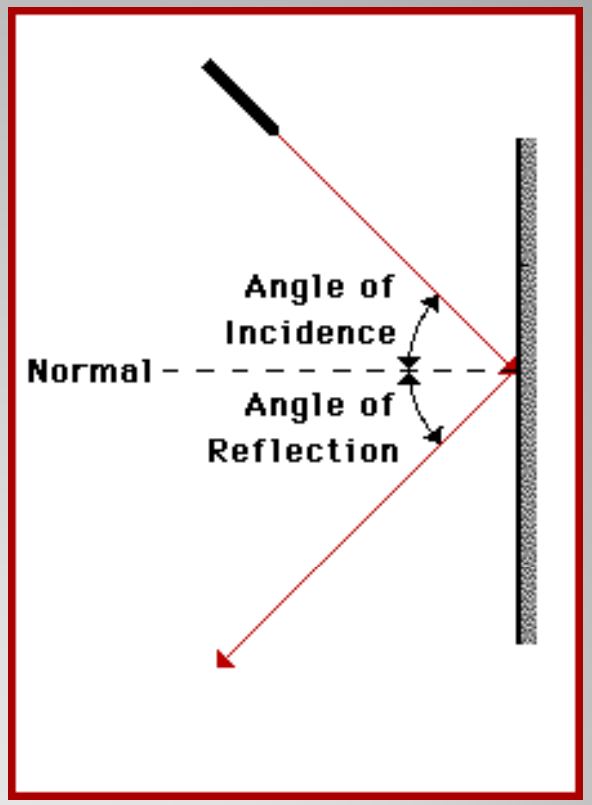
Reflection and Image Formation in Plane Mirrors

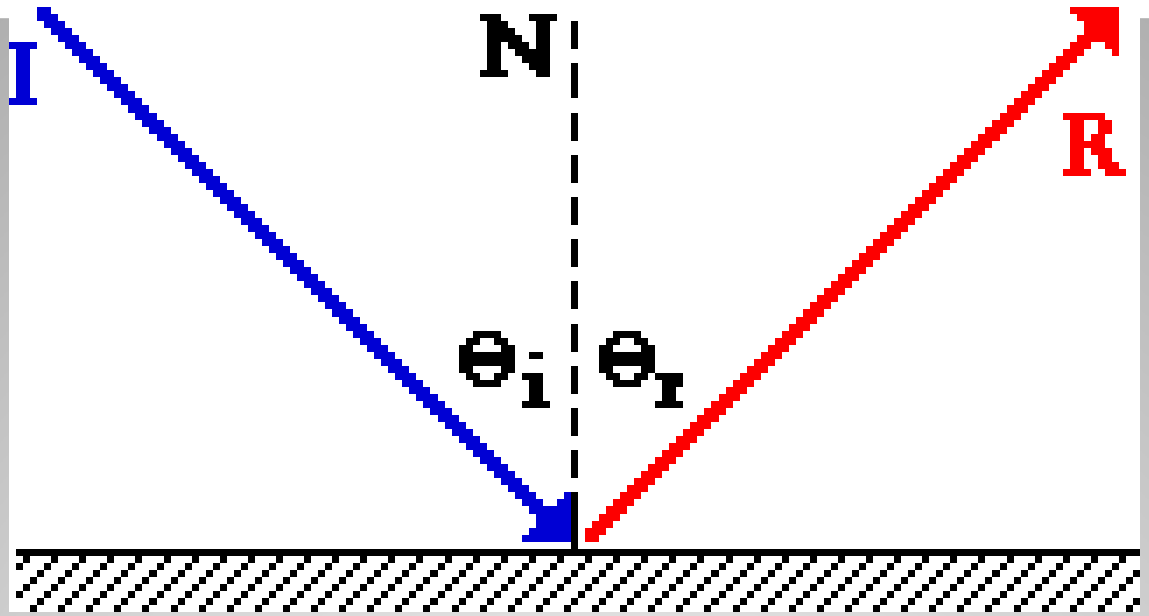
- Use the lab to develop an understanding of the Law of Reflection

