

**Discussion Question 15A**  
**P212, Week 15**  
*Viewing Images in a Concave Mirror*

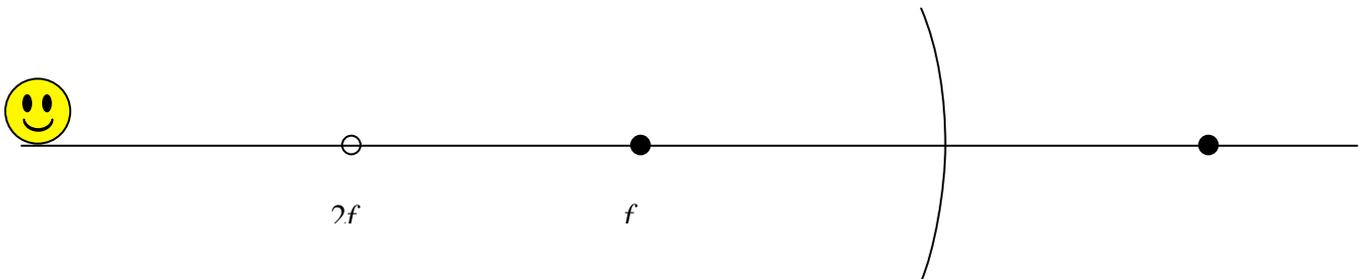
A shaving mirror is a common application of a concave mirror. Such a mirror is designed to give you a magnified reflection of your face. We will investigate the behavior of such a mirror, with focal length  $f$ . **Where exactly do you have to hold the mirror for it to work as advertised?** Let  $s$  denote the distance between your face and the mirror (this is the object distance). *Trace all rays necessary to answer the questions below.*

Determine where the image is located in each of the three cases below using ray tracing. Next, think about what the image will look like to you, the observer ... and remember that you will be observing the image from the same location as the object, since you *are* the object. How does your eye interpret the incoming rays? Common experience in everyday life has taught our brains how to interpret light rays coming from an object, as shown at left ... our brain has no idea what to do

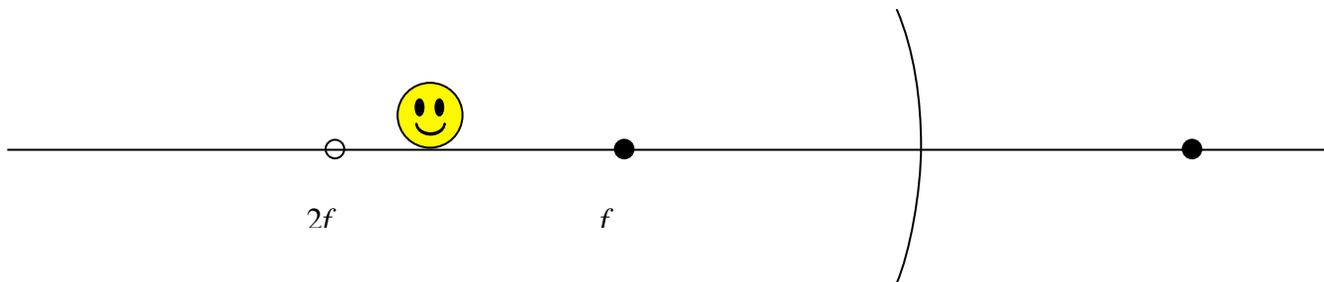


with the situation at right.

(a) If  $s > 2f$ , is the image real or virtual? What sort of picture do you see in the mirror?



(b) If  $f < s < 2f$ , is the image real or virtual? What sort of picture do you see in the mirror?



(c) If  $s < f$ , is the image real or virtual? What sort of picture do you see in the mirror?

