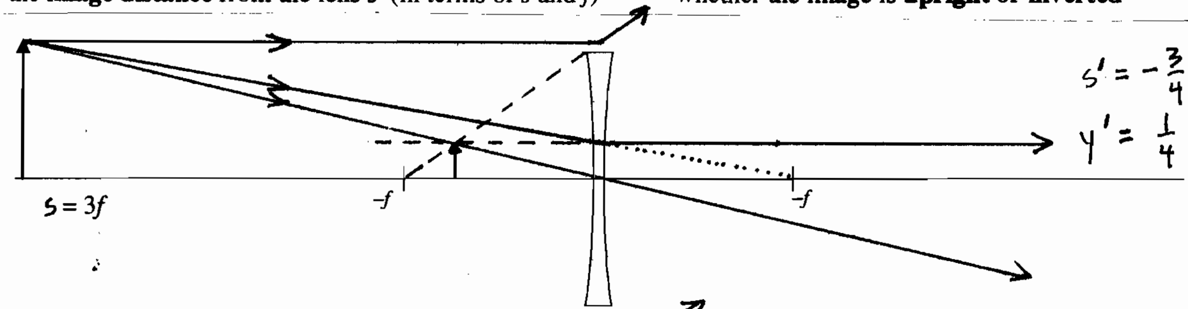
Physics 152

Diverging & Converging LENS Worksheet SOLUTIONS

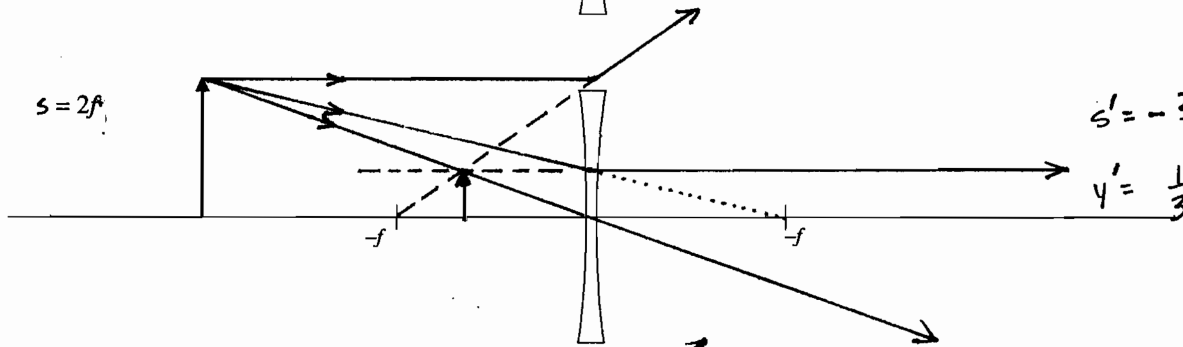
The same object (height = y) is placed at several different distances s to the left of the same lens (focal length = f). For each case, draw the **3 principal rays** to locate the image. Then use the "thin lens" equations to calculate:

- the **image height** y' (in terms of y)
- the **image distance** from the lens s' (in terms of s and f)
- whether **the image is real or virtual**
- whether **the image is upright or inverted**



