Instructor, A **section 118**

SFU Department of Physics

phys102n – Spring 2003 – Assignment 8.
Due Thr, Nov 25, 2004 at 23:59hrs. CAPA ID is **2620**

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1. [1 pt.] Which of the following statements are TRUE about the image formed by a single lens? Enter all true statements.

A) A diverging lens can produce a real, inverted, reduced image.
B) A converging lens can never produce a virtual, upright, reduced image.
C) A converging lens cannot produce a real, inverted reduced image.
D) For a converging lens an object has to be placed between the focal length and the lens in order to form a virtual image.
E) A diverging lens always produces a virtual, upright, reduced image.
F) A converging lens can produce a virtual, upright, enlarged image.

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2. [1 pt.] An apple is placed 12.2cm in front of a diverging lens with a focal length of magnitude 25.2cm. What is the image distance i to the image of the apple through this lens?

3. [1 pt.] What is the magnification of the image of the apple?

4. [1 pt.] Consider the following statements. Determine which are true and which are false (if, for example, 'C' and 'D' are true and the rest are false then answer 'FFTT'.)

The image of the apple is ...

A)Virtual.
B)Reduced in size.
C)Inverted.
D)In front of the lens.

Note: We suggest you use ray diagrams to qualitatively understand the following questions. You will be asked to produce ray diagrams on the exams.
A candle 6.70cm high is placed in front of a thin converging lens of focal length 39.0cm.

5. [1 pt.] What is the image distance i when the object is placed 109.0cm in front of the same lens?

6. [1 pt.] What is the size of the image? (Note: an inverted image will have a 'negative' size.)

7. [1 pt.] Is the image real(R) or virtual(V)?; upright(U) or inverted(I)?; larger(L) or smaller(S) or unchanged(UC)?; In front of the lens(F) or behind the lens(B)? Answer these questions in the order that they are posed. (for example, if the image is real, inverted, larger, and behind the lens then enter 'RILB'.)

8. [1 pt.] The object is now moved to 48.0cm in front of the lens. What is the new image distance i?

9. [1 pt.] What is the new size of the image? (Note, an inverted image will have a 'negative' size.)

10. [1 pt.] Is the new image real(R) or virtual(V)?; upright(U) or inverted(I)?; larger(L) or smaller(S) or unchanged(UC)?; In front of the lens(F) or behind the lens(B)? Answer these questions in the order that they are posed. (for example, if the image is real, inverted, larger, and behind the lens then enter 'RILB'.)

11. [1 pt.] The object is now moved to 24.5cm in front of the lens. What is the new image distance i?

12. [1 pt.] What is the new size of the image? (Note, an inverted image will have a 'negative' size.)

13. [1 pt.] Is the new image real(R) or virtual(V)?; upright(U) or inverted(I)?; larger(L) or smaller(S) or unchanged(UC)?; In front of the lens(F) or behind the lens(B)? Answer these questions in the order that they are posed. (for example, if the image is real, inverted,larger and behind the lens then enter 'RILB'.)

