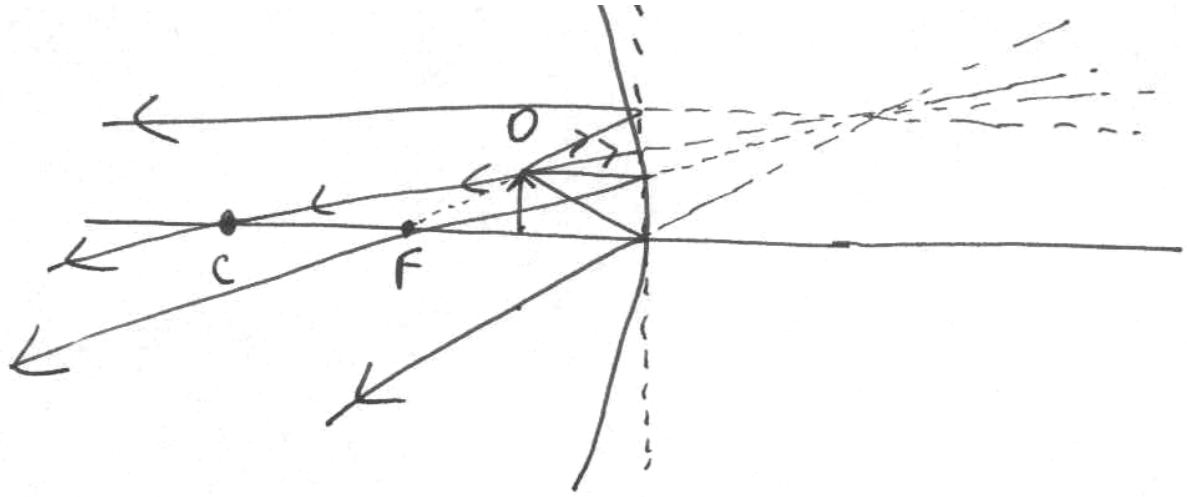
CLASS EXERCISE #18 - 19 July 2005

A spherical mirror has a radius of curvature of 20 cm. An object is placed on the principal axis on the concave side a distance of 5.0 cm from the vertex of the mirror.

Determine the focal length of this mirror and then make a sketch showing the object and image as determined by three different rays.

Then use the mirror formula to determine the image location and the magnification, and characterize the image (real or virtual, etc.)



The focal length $f = R/2 = (20\ \text{cm})/(2) = +10\ \text{cm}$ and the object distance $o = 5.0$ cm.

$1/i = 1/f - 1/o = 1/(10\ \text{cm}) - 1/(5\ \text{cm}) = (1-2)/(10\ \text{cm}) = -1/(10\ \text{cm})$ so $i = -10$ cm.

The magnfication $m = -i/o = -(-10\ \text{cm})/(5.0\ \text{cm}) = +2$.

The image is virtual (because i is negative), erect (because m is positive), and twice as large as the object.