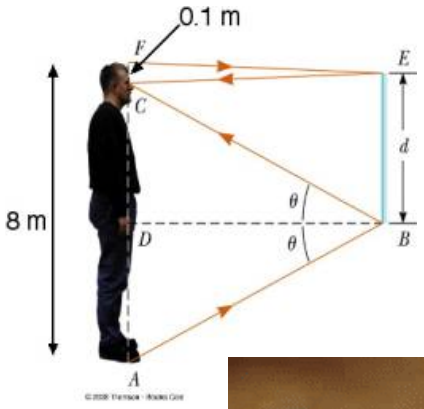
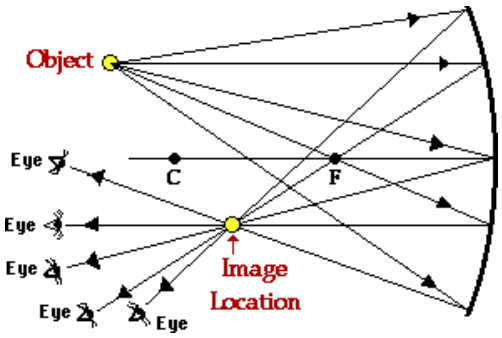
Reflection of Light

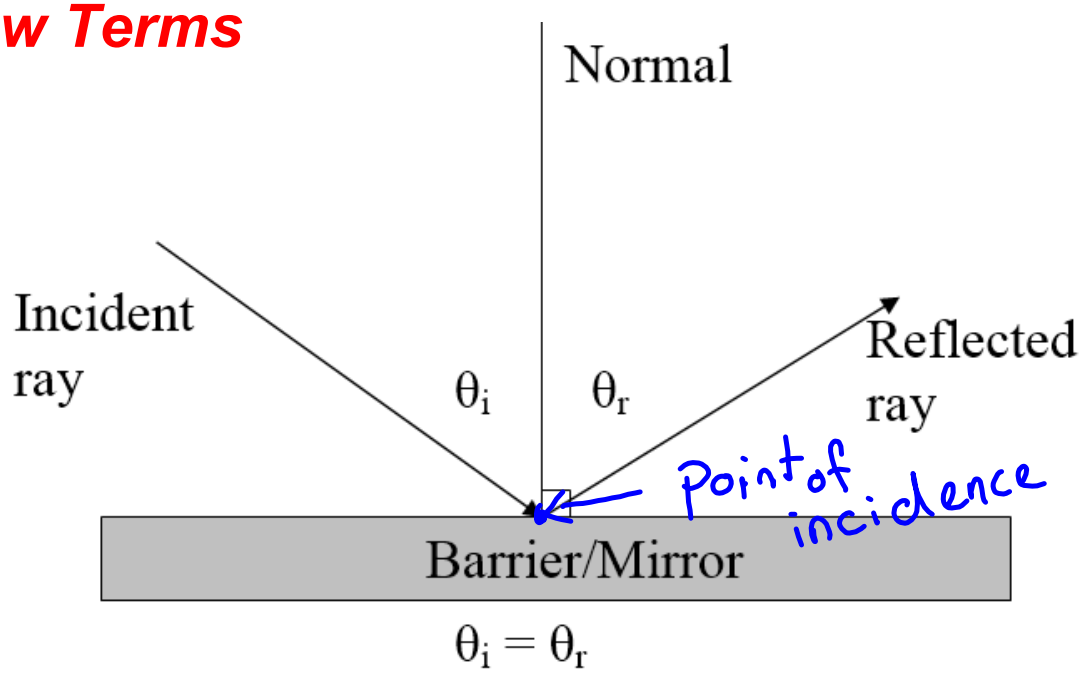
Plane and Curved Mirrors





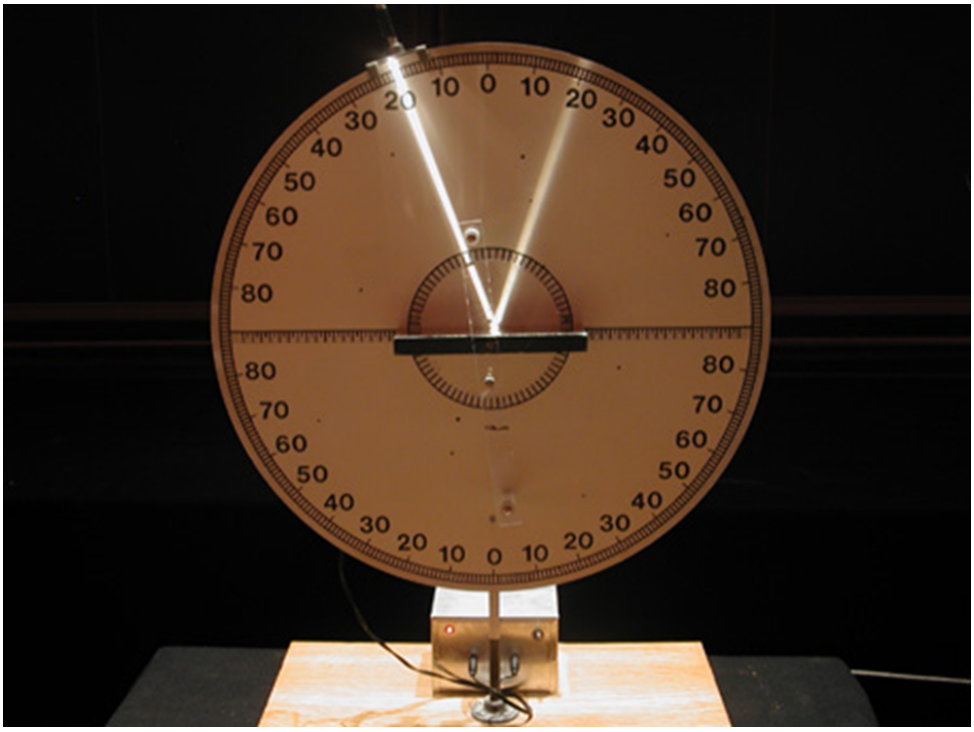
Great test question!

