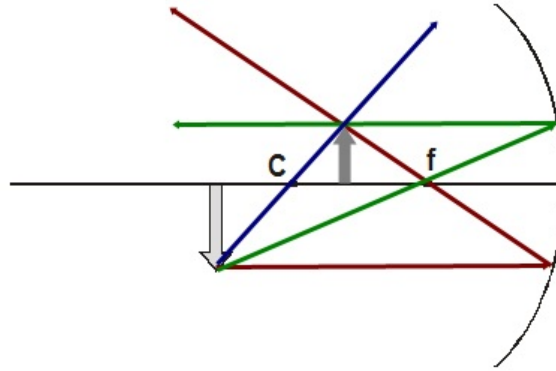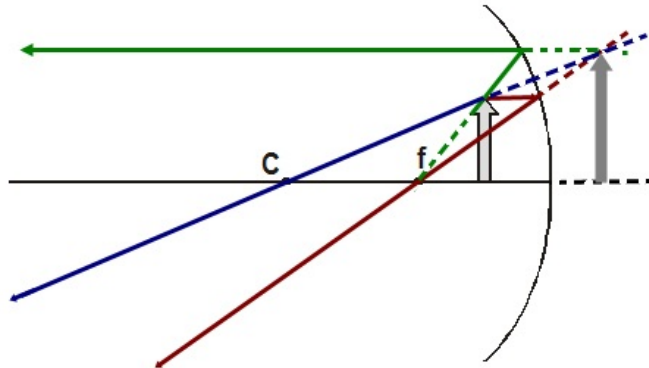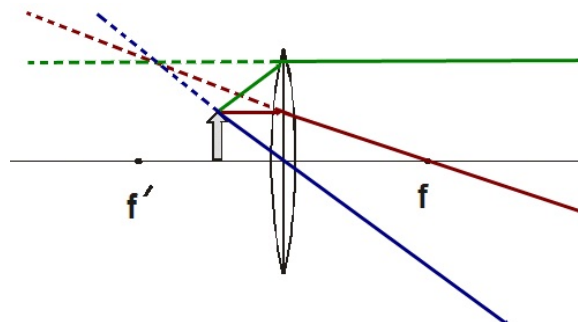Name: _____

1. Construct the image on the drawing below via ray tracing.
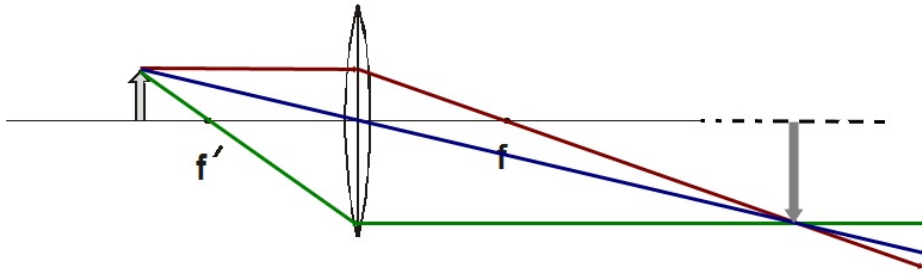

2. Construct the image on the drawing below via ray tracing.

3. Construct the image for an object placed as shown below.

4. Construct the image formed by the object as shown below. If the focal length of the lens is 15.5 cm and the 3.20 cm (in height) object is placed 22.0 cm from the lens, find (a) the image distance, (b) the magnification, (c) the image height.

    a. $1/f = 1/d_i + 1/d_o$

       $1/(0.155 \text{ m}) = 1/d_i + 1/(0.22 \text{ m})$

       $d_i = (1/(0.155 \text{ m}) - 1/0.22 \text{ m})^{-1} = \boxed{52.5 \text{ cm}}$

    b. $M = -d_i/d_o = 52.5 \text{ cm}/22.0 \text{ cm} = -2.384615 = \boxed{-2.38}$

    c. $h_i = M \cdot h_o = -2.384615 \cdot 3.20 \text{ cm} = -7.630769 \text{ cm} = \boxed{-7.63 \text{ cm}}$

5. A double convex thin lens has a focal length of 35.0 cm. A 2.15 cm tall object is placed 10.0 cm from the lens, find (a) the type of image, (b) the image distance, (c) the magnification, (d) the image height.

    b. $i^{-1} + o^{-1} = f^{-1}$

       $i = (f^{-1} - o^{-1})^{-1} = ((1/35) - (1/10))^{-1} = \boxed{-14.0 \text{ cm}}$

    a. $\boxed{\text{virtual image}}$ (negative image distance value)

    c. $m = -i/o = -(-14.0 \text{ cm})/10.0 \text{ cm} = \boxed{1.40}$

    d. $h_i = h_o \cdot m = 2.15 \text{ cm} \cdot 1.40 = \boxed{3.01 \text{ cm}}$