Lab Time

The Law of Reflection

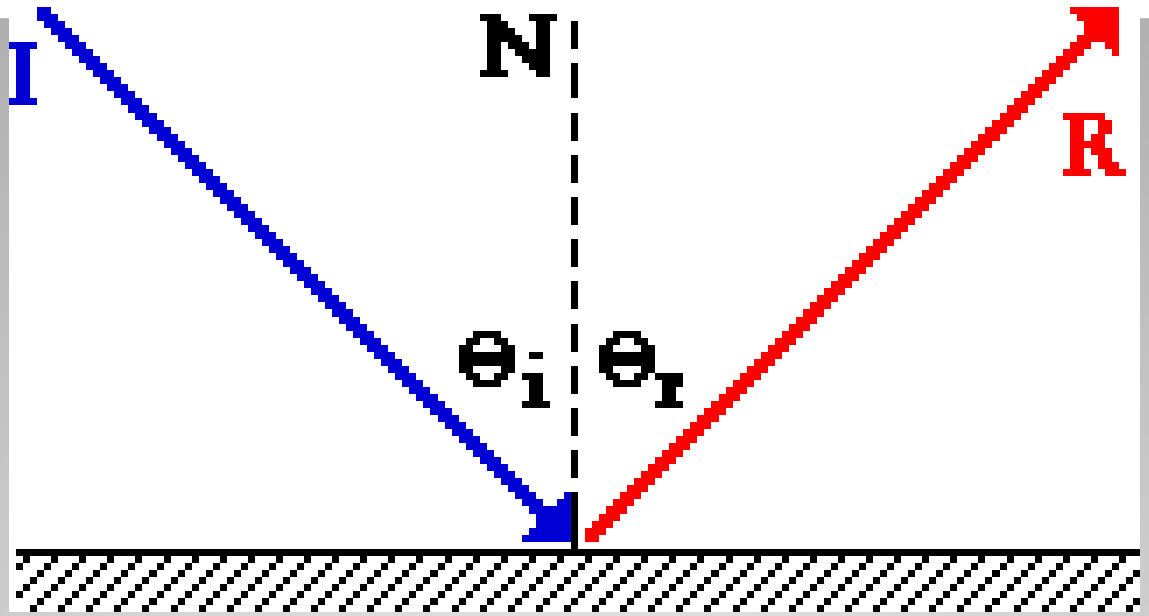
- The angle of incidence equals the angle of reflection





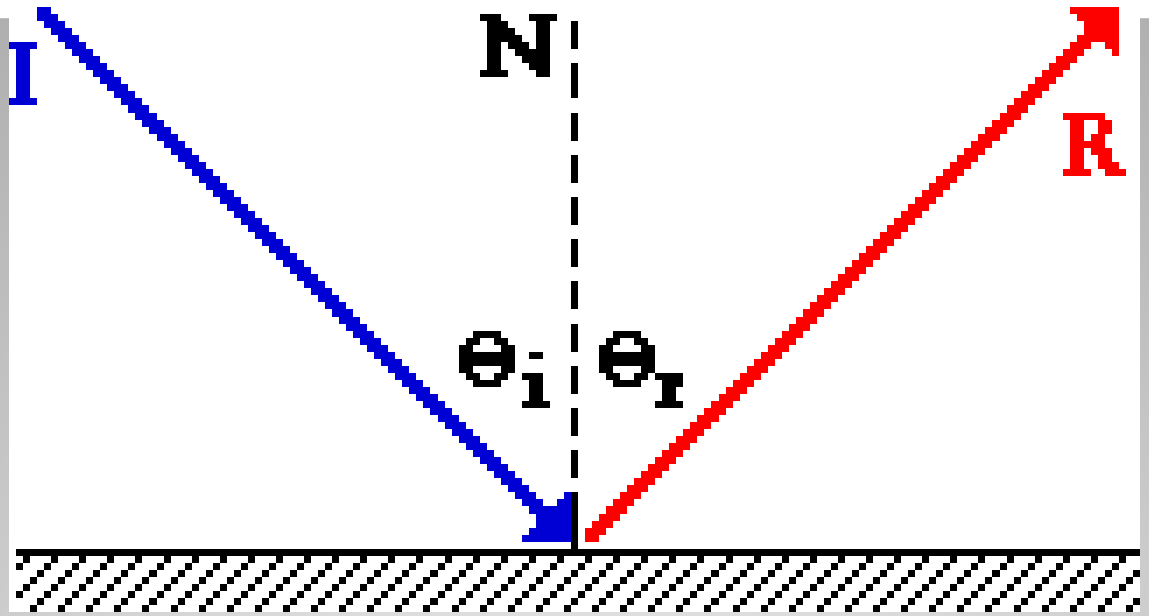
- The ray of light approaching the mirror is known as the **incident ray** (labeled **I** in the diagram)
- The ray of light that leaves the mirror is known as the **reflected ray** (labeled **R** in the diagram)

Incident and Reflected Rays



- At the point of incidence where the ray strikes the mirror, a line can be drawn perpendicular to the surface of the mirror. This line is known as a **normal line** (labeled **N** in the diagram)
- The normal line divides the angle between the incident ray and the reflected ray into two equal angles.