New Terms



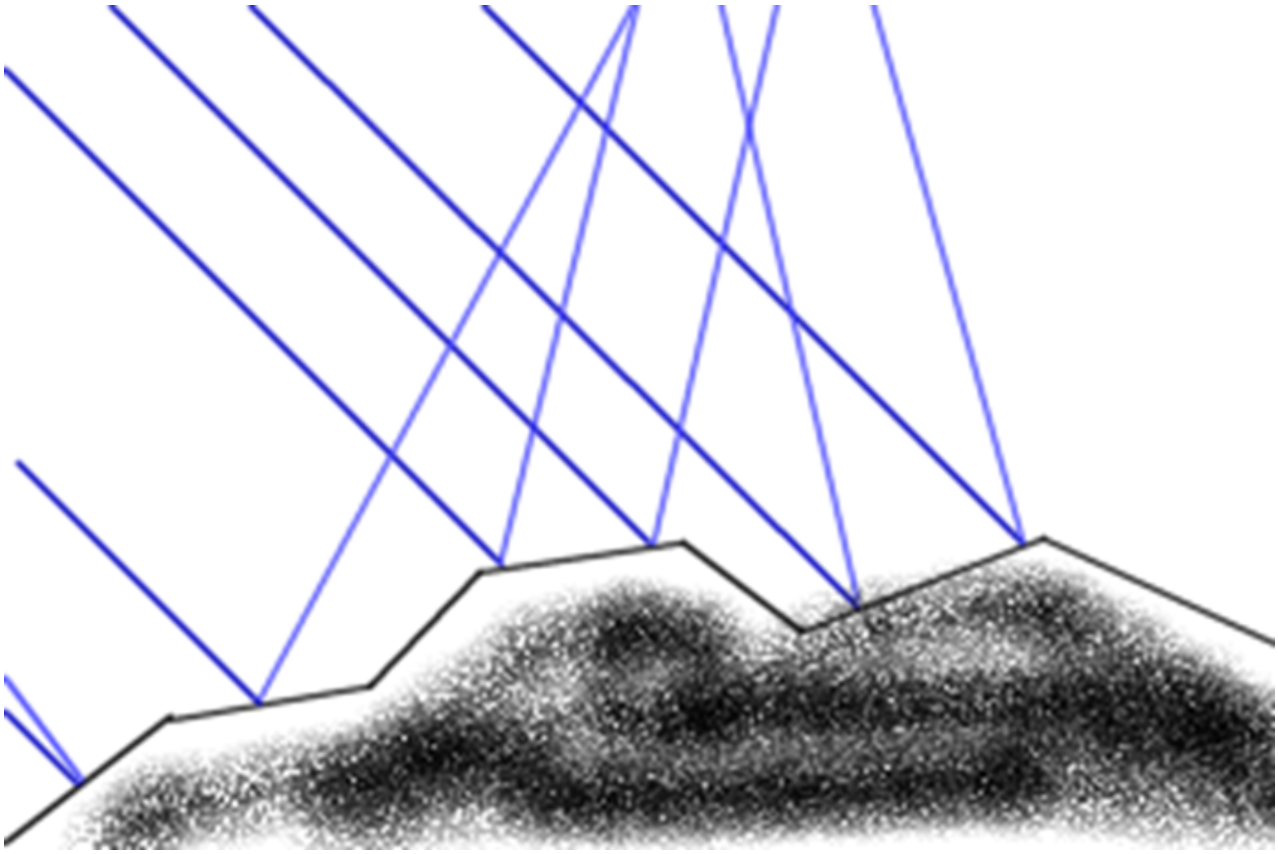
- Incident ray: a ray approaching a surface.
- Point of incidence: where incident ray strikes a surface.
- Normal: It is a line drawn perpendicular to the surface at the point of incidence.
- Reflected Ray: The portion of the incident ray that leaves the surface at the point of incidence.
- Angle of Incidence: The angle between the incident ray and the normal.
- Angle of Reflection: The angle between the reflected ray and the normal.

- Laws of Reflection:
  - > The angle of incidence is equal to the angle of reflection.
  - > The incident ray, the normal, and the reflected ray are coplanar.



The above image is an example of **specular reflection**. The surface is very smooth so incident parallel rays reflect as parallel rays.

If parallel rays strike a rough surface they will not be reflected in parallel. This is called **diffuse reflection**.

