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Astronomy 161 –Solar System Astronomy
Winter Quarter 2010 – 9:30-10:18 M-F – Prof. Martini
Homework #1

Due Friday, January 22 in class

Instructions

Answer the following five questions (and optionally the two extra credit questions) by circling the correct answer. Each question has equal weight.

No late homework will be accepted.

1. Neil Armstrong weighed 58lbs in his space suit on the surface of the Moon. The surface gravity on the moon is 0.165 times the surface gravity on the surface of the Earth. How much would he weigh in this suit on the surface of the Earth?
 - a) 35.1 pounds
 - b) 9.6 pounds
 - c) 351 pounds
 - d) 165 pounds
 - e) 58 pounds

2. Aliens abduct you and then leave you on a small island somewhere on Earth. You noticed that Polaris, the North Star, is 10 degrees above the horizon. What is the latitude of this island?
 - a) 10 degrees
 - b) 20 degrees
 - c) 40 degrees
 - d) 70 degrees
 - e) 80 degrees

3. Eclipses occur on Earth because the apparent size of our Moon and Sun are comparable (their diameters both subtend about half a degree). Mars is 2.28×10^8 km from the Sun and therefore the Sun appears smaller from Mars than from the Earth. The diameter of the Sun is 1.4×10^6 km. What is the angular diameter (in arcminutes) of the Sun as seen from Mars?
 - a) 42
 - b) 21
 - c) 0.37
 - d) 0.35
 - e) 1267

(turn over)

4. What is the furthest the Sun gets from the Zenith at Local Solar Noon for an observer on the Equator?
- a) 0 degrees
 - b) 90 degrees
 - c) 67.5 degrees
 - d) 40 degrees
 - e) 23.5 degrees
5. Lunar Phases. Particular phases of the Moon can only be seen at certain times of the day (or night) and in certain parts of the sky. Which one of the following combinations is impossible?
- a) A new moon *directly overhead* at noon
 - b) A waning crescent in the sky at noon
 - c) A first quarter moon *on the eastern horizon* at noon
 - d) A waning gibbous *above the eastern horizon* at dawn
 - e) A waning gibbous moon in the sky right before dawn
6. *Extra Credit:* Imagine you are assigned to use Eratosthenes' method to measure the size of the Earth using two hypothetical cities: Tropica and Equatoria. Which of the following **MUST BE TRUE** for your measurement to be successful:
- a) You must make the measurements on either the Summer or Winter Solstice
 - b) The Sun must cast no shadows at noon in one of these cities
 - c) The North-South distance between the two cities must be known
 - d) Tropica and Equatoria must lie on the same Meridian
 - e) All of the above must be true
7. *Extra Credit:* Total solar eclipses are only visible from narrow, curving paths across the surface of the Earth. Which of the following does **NOT** affect the shape and/or width of these paths?
- a) The rotation of the Earth during the eclipse
 - b) The Earth-Moon distance at the time of eclipse
 - c) The alignment of the Earth, Moon, and the line of nodes
 - d) The orbit of the Moon around the Earth
 - e) All of the above affect the paths