

- Two thin lenses with focal lengths  $f_1$  and  $f_2$  are placed back to back with their principal axes coincide. What is the effective focal length  $f$  of the two lenses?
- Nellie is nearsighted. She cannot focus on objects farther than 40.0 cm from her unaided eye. (a) Does she require a converging or diverging lens to correct her vision? (b) What focal length must her corrective contact lens have to bring into focus the most distant objects?
- A microscope has an objective lens focal length of 0.30 cm, an eyepiece focal length of 1.3 cm, and the two lenses are separated by 14 cm. Using an average nearpoint of 25 cm, what is the approximate overall magnification of the microscope?
- A diverging lens is placed 50.0 cm to the right of a concave mirror. An object is placed between the two, 30.0 cm from the mirror. The lens has a focal length of  $-30.0$  cm and the mirror has a radius of curvature of 44.0 cm. Use only the light that leaves the object and hits the mirror first to answer the following questions. (a) Is the final image to the left or right of the mirror? (b) Is the final image real or virtual? (c) Is the final image upright or inverted compared to the original object? (d) How far is the final image from the mirror? Give the absolute value of this distance if it is negative. (e) What is the overall magnification of the system?