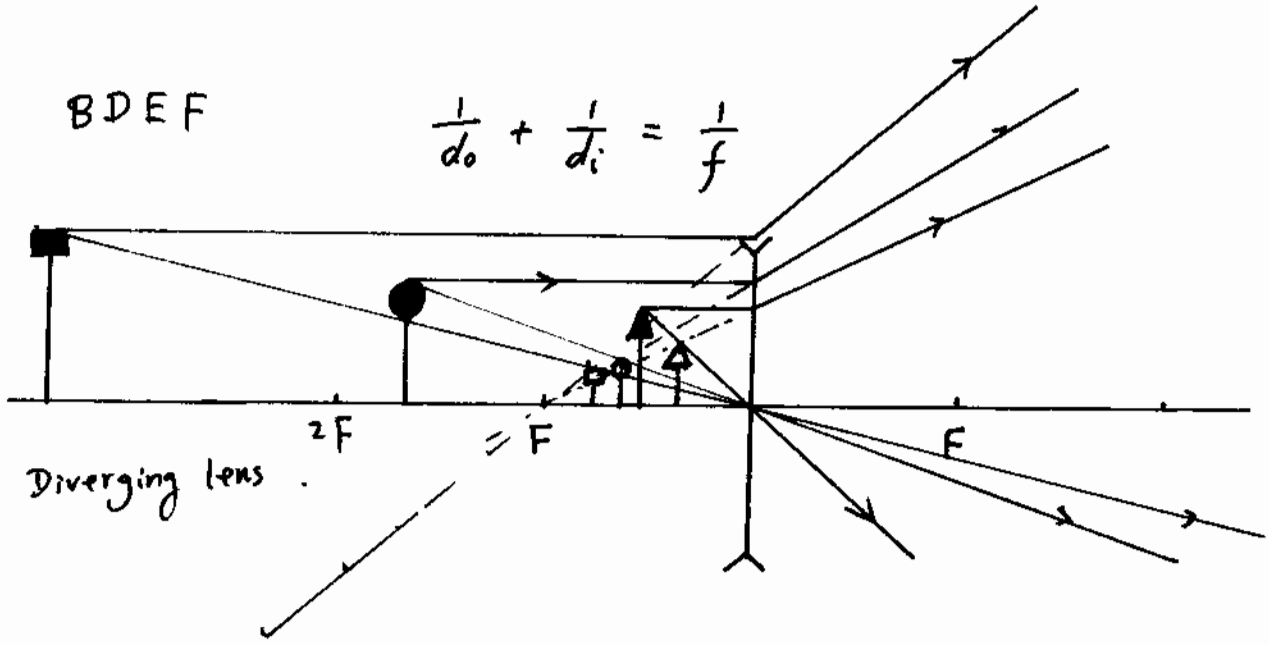
Baking Tip: Golden raisins, dark raisins and currants can be used interchangeably in baking recipes.

