

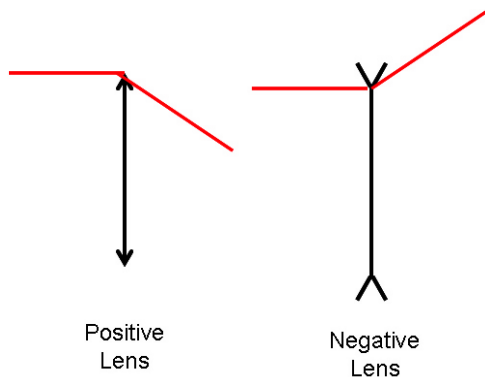
These problems illustrate the imaging properties of lenses and use the two image equations that were mentioned in class:

$$\frac{1}{z_1} + \frac{1}{z_2} = \frac{1}{f}$$

$$M_t = -\frac{z_2}{z_1}$$

Characterize the images (location and magnification) obtained using single thin lenses under the following conditions.

Sketch the systems showing the lens, focal points, object, and image. Use “arrows” to represent the lenses: a ‘normal’ arrow for a positive lens and an arrow with the heads ‘reversed’ for a negative lens:



Black Arrows = Lens, Red Lines = Rays

1.  $f = +100$  mm,  $z_1 = +200$  mm
2.  $f = +100$  mm,  $z_1 = +150$  mm
3.  $f = +100$  mm,  $z_1 = +100$  mm
4.  $f = +100$  mm,  $z_1 = +50$  mm
5.  $f = -100$  mm,  $z_1 = +200$  mm
6.  $f = -100$  mm,  $z_1 = +100$  mm
7.  $f = -100$  mm,  $z_1 = +50$  mm