

18. (a) Since intensity is power divided by area, and for an isotropic source the area may be written $A = 4\pi r^2$ (the area of a sphere), then we have

$$I = \frac{P}{A} = \frac{1.0 \text{ W}}{4\pi(1.0 \text{ m})^2} = 0.080 \text{ W/m}^2 .$$

- (b) This calculation may be done exactly as shown in part (a) (but with $r = 2.5 \text{ m}$ instead of $r = 1.0 \text{ m}$), or it may be done by setting up a ratio. We illustrate the latter approach. Thus,

$$\frac{I'}{I} = \frac{P/4\pi(r')^2}{P/4\pi r^2} = \left(\frac{r}{r'}\right)^2$$

leads to $I' = (0.080 \text{ W/m}^2)(1/2.5)^2 = 0.013 \text{ W/m}^2$.