

61. The Moon is a distance  $R = 3.82 \times 10^8$  m from Earth (see Appendix C). We note that the “cone” of light has apex angle equal to  $2\theta$ . If we make the small angle approximation (equivalent to using Eq. 37-14), then the diameter  $D$  of the spot on the Moon is

$$\begin{aligned} D &= 2R\theta = 2R \left( \frac{1.22\lambda}{d} \right) \\ &= \frac{2(3.82 \times 10^8 \text{ m})(1.22)(600 \times 10^{-9} \text{ m})}{0.12 \text{ m}} \\ &= 4.7 \times 10^3 \text{ m} = 4.7 \text{ km} . \end{aligned}$$