

Astronomy 161 – Introduction to the Solar System
Autumn Quarter 2006
Homework #3

Due Tuesday, October 31 in class

Instructions:

Answer the 5 questions on the bubble sheet provided with the handout. This handout is just a worksheet: we will only accept homework on bubble sheets available in class during the week.

On the bubble sheet, please fill in the following info:

1. Your full name, **last name first**, first name last, and **remember to bubble in the letters!**
2. Use only a black **Number 2 Pencil**, no pens or other markers, please.

Please turn in your homework during class Tuesday, October 31. **No late homework will be accepted.**

This homework assignment consists of the 5 questions below. Each question has equal weight.

1. Eris is the largest-known Pluto-like dwarf planet in the outer solar system. Eris has an elongated elliptical orbit with an aphelion of 98 AU. If you were standing on the surface of Eris when it is at aphelion, how much fainter would the Sun appear to be compared to what we see here on Earth?
 - a) it appears to be as bright as it does on the Earth.
 - b) it appears to be 98 times fainter than it does on the Earth.
 - c) it appears to be 196 times fainter than it does on the Earth.
 - d) it appears to be 9604 times fainter than it does on the Earth.

2. How far do you have to be from the Sun in AU in order for the gravitational force from the Sun on you to be 100 times smaller than the Sun's gravitational force is on you right now?
 - a) 0.1 AU
 - b) 1 AU
 - c) 10 AU
 - d) 100 AU

3. You seal a sample of pure radioactive Unobtainium-123 into a jar and leave it alone for 12 years. After 12 years you open the jar and find that $\frac{3}{4}$ of the Unobtainium has decayed into Illudium. What is the half-life of Unobtainium-123?
 - a) 6 years
 - b) 12 years
 - c) 24 years
 - d) 48 years

Please turn over...

4. Two identical robotic spacecraft are launched by NASA. One parks itself in a circular orbit 20000km from the center of the Earth, while the second flies to the planet Mongo and settles into a circular orbit that is 20000km from the center of Mongo. However, the spacecraft orbiting around Mongo has an orbital period of exactly half the period of its sister spacecraft orbiting the Earth. From this data, you know that
- a) Mongo is 2x more massive than the Earth.
 - b) Mongo is 4x more massive than the Earth.
 - c) Mongo has the same mass as the Earth.
 - d) Mongo is 2x less massive than the Earth.
 - e) Mongo is 4x less massive than the Earth.
5. A new comet has been discovered far out in the Solar System. The semimajor axis of its long elliptical orbit around the Sun is 100 AU. How long will this comet take to complete one orbit around the Sun?
- a) 10 years
 - b) 100 years
 - c) 1000 years
 - d) 10,000 years