## Refracting telescopes also use two converging lenses

As mentioned in the chapter on light and reflection, there are two types of telescopes, reflecting and refracting. In a refracting telescope, an image is formed at the eye in much the same manner as is done with a microscope. A small, inverted image is formed at the focal point of the objective lens, F_0, because the object is essentially at infinity. The eyepiece is positioned so that its focal point lies very close to the focal point of the objective lens, where the image is formed, as shown in **Figure 9.** Because the image is now just inside the focal point of the eyepiece, F_e, the eyepiece acts like a simple magnifier and allows the viewer to examine the object in detail.
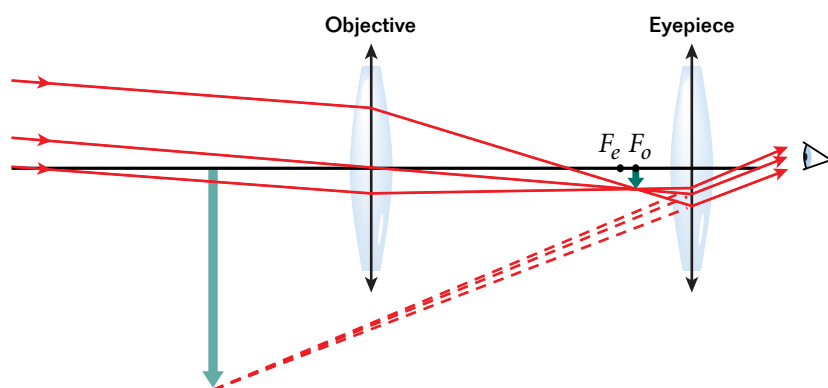
Figure 9
The image produced by the objective lens of a refracting telescope is a real, inverted image that is at its focal point. This inverted image, in turn, is the object from which the eyepiece creates a magnified, virtual image.

SECTION REVIEW

1. What type of image is produced by the cornea and the lens on the retina?

2. What type of image, virtual or real, is produced in the following cases?
   a. an object inside the focal point of a camera lens
   b. an object outside the focal point of a refracting telescope's objective lens
   c. an object outside the focal point of a camera's viewfinder

3. Find the image position for an object placed 3.0 cm outside the focal point of a converging lens with a 4.0 cm focal length.

4. What is the magnification of the object from item 3?

5. Interpreting Graphics   Using a ray diagram, find the position and height of an image produced by a viewfinder in a camera with a focal length of 5.0 cm if the object is 1.0 cm tall and 10.0 cm in front of the lens. A camera viewfinder is a diverging lens.

6. Critical Thinking   Compare the length of a refracting telescope with the sum of the focal lengths of its two lenses.