Normal Line

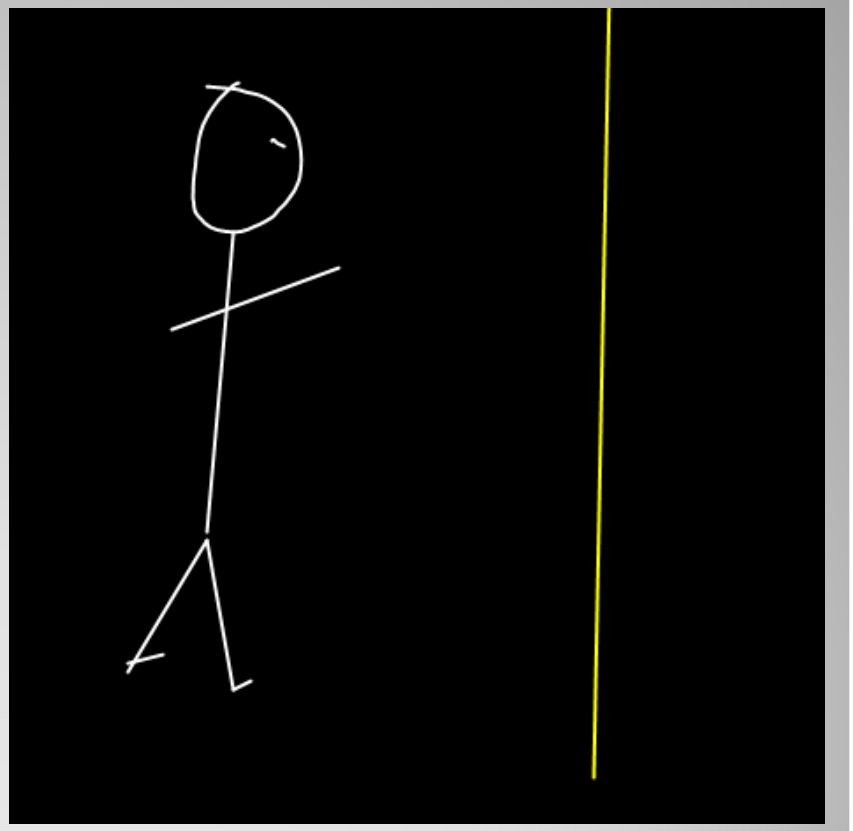


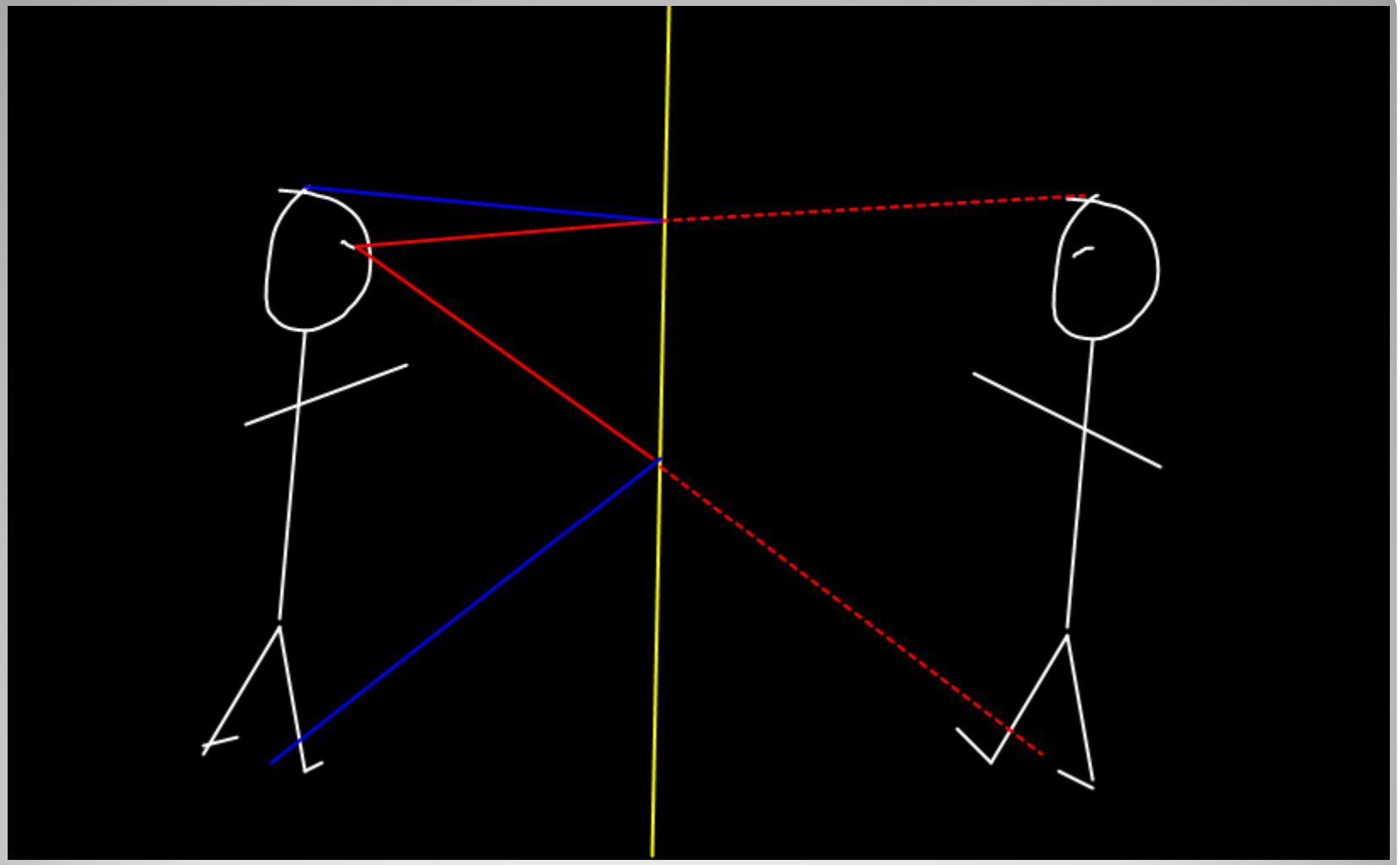
- The angle between the incident ray and the normal is known as the **angle of incidence**
  The angle between the reflected ray and the normal is known as the **angle of reflection**

