

HOMEWORK 2 = Lab 1: due Wednesday 20 September 2006 in class (or turn them in before then to my mailbox, 5th floor, Sterling Hall). Show your working (for partial credit if you make an arithmetic error), and attach an extra sheet of paper if you need it.

1) Go outside and find a convenient place from which you have a good view of the east, south and west. Carefully make a sketch of features on your horizon—trees, houses, a chimney—from east to south to west. The figure shows what your landscape sketch should look like; write on it where you were standing when you made the observation, *and the date and times*.

Soon after sunset, find the constellation of Cygnus, the swan: in Figure 1.10 in the text it is about $2/3$ of the way along, above the wavy yellow line of the *ecliptic*.

a) Using your hand as on page 6 of the text, how big is the angle on the sky between Deneb (blue star at the swan's tail) and Albireo, a double star at the end of the swan's long neck?

b) Sketch Cygnus on your horizon drawing, showing its position as carefully as you can. Note the time. About an hour later, draw it on the *same* horizon sketch, again noting the time. Repeat this each hour until you go to bed. Cassiopeia (the 'W') should come up later in the evening.

When you make your observations, record immediately and carefully what you see; don't rely on your memory. Astronomers hate clouds! You can't do anything about them except to take advantage of any clear night to make your observations. We'll give an extension if there are fewer than two evenings when you could have observed; starting later in the evening beats giving up!

c) In which compass direction does the constellation move?

Explain why the position of your constellation changed during the time that you observed it. It helps to draw a picture.

d) Considering *only* what you have observed, can you think of any reason to suppose that the sky is fixed and that the Earth is rotating? What would it look like if the Earth stood still and the sky revolved around it once each day?

e) Would you be able to observe this constellation six months from now? Draw a picture and explain. Would someone in Australia be able to observe it six months from now? Why or why not?

f) Why would it be difficult to do this homework on September 7 or October 7? (What else is happening in the sky then?)

2) The full Moon covers about half a degree on the sky.

a) Thinking of a big circle around yourself, with its radius reaching out to the Moon, what fraction of that circle does the Moon cover up?

b) The Moon is about 384,000 km away: write this in powers-of-ten.
What is the circumference of your big circle?

From this, find the Moon's diameter (check your answer with Table B2).

c) During a Solar eclipse, the Moon just covers up the Sun, as seen from the Earth. What does that tell you about the *angular size* of the Sun (the angle that it covers on the sky)?

The Sun is 150 million km away. Use ratios to find out how many times larger it is than the Moon.
What does that tell you the Sun's diameter is, in km?

