Due: Tue Sep 25 2007 11:59 PM EDT   Description
Problem Set 1

Instructions
You have 20 submissions before the due date. You have the
opportunity to make changes up until the due date or you reached
the maximum of 20 submissions. The last submission will be
graded. Note that you can submit one question at a time or all at
once. You can also answer just a few questions, save them, and
come back later and finish answering the questions and then
submit them. Solutions will not be available until after the due date.

You are welcome to communicate with your colleagues on the
homework using the Discussion Board in Blackboard. You may also
use any source of information you find in other texts and also on
the internet. However. you must write up the homework on your
own as I describe in the guidelines below.

The following rules apply to every assignment. If you want full
credit, you must follow them.

1. Always follow up your answer with an explanation for it. That is:
Explain the reason behind your answer.

2. Always write your answer in complete sentences. Do not use
fragments of sentences in giving your answer. Do not mispell
words.

3. Use clear and concise english. Use direct descriptive words and
do not use hyperbole.

4.Even if your answer is correct, if you have not given a reason for
your answer, you may not receive full credit.

5. Do not plagiarize you answers regardless of the source of
information. This will be a violation of the honor code. I emphasize
that you must write up your solutions in your own words.

6.Since the emphasis of this course is mostly conceptual, it is
important to describe "how things work" using decriptive language
without equations and pictures where ever possible. There will be

exceptions where the questions begs for a numerical answer involving calculations using equations. You will be graded with this emphasis in mind.

7. For the few numerical problems as part of the case studies you are expected to use equations to explain your answer. You may use html or you may use the following notation:

a*b means a multiplied by b
a/b means a divided by b
x^2 means x squared
Use parenthesis to indicate groupings.
(a+b)^2 means add a and b and then square the sum.
((a+b)^2)/c means add a and b, square the sum, and divide by c.

8.Individual questions will usually be graded by following the above rules and assigning:

1 for full credit
0.5 for partial credit
0 for no credit

Essay Questions will not be graded until after the due date.

1. Lamp Post Height [452290] Show Details

Find the height of a lamp post in a parking lot by measuring the length of its shadow, and measuring the length of your own shadow. Explain clearly how knowing your own height means you can figure the height of the lamp post.
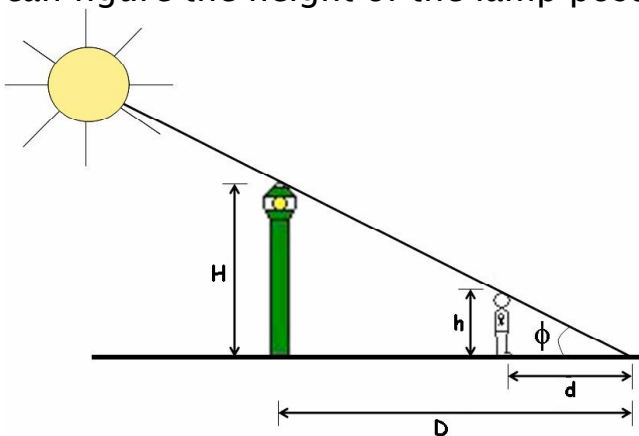
2. Midday Sun [452292] Show Details

By measuring some shadow, find how high in the sky the sun gets in the middle of the day, that is, what maximum angle does a pencil pointing directly at the sun make with the horizontal? What direction is the sun when this angle is maximum? Would this angle be measurably different in New York? Hint: it would be helpful to look at a globe when doing this question!
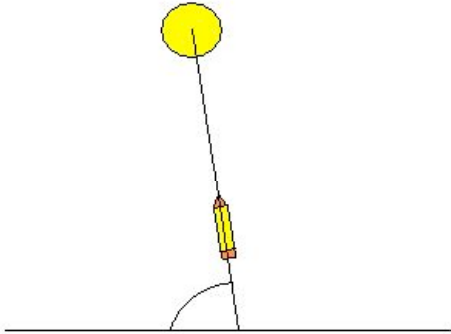
Explain how that maximum angle, measured on midsummer's day, relates to the latitude of your town. What about midwinter's day?

3. Angle of the sun measurement [208973] Show Details

Celestial Journal report. This question and problem is to get you started in creating your celestial journal. Describe how you are going about making the measurements of the angle of the sun, and give your results for at least one measurement.
Describe how you measured the angle of the sun with the horizon near noon. Do not look at the sun to make this measurement. A simple method, as described in class, makes use of the shadow of objects. A vertical stick on level ground (fire hydrant, traffic sign) casts a shadow pointing north at noon. If you measure the height of the stick h, and the length of the shadow d, then the angular height of the sun is the angle whose tan equals h/d. Using a hand calculator evaluate tan−1(h/d) and that is the angle of the sun. You can also use a windowsill on the south-facing side of a building: the length of its shadow on the floor (toward north, not necessarily perpendicular to the wall) is d, and its height above the floor is h.

4. Cromer's View [482047] Show Details

Read carefully: Uncommon Sense, Chapter 4. Summarize in a few sentences the view of Cromer as to why abstract mathematics and science flourished in ancient Greece, but not in Israel (or pretty much anywhere else). Do you completely buy this argument?

5. Plato/Aristotle Differences [482048] Show Details

In a paragraph or so, summarize the differences between Plato and Aristotle in their approach to nature.

6. Platonic "regular solid" [482049] Show Details

What is a Platonic "regular solid"? Explain in your own words why there can only be five such solids.

7. Half-moon [482050] Show Details

What is the alignment of the sun, earth, and moon for the phase of the moon on September 21, 2004? First find the phase of the moon at this date.

8. Little dipper motion [208975] Show Details

Polaris is the last star in the handle of the little dipper. Describe the motion of the stars in the Little Dipper as seen from 42° north latitude over a period of three hours. Describe the motion as best as you can since you are probably unable to draw a diagram with your computer.

9. SkyView cafe [374591] Show Details

Go to Sky View Cafe for the Interactive Planetarium. Experiment with this utility to familiarize yourself with its features and uses.

What five planets were visible from Philadelphia at 4:30 AM on July 4, 1776?

For a Charlottesville, Virginia resident, what time will the sun rise on December 25, 4004?

Because of atmospheric effects, the sun appears to set after it actually moves beyond the horizon. We can model this in Sky View Cafe by finding when the sun sets today. Then, unclick the "Refraction Effect" box on the right. Move the time back as long as necessary to find the difference between when the sun disappears beyond the horizon and when it appears to do so. How many minutes' difference is there? (Hint: you may need to change the view to "Full Sky")
minutes

10. Autumnal equinox [482051] Show Details

The autumnal equinox is on September 22 in the year 2004. You may use Skyview cafe to help with this question.

   a. Describe the path of the sun in the sky on that day, as seen from Charlottesville. Where, exactly does it rise? Where does it set? What is the angle of its maximum height in the sky?

   b. Now consider Melbourne, Australia, which happens to be just about as far south of the equator as we are north. Describe in similar detail the path of the sun through the sky as seen from Melbourne on that day.

   c. Finally, what is the path of the sun as seen from the South Pole research station on that day?