What's the Angle

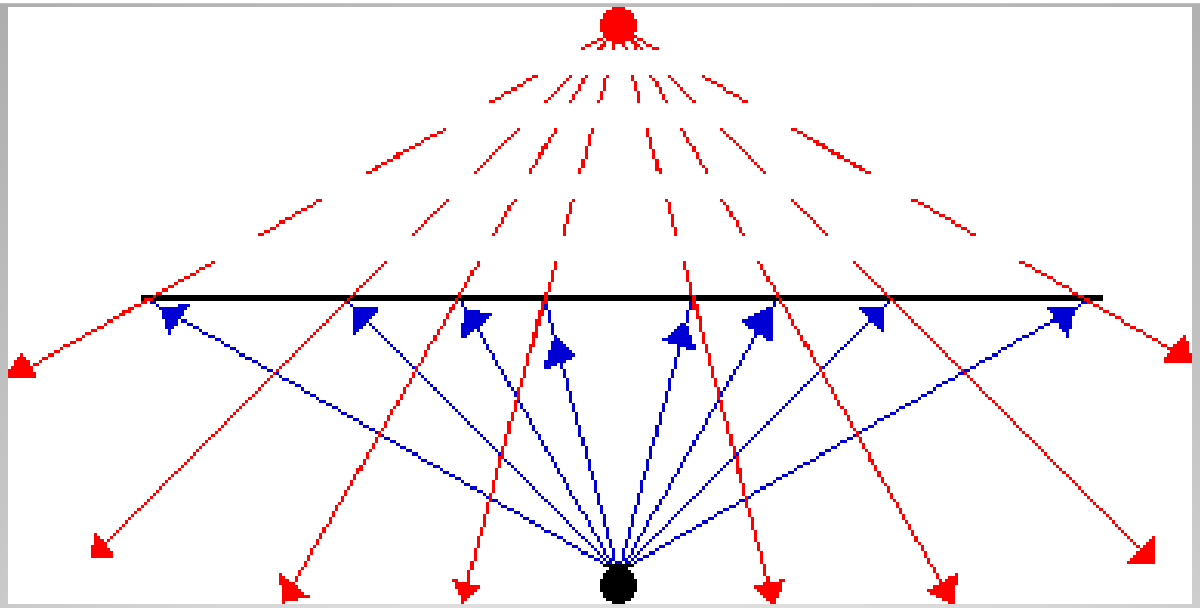
Why We See an Image

- In order to view an object, you must sight along a line at that object; and when you do light will come from that object to your eye along the line of sight
- In order to see the image of an object in a mirror, you must sight at the image; when you sight at the image, light will come to your eye along that line of sight