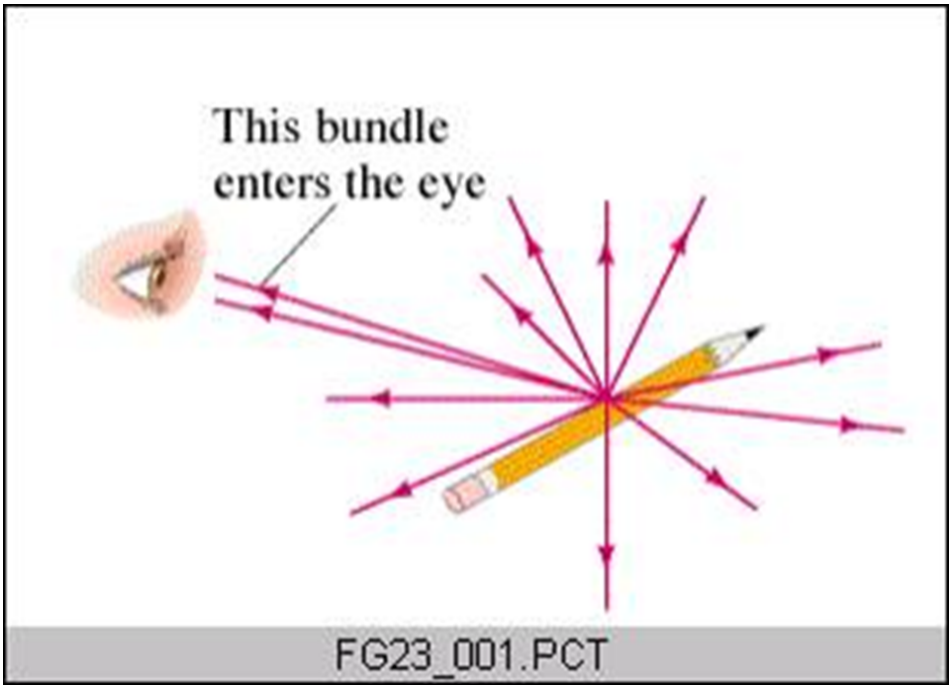


Both specular and diffuse reflection obeys the laws of reflection.

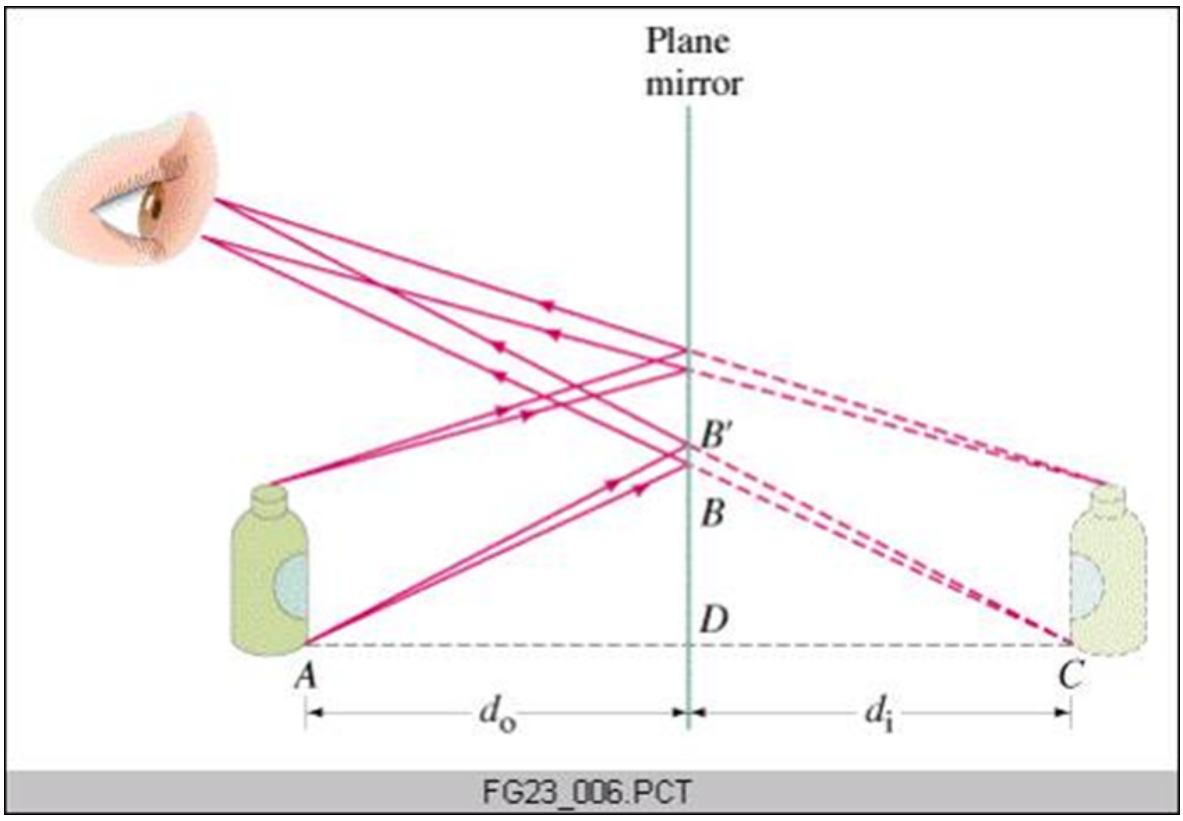
Images in a Plane/Flat Mirror

When you look into a plane mirror, your image appears to be behind the surface of the mirror. To understand why, and find the position of objects in a plane mirror, we need to consider how light is seen by the eye.

Light emanates from an object in all directions, but the eye only sees a diverging cone of rays.



