

ASTRO 18, 2010
Homework Assignment 3
due Tuesday October 19, 2010

Problems from Bennett textbook

Chapter 5: Light and Matter Problems 44, 54, 58, 61

Chapter 6: Telescopes Problems 43, 44, 51

Additional problems:

1) Your body, at a temperature of about 37°C (98.6°F), emits radiation in the infrared region of the spectrum.

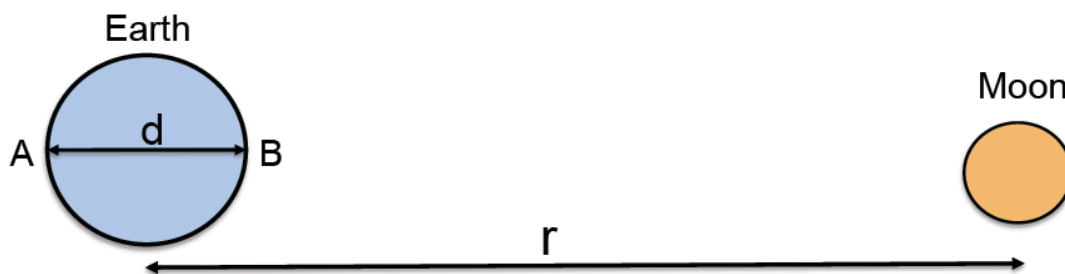
a) What is the peak wavelength, in μm , of your emitted radiation?

b) Assuming that your body's surface area is 1 m^2 , how many watts of power do you radiate to your immediate environment?

c) In general the radiating surfaces of your body will have a temperature that is different from your internal body temperature. Is your body's surface hotter or colder than your internal body temperature? Why do you think this is so?

2) Optional problem using calculus: Derivation of tidal forces. If you would like to do this problem, you may omit any two of the previous problems (and do this one instead).

Consider two points, "A" and "B", on opposite sides of the Earth and along a line to the Moon:



a) Write down equations for the gravitational force between the Earth and the Moon at Point A, and then at Point B.

b) Recognizing that $r \gg d$, do a Taylor expansion of the denominators in the two expressions for the gravitational force.

c) Calculate the difference between the gravitational force between the Earth and the Moon at point A and at point B. This is the tidal force.