Name _____

Astronomy 161 – An Introduction to Solar System Astronomy
Autumn Quarter 2009 – Prof. Gaudi
Homework #1

Due Monday, October 5 in class

Instructions

Answer the following five multiple-choice questions by circling the correct answer.

No late homework will be accepted.

In class, we learned how Eratosthenes measured the circumference of the Earth. The first three questions will be related to the concepts involved with his measurement.

Question 1 (20 points)

Eratosthenes' method relied on the assumption that the distance between Syene and Alexandria is much smaller than the distance from the Earth to the Sun. What is the distance from the Earth to the Sun in kilometers? In centimeters?

a) 1.496×10^{8} km, 1.496×10^{3} cm
b) 1.496×10^{8} km, 1.496×10^{13} cm
c) 3.086×10^{13} km, 3.086×10^{18} cm
d) 1.496×10^{18} km, 1.496×10^{18} cm
e) 1.496×10^{5} km, 1.496×10^{8} cm

Question 2 (20 points)

Although the distance to the Sun is obviously much larger than the distance between Alexandria and Syene, it is not infinite. This results in a small error in Eratosthenes' measurement, which is given by the

difference in the angle of the Sun between Alexandria and Syene. What is the difference in the angle in degrees? *(Assume a distance of between Alexandria and Syene of 860 km. It may help to draw a diagram.)*

a) 3.29×10^{-4} degrees
b) 2.07×10^{-3} degrees
c) 5.75×10^{-6} degrees
d) 0.329 degrees
e) 3.29×10^{-2} degrees

Question 3 (20 points)

Two astronomers that live on the hypothetical planet of Velux are located due north and south of each other on the day of the Veluxian Equinox. The first Veluxian astronomer is on the Veluxian equator and sees no shadows cast at noon. The second is 220 km north of the Equator and sees a 4 degree shadow at noon. What is the circumference of Velux?

a) 8520 km
b) 9900 km
c) 39600 km
d) 62204 km
e) 19800 km

Question 4 (20 points)

One of the Veluxian astronomers has pet rock, which he bought on Earth. The rock has a mass of 10 kg and weighs about 22 pounds on Earth. The gravity of Velux is about $1/10^{th}$ that of Earth's. On Velux, the mass and weight of the pet rock are:

a) 1 kg, 2.2 pounds
b) 10 kg, 22 pounds
c) 10 kg, 2.2 pounds
d) 1 kg, 22 pounds
e) 10 kg, 220 pounds

Question 5 (20 points)

The other Veluxian astronomer abducts you and drops you on a small island somewhere that you assume is on Earth. You notice that the Sun's path at sunrise and sunset is always at a right angle (90 degrees) with respect to the horizon and there are no circumpolar stars. Where are you?

a) An island near the north pole.
b) It is not possible to tell from this information.
c) You don't know, but it can't be on Earth.
d) An island on the Equator.
e) An island in the Pacific Ocean 50 degrees below the equator