Physics 102

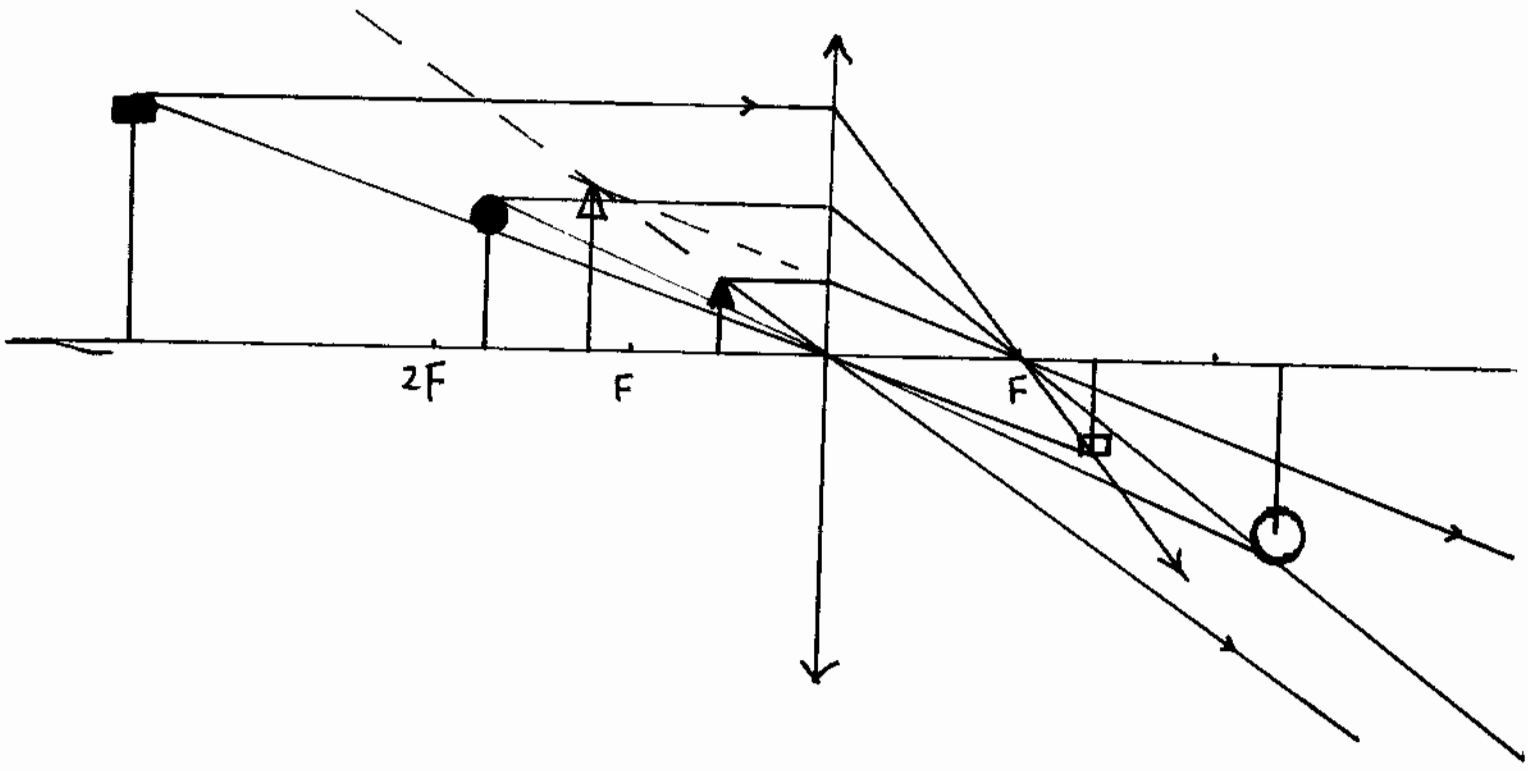
CAPA set #8 solutions

1. BDEF

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$



Diverging lens.



2. $f = -25.2$ cm $\qquad \frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$.

$d_o = 12.2$ cm

$$d_i = \frac{d_o \cdot f}{d_o - f} = \frac{(12.2)(-25.2)}{12.2 - (-25.2)} = -8.22 \text{ cm}$$

3. $$m = -\frac{d_i}{d_o} = -\frac{-8.22}{12.2} = 0.674$$

4. ABD

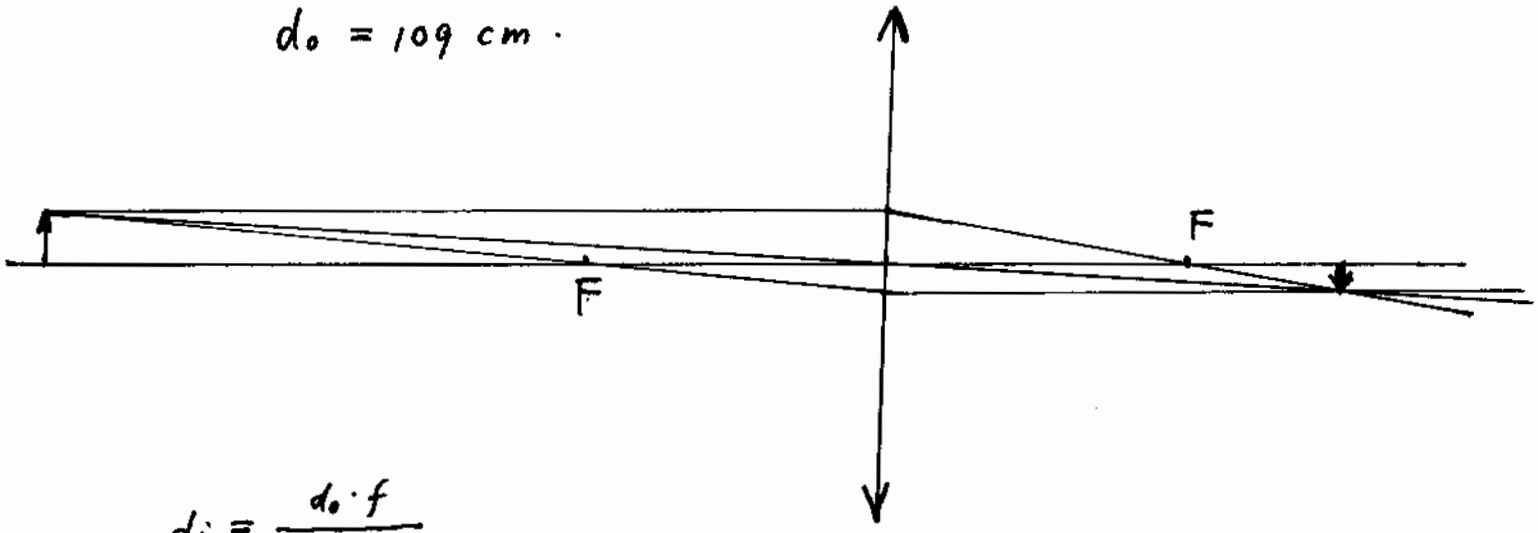
A — Virtual ($d_i < 0$)

