 **Lab Report 5:**

**Reflecting Light Off a Plane Mirror**

***Question:***

How does the path of a ray from a ray box reflect off a plane mirror?

***Hypothesis:* (2)**

***Materials:***

Ray Box with Single-Slit Window Plane Mirror that can Stand by Itself

Ruler Sharp Pencil

Plain Paper Protractor

***Procedure:***

1. Aim a narrow ray of light form the ray box toward the mirror. Move the ray box so the incident ray hits the mirror at the same point but with different angles of incidence. Observe the reflected ray each time you move the ray box.
2. Draw a straight line, AB, on a piece of paper. The line should be longer than your mirror. Mark a point near the middle of AB. This will be your point of incidence. Place the plane mirror so its reflecting surface (not the glass surface) lies along AB.
3. Aim a light ray at the point of incidence. Move the ray box until the reflected ray is lined up with the incident ray. Draw three small dots along the middle of the light ray. Remove the ray box and the mirror and use a ruler to connect the dots to the point of incidence with a broken line. Label the line.
4. Return the mirror and aim a ray of light toward the point of incidence. Make sure the angle of incidence is large. Mark small dots along the middle of the incident and reflected rays. Remove the mirror and the ray box and use a ruler to join the dots of each ray to the point of incidence. Label the rays and show their directions with arrows. Use your protractor to measure the angle of incidence and the angle of reflection in your diagram.
5. Repeat steps 3 and 4 on new paper for several different angles of incidence.

***Observations:***

1. Record your observations between the different angles of incidence. **(2)**
2. What is this line you drew in step 3? **(2)**
3. Draw a diagram of the angle of incidence and the angle of reflection in step 4. **(3)**
4. Draw another diagram of the new angle of incidence and the angle of reflection in step 5. **(3)**

***Analysis:***

1. How accurate was your hypothesis? **(3)**
2. Where is the reflected ray when the incident ray travels along the normal to a plane mirror? **(3)**
3. What are the angles of incidence and reflection in this case? **(3)**
4. Scientists use two laws to describe how light reflects from a plane mirror. The first law of reflection compares then angle of incidence with the angle of reflection for light rays hitting a mirror. What does the first law of reflection say? **(3)**
5. The second law of reflection states that the incident ray, the reflected ray, and the normal all lie in the same plane. Can you support this with your observations? Explain. **(3)**

***Conclusion:***

How does the path of a ray from a ray box reflect off a plane mirror? **(3)**

***Evaluation:***

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| **Category** | **Level 4** | **Level 3** | **Level 2** | **Level 1** | **%** |
| **Observations** | The relationship between the procedure and what was observed is discussed in detail. All information is accurate. | The relationship between the procedure and what was observed is discussed. Most information is accurate. |  |  | 25 |
| **Diagrams** | Clear, accurate diagrams are included and make the experiment easier to understand. Diagrams are labeled neatly and accurately. | Diagrams are included and labeled neatly and accurately. |  |  | 25 |
| **Analysis** | The patterns in the observations are discussed and logically analyzed. Predictions are made about what might happen if part of the lab were changed or how the experimental design could be changed. | The patterns in the observations are discussed and logically analyzed. Some predictions are made. |  |  | 25 |
| **Conclusion** | Conclusion includes whether the findings supported the hypothesis, possible sources of error, and what was learned from the experiment. | Conclusion includes whether the findings supported the hypothesis and what was learned from the experiment. |  |  | 25 |