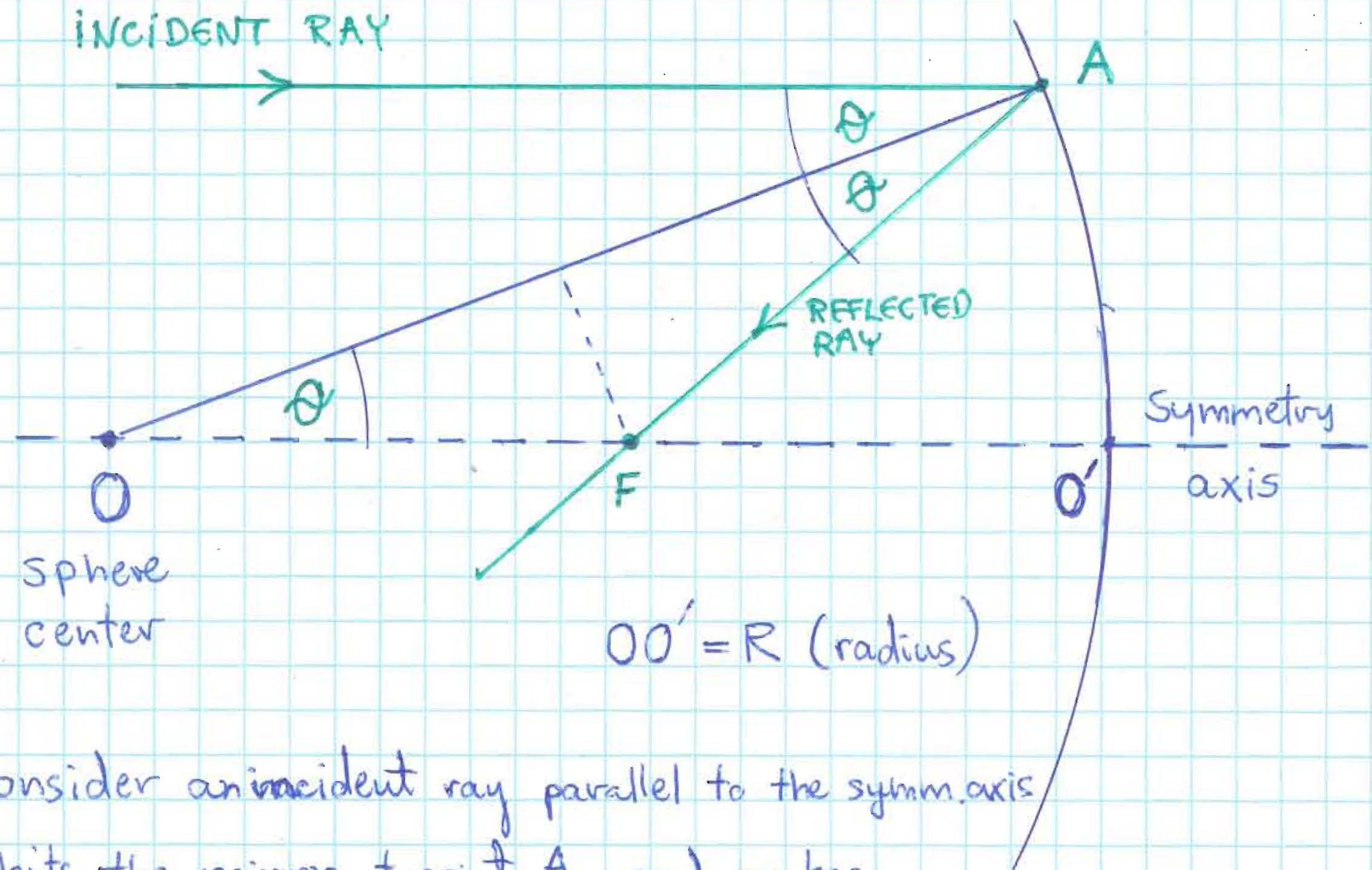
Concave Mirror is a reflective surface bulging inward. Most convex mirrors have a surface that is shaped like part of a sphere.



