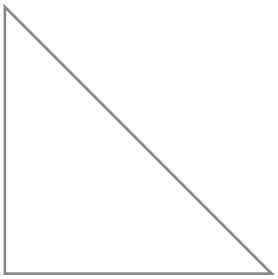
1. Aim the light at the long side.

   Q. What did you observe?

2. Try a different side so that you get a totally internally reflected ray.

   Draw on diagram

   Q. Can you do more than one internal reflection?
   Show this also on diagram.



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Part C Refraction in Lenses

Aim

To observe multiple light rays through different shape lenses

Equipment

Ray Box and Light source or other light ray sources such as LED ray boxes.
different shape lens prisms
different shape circular lens

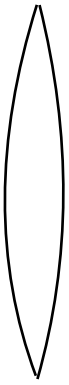
Method

A. Use a thin convex lens prism and aim multiple rays horizontally at the lens

   Q. What did you observe?

   Q. Did changing the angle of the rays affect the focal length?

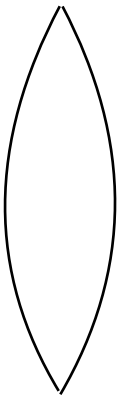
Draw on diagram here



B. Use a thicker lens prism if you have one and aim multiple rays horizontally at the lens

Q. What did you observe?

Draw on diagram here



Q. What difference did you observe in the change of focal length?

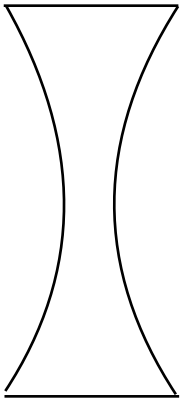
C. Use a concave lens prism if you have one and aim multiple rays horizontally at the lens

Q. What did you observe?

Draw on diagram

Q.Was there a focal length?

Q. I there a use for this type of lens?



D. Use a circular lens like a magnifying glass if you have one.

1. Use the lens as a magnifying glass up close to some writing.

Q. Observe the size and orientation:

2. Move the lens away from a light source or bright object (just a bit further than the focal length).

Try to project the source onto a screen or wall further away.

See diagram

Q. What did you notice about size and orientation:

3. Now take the lens further away and observe the image on the screen. (You will have to move the screen closer).

Q. What did you notice about size and orientation:

Q. What uses are there for this type of lens?