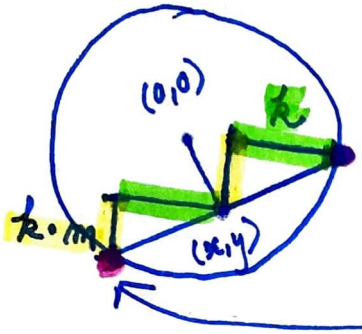
(x,y) randomly selected = midpoint of a chord

bisector (perpendicular)

$$\text{slope} = \frac{-x}{y} = m$$



$\Rightarrow (x-k,\ y-k*m)$ = chord_x

$(x+k,\ y+k*m)$ = chord_y

~~$r^2 = d((x+k)$~~

$$r^2 = d((x+k, y+k\cdot m), (x-k, y-k\cdot m))^2$$

$$= ((y+km) - (y-km))^2 + ((x+k) - (x-k))^2$$

$$= (2km)^2 + (2k)^2$$

$$= 4k^2m^2 + 4k^2$$

$$= 4k^2(m^2+1)$$

solve for k, since we know r:

$$k = \sqrt{\frac{r^2}{4(m^2+1)}} = \sqrt{\frac{8h(R-\frac{h}{2})}{4(m^2+1)}} = \sqrt{\frac{2h(R-\frac{h}{2})}{\frac{x^2}{y^2}+1}}$$