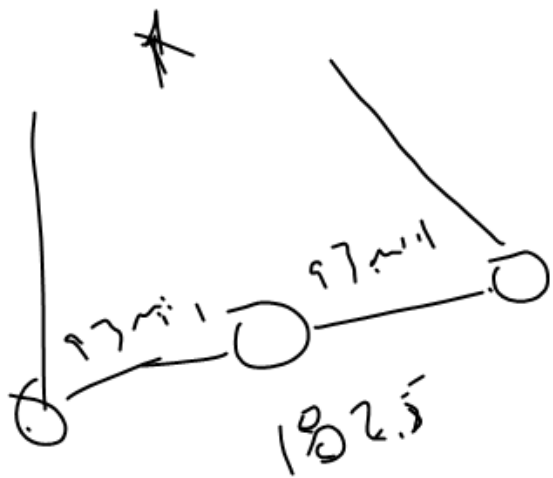
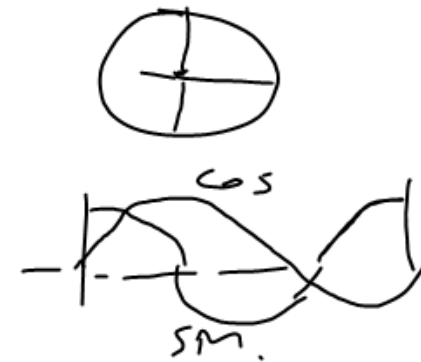


SOh CAH TOA

$$\sin \alpha = \frac{\text{opp}}{\text{hyp}}$$

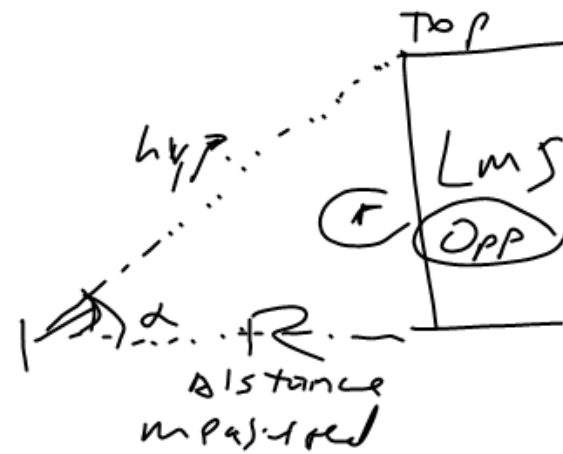
$$\cos \alpha = \frac{\text{adj}}{\text{hyp}}$$

