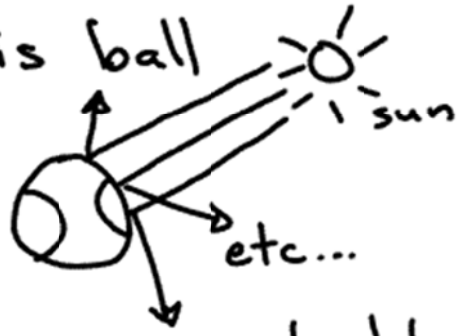
AP Physics - Geometric Optics - Curved Mirrors

Note Title 1/10/2008

Light from rough objects in all directions.

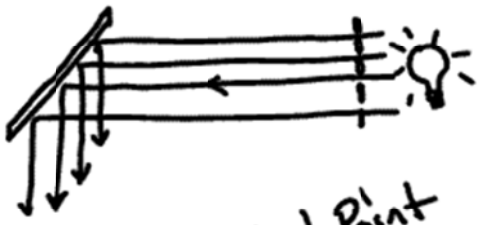
Proof: We can see the object from all directions.

Example: Tennis ball



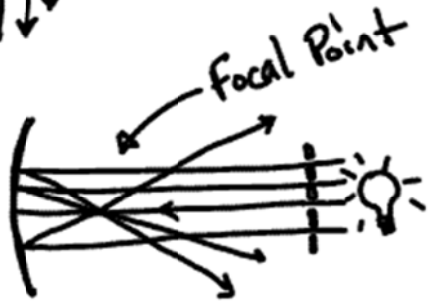
We are going to use this idea to figure out how images form with mirrors.

Plane Mirror:

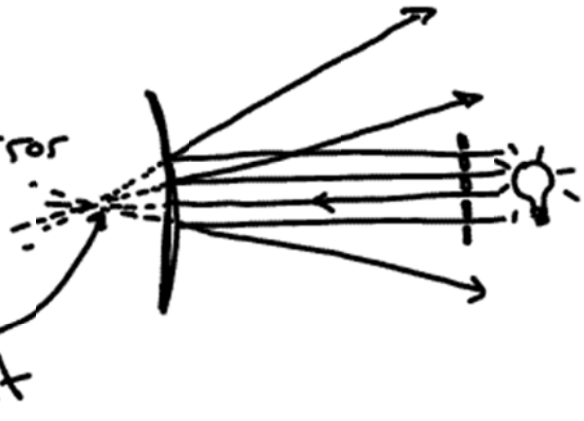


(No focal point)

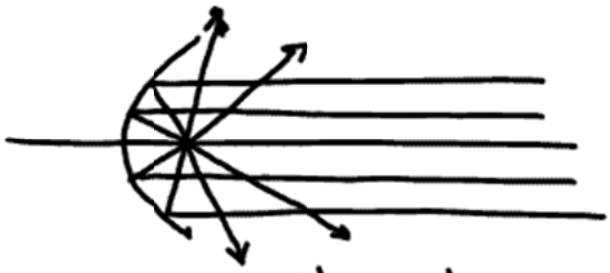
Concave/Converging Mirror:



Convex/Diverging Mirror



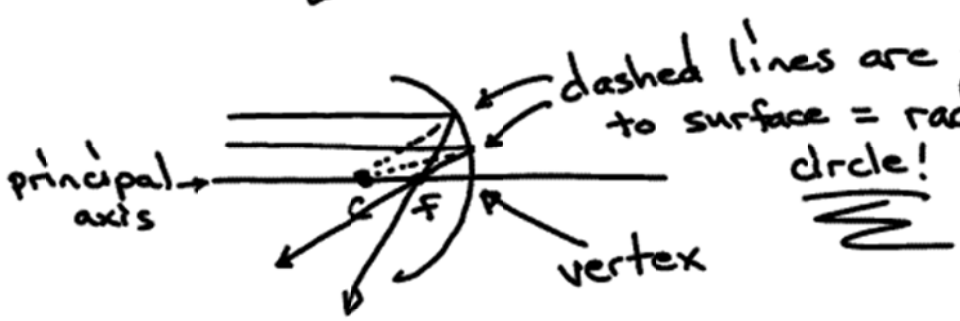
We remember from algebra that the shape that will perfectly focus parallel rays is the parabola:



However, truly parabolic mirrors are very expensive to make, so most curved mirrors are actually segments of a sphere, or <u>spherical</u> mirrors. Spheres are much easier to make (think balloons), and, if they don't subtend large angles of curvature, are pretty fair approximations of parabolic mirrors.

Spherical mirrors have a center of curvature and an approximate focal point as follows:

Law of Reflection says...



$\therefore$ $\boxed{C = 2f}$!!!

From Law of Reflection and our knowledge of mirrors, we develop three rules for predicting the location of an image:

1. Draw a light ray emanating from the object parallel to the principal axis, bouncing off the mirror directly toward or away from the focal point. (// and thru f)
2. Draw a light ray emanating from the object toward the mirror, in line with the focal point, which then bounces off the mirror parallel to the principal axis. (Thru f and //)
3. Draw a light ray emanating from the object toward the mirror, in line with the center point, which then bounces off the mirror in the direction from which it came (Thru c and back)