Solve the following problems using

the thin lens equation $$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

and the magnification equation $$m = \frac{h_i}{h_o} = \frac{d_i}{d_o}$$

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1. An object is located at 20.0 cm from the center of a lens. The image is formed on the other side of the lens, at 5.00 cm from the center of the lens.
a) What is the focal length of the lens?
b) Is the lens converging or diverging?

2. An object is located at 50.0 cm from the center of a lens with a focal length of + 10.0 cm.
a) What is the image distance?
b) Is the image real or virtual?

3. An object is located at 1.00 cm from the center the lens of focal length + 5.00 cm.
a) What is the image distance?
b) Is the image real or virtual?

4. An object is located at 4.50 cm behind the center of a lens. The image is formed at – 6.50 cm from the center of a lens, on the same side of the lens as the object.
a) What is the focal length of the lens?
b) Is the lens converging or diverging?
c) Is the image real or virtual?

5. An object is located at 7.50 cm behind the center of a lens. The image is formed at – 4.50 cm from the center of a lens, on the same side of the lens as the object.
a) What is the focal length of the lens?
b) Is the lens converging or diverging?
c) Is the image real or virtual?

6. A woman of 1.60 m height is located at a distance of 2.40 m from a lens of focal length 12.0 cm.
a) What is the image distance?
b) What is the image size?

7. A man of 1.80 m height is located at a distance of 5.00 m from the cornea – lens combination of an eye. The length of the eyeball is d_i = 24.0 mm.
a) What is the focal length of the cornea – lens combination?
b) What is the size of the image on the retina?

Solutions:

1. a) 4.00 cm	b) converging lens	
2. a) 12.5 cm	b) real	
3. a) -1.25 cm	b) virtual	
4. a) 14.6 cm	b) converging lens	c) virtual
5. a) -11.3 cm	b) diverging lens	c) virtual
6. a) 12.6 cm	b) 8.42 cm	
7. a) 23.9 mm	b) 8.64 mm	