

Lens Calculation Problems

SNC2DE_2016-2017

1. A converging lens has a focal length of 15 cm. An object is located 40 cm from the lens. How far is the image?

Answer: 24 cm on the side opposite the object

2. An object 10 cm in height is placed in front of a converging lens. A real image, 25 cm height, is formed on the other side of the lens. What is the magnification of the lens?

Answer: -2.5

3. A converging lens has a focal length of 17 cm. A candle is placed 48 cm from the lens. What type of image will be formed and where will it be located?

Answer: 26 cm, real, 26 cm from the lens, opposite the object.

4. A diverging lens has a focal length of 29 cm. A virtual image of a tree is located 13 cm from the lens. Where is the tree located?

Answer: $f = -29$ cm, $d_i = -13$ cm \therefore the tree is 23 cm from the lens on the same side as the image.

4. A small toy is placed 7.2 cm in front of a converging lens. An upright, virtual image of magnification 3.2 is observed. Where is the image located?

Answer: $d_i = -23$ cm, the image of the toy is 23 cm from the lens, on the same side as the toy.

5. A converging lens is placed 12 cm from a statue. The focal length of the lens is 15 cm.

a. Where is the image of the statue located?

b. What is the magnification?

Answer: (a) $d_i = -60$ cm, the virtual image occurs at 60 cm behind the lens.

(b) The magnification of the lens is 5x

6. A student examines a bug using a magnifying glass with a focal length of 5.0 cm. He holds the magnifying glass 3.5 cm above the bug. What is the magnification

Answer: $d_i = -11.67$ cm, \therefore magnification = 3.33 x.

7. An object is 45.0 cm from a converging lens, and the lens has a focal length of 15.0 cm. What are the image distance and magnification?

Answer: $d_i = -22.5$ cm and magnification = -0.500

8. The focal length of a diverging lens is 15 cm. A virtual upright image is formed at a distance of 5.0 cm from the lens. Where was the object?

Answer: 7.5 cm

9. An object of height 5.0 cm is placed at a distance of 40 cm in front of a converging lens that has a focal length of 15 cm.

a. What is the image distance?

b. What is the magnification?

c. What is the image height?

d. what are the characteristics of the image?

Answer: (a) $d_i = 24$ cm, (b) magnification = -0.60 , (c) $h_i = -3.0$ cm

(d) since the magnification is less than 1, the image is smaller than the object. Since the magnification is negative, the image is inverted and real. The image distance is 24 cm, so it is between F and 2F.