SNC2D   **Lens Equations**
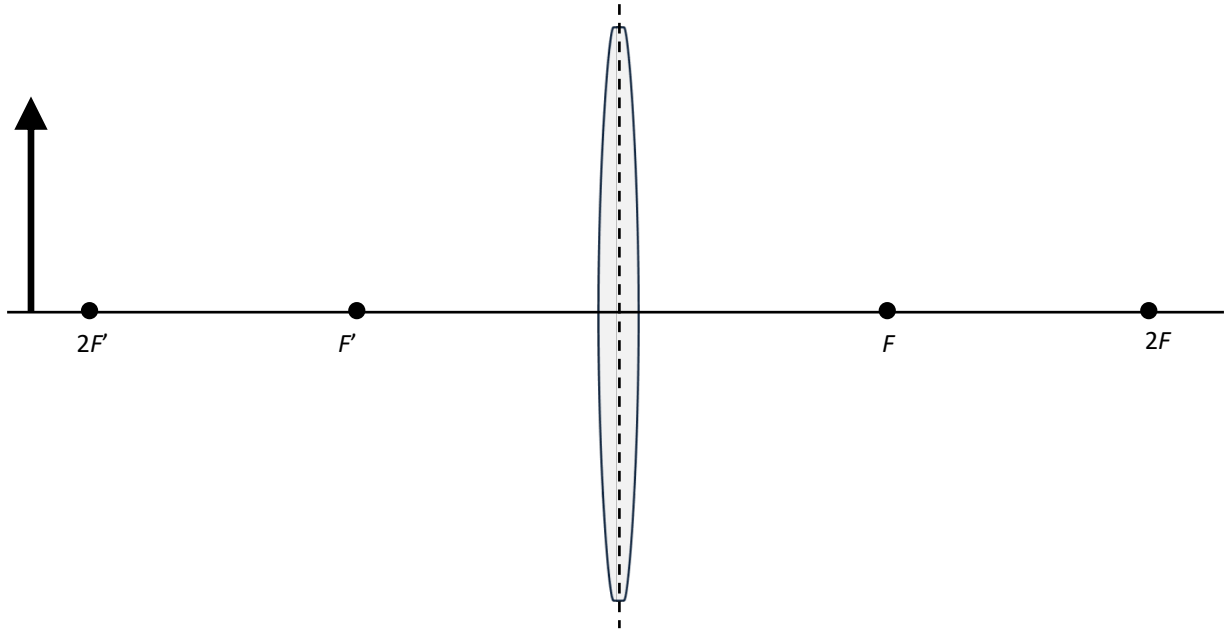Ms. Kueh

Textbook (*Science Perspectives 10*), Section 13.4 (pp. 562–566)

Complete the following ray diagram. Label each of the following: h_o, h_i, d_o, d_i, and f.

| | 2F' | F' | | F | 2F |

Provide terms for each of the variables.

Variable	Term
h_o	
h_i	
d_o	
d_i	
f	

Write the Thin Lens Equation:

Write the Magnification Equation:

Complete the following table.

Variable	Positive	Negative
h_o		
h_i		
d_o		
d_i		
F		
M		

1. A converging lens has a focal length of $17\ cm$. A candle is located 48 cm from the lens. What type of image will be formed, and where will it be located?

2. A diverging lens has a focal length of $29\ cm$. A virtual image of a marble is located $13\ cm$ in front of the lens. Where is the marble located?

3. A toy of height $8.4\ cm$ is balanced in front of a converging lens. An inverted, real image of height $23\ cm$ is noticed on the other side of the lens. What is the magnification of the lens?

4. A small toy building block is placed $7.2\ cm$ in front of a lens. An upright, virtual image of magnification 3.2 is noticed. Where is the image located?

5. A coin of height $2.4\ cm$ is placed in front of a diverging lens. An upright, virtual image of height $1.7\ cm$ is noticed on the same side of the lens as the coin. What is the magnification of the lens?

6. A converging lens has a focal length of $23\ cm$. A frog is $32\ cm$ from the lens. Calculate where the image of the frog will be located.

7. A pencil is located $53\ cm$ from a diverging lens. An upright, virtual image of the pencil is observed $18\ cm$ from the lens. Calculate the focal length of this lens.

8. A diverging lens has a focal length of $34\ cm$. An upright, virtual image of a small booklet is located $13\ cm$ behind the lens. Where is the booklet located?

9. A converging lens has a focal length of 16 *cm*. An insect is located 11 *cm* from the lens. Where will the image of the insect be located?

10. A vase of height 12 *cm* is placed in front of a converging lens. An inverted image of height 35 *cm* is noticed on the other side of the lens.
    a. Use the magnification equation to calculate the magnification of the lens.

    b. What type of image is it?

11. A playing card of height 14 *cm* is placed in front of a converging lens. An inverted, real image of height 7.9 *cm* is noticed on the other side of the lens. What is the magnification of the lens?

12. A postage stamp of height 2.8 *cm* is placed in front of a diverging lens. A virtual image of height 1.3 *cm* is noticed on the same side of the lens as the stamp.
    a. What is the magnification of the lens?

    b. Is there an inversion of the image?

13. A small fork is placed $9.4\ cm$ in front of a lens. An upright, virtual image of the fork with a magnification of 5.6 times is observed.

   a. Where is the image located?

   b. What is the focal length for this lens?

   c. What kind of lens is this? Explain.