Where an Image Appears

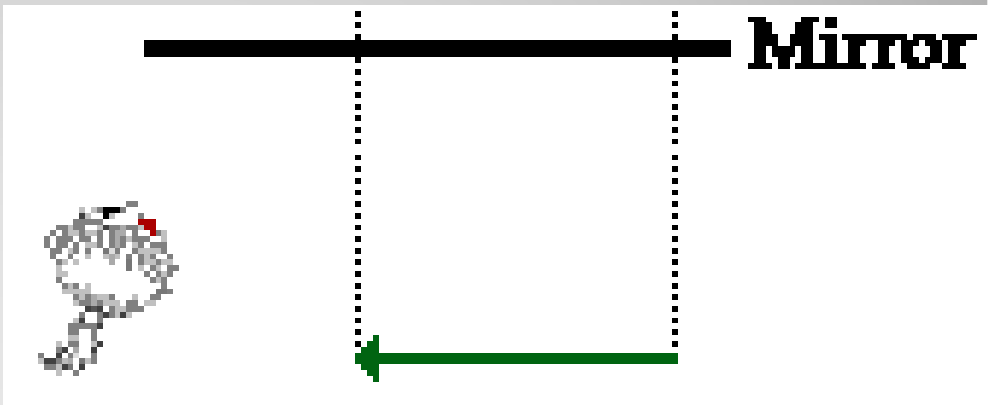


- Virtual images are images that are formed in locations where light does not actually reach
- Light does not actually pass through the location on the other side of the mirror; it only appears to an observer as though the light is coming from this location

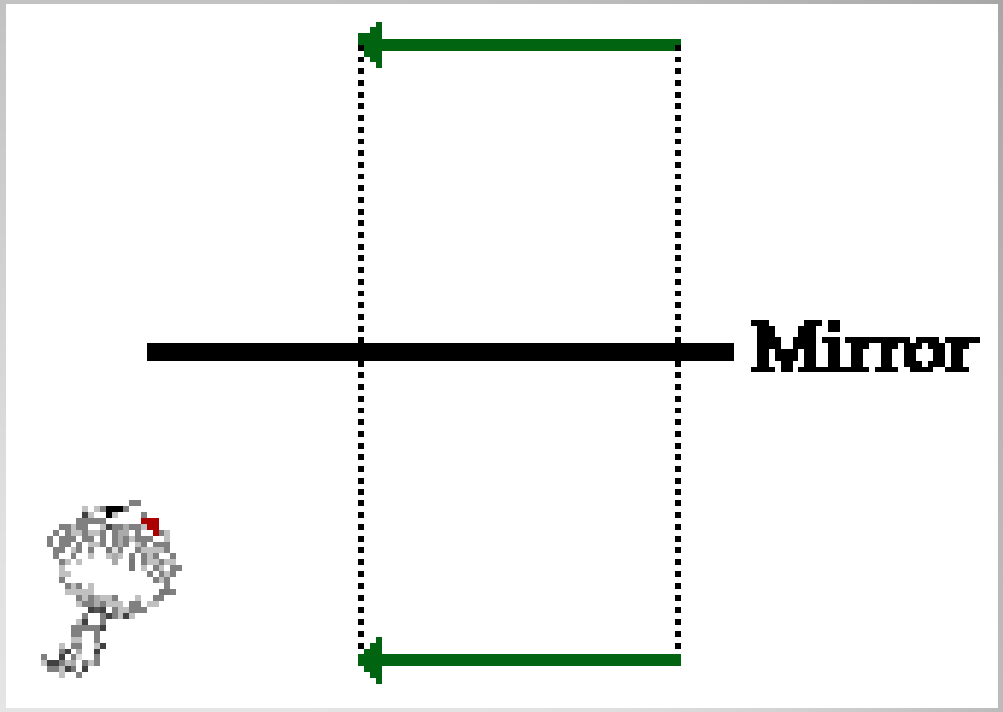
Virtual Images

Drawing Ray Diagrams

- A **ray diagram** is a diagram that traces the path that light takes in order for a person to view a point on the image of an object
- On the diagram, rays (lines with arrows) are drawn for the incident ray and the reflected ray