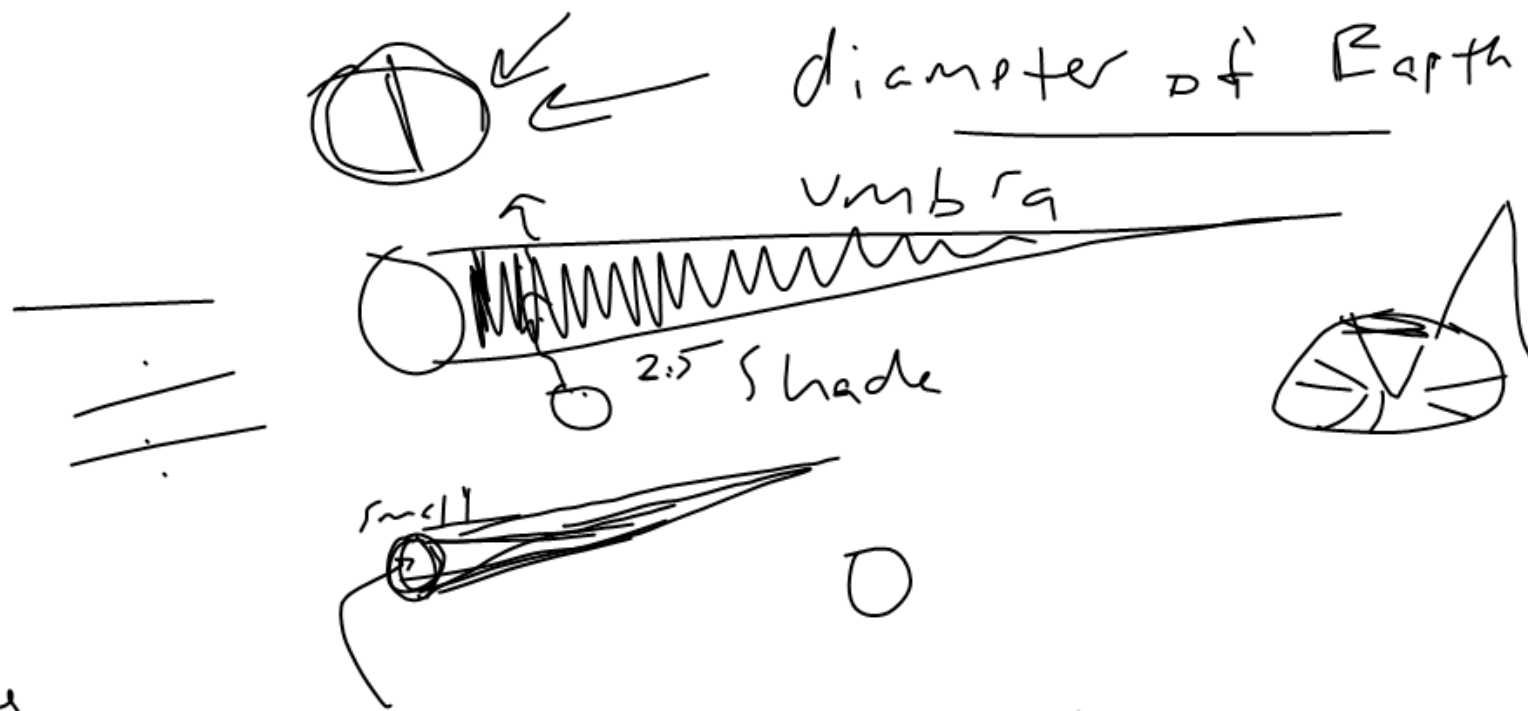
$$\tan \alpha = \frac{\text{opp}}{\text{adj}}$$



$$\tan \alpha (\text{Adj}) = \text{opp}$$

$$\tan \alpha (R) = r$$

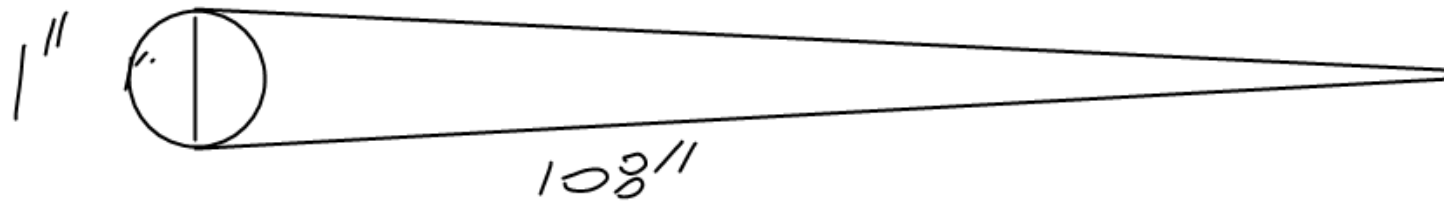




measure

$$\frac{1''}{\left(\frac{\text{Umbra length}}{108''} \right)}$$

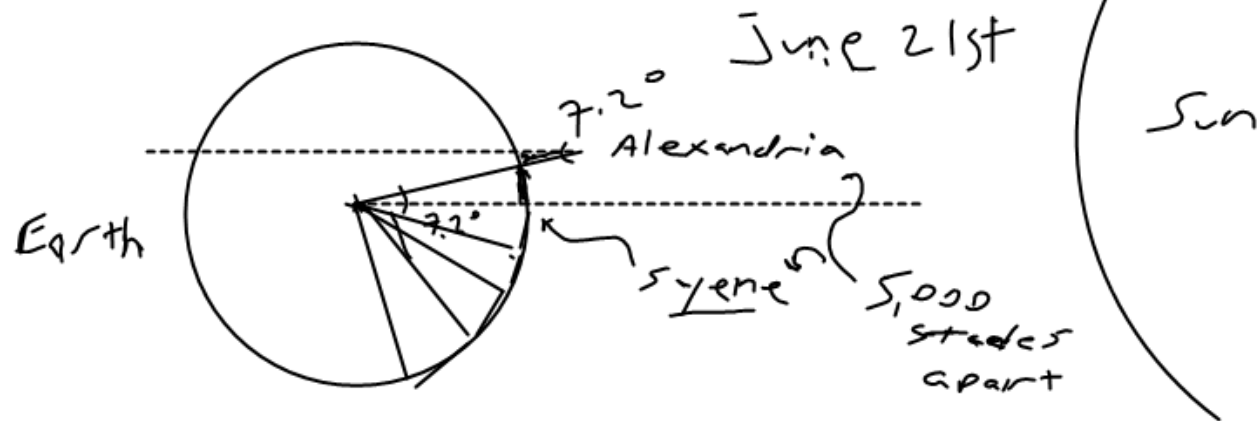
$$\frac{\text{Dia. Earth}}{\text{Umbra length Earth}}$$

