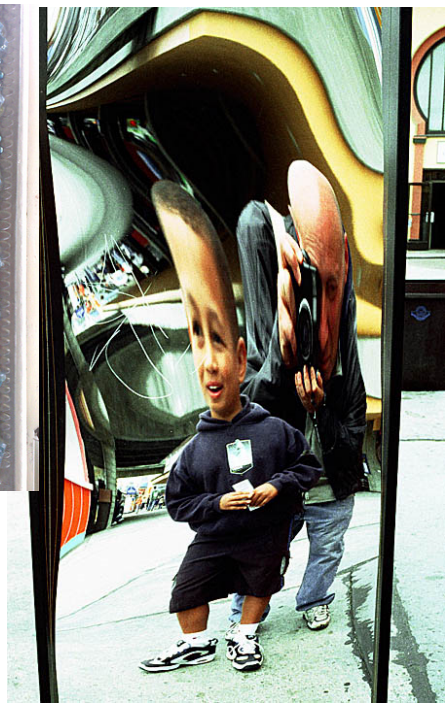
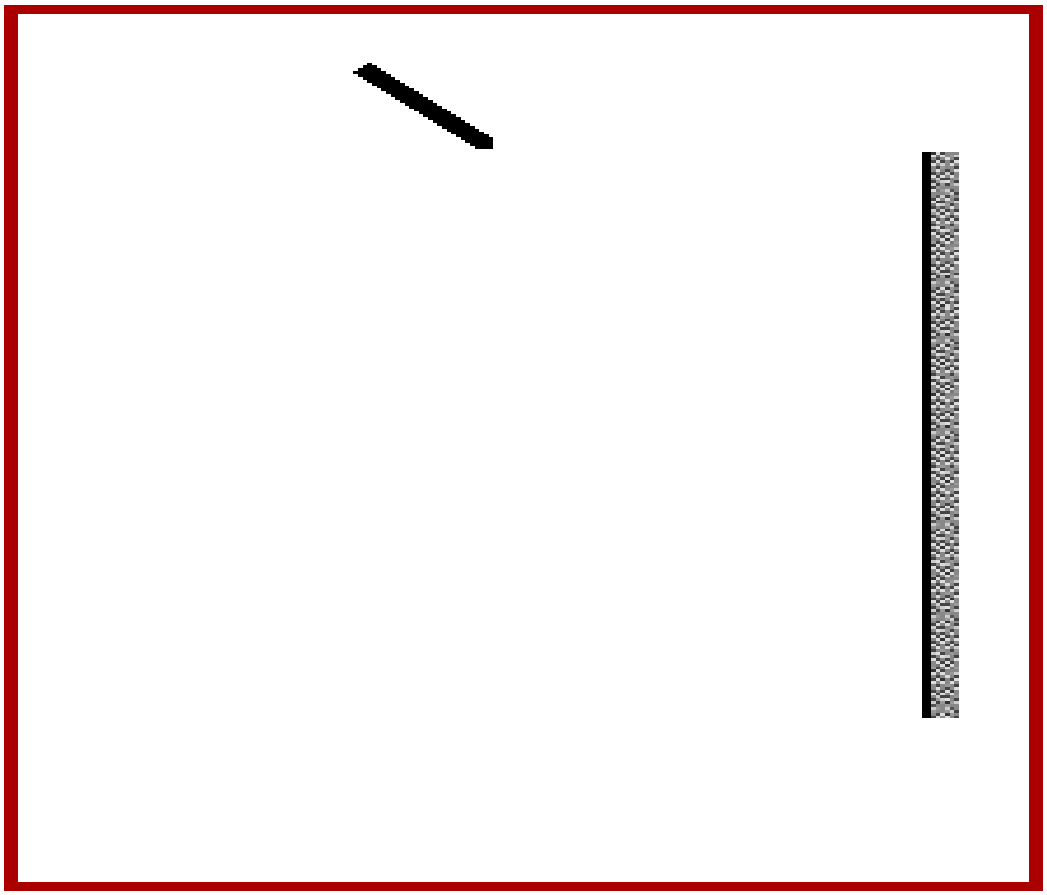
Mirrors