B — Reduced in size ($|m| < 1$)

D — in front of lens. ($d_i < 0$)

5. $h_o = 6.70$ cm. $\qquad f = 39.0$ cm.

$d_o = 109$ cm.



$$d_i = \frac{d_o \cdot f}{d_o - f}$$

$$= \frac{(109)(39)}{(109) - 39} = 60.7 \text{ cm}$$

6. $\frac{h_i}{h_o} = -\frac{d_i}{d_o} = m$.

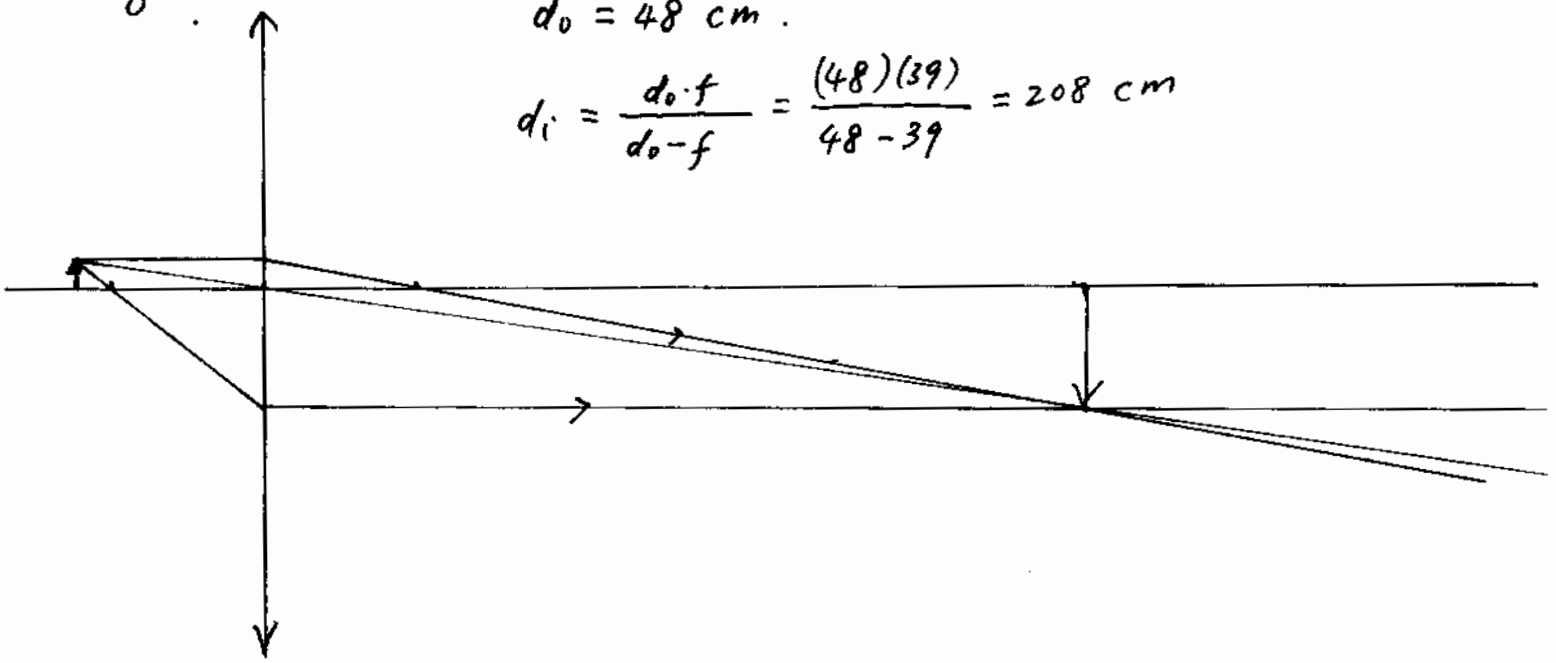
$$h_i = -\frac{d_i h_o}{d_o} = -\frac{(60.7)(6.7)}{109} = -3.73 \text{ cm}.$$

7. RISB

8.