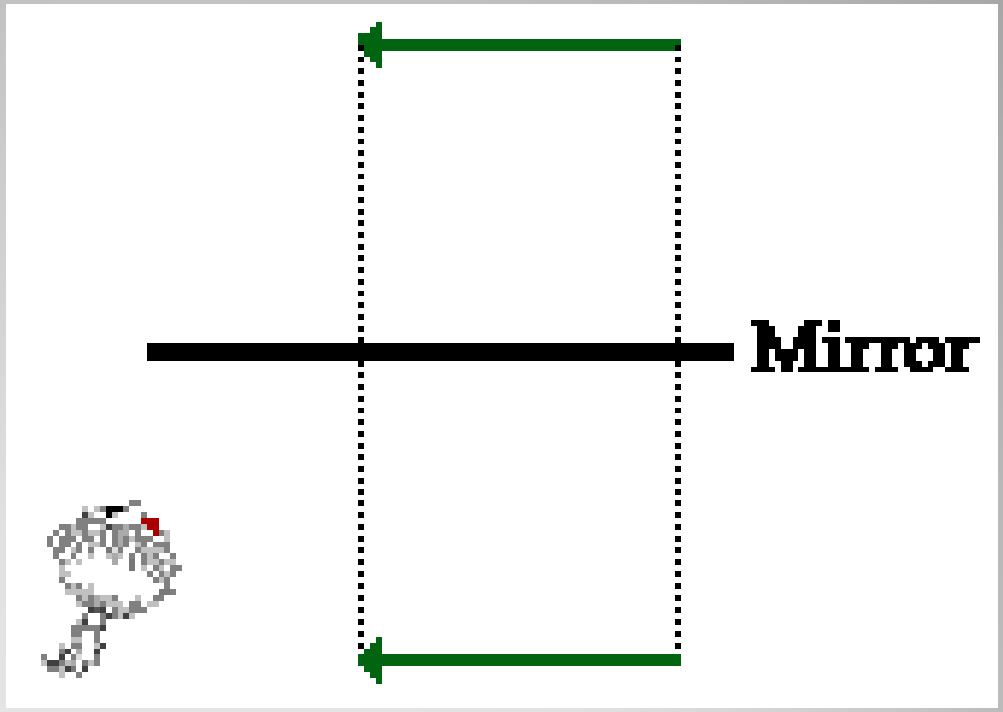


- Use the principle that the object distance is equal to the image distance to determine the exact location of the object
- Pick one *extreme* on the object and carefully measure the distance from this *extreme point* to the mirror
- Mark off the same distance on the opposite side of the mirror and mark the image of this *extreme point*



1. Draw the image of the object.

- Repeat this process for all extremes on the object until you have determined the complete location and shape of the image
- Note that all distance measurements should be made by measuring along a segment that is perpendicular to the mirror.



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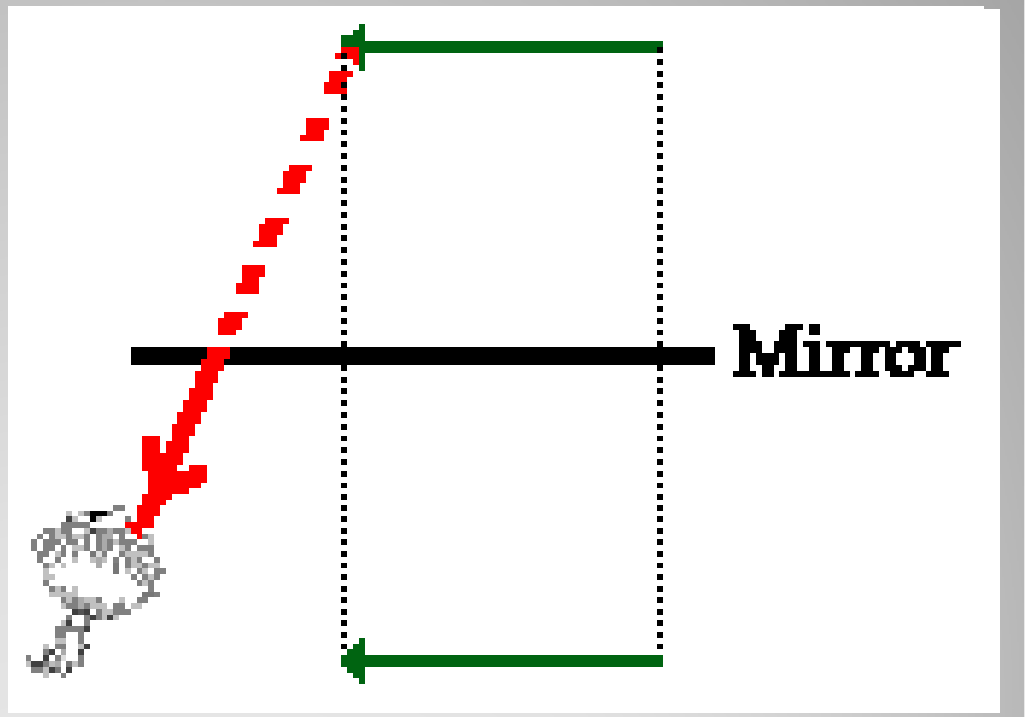
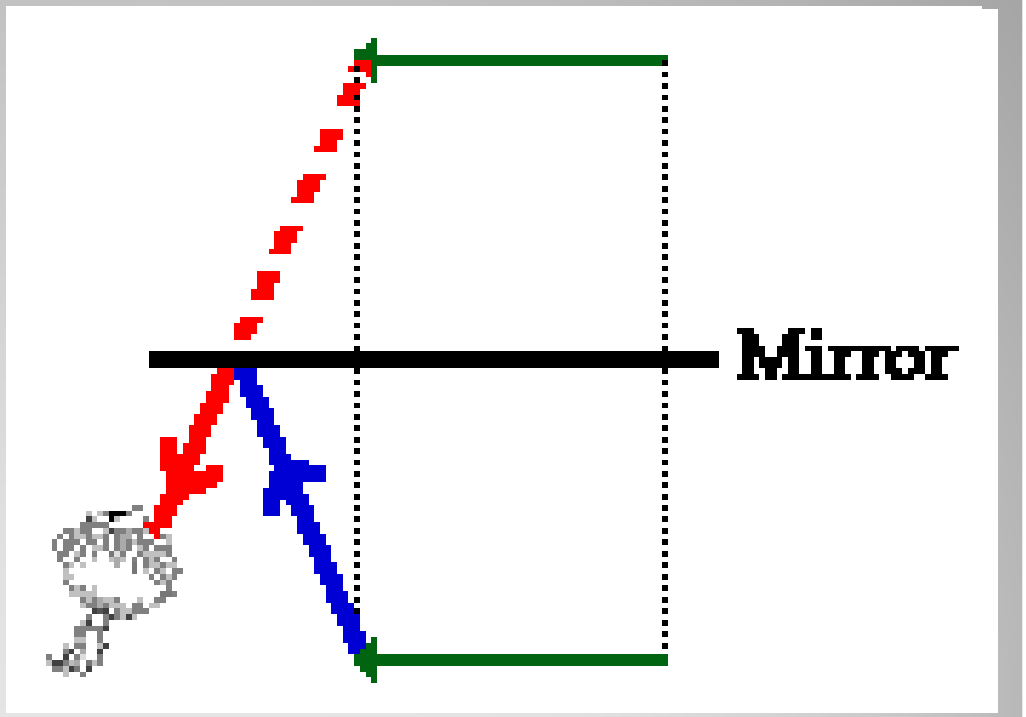