14.1



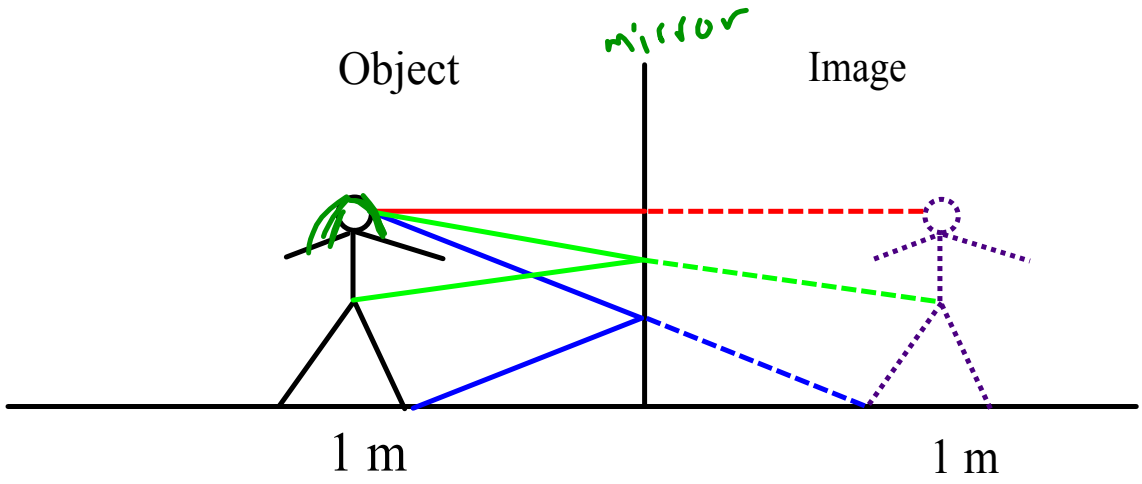
Law of Reflection

- The angle of reflection is equal to the angle of incidence
- Draw a ray diagram to show it
- Use words to describe image



Plane Mirrors

- Flat surface
- You see a reversed image
- It is always virtual, upright, same size

