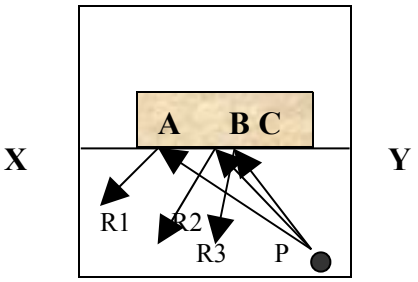
NAME_____ date completed _____

When light rays are reflected from surfaces, the rays are found to be reflected in such a way that the angle of incidence is equal to the angle of reflection. This is the LAW OF REFLECTION. Both angles are measured from an imaginary line perpendicular to the surface at the point where the ray is reflected. We call this line a normal.



OBJECTIVES: During this lab you will
-use the law of reflection to locate the image of an object formed by a plane mirror.
-observe the characteristics of the image.

PROCEDURES:

A. THE LAW OF REFLECTION

1. Draw a straight line XY across the middle width of the paper. Place a plane mirror so that **it's silvered surface coincides with the line** XY and trace the sides of the mirror so you can keep it in the same place. Note that the silvered reflecting surface for most plane mirrors is generally its back surface.

2. Draw a point on the paper roughly 4 cm away from the mirror. Draw a line from point P to the mirror. Place a light box with a single slit on the paper. The light emitted from the light box should be matched up with a line that you have drawn. **LIGHTLY** trace the reflected ray on the paper.

3. Now, aim the light box a little bit to the left still passing through point P on the way to the mirror. Trace along the light ray emitted and reflected to find the direction of reflection of the second ray.

4. Again, aim the light box a little bit more to the left. Trace along the light ray emitted and reflected to find the direction of reflection of a third ray.

5. Remove the light box and mirror from the paper. Extend each of these reflected rays to the line representing the mirror surface, and label these three reflected rays R1A, R2B, and R3C respectively.

6. Draw lines PA, PB, and PC (from point P to where the three rays hit line XY). These are the paths of the incident rays corresponding to the 3 reflected rays. At A, B, and C draw the normals to XY as dotted lines.

7. Now carefully measure the angles of incidence and reflection for each ray and enter your values in Table 1.

8. Calculate the percent difference for each reflection on your first drawing. [Percent difference = difference between angle of incid. and angle of refl. / avg. of both values].

B. LOCATING THE IMAGE OF POINT P.

9. Extend the reflected rays R1A, R2B, and R3C behind XY by dotted lines until they intersect. The point of intersection (label it P') is the position of the **image** from which the reflected rays appear to come.

C. LOCATING THE IMAGE OF AN OBJECT.

10. You will now use the law of reflection to construct and predict the position of an object in front of a plane mirror. In the middle of another sheet of paper draw line XY again, and some non-equilateral triangle ABC to represent the object shown in the diagram. From vertex A draw two lines to XY. These lines represent incident rays. Shine the light box on these lines (with the single slit of course) and sketch each of their reflections as in #2.

11. Extend the two reflected rays back (dotted lines behind the mirror) until they meet at the image of A (call it A'). Find the images of B and C in the same manner. Then connect the images A'B'C' to form triangle A'B'C' (which is the image of triangle ABC).

12. Place the mirror with its reflecting surface on line XY and compare the actual image to your experimental image. Comment on their similarities and differences in discussion question 3.

DATA & RESULTS:

Table 1.

Incident Ray	∠ Incidence	∠ Reflection	% Error
PA			
PB			
PC			

DISCUSSION:

1. Does your data verify the law of reflection within the 10% limits of experimental error? Explain.

2. How does the perpendicular distance from P to XY compare with the perpendicular distance from P' to XY in drawing #1?

3. What type of image (real or virtual) is formed by a plane mirror? Explain **why** you say this.

4. (Refer to drawing 2). How close is the appearance of the actual image to that of the constructed image? Elaborate.

5. Once you have obtained the image of a point, how are all rays leaving that point reflected?

6. Write a brief conclusion to the lab specifically addressing each **objective** of the lab.