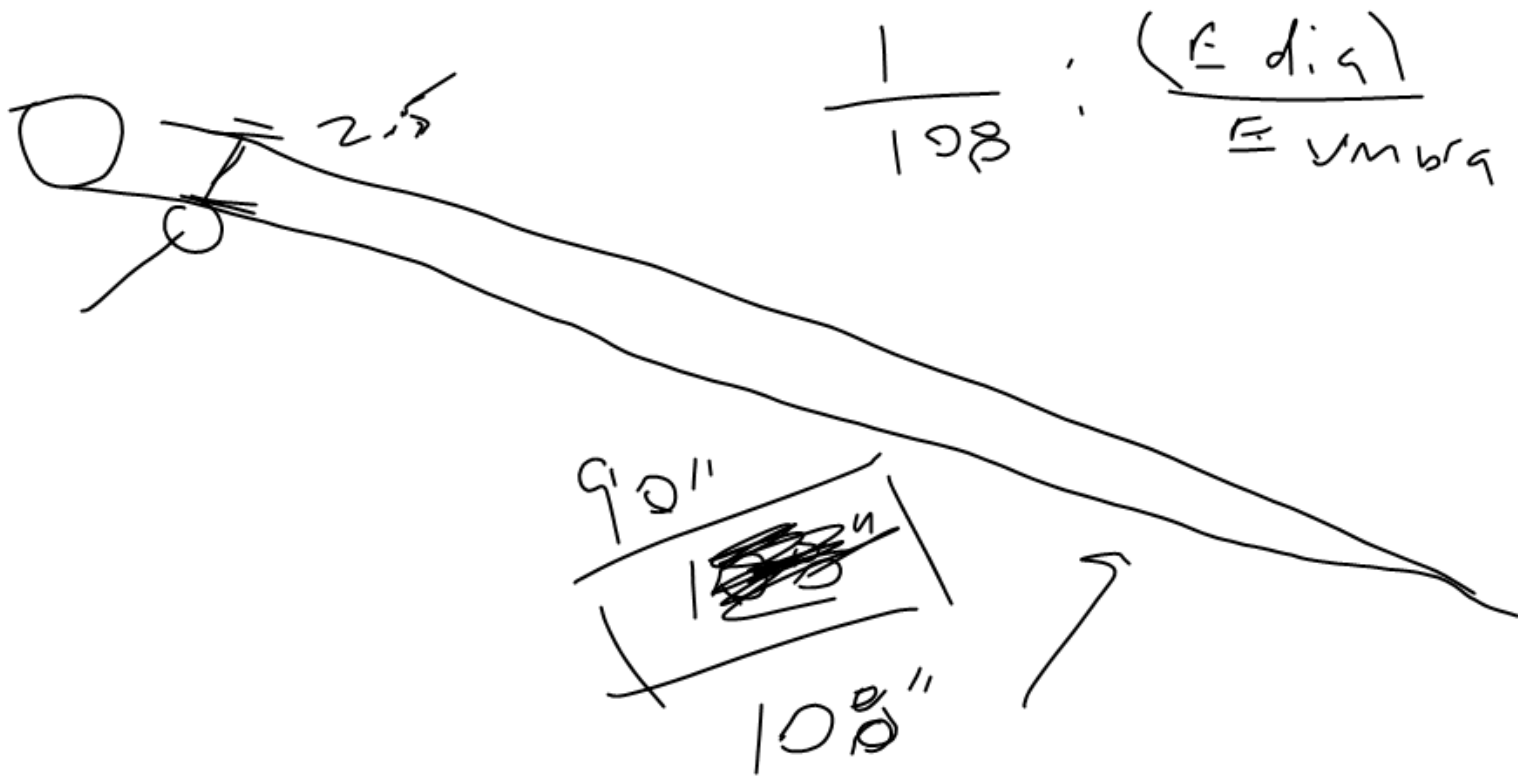


$$\frac{1}{108} : \frac{\text{Earth's Dia}}{\text{Umbra Length}}$$

$$\frac{360^\circ}{7.2} = 50$$

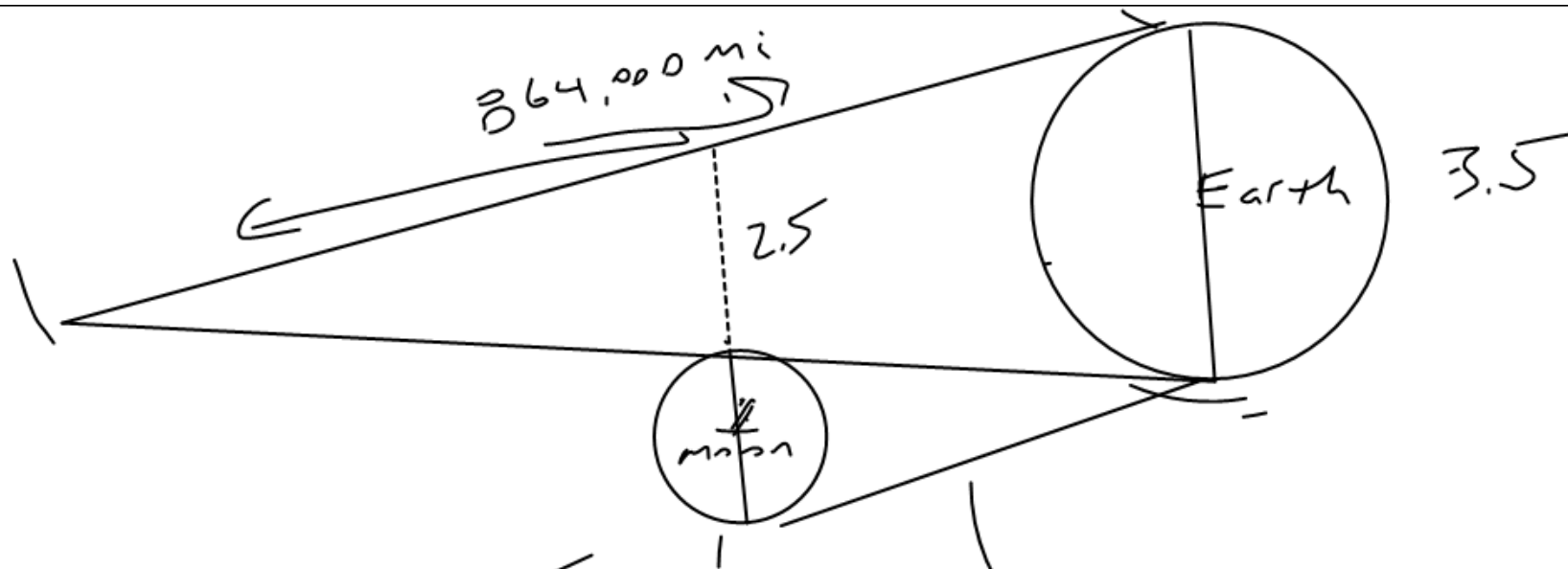
Eratosthenes, Greek 300 BC





$$\begin{array}{l} \text{Circumference} = \\ \bar{50} \times \bar{5,000} = 250,000 \text{ stades} \\ \quad \quad \quad \quad \quad \quad \quad \downarrow \\ \quad \quad \quad \quad \quad \quad \quad 25,000 \text{ miles} \end{array}$$

$$\text{dia} = \frac{25,000}{\pi} = 8,000 \text{ mi}$$



$$\frac{1}{108} \cdot \frac{8,800 \text{ mi}}{(\text{umbra})} = 864,000 \text{ mi}$$

$$\frac{864,000}{3.5} = \underline{\underline{240,000 \text{ mi}}}$$