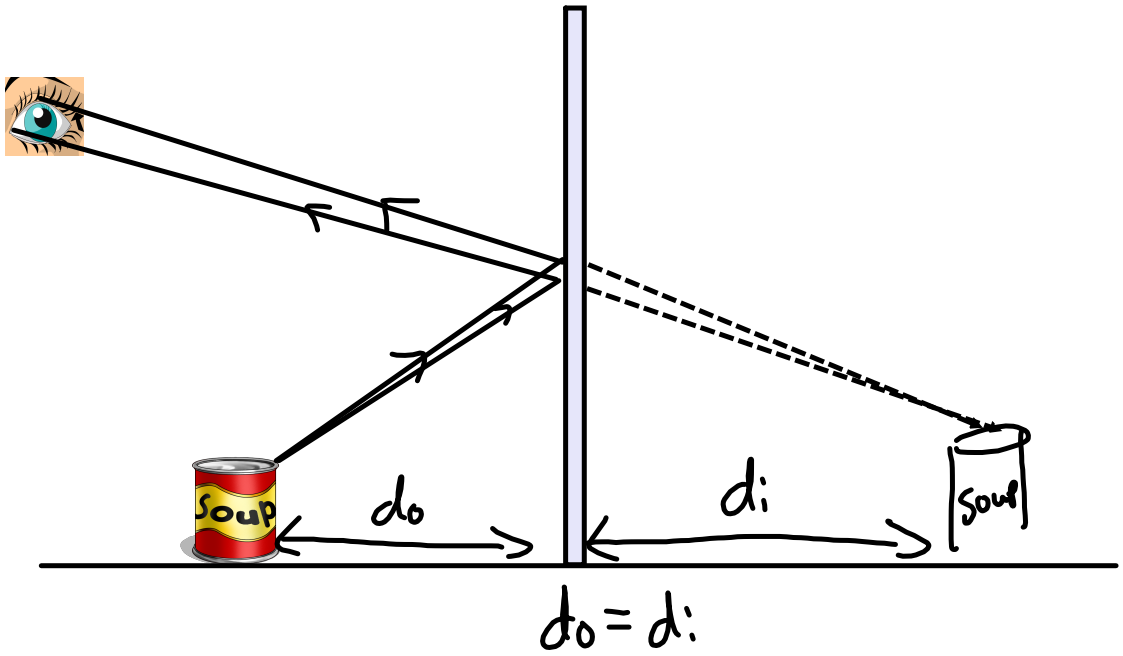
- When you see an object in the mirror, the mirror reflects the cone of rays.
- You cannot see that light was reflected, and your eyes assume the cone of rays originated behind the mirror.



- The resulting image is called a virtual image. That is because the image is produced at the point where the reflected rays, extended behind the mirror, intersect.
- A real image, is an image that can be formed on a screen (where the actual rays intersect).
- Images in plane mirrors are laterally inverted; what was on the right now appears to be on the left from the mirrors perspective.
- When drawing rays that don't actually exist, draw them as dotted lines. Rays that do exist are solid lines.

Example

Sketch the real and virtual light rays to show how the eye sees the image in the mirror. Appropriately label the diagram.



Reading Review: Holt pages 451 - 454.

Reflection & Plane Mirrors

Grade: 12

Subject: Science 122

Date: 2014

1 Images that appear behind a mirror are called virtual images.

True

False

2 Dashed lines are used to represent the path light actually takes to our eyes.

True

False

3 A smooth, flat surface will result in _____ reflection.

A diffuse

B specular

C normal

4 An image in a plane mirror is laterally inverted.

True

False

5 Eyes can see that light has changed direction.

True

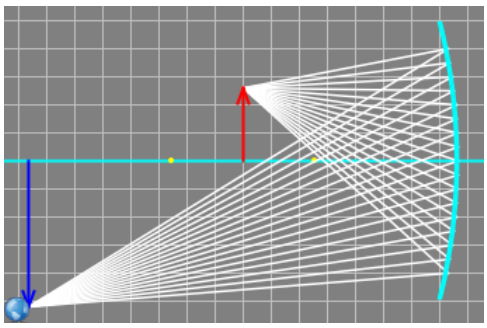
False

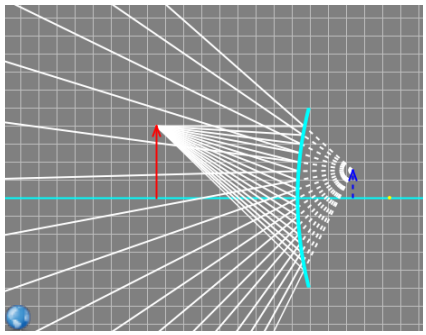
6 A word is held up to a plane mirror. The image will be upside-down.

True

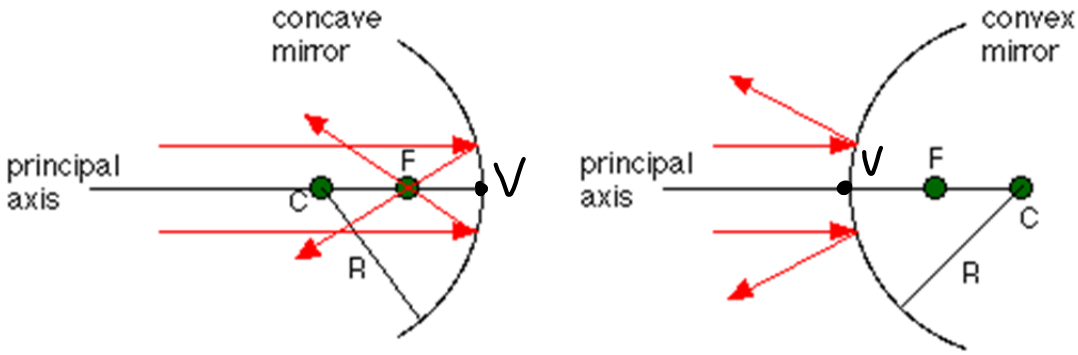
False

Spherical Mirrors





Terminology



- The centre of a curved reflecting surface is called the centre of curvature, *C*, and the radius of curvature is the shortest distance from the centre to the curved surface.
- The geometric centre of the curved mirror is called the vertex, *V*.
- The straight line passing through V and C is called the principal axis.

