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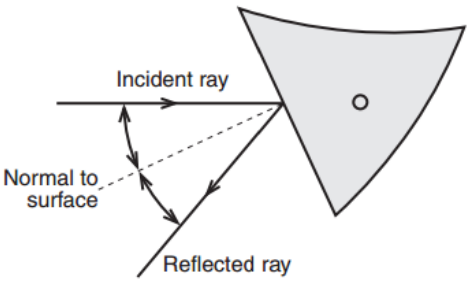
LAB 10. RAY OPTICS: LAW OF REFLECTION

AP PHYSICS II



Driving Question | Objective

What is the relationship between a ray which is incident (incoming) to a mirror and the ray that is reflected?

Materials and Equipment

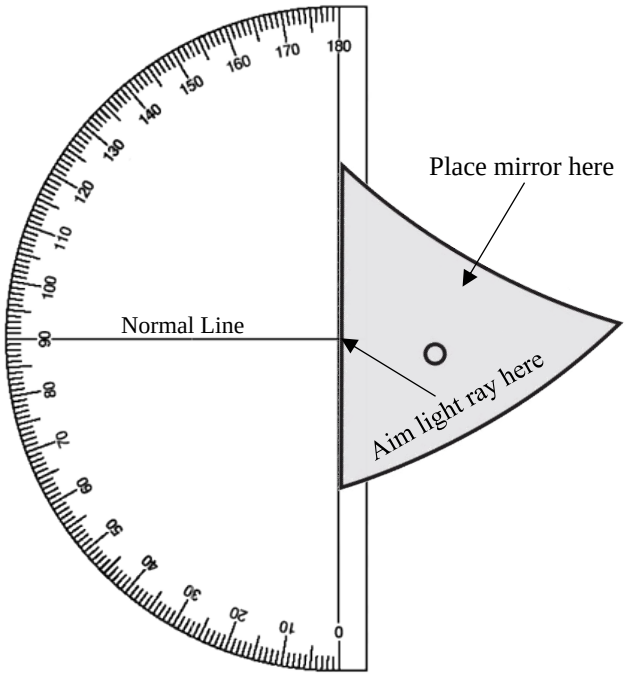
- Mirror
- Light Source
- Mirror
- Protractor Paper
- Ruler

Procedure

1. Place the light source in ray-box mode on this sheet of paper.
2. Place the mirror on the paper and position the planar (flat) surface of the mirror in the location indicated on the bottom of this page.
3. Point the light source toward the mirror, assuring the incident ray (incoming ray) touches the center of the paper protractor.
4. Measure the angle of incidence of the incident ray. This is the angle between the normal line and in incident ray.
5. Measure the angle of reflection of the reflected ray. This is the angle between the normal line and the reflected ray.
6. Do this for 3 different angles of incidence and their respective angles of reflection and record your values in the table below.

Table 1

Angle of Incidence	Angle of Reflection
15°	15°
23°	23°
30°	30°



7. Turn the wheel on the light source to the three primary color rays. Shine the colored rays at an angle to the plane mirror. Mark the position of the surface of the plane mirror and trace the incident and reflected rays. Indicate the colors of the incoming and outgoing rays and mark them with arrows in the appropriate directions. These rays should be the only ones physically traced on the diagram to the right.

Analysis

1. Based on our data, what is the relationship between the angles of incidence and reflection?

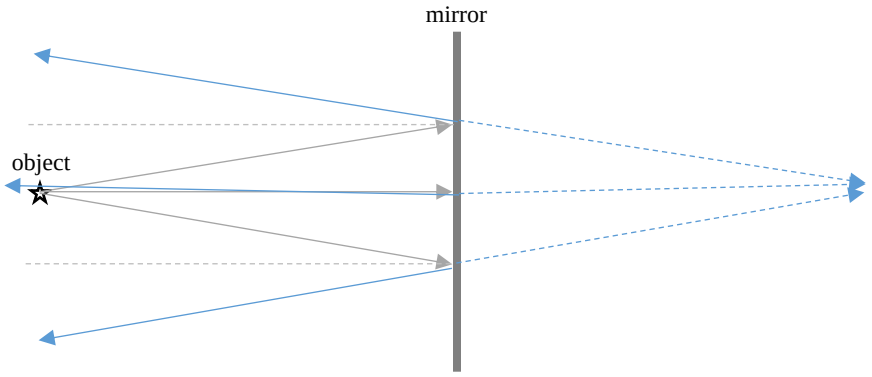
Both angles are equal

2. Are the three colored rays reversed by the plane mirror?

Yes.

3. Consider the example below. A point source is emitting light in all directions. We are going to look at a select three to attempt to locate the "image" of the light source. An *image* is defined as a location where light rays intersect or at least "look like" they *intersect after reflection*.

a) On the diagram, draw the reflected rays of the 3 incident rays depicted. Be sure to use a protractor



b) Do any of the reflected rays intersect each other? **No**

c) Take the straight edge of your ruler and extend each reflected ray behind the mirror. Be sure to do this with a *dotted line*. Do these dotted lines intersect? **Yes**

d) This point of ray convergence is referred to as an ***image***. However, since this image is formed through non-real light rays, we refer to this kind of image as a ***virtual image***.

e) Measure the distance of the object to the mirror. How does this compare to the distance between the image and mirror?

They are equal to eachother

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