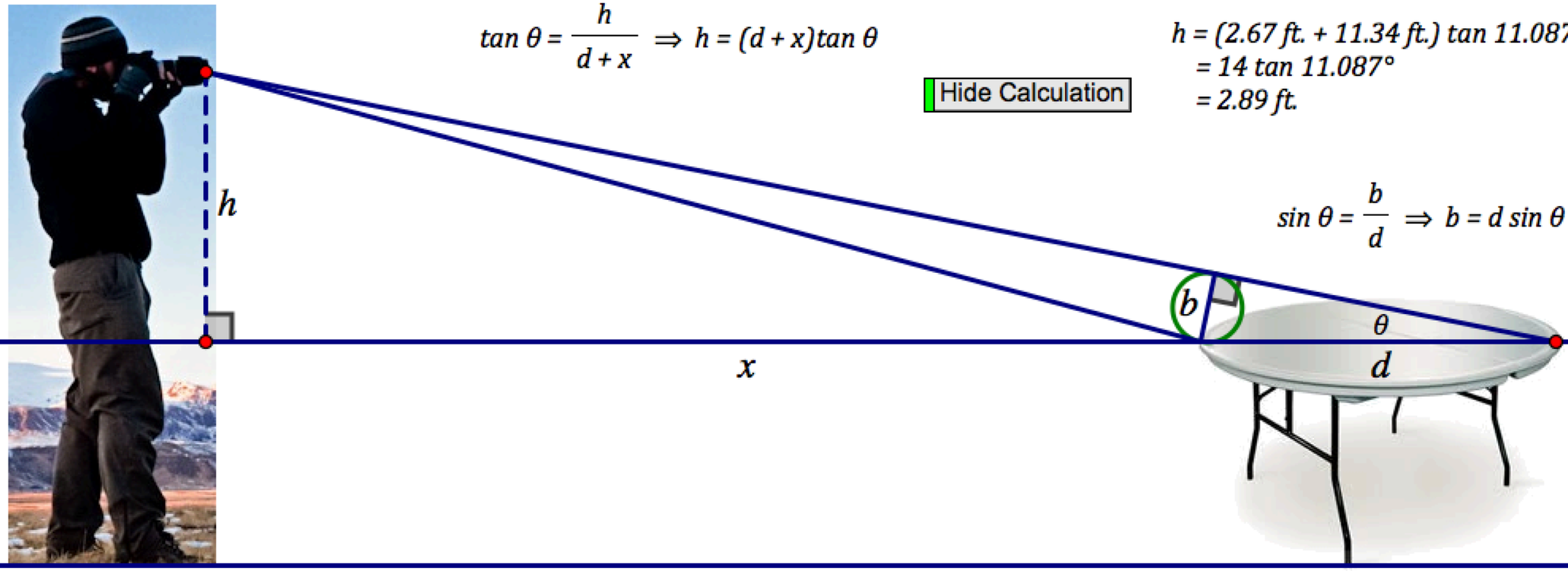
$$\text{distance to object } (x) = \frac{\text{camera focal length (mm)} * \text{height of object in real life} * \text{height of photo (pixels)}}{\text{height of object in photo (pixels)} * \text{camera sensor's height (mm)}}$$

Hide Calculation

$$\text{distance to nightclub table } (x) = \frac{28.5 \text{ mm} * 2.67 \text{ feet}}{4.54 \text{ mm}} * \frac{5.32}{7.36} = \text{about } 11.34 \text{ feet}$$

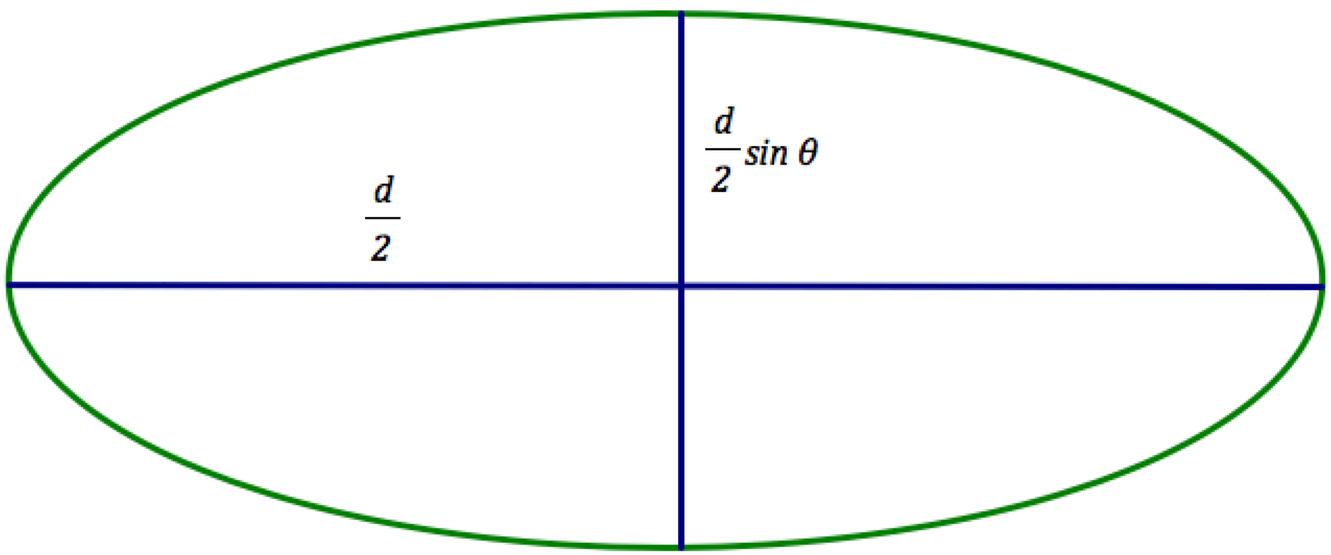


$$\tan\theta = \frac{h}{d+x} \Rightarrow h = (d+x)\tan\theta$$

Hide Calculation

$$h = (2.67 \text{ ft.} + 11.34 \text{ ft.}) \tan 11.087°$$
$$= 14 \tan 11.087°$$
$$= 2.89 \text{ ft.}$$

$$\sin\theta = \frac{b}{d} \Rightarrow b = d\sin\theta$$



$$e = \frac{c}{a} \Rightarrow c = e \cdot a = e \cdot \frac{d}{2}$$

$$c^2 = a^2 - b^2 = \frac{d^2}{4} - \frac{d^2}{4}\sin^2\theta = \frac{d^2}{4}\left(1 - \sin^2\theta\right) = \frac{d^2}{4}\cos^2\theta \Rightarrow c = \frac{d}{2}\cos\theta$$

$$\text{so: } e \cdot \frac{d}{2} = \frac{d}{2}\cos\theta \Rightarrow e = \cos\theta \text{ !} \qquad \left(\theta = \cos^{-1}e\right)$$

Hide Calculation

$$\theta = \cos^{-1}e = \cos^{-1}(0.98133) \approx 11.087°$$