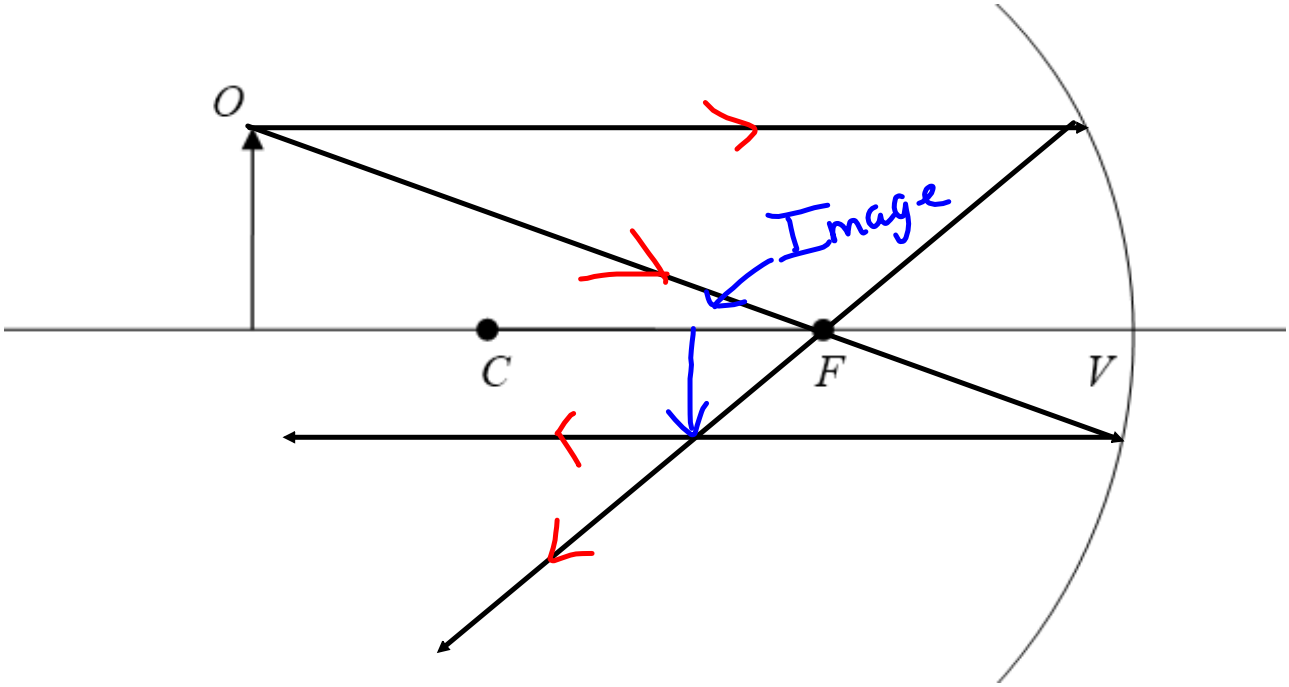
Light Rays Used to Find the Image:

- A ray that is parallel to the principal axis is reflected through the principal focus.
- A ray that passes through the principal focus is reflected parallel to the principal axis.
- A ray the passes through the centre of curvature is reflected back along the same path.

The location of the image can be found by determining where two of the above three rays intersect.

Image Location & Characteristics: Concave Mirrors

Object behind C



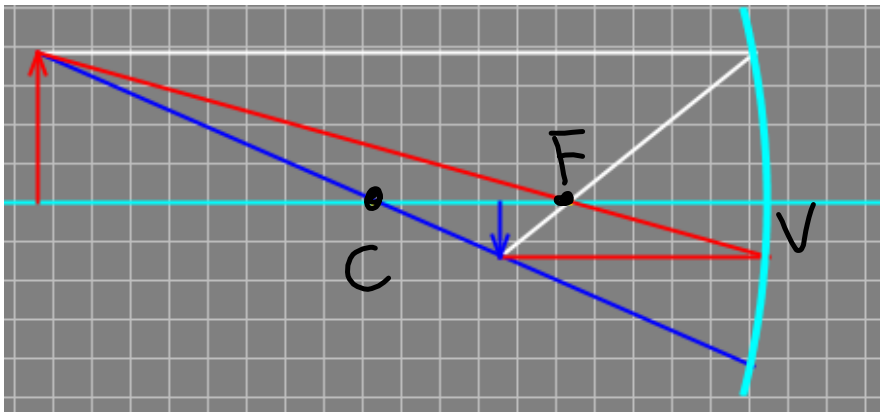
Characteristics:

