

CORS221 Module 3 Homework 1

Out: 2010 November 2

Due: 2010 November 9 9:30AM Pacific Standard Time

1. Multiple Choice

1. Can science prove that carbon dioxide emissions cause global warming?
(a) yes (b) probably (c) it depends on the circumstances (d) no
2. What is light?
(a) nuclear radiation (b) spacetime distortion waves
(c) electromagnetic radiation (d) neutrino waves
3. Which of the following is most likely to cause a genetic mutation leading to cancer, if you were exposed to it at low levels?
(a) microwaves (b) infrared (c) ultraviolet (d) gamma rays
4. Hotter objects emit blackbody radiation at _____ wavelengths than cooler objects.
(a) shorter (b) the same (c) longer (d) more random
5. Hotter objects emit _____ blackbody radiation than colder objects.
(a) more (b) the same (c) less (d) more variable
6. What fraction of sunlight that hits Earth is reflected directly into space without warming the surface or atmosphere?
(a) 30% (b) 50% (c) 70% (d) 90%
7. In radiative equilibrium, the total power of incident sunlight on the earth is _____ the total amount radiated by the Earth as blackbody radiation in the infrared?
(a) greater than (b) the same as (c) less than (d) irrelevant to
8. What is the equilibrium temperature of Saturn's moon Titan, with distance to the sun $a = 9.5$ AU and the absorption fraction $A = 0.78$?
(a) 0.19 K (b) 85 K (c) 149 K (d) 7225 K
9. Given your answer to the previous question, if there is water on Titan, then in what physical state should it be?
(a) solid (b) liquid (c) gas (d) plasma
10. What gas contributes most to the greenhouse effect on planet Earth?
(a) water vapor (b) methane (c) carbon dioxide (d) oxygen

2. Short Answer

11. What is the difference between climate and weather?
12. How does a thermal imaging (FLIR) camera measure the temperature of objects that it sees?
13. How does the greenhouse effect keep Earth warmer than its calculated equilibrium temperature?
Draw a diagram and explain the process in 1 paragraph.