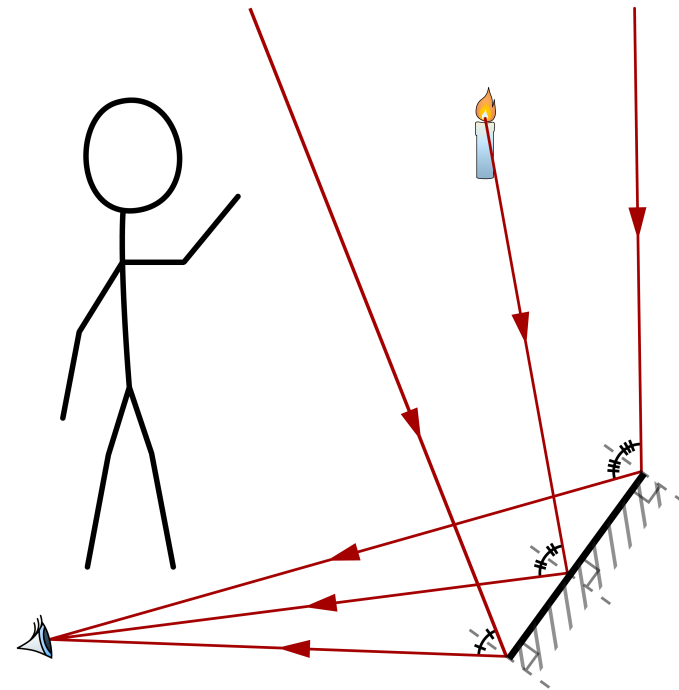


Efficiently raytracing to determine what can be seen

In some situations, what can be seen can be determined by drawing a small number of rays.

Can you see object(s) using the mirror?

1. Draw a large scale diagram illustrating
 - a. surrounding environment
 - b. object(s) of interest
 - c. mirror
 - d. observer's eye
2. Trace in reverse direction three rays landing on the eye:
 - a. ray grazing one edge of the mirror
 - b. ray grazing the other edge of the mirror
 - c. ray that hits the interior of the mirror
3. Obeying the law of reflection, continue to extend the three rays from step 2.
4. Use the rays extended in step 3 to identify the portion of the scene that is visible to the eye.
5. State whether the object(s) of interest are in the portion of the scene visible to the eye.



Efficiently raytracing to determine what can be seen

In some situations, what can be seen can be determined by drawing a small number of rays.

What is the illumination pattern on a screen when light

encounters a “large” obstacle/aperture?

passes through a “small” aperture (pinhole)?

1. Draw a large scale diagram illustrating
 - a. light source
 - b. obstacle/aperture
 - c. screen

2. Trace the following ray segments:
 - a. top of light source to top of obstacle/aperture
 - b. top of light source to bottom of obstacle/aperture
 - c. bottom of light source to top of obstacle/aperture
 - d. bottom of light source to bottom of obstacle/aperture

2. Trace the following ray segments:
 - a. top of light source to pinhole
 - b. bottom of light source to pinhole

3. Extend all ray segments drawn in step 2 until they reach the screen or extend past the screen.

4. The intersections, if any, of the rays extended in step 3 with the screen can partition the screen into separate regions. In each region,
 - a. use your finger to indicate a test point
 - b. ask whether the obstacle blocks any light rays that would otherwise reach your finger.

Condition	Label
no rays blocked	no shadow
some, but not all, rays blocked	partial shadow (<i>penumbra</i>)
all rays blocked	complete shadow (<i>umbra</i>)

4. Label ray endpoints, if any, on the screen:

Point on screen	Label
Illuminated by light from top of source	“from top”
Illuminated by light from bottom of source	“from bottom”

5. Shade the regions labeled in step 4.

