Name _____

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

Due Monday, October 26 in class

Instructions

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

No late homework will be accepted.

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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. In principle, one could repeat Eratosthenes's measurement using light from the moon rather than the sun. However, the moon is clearly much closer to the Earth than the sun. What is the average distance from the Earth to the moon in kilometers? In centimeters?

a) 1.496×10^{8} km, 1.496×10^{13} cm
b) 3.844×10^{6} km, 3.844×10^{10} cm
c) 3.844×10^{4} km, 3.844×10^{9} cm
d) 3.844×10^{3} km, 3.844×10^{5} cm
e) 3.844×10^{5} km, 3.844×10^{10} cm

Question 2 (20 points)

Although the distance to the moon is obviously much larger than the distance between Alexandria and Syene, it is not infinite. This results in a small error in Eratosthenes' method when applied to light from the moon, which is given by the difference in the angle of the moon 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) 0.128 degrees
b) 2.24×10^{-3} degrees
c) 3.90×10^{-5} degrees
d) 0.256 degrees
e) 7.691 degrees

Question 3 (20 points)

Two astronomers that live on the hypothetical planet of Delux are located due north and south of each other on the day of the Deluxian Summer Solstice. The first Deluxian astronomer sees no shadows cast at noon on that day. The second is 55 km due north of the first astronomer and sees a 5 degree shadow at noon. What is the circumference of Delux?

a) 3135 km
b) 1980 km
c) 39600 km
d) 3960 km
e) 23180 km

Question 4 (20 points)

One of the Deluxian astronomers has pet rock, which he bought on Earth. The rock has a mass of 5 kg and weighs about 11 pounds on Earth. The gravity of Delux is about 1/20th that of Earth's. On Delux, the mass and weight of the pet rock are:

a) 0.25 kg, 0.55 pounds

      b) 5 kg, 11 pounds
      c) 5 kg, 0.55 pounds
      d) 0.25 kg, 11 pounds
      e) 100 kg, 220 pounds

Question 5 (20 points)

The other Deluxian astronomer abducts you and drops you somewhere that you assume is on Earth. You notice that the Sun's path is always parallel to the horizon, and all the stars are circumpolar. Where are you?

      a) An island near the north pole.
      b) Near the south pole.
      c) You don't know, but it can't be on Earth.
      d) An island near the Equator.
      e) Near either the north or south pole, but you don't know which.