16. (a) Let the emf of the solar cell be $\mathcal{E}$ and the output voltage be V. Thus,

$$V = \mathcal{E} - ir = \mathcal{E} - \left(\frac{V}{R}\right) r$$

for both cases. Numerically, we get $0.10\,\text{V} = \mathcal{E} - (0.10\,\text{V}/500\,\Omega)r$ and $0.15\,\text{V} = \mathcal{E} - (0.15\,\text{V}/1000\,\Omega)r$. We solve for $\mathcal{E}$ and r: $\mathcal{E} = 0.30\,\text{V}$, $r = 1000\,\Omega$.

(b) The efficiency is

$$\frac{V^2/R}{P_{\text{received}}} = \frac{0.15\,\text{V}}{(1000\,\Omega)(5.0\,\text{cm}^2)(2.0 \times 10^{-3}\,\text{W/cm}^2)} = 2.3 \times 10^{-3}\ .$$