real

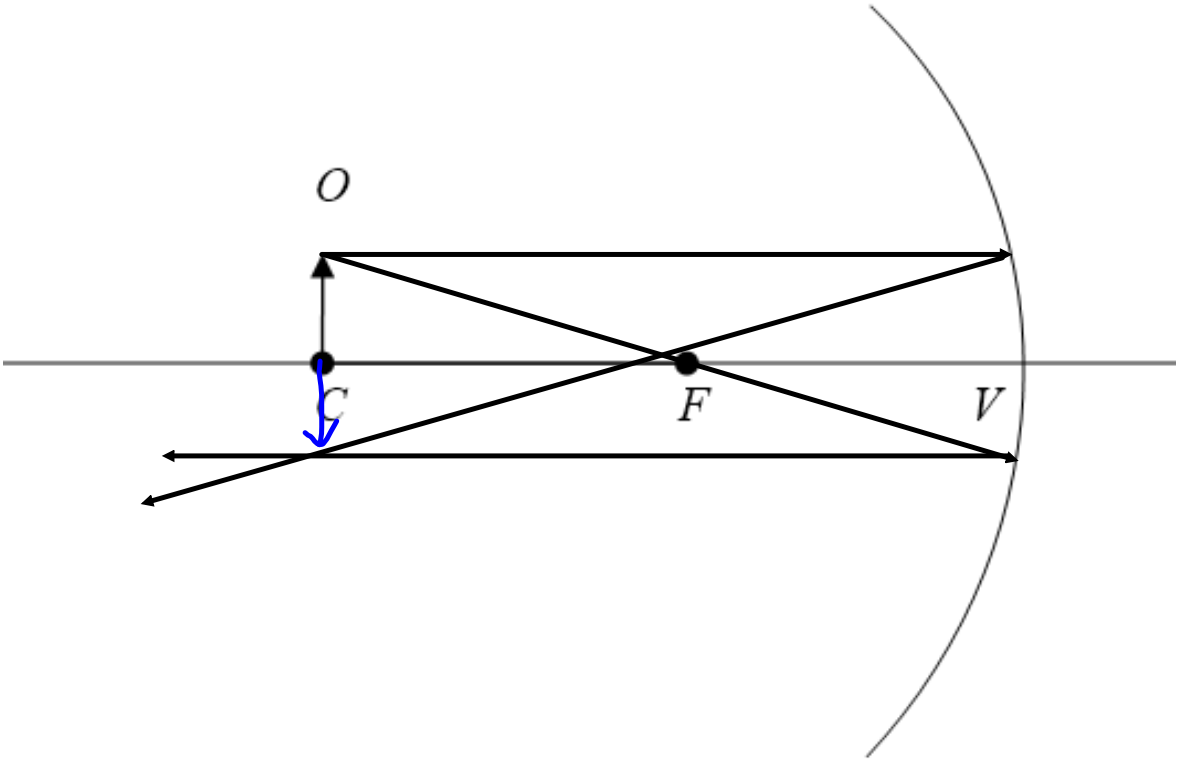
upside down

smaller

between C & F



Object at C



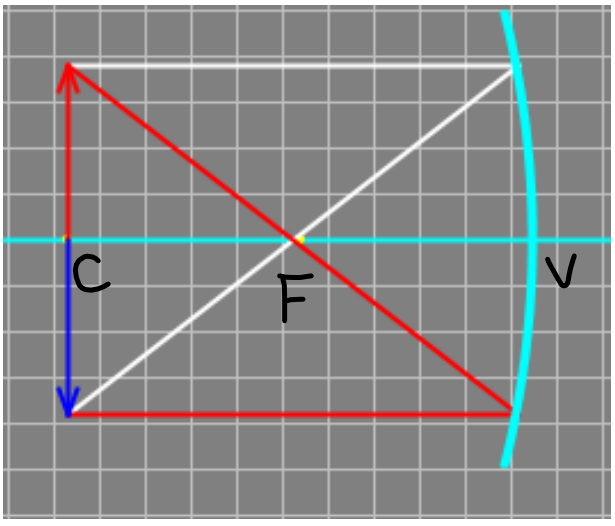
Characteristics:

at C

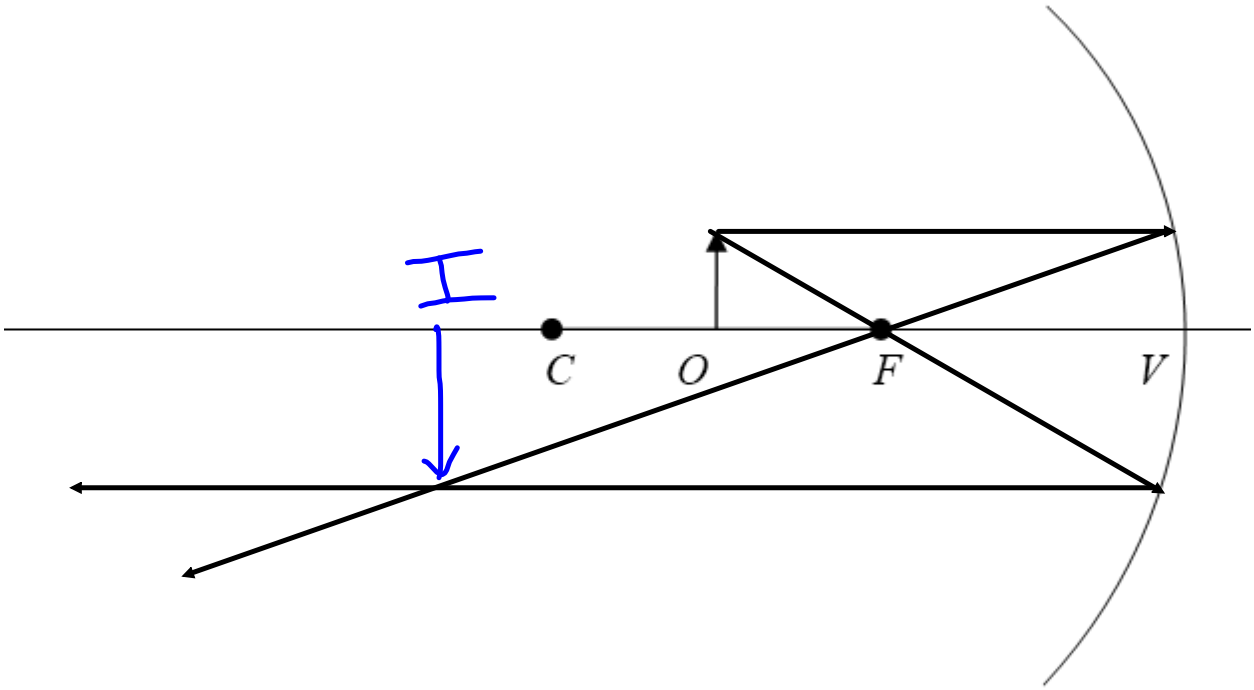
real

upside down

Same size
(magnification = 1)



