

Imagining Images - Lenses

1. Determine the image distance and image height for a 5-cm tall object placed 45.0 cm from a converging lens having a focal length of 15.0 cm. Sketch the ray diagram for this situation.
2. Determine the image distance and image height for a 5-cm tall object placed 30.0 cm from a converging lens having a focal length of 15.0 cm. Sketch the ray diagram for this situation.
3. Determine the image distance and image height for a 5-cm tall object placed 20.0 cm from a converging lens having a focal length of 15.0 cm. Sketch the ray diagram for this situation.
4. Determine the image distance and image height for a 5-cm tall object placed 15.0 cm from a converging lens having a focal length of 15.0 cm. Sketch the ray diagram for this situation.
5. Determine the image distance and image height for a 5-cm tall object placed 10.0 cm from a converging lens having a focal length of 15.0 cm. Sketch the ray diagram for this situation.
6. Arrangements 1-5 are specific examples of object positions relative to the focal point for a converging lens. Summarize the results in terms of:
 - a. Magnification
 - b. Orientation
 - c. Real or Virtual
7. An inverted image is magnified by 2 when the object is placed 22 cm in front of a converging lens. Determine the image distance and the focal length of the lens. Sketch the ray diagram for this situation.

8. A converging lens produces a virtual image 8.0 cm tall when looking at a 4.0 cm tall object. The focal length of the lens is 10 cm. Determine the object and image distances.

9. A diverging lens with a focal length of 20 cm is used to look at a 5 cm object that is placed 30 cm from the lens. Calculate the location, size and orientation of the image. Sketch the ray diagram for this situation.

10. When a diverging lens is used to look at a 10 cm tall object, the image appears to be 5.0 cm tall and 12 cm from the lens. Calculate the object distance and the focal length. Sketch the ray diagram for this situation.

11. Explain the relationship between the location of the image and whether the image is real or virtual.

12. Explain the relationship between real/virtual images and upright/inverted images. Include sketches in your explanation.