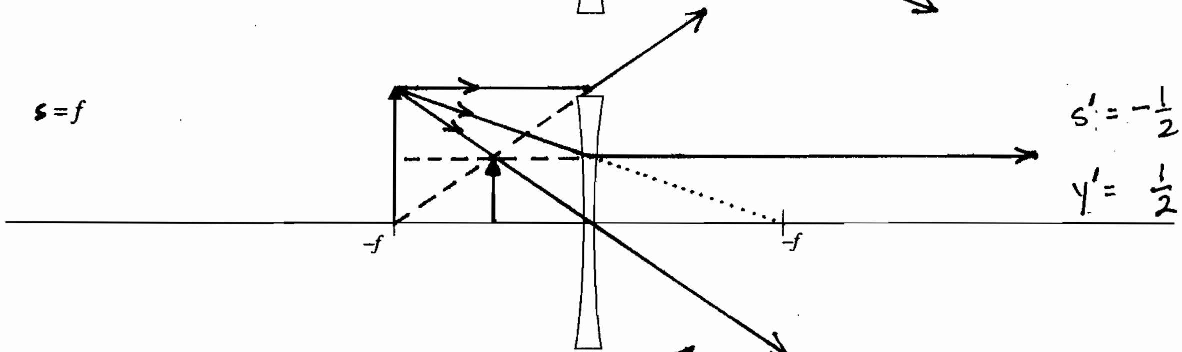
$s' = -\frac{3}{4}f$ virtual,

$y' = \frac{1}{4}y$ upright



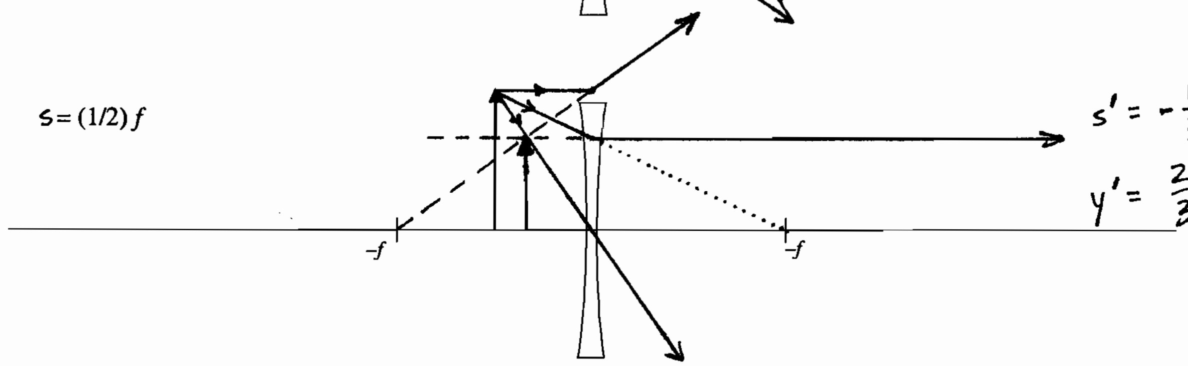
$s' = -\frac{2}{3}f$ virtual,

$y' = \frac{1}{3}y$ upright



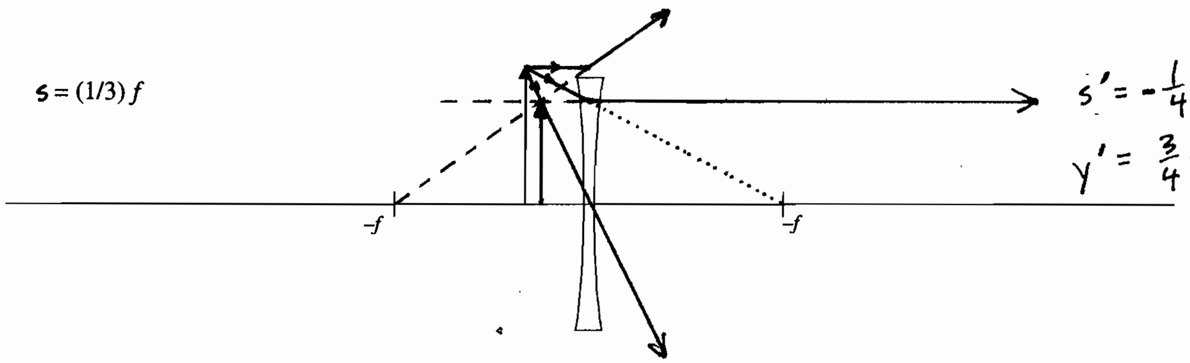
$s' = -\frac{1}{2}f$ virtual,

$y' = \frac{1}{2}y$ upright



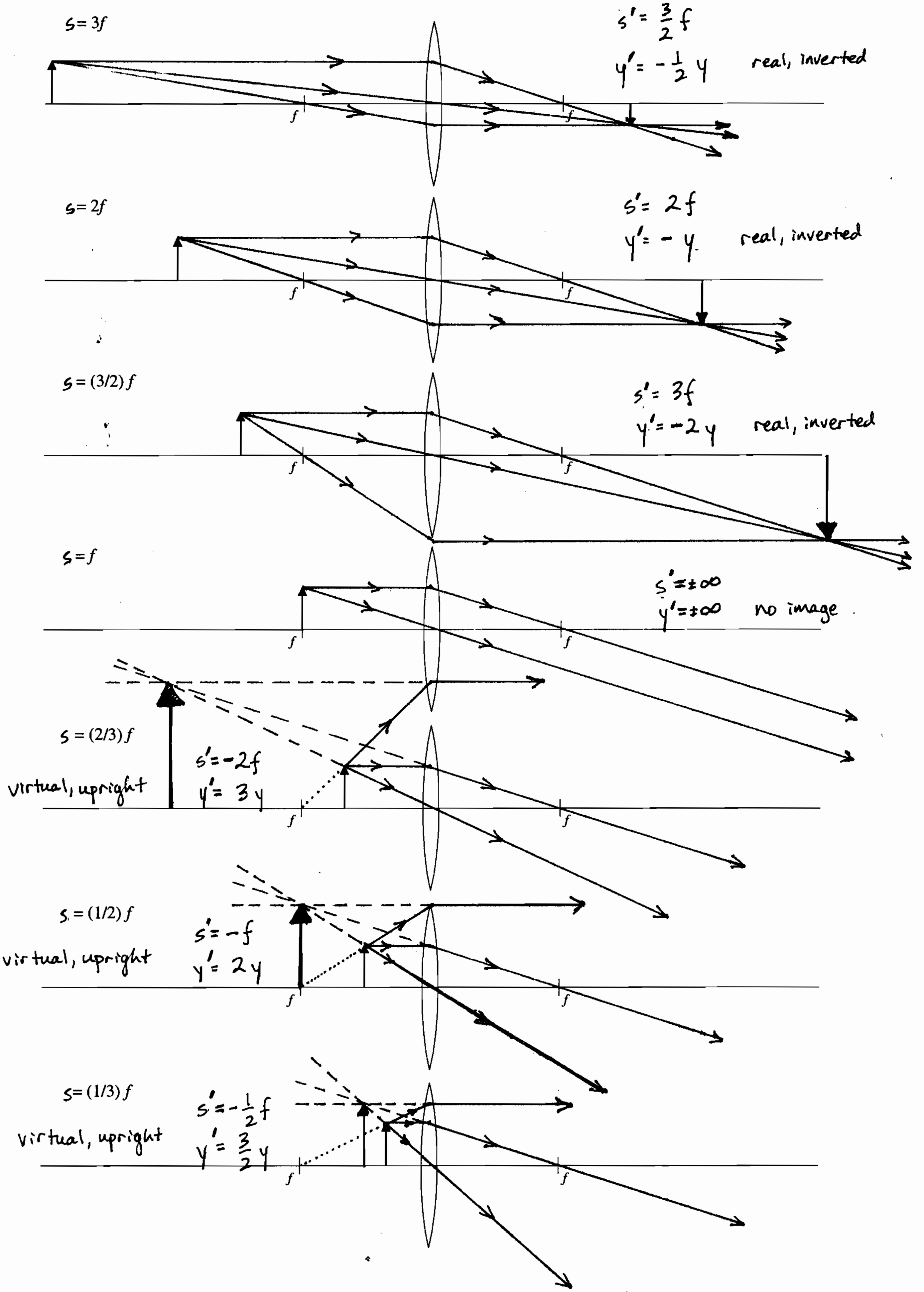
$s' = -\frac{1}{3}f$ virtual,

$y' = \frac{2}{3}y$ upright



$s' = -\frac{1}{4}f$ virtual,

$y' = \frac{3}{4}y$ upright