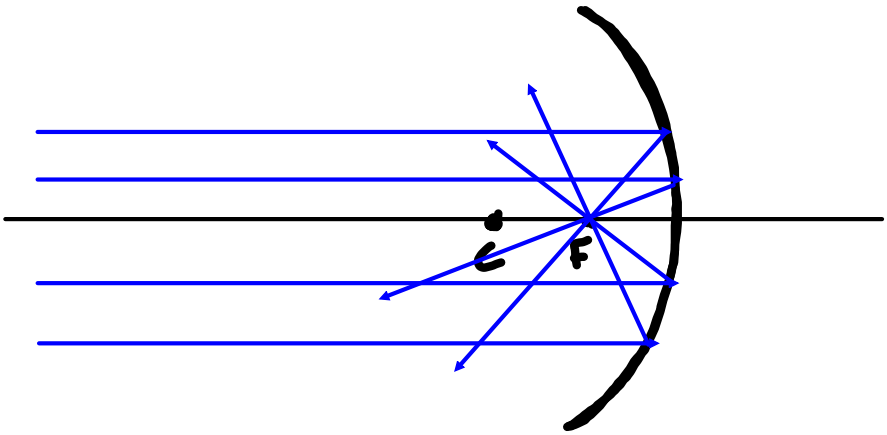


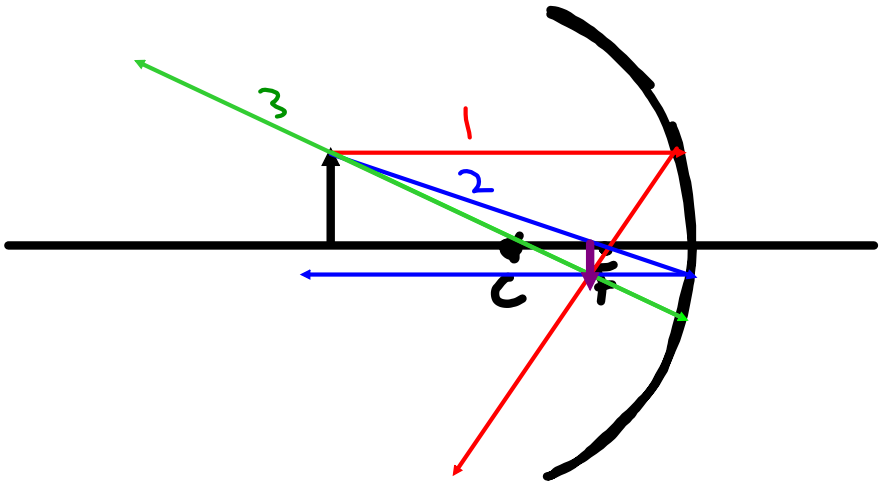
cat mirror

Concave Mirrors

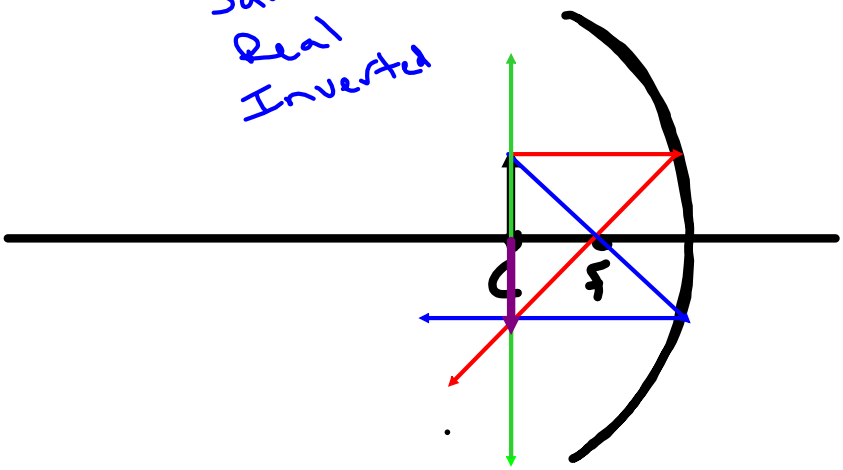
$F = \frac{C}{2}$

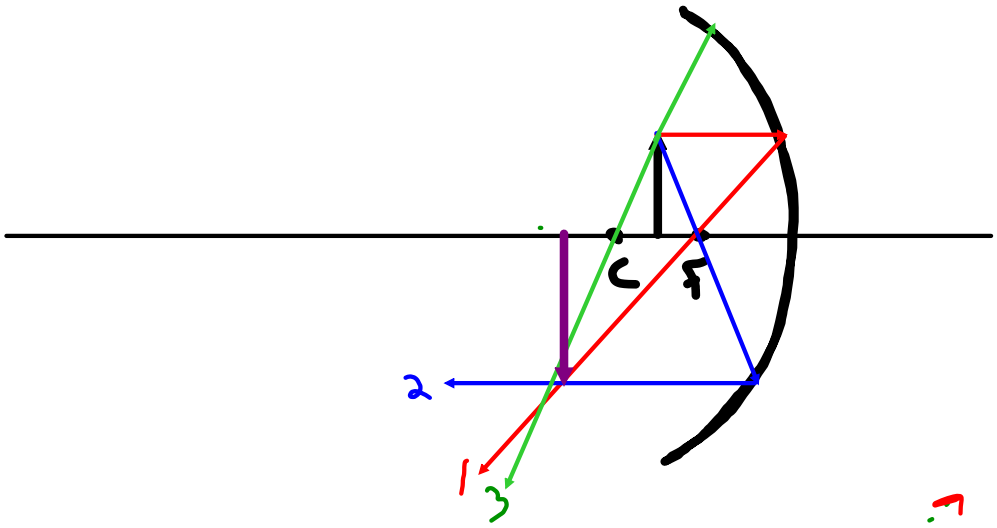
- Inside reflecting surface is curved
- Rays meet at a focal point
- Can form either real or virtual images
- Used in headlights on cars

