

Name _____

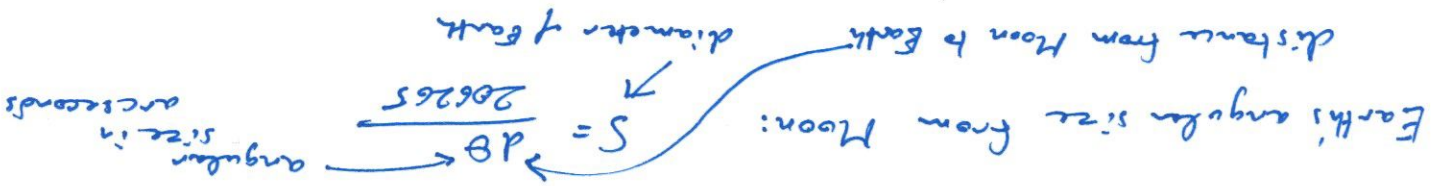
ANSWER KEY

ASTR 1010 - Exam 1 - Spring 2009 - Prof. Magnani

February 6, 2009

There are 7 questions on this exam and you must attempt them all (the numerical point value of each question is denoted in parentheses). A formula and constants sheet is included at the end of this exam. Please write right on the exam pages and use the back of the sheets if you need more room. You may use a calculator. Be sure to include the units associated with the numerical result that you get for your quantitative answers. Good luck!

1. (16 points) Calculate the Earth's angular size as seen from the Moon. If the Sun's size and distance do not change from the values on the formula sheet, how small could the Earth get for you to still have total solar eclipses as seen from the Moon?



$$12756 = \frac{3.84 \times 10^5 \theta}{206265} \Rightarrow \theta = 6850'' = 1.9^\circ$$

Sun's angular size from Moon:

$$1.39 \times 10^6 = \frac{1.5 \times 10^8 \theta}{206265} \Rightarrow \theta = 1910'' = 0.53^\circ$$

if the Earth gets smaller, its angular size decreases.

As long as the Earth is at least the ~~same~~ angular size of the Sun, you can have total solar eclipses...

so, the Earth could get smaller by a factor of $\frac{6850}{1910} = 3.6$

So, even if the Earth was $\frac{12756}{3.6} = 3540 \text{ km}$ in

diameter, you would still have total solar eclipses.