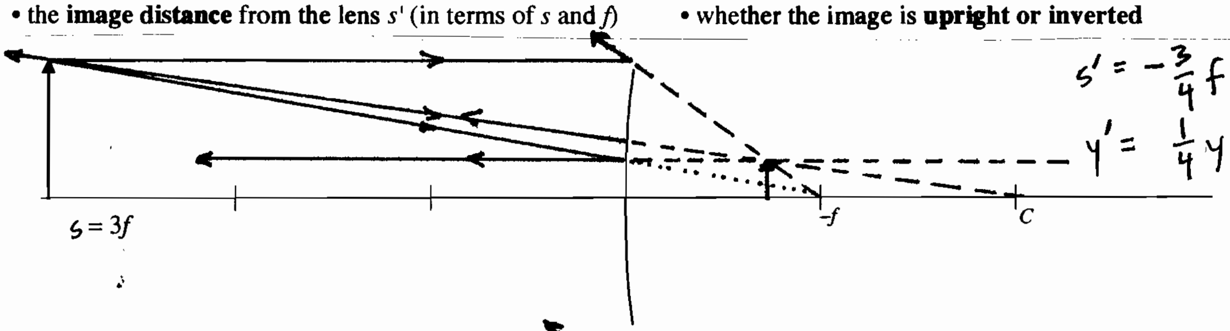
s = 3f
s' = 3/2 f
y' = -1/2 y
real, inverted
f
f
s = 2f
s' = 2f
y' = - y
real, inverted
f
f
s = (3/2) f
s' = 3f
y' = -2 y
real, inverted
f
f
s = f
s' = ±∞
y' = ±∞
no image
f
f
s = (2/3) f
s' = -2f
y' = 3 y
virtual, upright
f
f
s = (1/2) f
s' = -f
y' = 2 y
virtual, upright
f
f
s = (1/3) f
s' = -1/2 f
y' = 3/2 y
virtual, upright
f
f

Physics 152

Convex & Concave MIRROR Worksheet SOLUTIONS

