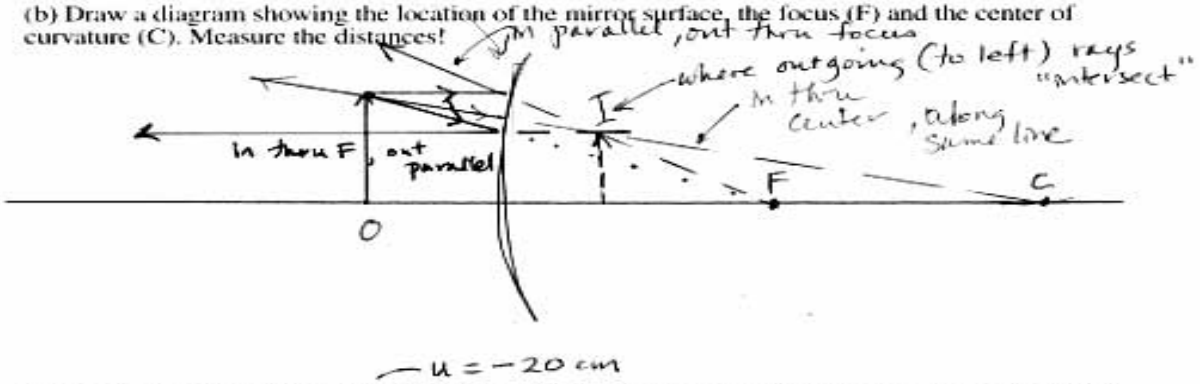
Curved Mirror Examples

1. A convex spherical mirror has a radius of curvature of 80.0 cm.

$\Rightarrow R = +80$ cm

(a) How far from the surface of the mirror is the focus (F) located? $f = \frac{R}{2} = +40$ cm

(b) Draw a diagram showing the location of the mirror surface, the focus (F) and the center of curvature (C). Measure the distances!



$u = -20$ cm

(c) For a real object located 20.0 cm from the front of the mirror, draw a ray diagram and find the location of the image. Use a straight-edge!

(d) Is the image **erect** / **inverted** ? **larger** / **smaller** than the object? **real** / **virtual** ? (Circle one.)

(e) Now use the mirror equation(s) to calculate the answers to part (d): the location of the image (which tells distance and whether real or virtual) and its magnification (which tells larger/smaller and erect/inverted) and verify that they are consistent.

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

$$-\frac{1}{20} + \frac{1}{v} = \frac{1}{40}$$

$$\frac{1}{v} = \frac{1}{40} + \frac{1}{20} = \frac{3}{40}$$

$$v = \frac{40}{3}\text{ cm} = +13.3\text{ cm}$$

$$m = -\frac{v}{u} = -\frac{13.3\text{ cm}}{-20\text{ cm}} = +\frac{2}{3}$$

< 1

(f) Is there an object location that will result in a real image? Why or why not?

NO from the eqn, if $f > 0$ (convex mirror) & $u < 0$ (real object)

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{f} + \frac{1}{|u|} > 0 \Rightarrow$$ Image to right of mirror (behind) 1/16/06

$\therefore$ always virtual

continues over