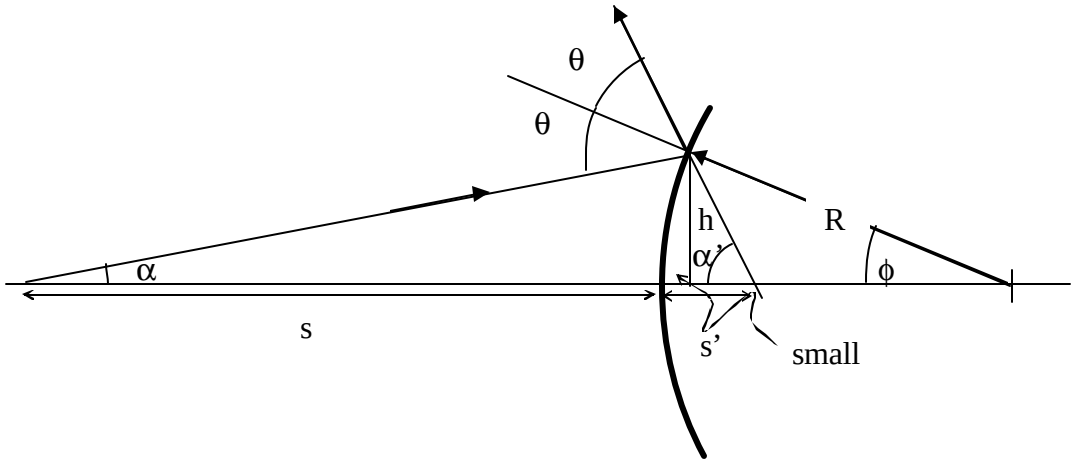
Reflection from curved surfaces.

Our goal is to determine the location of the image of a point source based upon the point sources distance from the mirror surface and the radius of curvature of the mirror.

Useful information: small angle approximation $\tan f \approx \sin f \approx f$, $\cos f \approx 1$



Consider a point source located a distance "**s**" away from the surface of a convex spherical mirror of radius R. This is shown in the diagram above. Imagine a light ray that makes an angle α from the horizontal axis and hits the mirror some height "h" above the horizontal axis.

How would you determine where the image of the point source is formed? What is the distance of that image from the surface of the mirror?

Is the image real or virtual?

Can you relate the angles α, α', and θ together?

Can you relate the angles α, θ, and ϕ together?

Using these two expressions relate α, α', and ϕ together.

Relate the angles α, α', and ϕ to h through judicious use of the small angle approximation.

Using the relation you found between α, α', and ϕ relate the object distance, **s**; the image distance, **s'**; and the radius of curvature, R.

Imagine that the source was moved very far away (s becomes ∞). What does this determine?

You have worked out the equation for images under the paraxial approximation. What is the paraxial approximation?