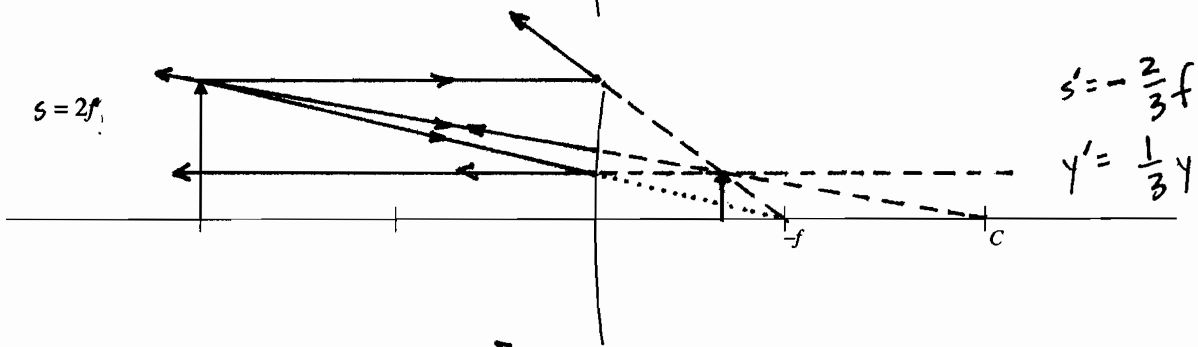
The same object (**height** = y) is placed at several different distances s to the left of the same mirror (focal length = f). For each case, **draw the 3 principal rays** to locate the image. Then use the "thin lens" equations to calculate:

- the **image height** y' (in terms of y)
- the **image distance** from the lens s' (in terms of s and f)
- whether the image is **real or virtual**
- whether the image is **upright or inverted**



