

Department of Natural Sciences
Clayton College & State University

April 16, 2002

Physics 1112 - Quiz 11b

Name SOLUTION

1. An arrow 20.00 cm long is located 75.0 cm from a diverging lens, which has a focal length of 30.0 cm.

a. How far is the image from the lens?

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$$

$$p = 75.0 \text{ cm}$$

$$f = -30.0 \text{ cm} \quad \frac{1}{q} = \frac{1}{f} - \frac{1}{p}$$

$$\frac{1}{q} = -0.0333 - 0.0133 = -0.0466$$

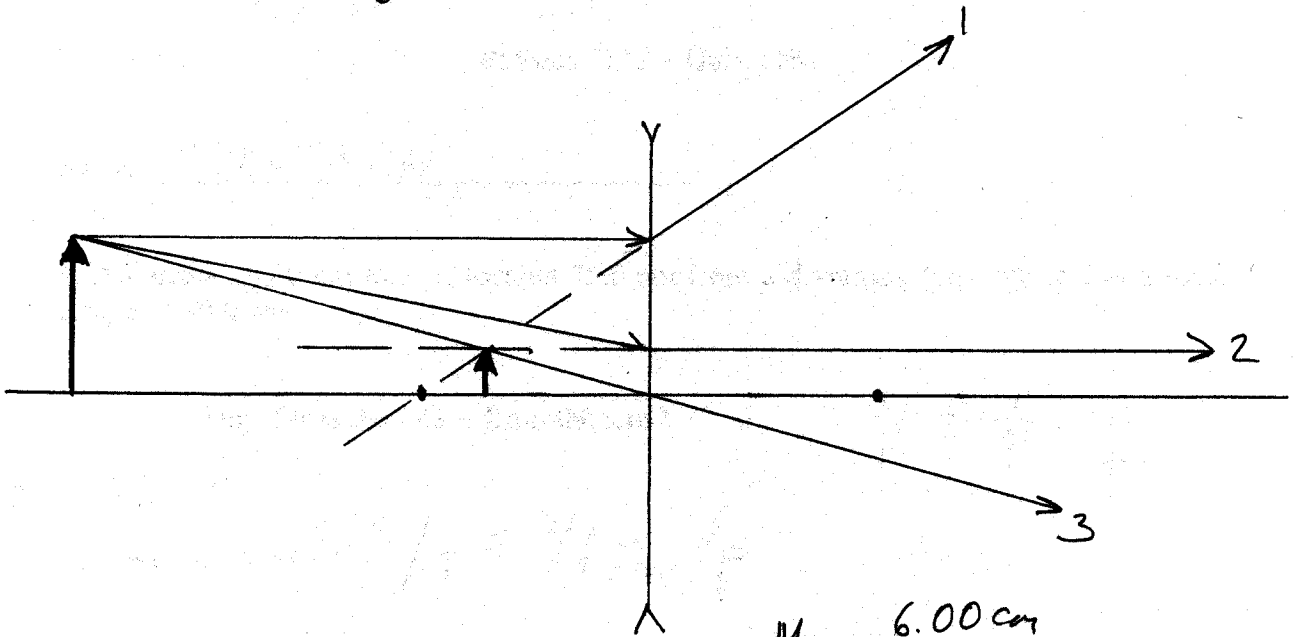
$$\underline{\underline{q = -21.4 \text{ cm}}}$$

b. What is the height of the image?

$$M = -\frac{q}{p} = -\frac{-21.4 \text{ cm}}{75.0 \text{ cm}} = \underline{\underline{0.29}}$$

$$M = \frac{h'}{h} \quad h' = M \cdot h = 0.29 \cdot 20.0 \text{ cm} = \underline{\underline{5.71 \text{ cm}}}$$

- c. Draw a ray diagram of the situation and find the magnification of the lens from the diagram.



$$M = \frac{6.00 \text{ cm}}{20.0 \text{ cm}} = \underline{\underline{0.30}}$$

- d. Describe the image (real or virtual, upright or inverted, enlarged or reduced?).

VIRTUAL (q IS NEGATIVE)
UPRIGHT (M IS POSITIVE)
REDUCED (M IS LESS THAN ONE)