ASTR 121: Homework 1

Due Thursday, September 3rd, 2009

For problems that require mathematics, all work must be shown for full credit. This includes multiple choice questions.

1. The intellectual foundation of science is

   a. rejection of all observations that disagree with theory.

   b. observation, faith, and acceptance.

   c. logical derivation entirely from fundamental principles.

   d. observation, logic, and skepticism.

2. Consider two cases:

   1. The Earth was created by the flying spaghetti monster.

   2. The Earth was created as proto planets condensed out of the solar nebula and merged. The early Earth was heated through the mass of the material coming together and additional bombardments, and has since been cooling.

   Explain why each of these is or isn't a good scientific theory?

3. Compute the following using powers-of-ten notation:

   i. $10^{-6} \times 10^{0}$

   ii. $\frac{1}{10^{7}} \times 10^{3}$

   iii. $\frac{10^{9}}{10^{-2}} \times 10^{1}$

4. The Moon is 3.84×10^{5} km away from Earth and its diameter is 3.47×10^{3} km. If an object has the same linear size as the moon, and appears to have an angular size of 500 arcseconds, how far away is it?

   a. 8.92×10^{4} km

   b. 1.43×10^{6} km

   c. 1.43×10^{3} km

   d. 7.14×10^{8} km

   e. 6.94 km

5. *Chapter 1, problem 24*: The diameter of the Sun is 1.4×10^{11} cm, and the distance to the nearest star, Proxima Centauri, is 4.2 ly. Suppose you want to build an exact scale model of the Sun and Proxima Centauri, and you are using a ball 30 cm in diameter to represent the Sun. In your scale model, how far away would Proxima Centauri be from the Sun? Give your answer in kilometers, using powers-of-ten notation.