

Physics 103 Quiz #14, Thursday (5/2/2013)

Show all work in order to obtain points for problems

Name: _____

1. (2 pts.) You stand two feet away from a plane mirror. How far is it from you to your image?

- a. 2.0 ft
- b. 3.0 ft
- c. 4.0 ft
- d. 5.0 ft



2. (2 pts.) A concave mirror forms a real image at 25.0 cm from the mirror surface along the principal axis. If the corresponding object is at a 10.0-cm distance, what is the mirror's focal length?

- a. 1.43 cm
- b. 16.7 cm
- c. 12.4 cm
- d. 7.14

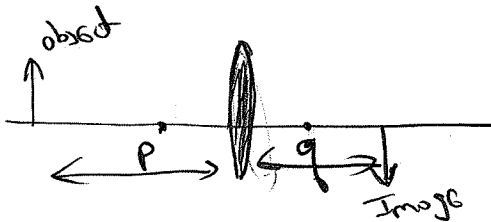


$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$$

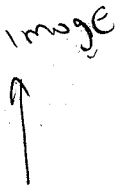
$$\frac{q+p}{pq} = \frac{1}{f} \quad f = \frac{pq}{q+p} = \frac{(25)(10)}{25+10} = 7.14$$

3. (5 pts) A transparent image on a slide is placed in front of a converging lens with focal length 3.00 cm. The lens forms an image of the slide 15.0 cm from the slide. How far is the lens from the slide if the image is real.

3.00 cm



real image case



Virtual image case

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

$$p+q = 15 \text{ cm}$$

$$f = 3 \text{ cm}$$

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

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

$$\frac{1}{f} p(15-p) = (15+p)+p = 15$$

$$15p - p^2 = f15$$

$$p^2 + 15p + 15f = 0$$

$$p = 4.15 \text{ cm}$$

$$p = 10.8 \text{ cm}$$

$$p = \frac{15 \pm \sqrt{15^2 - 4(1)(15)}}{2}$$