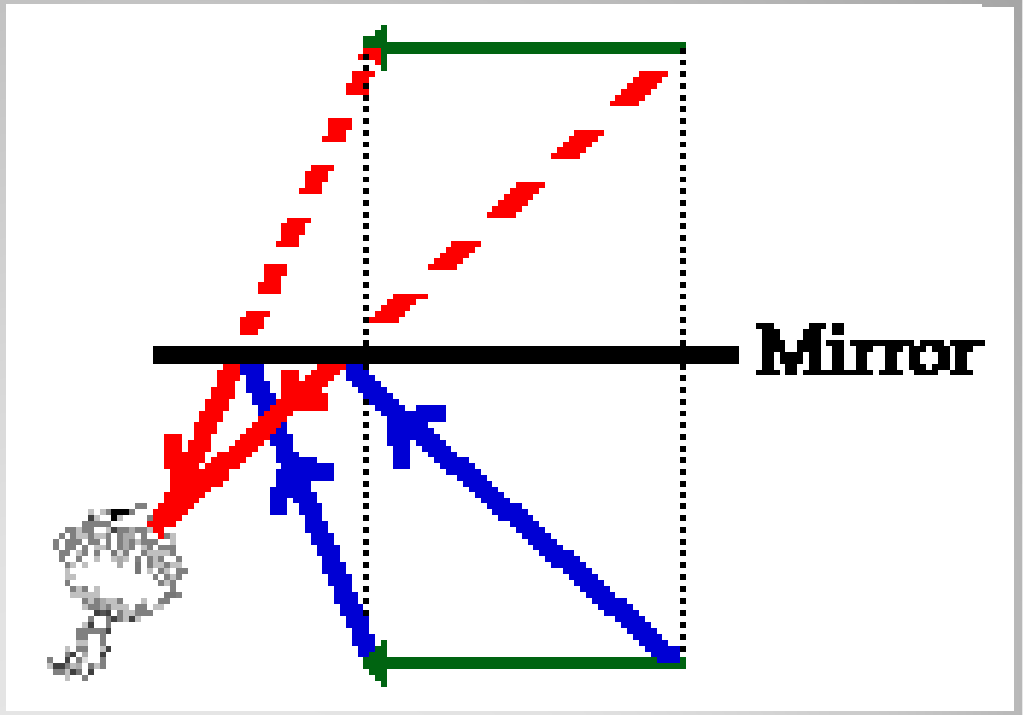
2. Pick one extreme on the image of the object and draw the reflected ray that will travel to the eye as it sights at this point

