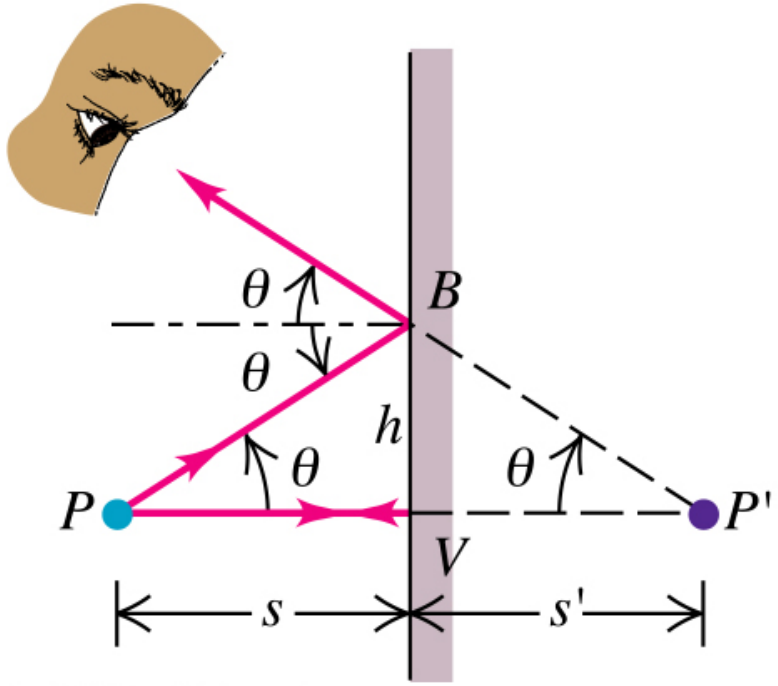
Ch 34. Geometric Optics

34-1. Reflection



s: object distance

s': image distance

s= -s'

