

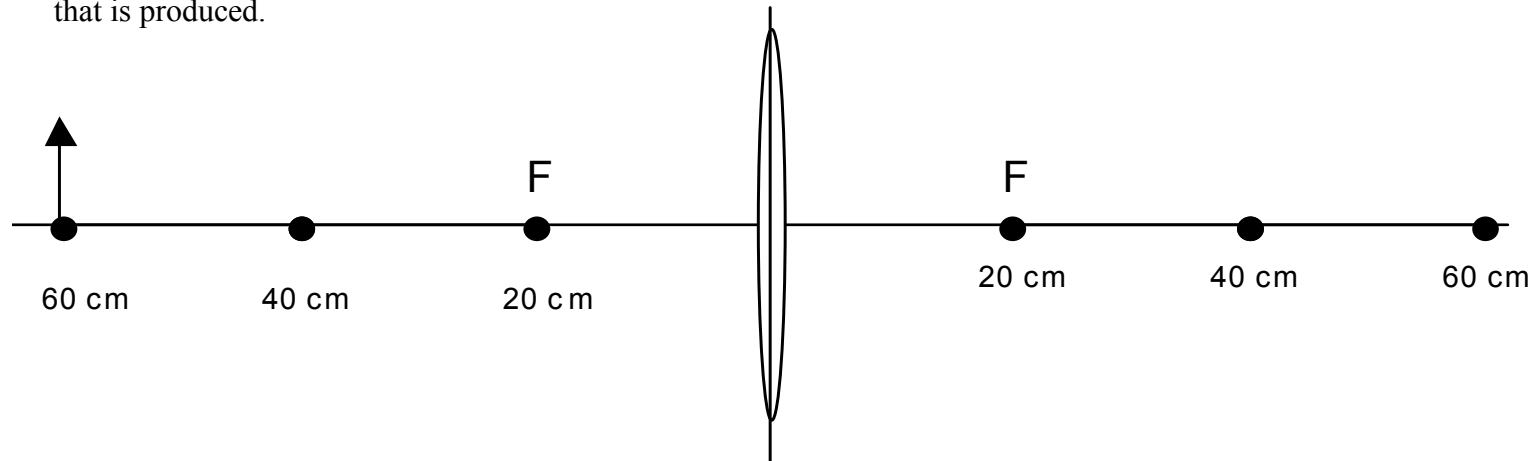
Name _____

Date _____ Pd _____

Optics Worksheet 5: Thin lens Equation

1. A lit candle is placed 60 cm from a large converging lens that has a focal length of 20 cm. The candle is 4.5 cm in height. Using your knowledge of ray diagrams, the thin lens equation and the magnification equation answer the following questions.

- a. Complete the following ray diagram as accurately as possible to determine an estimated location and size of the image of the candle that is produced.



- b. Use the thin lens equation to determine the exact distance between the lens and the location of the image of the candle.
- c. Use the magnification equation to determine the magnification of the image of the candle.
- d. What significance is the negative sign in front of the magnification factor? Explain in one complete sentence.
- e. Explain how size of the object and image compare when the magnification value is less than one. What about when it is larger than one?

2. The focal length of a converging lens is 17 cm. A 5 cm tall light bulb is placed 34 cm in front of the lens.
 - a. Determine the distance from the image to the lens. Show your work.
 - b. What is the height of the image of the light bulb? Is the image upright, or upside down? Explain how you know? Show your work.
3. An apple is placed in front of a diverging lens with a focal length of -10 cm. The distance from the apple to the lens is 30 cm.
 - a. Determine the location of the image of the apple.
 - b. On what side of the lens is the image of the apple? What in your answer tells you this information about the image? Explain in one complete sentence.
 - c. What is the height of the image of the apple, if the apple itself is only 10 cm tall? Show your work.
 - d. What is the magnification factor of this lens? Show your work.
 - e. Why is the magnification factor positive? Explain in one complete sentence.