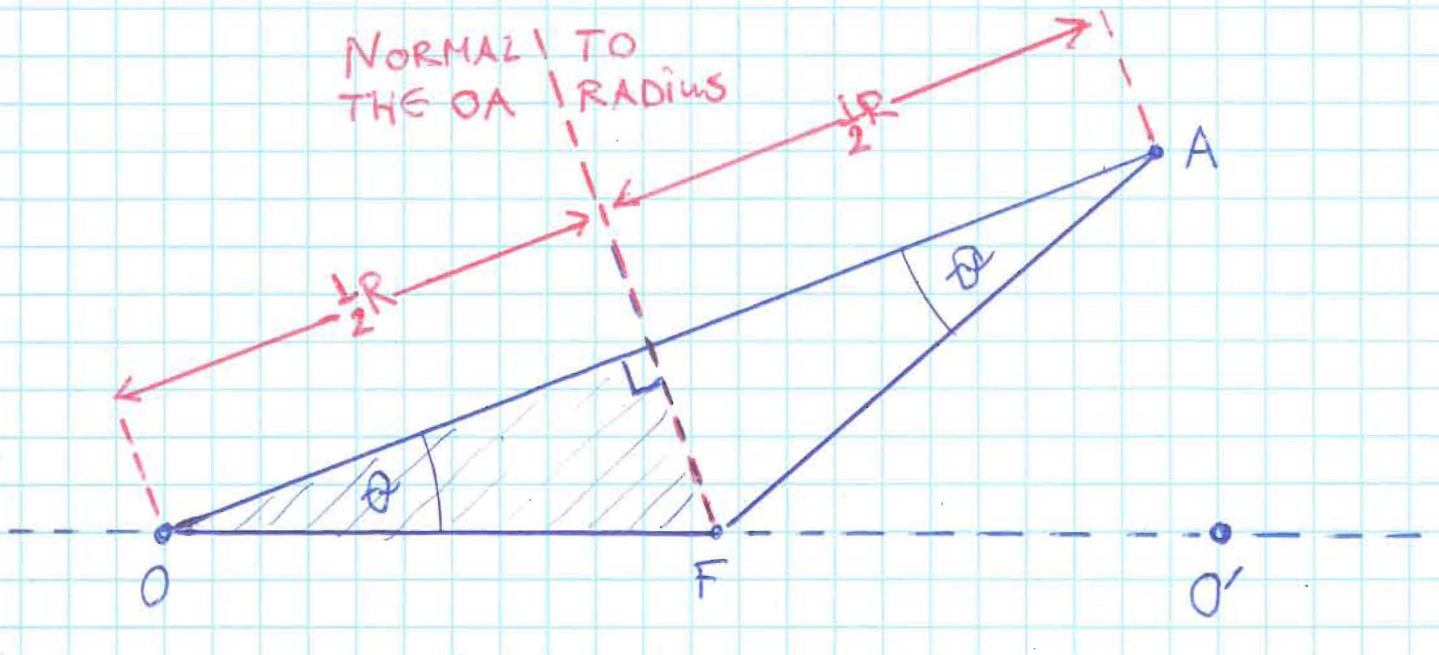
Consider an incident ray parallel to the symm. axis. It hits the mirror at point A, and makes an angle θ with a sphere radius intersecting the surface at point A.

Any radius is normal to the sphere surface, right?

OK, so the reflected ray makes an angle θ with the OA radius, and intersects the symmetry axis at point F.

Our task is to calculate the O'F distance.

For clarity, we re-draw the OAF triangle:



It's an *isosceles triangle*, because there are two equal angles.

A normal to OA radius drawn from F "cuts" the radius into two halves.

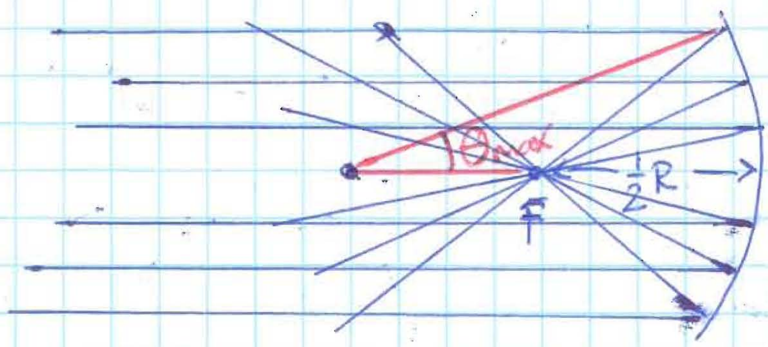
Applying basic trigonometry to the shaded small triangle, we get:

$$OF = \frac{\frac{1}{2}R}{\cos\theta} = \frac{R}{2\cos\theta}$$

Now,
$$O'F = OO' - OF$$
$$= R - \frac{R}{2\cos\theta} = \frac{R}{2}\left(2 - \frac{1}{\cos\theta}\right)$$

θ	$2 - \frac{1}{\cos\theta}$
0°	1.0000
1°	0.99985
2°	0.99939
5°	0.99618
10°	0.9846
20°	0.9358

We see that for small θ angles the distance of the "point of intersection" F from the mirror surface is, with a very good approximation, $O'F = R/2$.



For θ_{max}, say equal to 2°, all reflected rays from a parallel beam of rays are "focused" at one point F

A small convex mirror that I will show you: $R \approx 36$ inches, it's 2 inches across, corresponding to $\theta_{max} \approx 1.6°$ – <u>good focusing</u>