

UNIT 1

UNIT 2

UNIT 3

UNIT 4

UNIT 5

UNIT 6

UNIT 7

UNIT 8

UNIT 9

End of Unit 4 Assignment

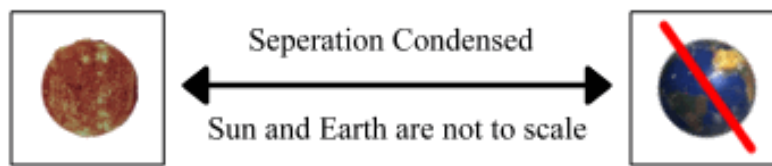
This assignment consists of four parts. The first is a review with a couple of practice questions linked directly to their answers. The second is a short quiz that you take using WebCT. It will be instantly scored for you by WebCT; you only get one chance to take it, however, so be sure you are ready! The third part is an essay question. The question appears below; when you are ready to answer it, log on to WebCT and submit your essay. Finally, for each unit, you should log on to WebCT and contribute a question, an answer, or a comment to one of the posted topics. If you would like to introduce a new topic instead of contributing to an existing thread, please send your topic idea to your instructor. If you find the material in this unit challenging, you might want to start with the "discussion" part of the assignment in order to get some help with some of the ideas.

Brief summary of Unit Four:

This unit deals with the apparent motion of the sun on the sky over the course of a year. This apparent motion results from Earth's motion around the sun, and is made complicated by the fact that Earth's equator and Earth's orbit are not in the same plane. The North Pole of Earth points to the same place in the sky all year, so as the earth orbits around the sun, sometimes the sun appears north of the celestial equator and sometimes it appears south. That is, the sun's declination varies from -23.5 to $+23.5$ degrees. At the same time, the part of the sky that is behind the sun changes, so in winter evenings we see Orion and in summer evenings we see Sagittarius. In other words, the sun's right ascension changes, increasing from 0 at the vernal equinox around to 24hours = 0 a year later. Right ascension is measured in hours because it is closely related to sidereal time. A simple way to tell sidereal time is that it equals the right ascension of an object that is transiting the observer's meridian. There are 23h56m of normal solar time in one day of sidereal time, or, there are 365.2422 solar days in one year and 366.2422 sidereal days in one year.

Practice Question One

If the arrangement of the earth and sun are as sketched, is the declination of the sun positive or negative?



Practice Question Two

What are the right ascension and declination of the sun on the following dates:

March 21, June 21, September 21, and December 21?

What are these dates called? On which of these dates will the sun rise due east? Here is a meridian diagram.

When you are ready, [WebCT](#) and take Quiz Four.

You will get instant feedback on your score on Quiz Four (and your instructor will also be informed of your score). If your score is OK, you may proceed directly to the Essay Question Four on WebCT. Otherwise, you might want to look at what you missed, ask your instructor about questions you missed, or review relevant parts of the unit.

Essay Question

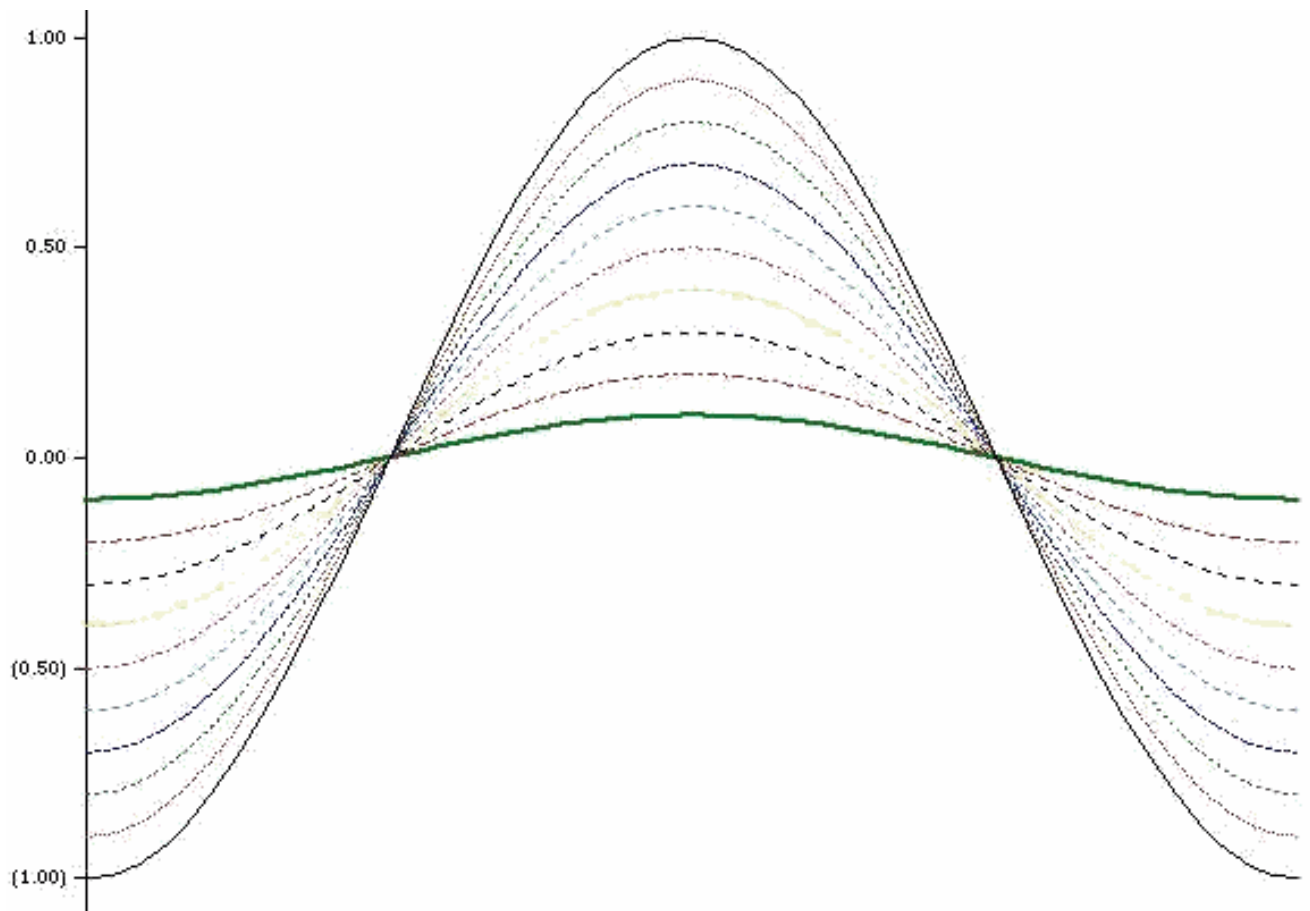
Suppose that the tilt of the earth were double what it actually is. Which of the following would be affected: Sidereal time vs. solar time; the dates of the equinoxes; the declination of the sun at the equinoxes; the declination of the Sun at the solstices. Explain!

When you are ready to answer this question, go to [WebCT](#) to write your answer.

Alternative to the Essay Question

You can verify the tilt of the axis of the earth by observing the altitude of the sun at noon over the course of several months near one of the solstices. You can use a meridian diagram to solve for the changing declination of the sun. Try it and see what you get!

In principle, it is possible to measure the declination of the sun over any several-month period and fit a sine curve to it to get the declination. However, this will not be very accurate if the observations are too close to an equinox. This diagram illustrates the problem: The black, red, and green lines are hard to separate near the place where they all cross.



Don't forget to contribute to the discussion on [WebCT](#) on one of the topics in this unit!



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