$d_o = 48$ cm.

$$d_i = \frac{d_o \cdot f}{d_o - f} = \frac{(48)(39)}{48-39} = 208 \text{ cm}$$

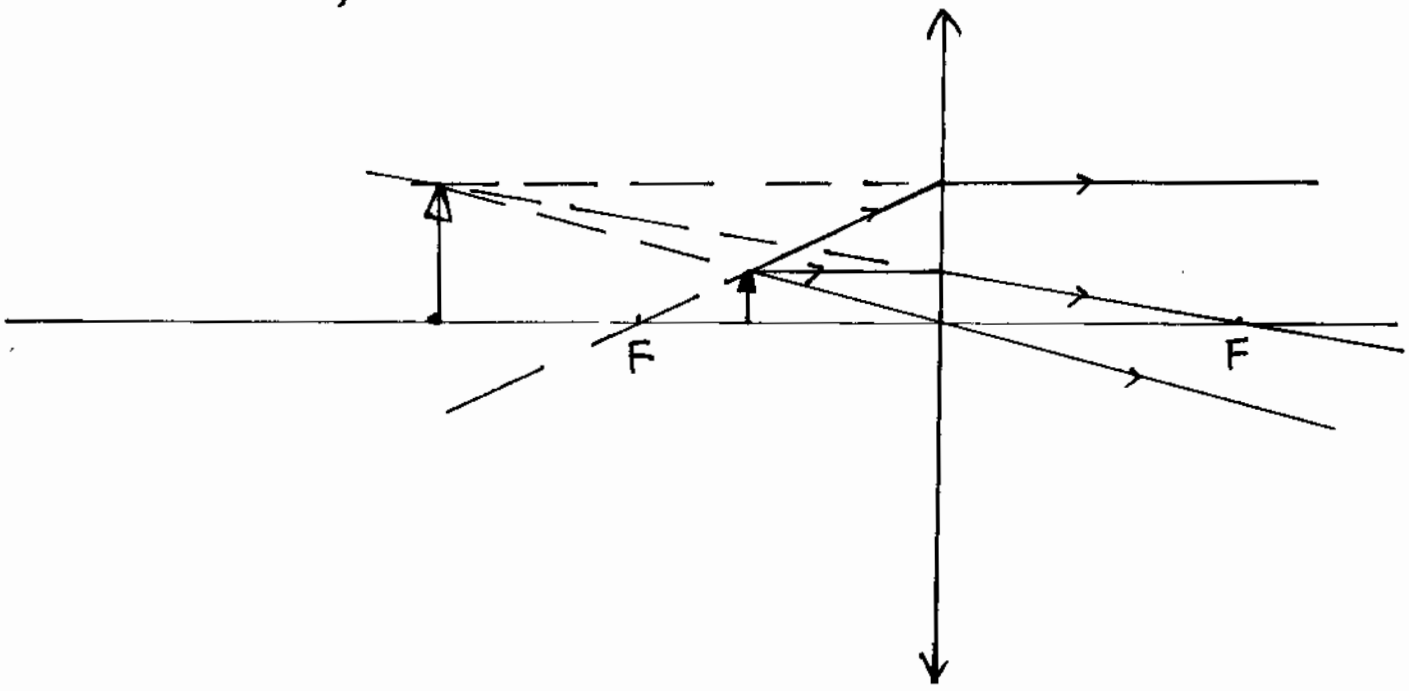


9. $h_i = -\frac{d_i h_o}{d_o} = -\frac{(208)(6.7)}{48} = -29$ cm.

10. RILB

11. $d_o = 24.5$ cm.

$$d_i = \frac{d_o \cdot f}{d_o - f} = \frac{(24.5)39}{24.5 - 39} = -65.9 \text{ cm}$$



12. $h_i = -\frac{d_i h_o}{d_o} = -\frac{(-65.9)(6.7)}{24.5} = 18.0 \text{cm}$

13. VULF