Name _____ Date _____ Period _____

PLANE MIRROR IMAGES

BACKGROUND: The image of an object formed by a plane, or flat, mirror seems to be exactly like the object. But is the image really an exact "copy" of the object? And how does a mirror produce an image?

OBJECTIIVE:

In this investigation you will see how a plan mirror forms an image and how that image compares to the object.

PROBLEM:

How is an image produced by a plane mirror?

MATERIALS:

- Cardboard (approximately 30 cm X 30 cm)
- 30-cm ruler
- 3 straight pins
- Protractor
- Unlined paper
- Small mirror and support

PROCEDURE:

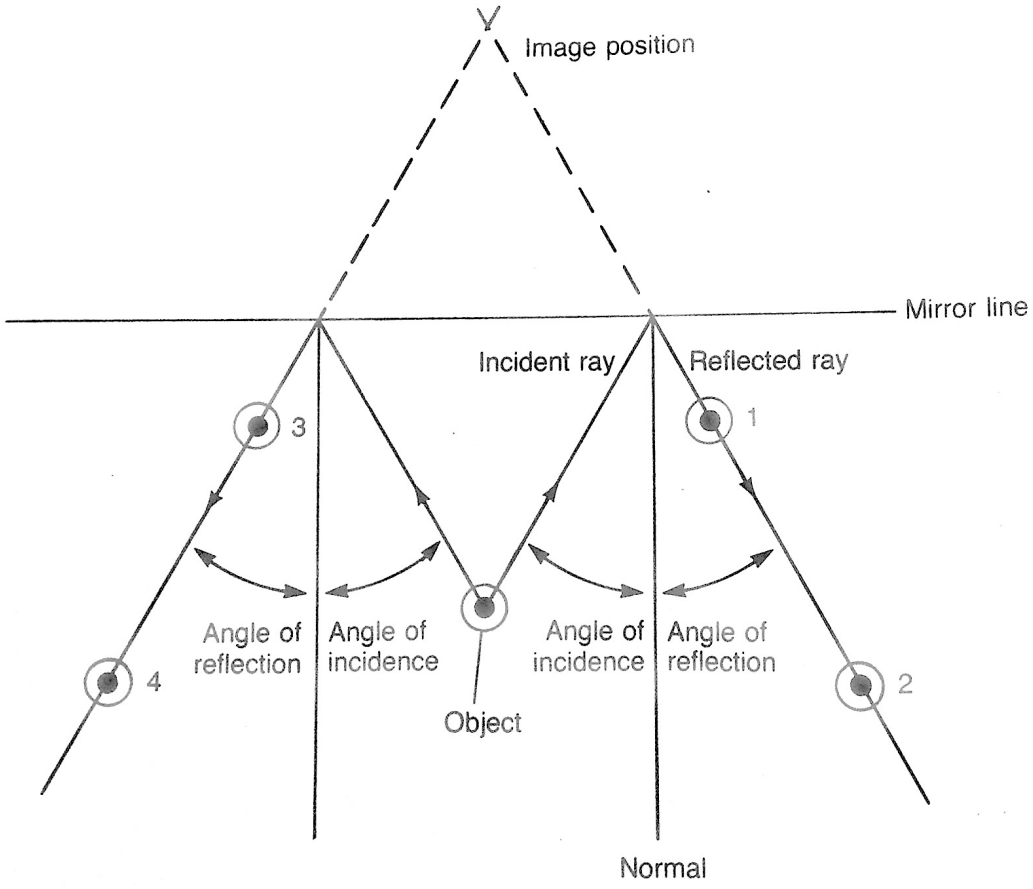
1. Place the paper on the cardboard. Stand the mirror in the center of the paper and draw a line along the edge of the mirror. Stick a pin in the paper and cardboard about 4 cm in front of the mirror. Draw a small circle around the pin position and label it Object.

2. Bend down so that your head is near the lower right corner of the paper. Look at the mirror with on eye closed and observe the reflection of the pin. Do not look at the real pin. Place a pin in the paper so that it hides the reflection of the object pin in the mirror. Draw a circle around the pin position and label it 1.

3. From the same position on the right-hand side of the paper, place a second pin in the paper so that it hides the real pin you placed in position 1 and the reflection of the object pin. Draw a small circle around the pin position and label it 2.

4. Remove the pins from position 1 and 2. Use them to repeat steps 2 and 3 from the lower left corner of the paper. Draw circles around these pin positions and label them 3 and 4.

5. Remove the mirror and all the pins. Using the ruler, draw a solid line through pin positions 1 and 2 and extend it as far as the mirror line. This line is a reflected ray. Draw a line form the object position to the point where the reflected ray leaves the mirror. This line is the incident ray. Label each ray and use an arror on the ray to show its direction.
6. Repeat step 5 for pin positions 3 and 4.
7. Draw two lines perpendicular to the mirror line at the two points where the incident rays and the reflected rays touch. These lines are the normals. Label and measure the angles of incidence and reflection for the rays coming from the left and right corners of the paper. See Figure below.



8. Using the ruler, draw two dashed lines extending the two reflected rays beyond the mirror line. Continue your dashed lines just beyond the point where they cross. This position is the position of the image of the pin in the mirror. Label this point Image.

OBSERVATIONS:

1. Attach your drawing.

2. Left-side rays: Angle of incidence = _____

   Angle of reflection = _____

3. Right-side rays: Angle of incidence = _____

   Angle of reflection = _____

ANALYSIS AND CONCLUSION:

1. At what distance is the object from the mirror line? _____

   _____

   _____

CRITICAL THINKING AND APPLICATION:

1. Follow the pat of one of the incident rays to the mirror and of its reflected ray. Repeat for the other incident ray. If the incident ray enters from the left, the reflected ray leaves toward the _____. If the incident ray enters from the right, the reflected ray leaves toward the _____.

2. Based on your answer to question 1, how does the image compare with the object? _____

3. If the angle of incidence were not equal to the angle of reflection, would that have an effect on the appearance of the image? _____ Explain:

   _____

   _____

4. When you look in a plane mirror, the images seems to be "inside" or "behind" the mirror. Yet an examination of the mirror reveals that the back is opaque. That is, no light rays can pass through it. What kind of image is not formed by real light rays?

   _____

   _____

   Why does the image seem to be "inside" or "behind" the mirror?

   _____

   _____

   _____

   _____

GOING FURTHER:
Investigate the types of images formed by convex and concave mirrors. How do the images formed by these curved mirrors compare to the actual objects? Find some practical applications of these mirrors.