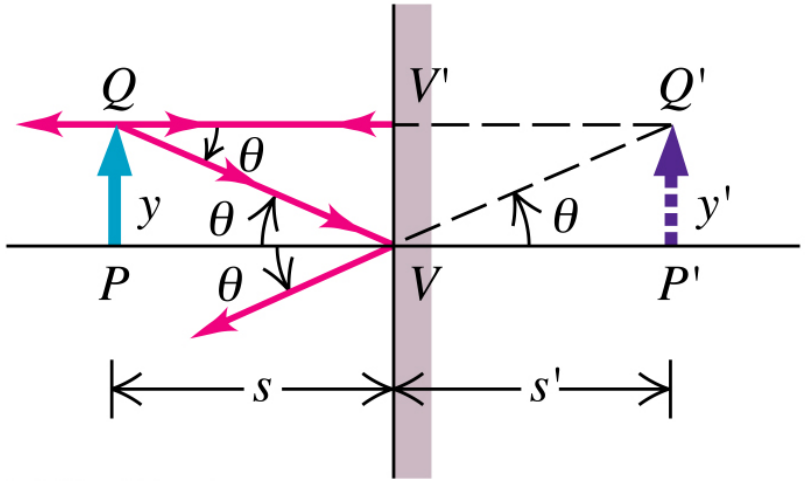
+: if in front of reflecting surface

-: behind

Virtual Image: light doesn't actually pass through, can't form on a screen

Real Image: light actually pass through, can form on a screen

Magnification



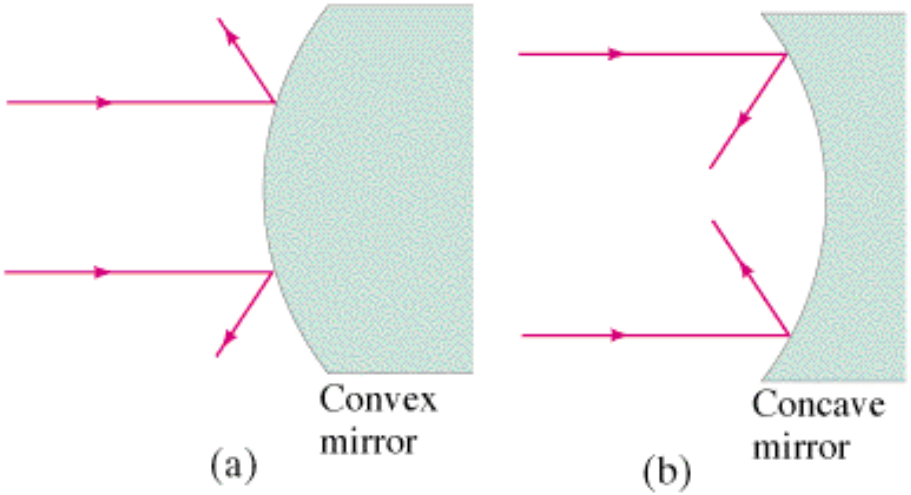
Object height y: +

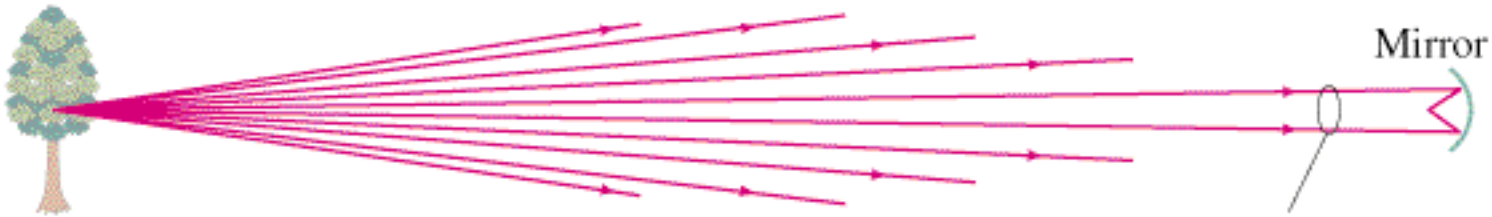
Image height y': + upright

- inverted

Lateral magnification m=y'/y

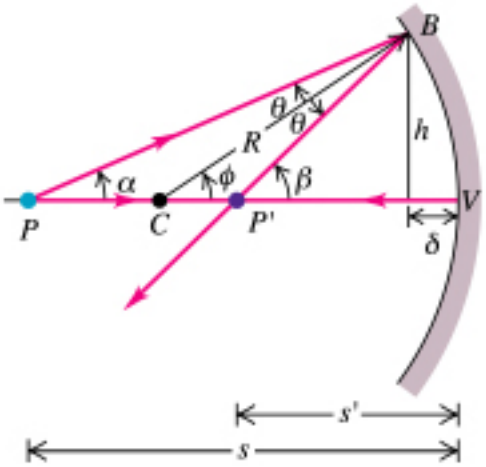
34-2. Spherical Mirrors

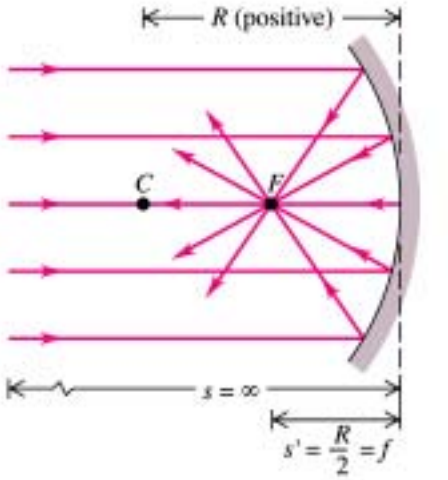




These rays are the only ones shown that will strike the mirror, and they are essentially parallel.