Object between C and F



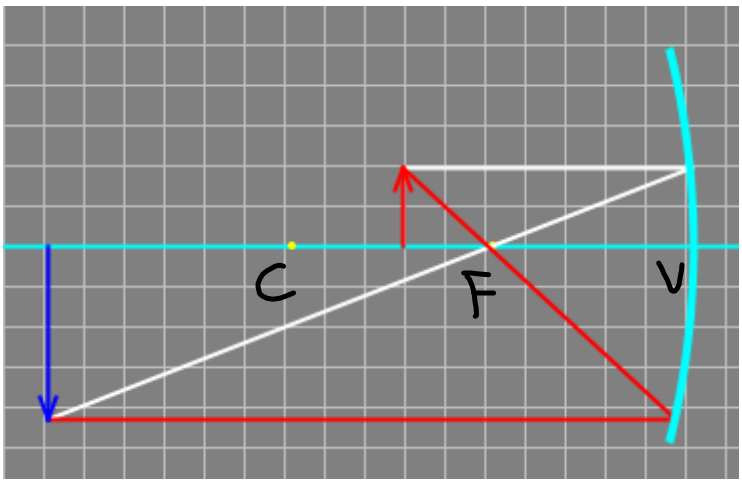
Characteristics:

real

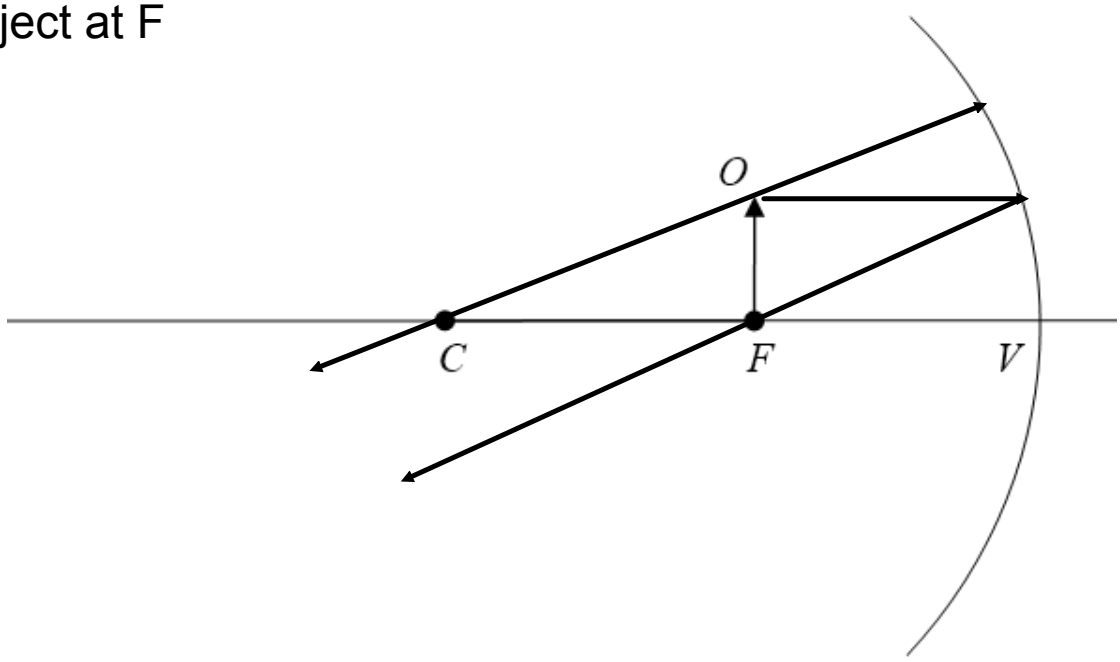
behind C

upside down

Larger

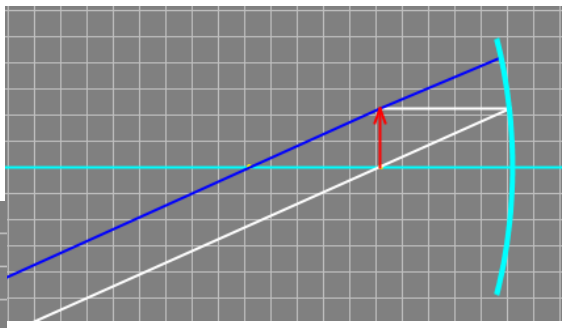


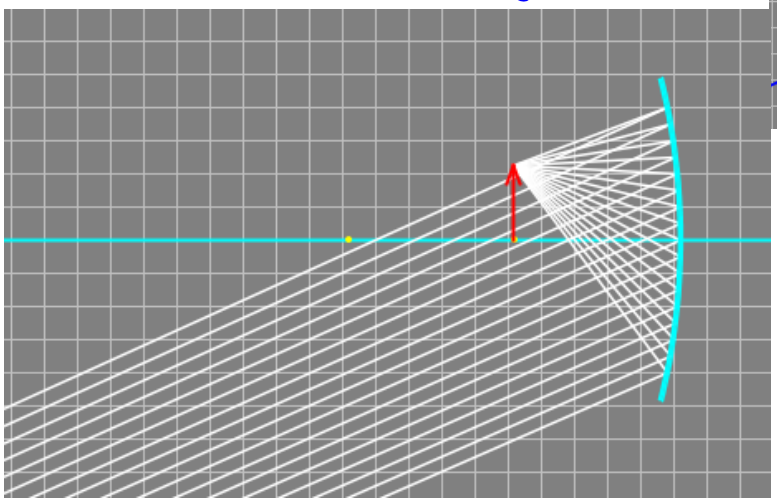
Object at F



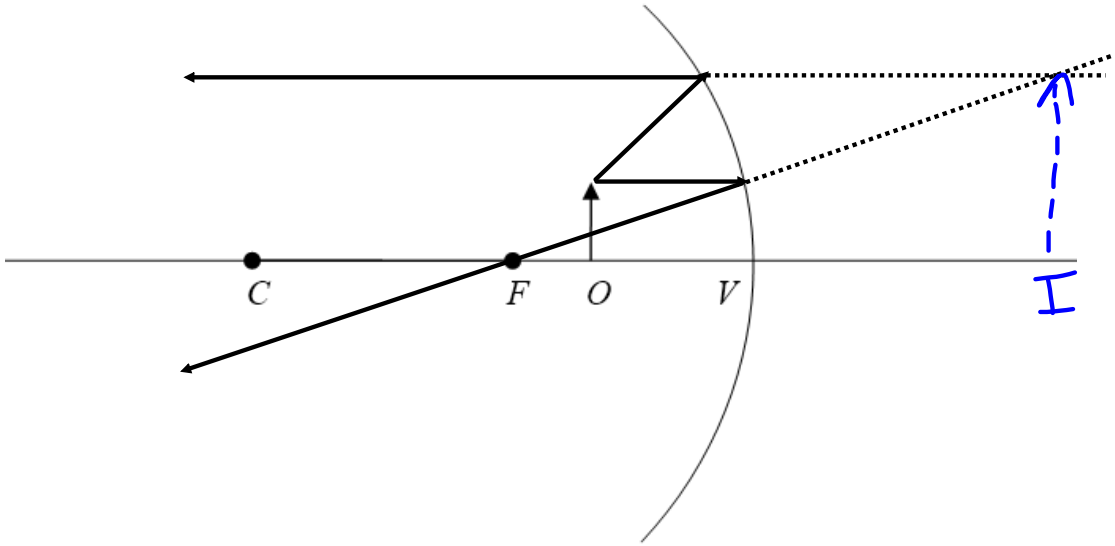
Characteristics:

No image (reflected rays //)





Object between F and V



Characteristics:

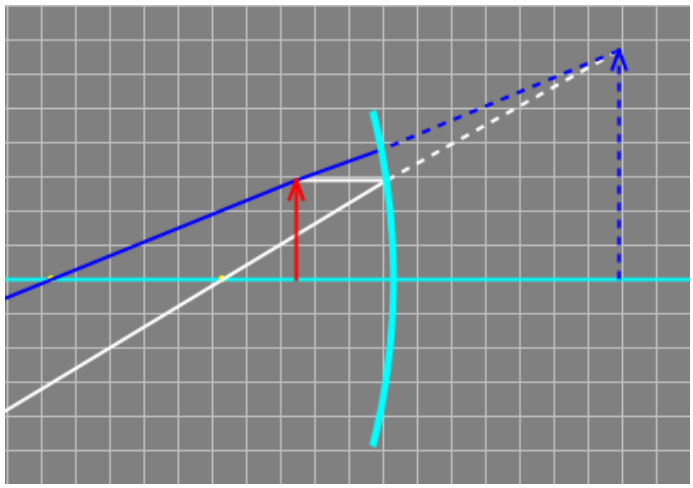
Virtual

behind mirror

upright

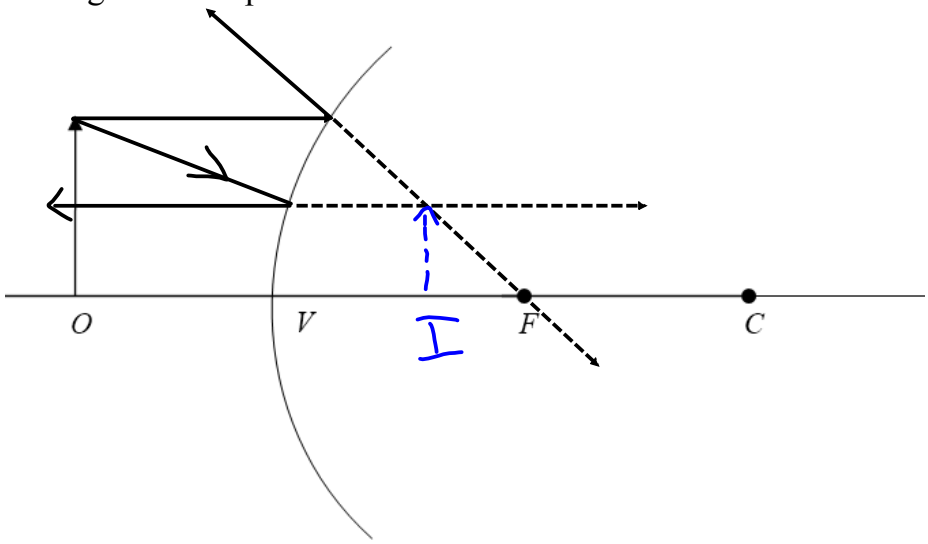
Larger

(Magnification > 1)