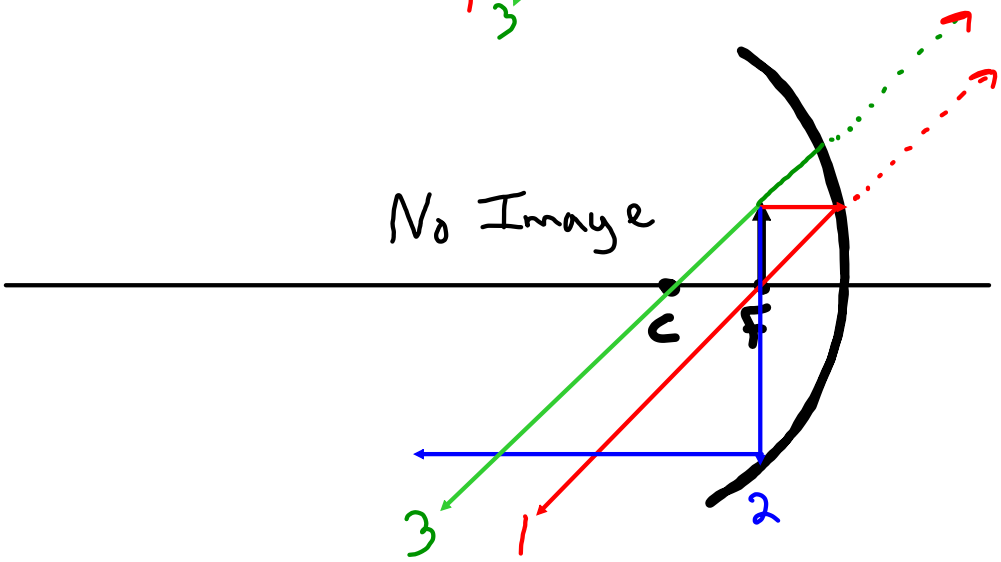


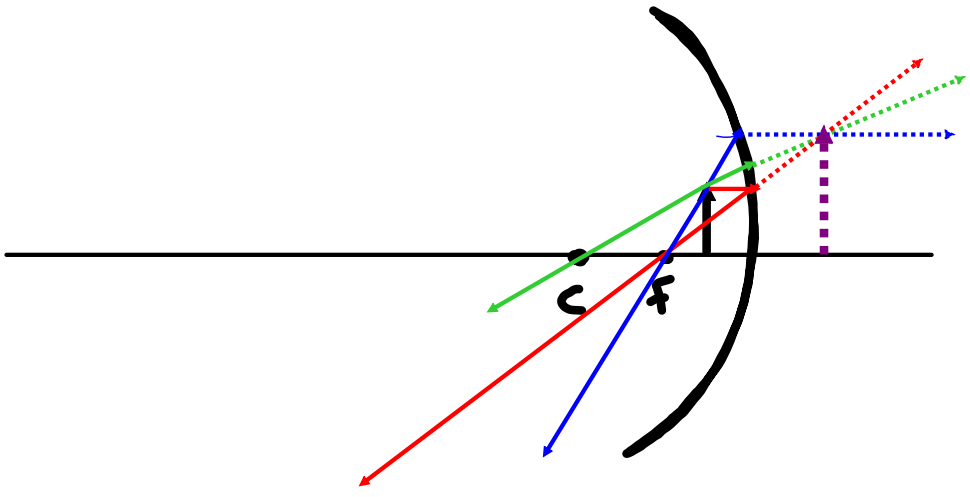


Same Size
Real
Inverted



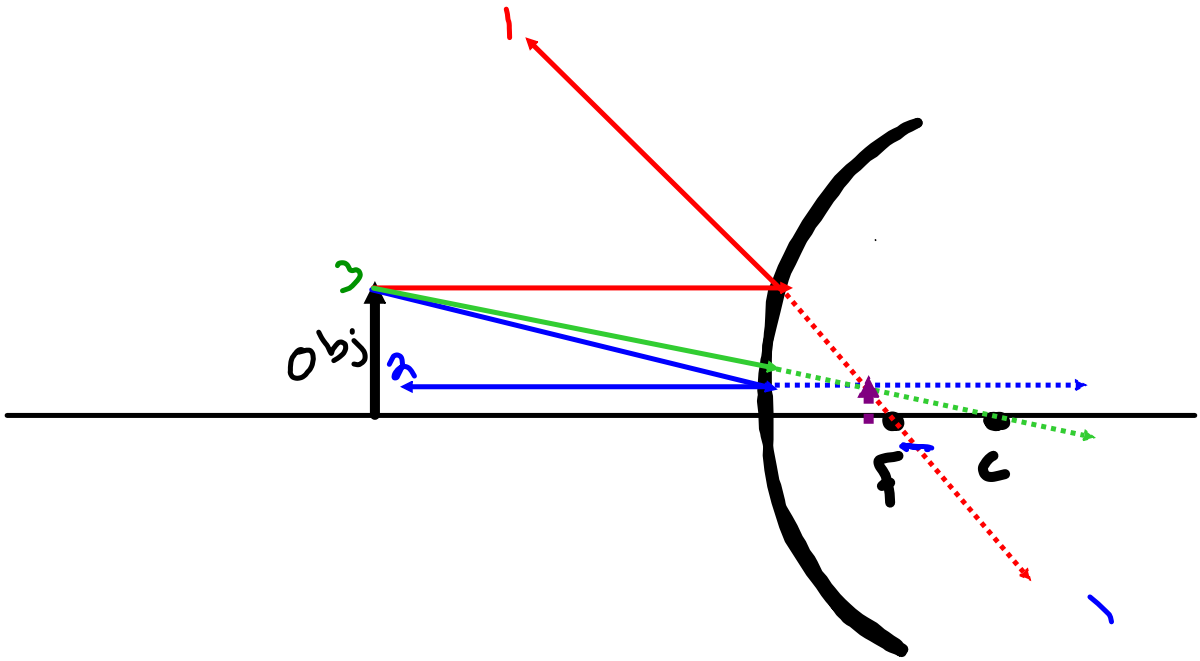

C
f
2
1
3


No Image
C
f
3
1
2


C
f

Convex Mirrors

- Outside reflecting surface is curved
- Always virtual, smaller, upright
- Gas Stations, car mirrors



Magnification

$M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$

magnification

$-d_i \rightarrow$ virtual

$-h_i \rightarrow$ inverted

$-M \rightarrow$ inverted

M = Hi/Ho = - Di/Do

any image that is upside down is (-)

$M > 1$ larger

$0 < M < 1$ smaller

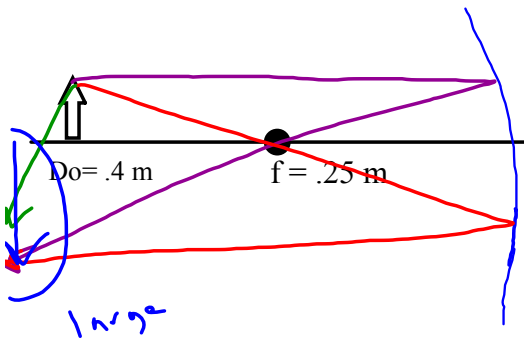
f = focal length

To find the object distance or focal points use this equation

1/f = 1/Do + 1/Di $\quad \frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$

Anything that is behind the mirror has a (-) sign

$-f \rightarrow$ convex



large
real
invert

$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$

$\frac{1}{.25} = \frac{1}{.4} + \frac{1}{d_i}$

Di = ? $\quad d_i = +.67m$

real

bigger

M= ?

$M = \frac{-d_i}{d_o}$

$M = -\frac{.67}{.4} = -1.67$

invert

real images → inverted

Virtual images → upright

Concave

$d_o = .3m$

$h_o = .5m$

$f = .7m$

$h_i = ?$

$d_i = ?$

$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$

$\frac{1}{.7} = \frac{1}{.3} + \frac{1}{d_i}$

$d_i = -.525m$ Virtual

$\frac{h_i}{h_o} = \frac{-d_i}{d_o}$

$\frac{h_i}{.5} = \frac{-.525}{.3}$

$h_i = +.875m$ upright, big

Convex

$h_o = 30cm$

$h_i = ?$ → Virt

$d_i = -25cm$

$d_o = ✓$

$f = -45cm$

$d_o = 56.25cm$

$h_i = 13.3cm$

↓ upright, small

Concave

$h_o = 80cm$

$h_i = -40cm$

$f = 50cm$

$d_o = ?$

binocular soccer

optical illusion eye

cat mirror