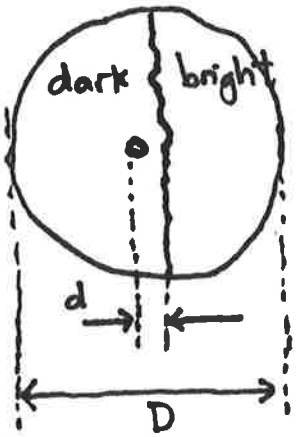
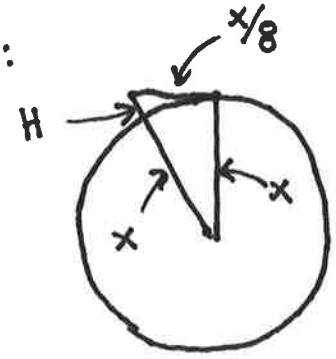
ASGVI EX 18.2 (Mountain height)

When observing the moon when it is in its first (or third) quarter – when it is a half moon – it will appear like this:



The top of a mountain is illuminated in the dark half of the moon at a distance $d = \frac{1}{16} D$ from the midpoint of the moon.

From this, and the (known) moon diameter, the height of this mountain can be found, as follows:



$$(x+H)^2 = \left(\frac{x}{8}\right)^2 + x^2$$

If $x = \frac{D}{2} = 1000$ mi.

then $(1000+H)^2 = (125)^2 + (1000)^2$

or $1000 + H = 1008$

and $\boxed{H = 8 \text{ (miles)}}$