Microscopy I

2.23. A symmetrical convex lens has a radius of curvature of 25 cm. The refractive index of the lens material is 1.4. Calculate
a) the power of the lens and
b) the focal length.

2.24. We would like to construct a symmetric convex lens from flint glass (n = 1.6) so that its power is 25 diopters. What should be the radius of curvature of the lens?

2.25. Consider a lens of a pair of eyeglasses with 5 dpt. Give its focal length in cm.

2.28. A convex lens of 3.33 dpt power is used for imaging an object with a size of 10 cm and at 70 cm from the lens.
a) Calculate the focal length.
b) Find the image distance and the image size by calculation and
c) by construction (with a ruler on paper).
d) Calculate the magnification.

2.29. We place an object at 12 cm distance in front of a convex lens. The image is formed 36 cm behind the lens. Calculate
a) the focal length of the lens,
b) the power of the lens, and
c) the magnification.
d) Construct (with ruler on paper) the principal rays.

2.30. We are inspecting an object with a size of 3 mm with a 10 dtp magnifying glass. The magnifying glass is 5 cm away from the object. Calculate
a) the focal length of the magnifying glass,
b) the image distance,
c) the size of the image,
d) the magnification.
e) Construct (with ruler on paper) the imaging.
f) How far should the magnifying glass be placed from the object to have an image five time the size that of the object?

Solutions

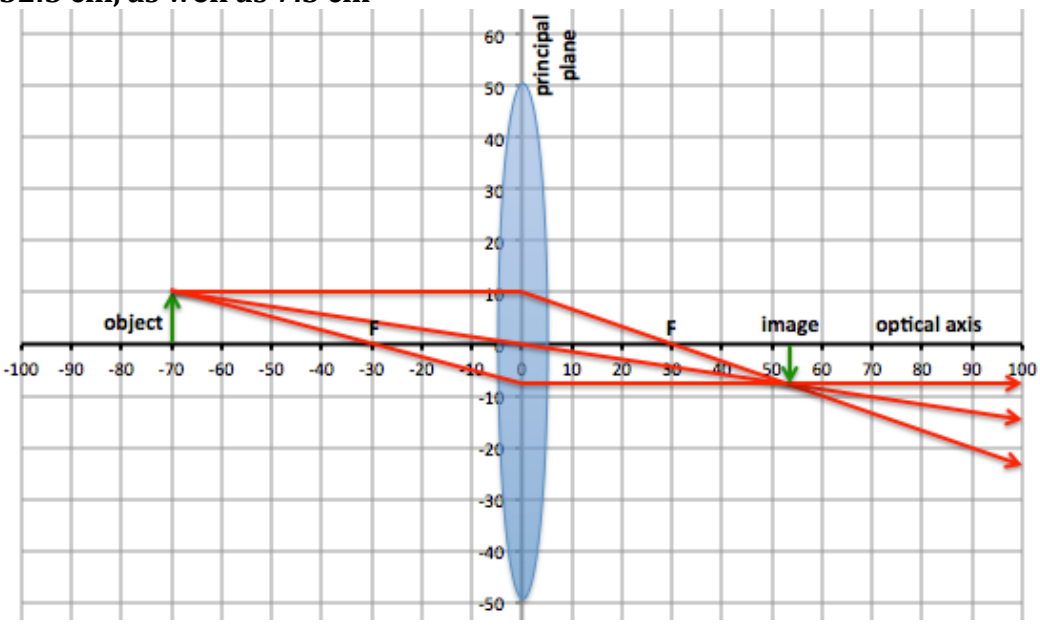
2.23. a) **3.2 dpt**
b) **31.25 cm**

2.24. **4.8 cm**

2.25. **20 cm**

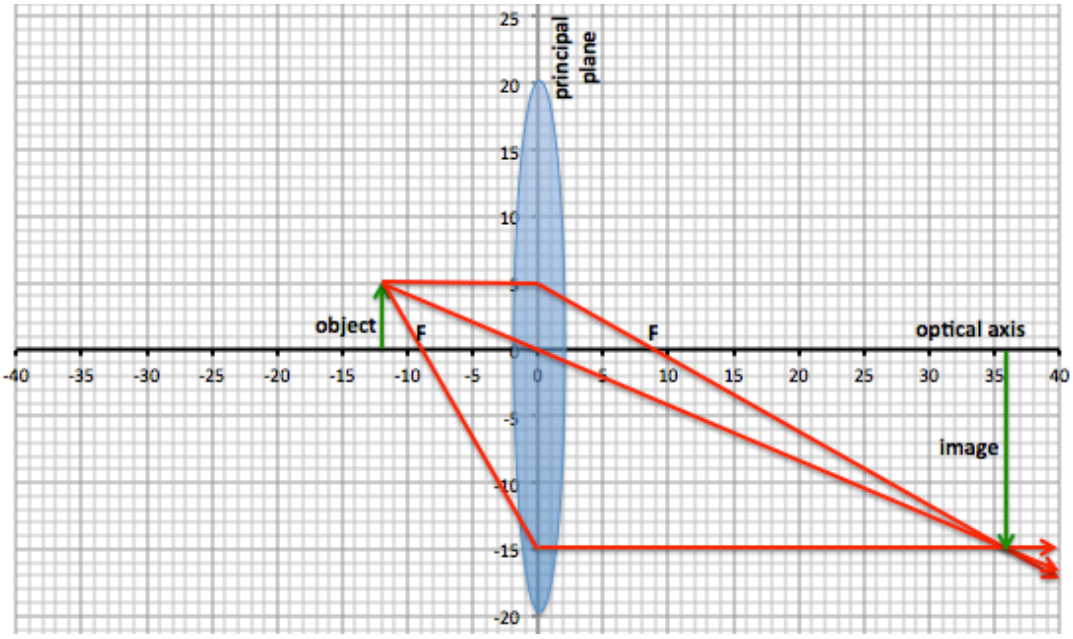
2.26. **4 dpt**

2.28. a) **30 cm**
b) **52.5 cm, as well as 7.5 cm**
c)



d) **0.75× i.e. it will be smaller**

2.29. a) **9 cm**
b) **11.1 dpt**
c) **3×**
d)



2.30. a) **10 cm**
b) **–10 cm**
c) **6 mm**
d) **–2×**
e)

f) **–5× magnification: o = 8 cm and the image is virtual; +5× magnification: o = 12 cm and the image is real**