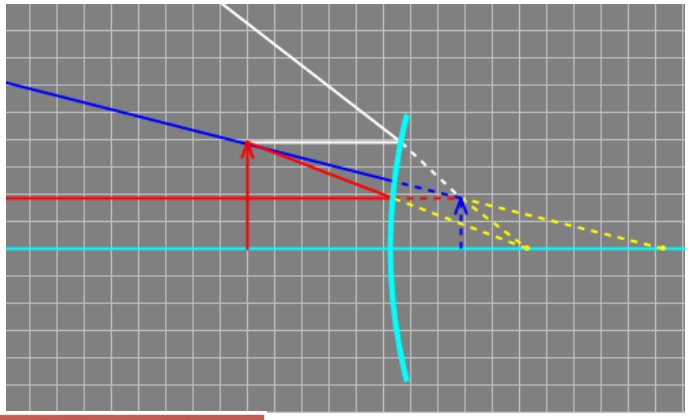
Images Formed by a Diverging (Convex) Mirror

- The principal focus and centre of curvature are virtual.Rays directed towards the virtual principal focus are reflected parallel to the P.A.
- Rays directed parallel to the P.A. are reflected in such a way that, when extended into the mirror, they go through the principal focus.
- Rays directed towards the centre of curvature are reflected back along the same path.



Characteristics:

virtual
smaller
between V & F
upright



Reading Review: Holt pg 459 - 460.