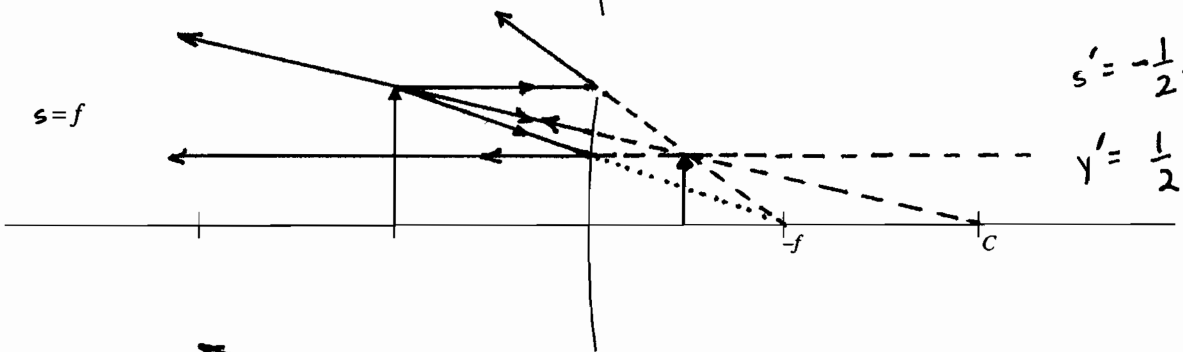
$s' = -\frac{3}{4}f$ virtual,

$y' = \frac{1}{4}y$. upright



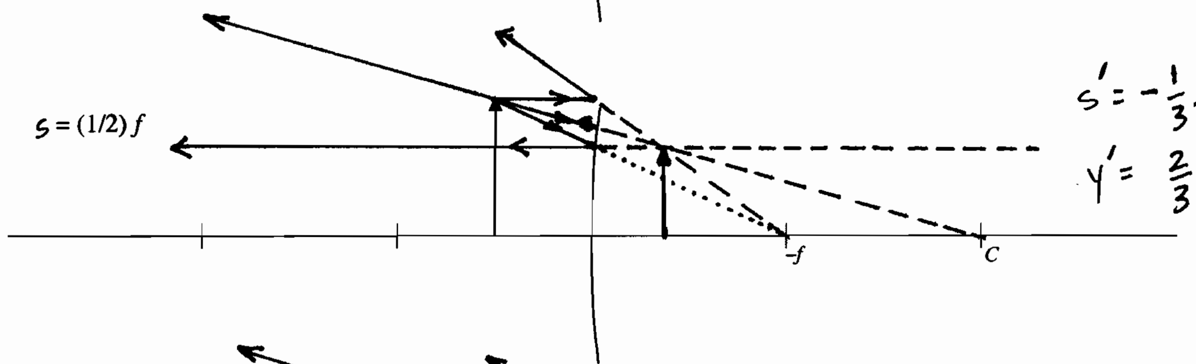
$s' = -\frac{2}{3}f$

$y' = \frac{1}{3}y$ virtual, upright



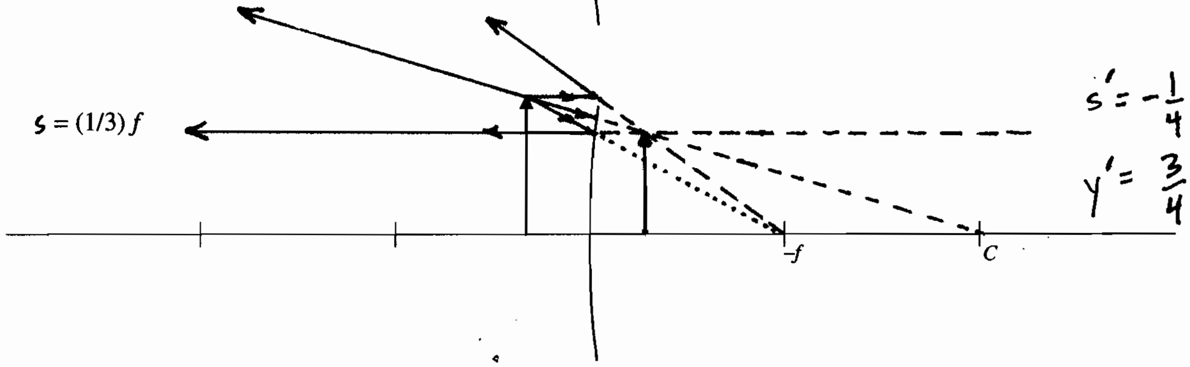
$s' = -\frac{1}{2}f$

$y' = \frac{1}{2}y$ virtual, upright



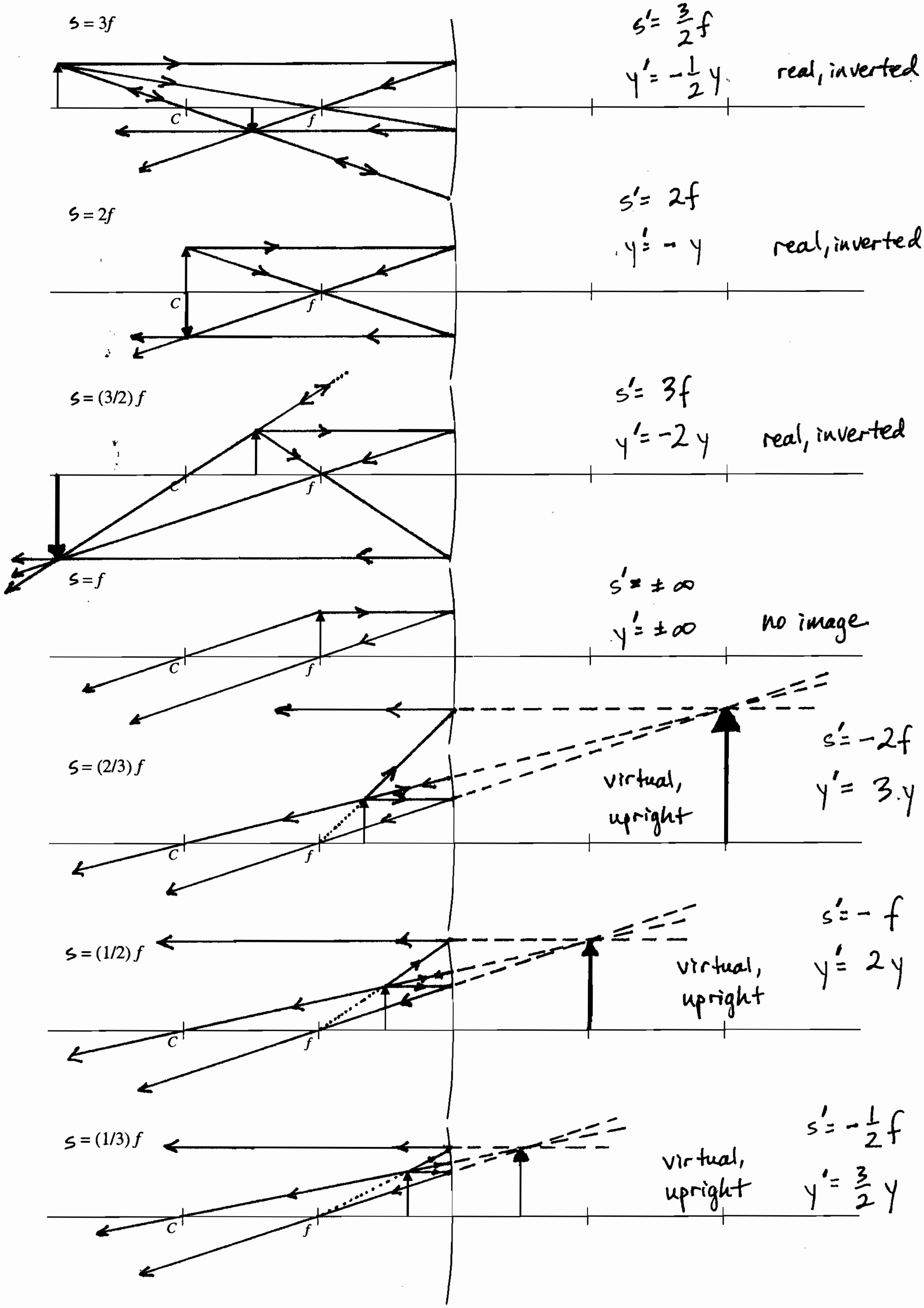
$s' = -\frac{1}{3}f$

$y' = \frac{2}{3}y$ virtual, upright



$s' = -\frac{1}{4}f$

$y' = \frac{3}{4}y$ virtual, upright


s = 3f
C
f
s' = (3/2) f
y' = −(1/2) y
real, inverted
s = 2f
C
f
s' = 2f
y' = − y
real, inverted
s = (3/2) f
C
f
s' = 3f
y' = −2 y
real, inverted
s = f
C
f
s' = ± ∞
y' = ± ∞
no image
s = (2/3) f
C
f
s' = −2f
y' = 3 y
virtual, upright
s = (1/2) f
C
f
s' = − f
y' = 2 y
virtual, upright
s = (1/3) f
C
f
s' = −(1/2) f
y' = (3/2) y
virtual, upright