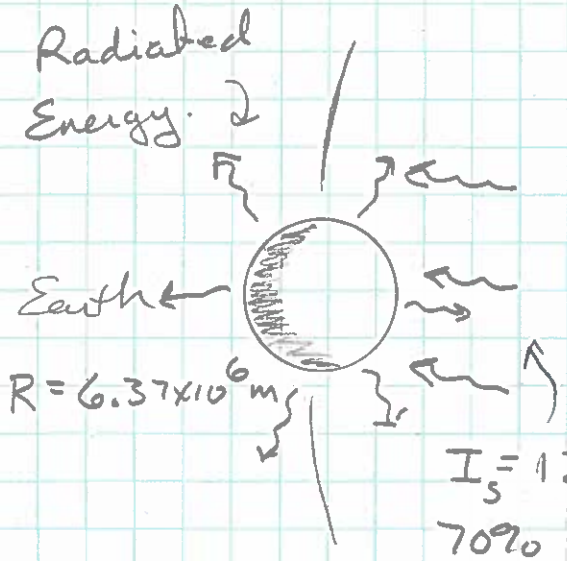
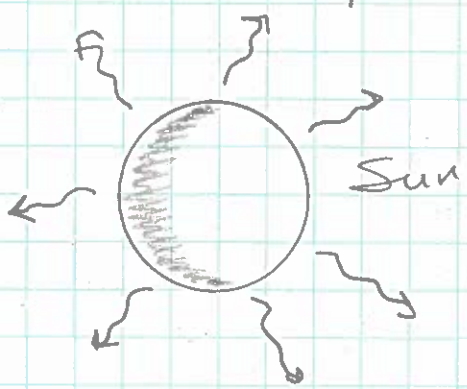




Power absorbed by the Earth $P_a = (0.70) I_s$ (cross sectional area of the Earth)

$$= 0.70 I_s \pi R^2$$

Power radiated by the Earth at temp. T $P_r = e\sigma$ (surface area of Earth) T^4

$$= e\sigma 4\pi R^2 T^4$$

At Equilibrium:

Absorbed Power = Radiated Power

$$0.70 I_s \pi R^2 = e\sigma 4\pi R^2 T^4$$

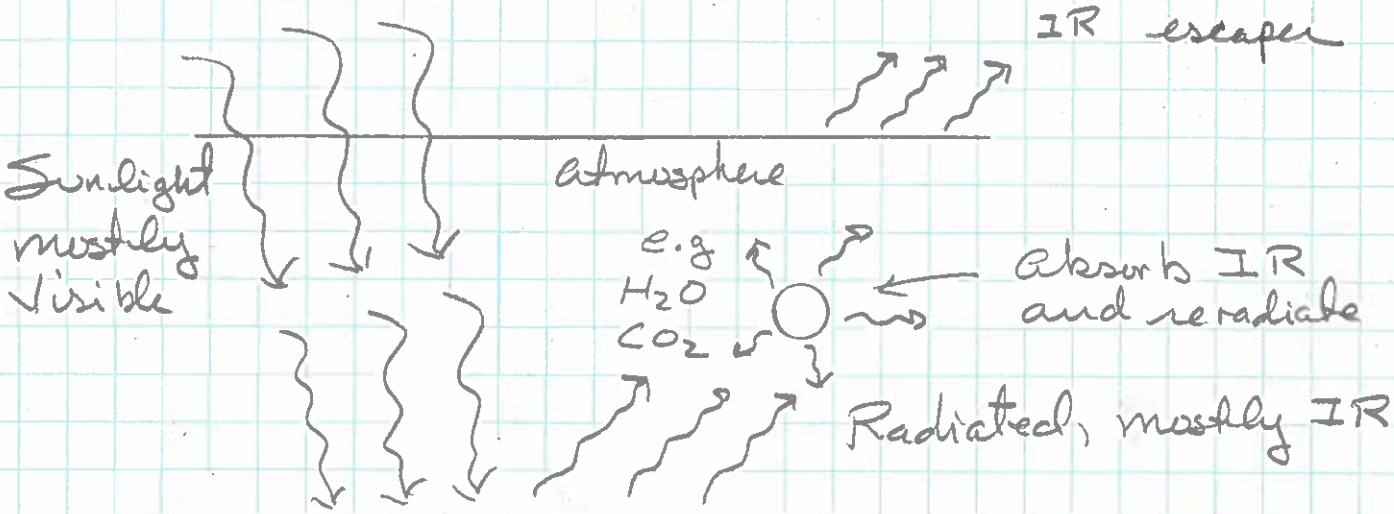
$$\therefore \quad T = \left\{ \frac{0.70 I_s}{4 e \sigma} \right\}^{1/4}$$

Use $e \simeq 1$, $\sigma = 5.67 \times 10^{-8} \frac{W}{m^2 K^4}$

So: $T = 255.0\,K = -18.0^\circ C$

NOTE: This is well below the freezing point of water.

The so-called "Greenhouse Effect" produced by the atmosphere causes the average temperature of the Earth to be 15 → 20°C higher.



Less IR escapes to space, Trapped IR raises temp of the surface.