Lenses & Mirrors (ch. 34)

- **Mirror images**: Focal length, \( f = \frac{R}{2} \)
  
  \( (\infty \text{ for flat mirror, negative for convex}) \)

  Image formation, \( \frac{1}{s} + \frac{1}{s'} = \frac{1}{f} \),

  where \( s \) is for object, \( s' \) for image.

  Magnification: \( m = \frac{y'}{y} = -\frac{s'}{s} \)

- **Converging lens** (\( s \) positive on back side, \( s' \) on observer side)

  \[ \frac{1}{s} + \frac{1}{s'} = \frac{1}{f} \], \[ \frac{y'}{y} = -\frac{s'}{s} \]

  lens power, \( 1/f \) in Diopters (\( D = 1/m \))

  \( m = -\frac{s'}{s} \), magnification, \( M = \frac{\theta'}{\theta} \), angular magnification

  \( f \)-stop or \( f \)-number: ratio of \( f \) to diameter

- **Diverging lens** (\( f \) negative, \( s' \) always negative)

  then use \( \frac{1}{s} + \frac{1}{s'} = \frac{1}{f} \), same as above.

- **Lens combinations**:

  *Image* of first lens acts as *object* for second lens.

- **Lens-makers equation**:

  \[ \frac{1}{f} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right) \],

  where \( n \) is index of refraction.