

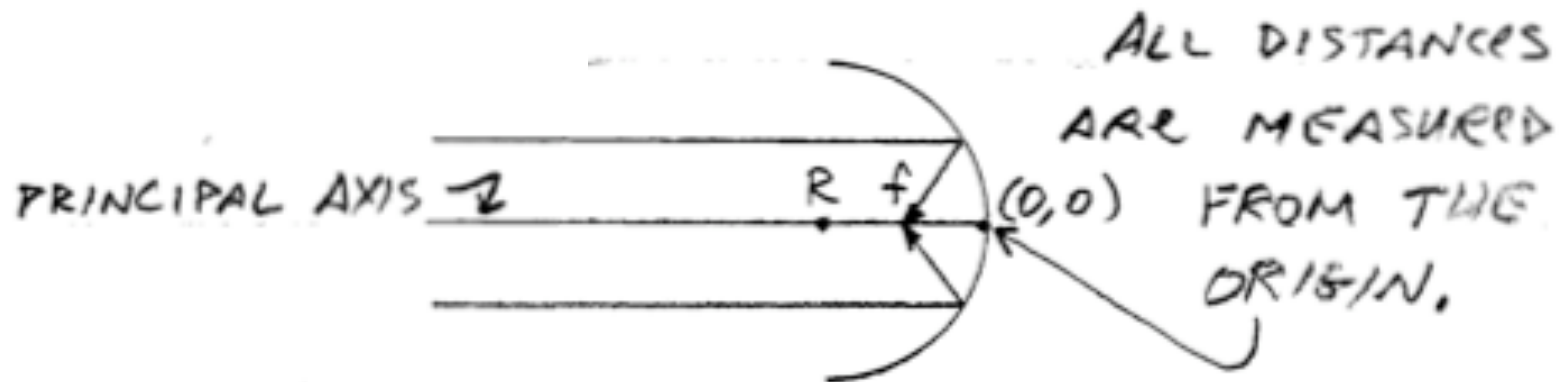
Optics: Mirrors

Concave Mirrors

- Our eyes think light travels in straight lines.
- *Where and how do we see images reflected from mirrors?*

Types of Mirrors:

1. Converging: Parallel light is concentrated at the principal focus.
- Shape is **CONCAVE**.
 - **f = focal length (+)** **R = radius of curvature** **R = 2*f**



- **Concave mirrors:**

f = focal length = (+)
 p = object location = (+)
 q = image location

q = (+) real, inverted; light rays actually intersect

q = (-) virtual, upright; light rays do not actually intersect –
image only exists in our minds.

Steps:

1. **Draw mirror and axis line.**
2. **Place focal length (f), radius (R), and object (p) on axis line.**
3. **Draw arrow pointed up to represent the object.**
4. **Ray 1: Straight across from object to mirror then back through focal point.**
5. **Ray 2: Straight from object through radius.**
6. **Point where 2 rays intersect is the image location (q).**
7. **Draw arrow from axis line to intersection point.**

REAL light rays are drawn with solid lines
IMAGINARY light rays are drawn with dashed lines

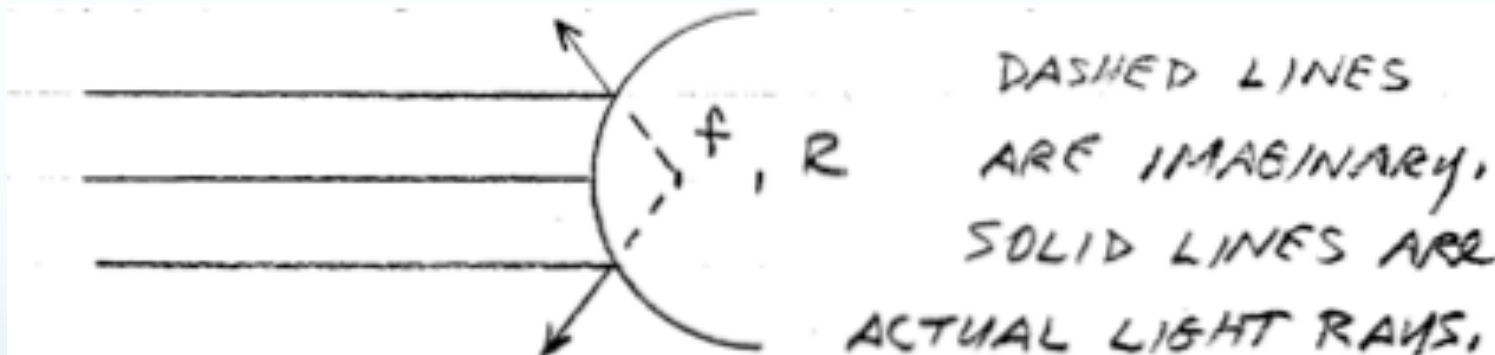
Describe the images created by concave the mirrors below.

Real or Imaginary
Inverted or Upright
Smaller or Larger

- A concave mirror has a radius of curvature of 40 cm. A 5 cm high object is placed 60 cm in front of the mirror.
- An object 5 cm tall is placed 10 cm in front of a concave mirror of focal length 20 cm.

Convex Mirrors

2. Diverging: $f = (-)$. Parallel light is dispersed as if it had come from the conjugate focus.
- Shape is **CONVEX**.
 - $f = \text{focal length } (-)$ $R = \text{radius of curvature}$ $R = 2f$



$f = \text{focal length} = (-)$
 $p = \text{object location} = (+)$
 $q = \text{image location} = (-)$

Diverging mirrors only make virtual, upright images.

Convex Mirrors

Steps:

1. Draw mirror and axis line.
2. Place focal length (f), radius (R), and object (p) on axis line.
3. Draw arrow pointed up to represent the object.
4. Ray 1: Straight across from object to mirror then dashed line through focal point.
5. Ray 2: Straight from object through radius. Dashed line behind mirror.
6. Point where 2 rays intersect is the image location (q).
7. Draw arrow from axis line to intersection point.

REAL light rays are drawn with solid lines
IMAGINARY light rays are drawn with dashed lines

- A convex mirror has a radius of curvature of 2 m. A 3 m high object is placed 6 m from the mirror.

Plane Mirror

Object and image are same size.

Our depth perception gets distance correct, but our brain thinks light travels in straight lines.