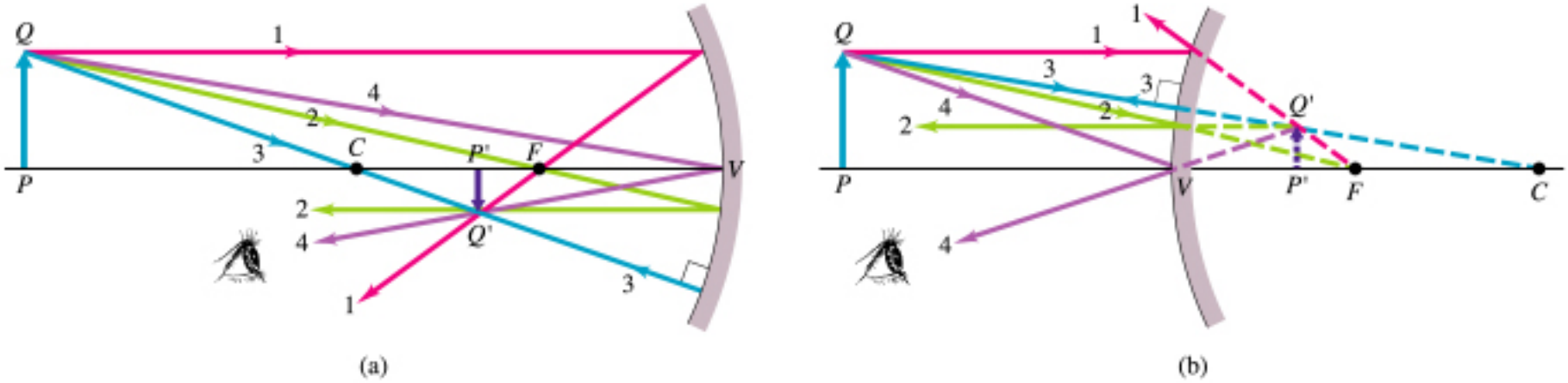
Concave Mirrors: Parallel Rays





CV: Principal axis
Point C: Center of curvature of the mirror
Point V: Vertex of the mirror
Point F: Focal point
R: Radius of curvature
f=*R*/2: Focal length
Paraxial rays: Parallel & close to the principal axis

Ray Diagram



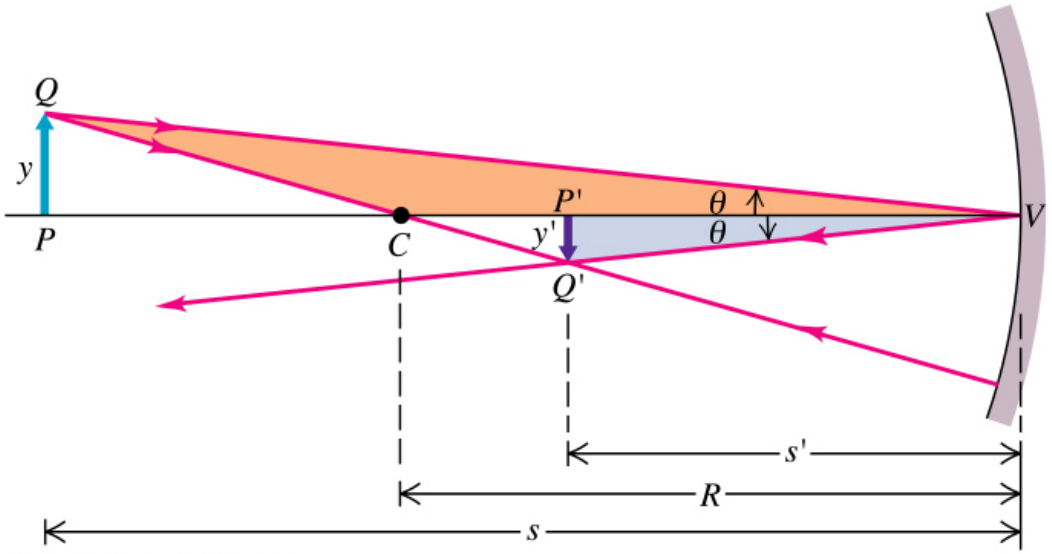
Ray 1 goes out from Q parallel to the axis & reflects through F.

Ray 2 goes through F and reflects back parallel to the axis.

Ray 3 heads out ⊥ mirror & reflects back on itself and goes through C.

Ray 4 reflects symmetrically about the axis at vertex V.

Mirror Equation



Object height: y
Image height: y'
Object distance: s
Image distance: s'

$$\frac{1}{s}+\frac{1}{s'}=\frac{2}{R}=\frac{1}{f}.$$

$$\frac{y}{-y'}=\frac{s}{s'} \qquad m=\frac{y'}{y}=-\frac{s'}{s}$$