- the incident ray from the *extreme point* to the point of incidence
- Once more, be sure to draw an arrowhead upon the ray to indicate its direction of travel
- The arrowhead should be pointing towards the mirror since light travels from the object to the mirror

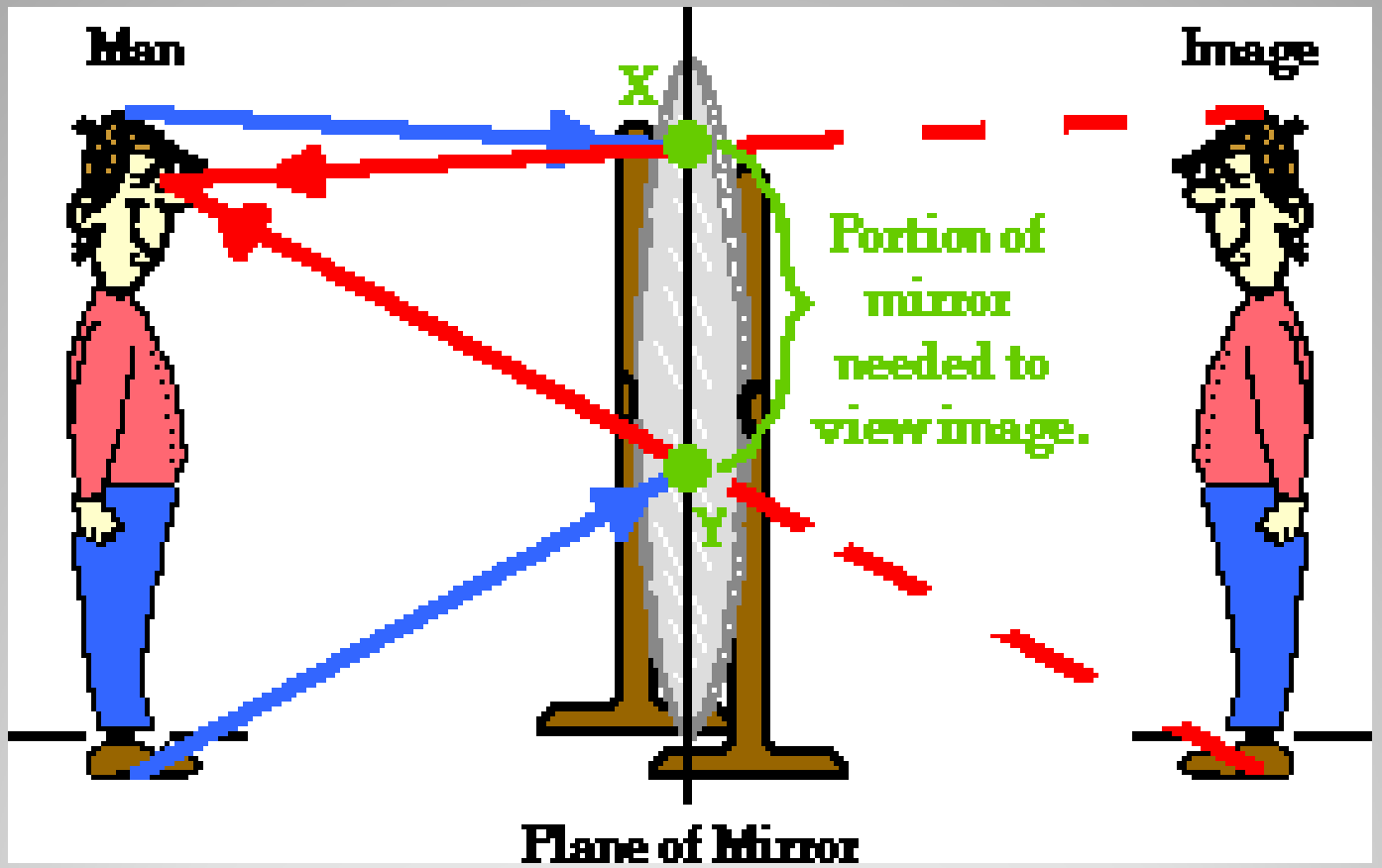


3. Draw the incident ray for light traveling from the corresponding extreme on the object to the mirror

- the incident ray from the *extreme point* to the point of incidence
- Once more, be sure to draw an arrowhead upon the ray to indicate its direction of travel
- The arrowhead should be pointing towards the mirror since light travels from the object to the mirror



4. Repeat steps 2 and 3 for all other extremities on the object



Why a Portion of a Mirror is Required

- Reflection and Plane Mirrors

- Next Class
  - Concave and Convex Mirrors

Homework