Quiz/Take-home #3: Right Ascension and Declination Name: _____

Due October 4

Examine the rectangular star map. It represents the entire celestial sphere. Distortions occur, of course, and are most severe near the top and bottom of the map. In that region you will notice oddly shaped constellations — for instance, the Big Dipper and Cassiopeia. The center two-thirds of the map, where we will be working, is quite tolerable. It's similar to the rectangular maps of the earth that grossly distort the landmasses near the north and south poles, but work fine for the major populated areas closer toward the equator.

The line running horizontally through the center of the rectangular map represents the celestial equator. **Right ascension (RA)** is measured along this line from *right to left.* Notice the right ascension scales at the top and bottom of the map. **Declination (dec)** is measured perpendicular to the celestial equator. The scales are on the left and right edges of the map. Compare this to the RA and dec lines on the August circular map.

Check the coordinates of Arcturus (RA= 14h 16m, Dec= 19°11' and Antares (RA= 16h 30m, Dec= -26°26') with those stars' positions on both the rectangular and circular maps to check that you understand how this celestial coordinate system works, and then answer the questions that follow.

1. Find the star Vega in the constellation Lyra on both maps. Determine its right ascension, to the nearest 15 minutes, and declination (nearest 2°) as read from either map. (Try a ruler or straight edge to improve your accuracy.)

   Vega's RA: _____ Dec: _____

2. The sun's location at the first day of each season (northern hemisphere) is giving in the table below. Plot all four positions on the rectangular star map and all but summer on the circular map. Label each date with the season (Spr, Sum, Aut, Win).

Season	RA	Declination
Autumn (Sep 23)	12h 0m	0°
Winter (Dec 22)	18h 0m	-23.5°
Spring (Mar 21)	0h 0m, or 24h 0m	0°
Summer (Jun 21)	6h 0m	+23.5°

   The sun always appears on the imaginary line called the ecliptic. The ecliptic can also be thought of as tracing the plane of the earth's orbit. **Label the ecliptic on the rectangular map.**

3. Now that the four principal seasons are plotted, imagine where the sun might be on dates between these points. For example, what are the approximate RA and dec of the sun on October 23? How about Nov 15? (The ticks on the ecliptic mark the 1st of each month, and the month labels indicate mid-month.)

Date	RA	Dec
October 23	_____	_____
November 15	_____	_____

4. The following table lists the celestial coordinates for the major planets on December 1, 2011. Plot all planet positions on the rectangular map, and Mercury, Venus, and Saturn on the circular map. Label each planet. Try to use a different color pen than the one you used for the sun plotting.

Planet	RA	Dec
Mercury (Mer)	16h 57m	-22°
Venus (Ven)	18h 27m	-25°
Mars (Mar)	10h 47m	+10°
Jupiter (Jup)	1h 58m	+11°
Saturn (Sat)	13h 38m	-8°

OVER

5. In the following table, fill in the constellation closest to each planet's position on December 1, 2011:

Planet	Constellation
Mercury	_____
Venus	_____
Mars	_____
Jupiter	_____
Saturn	_____

6. The following table lists the moon's coordinates at weekly intervals for October. Plot all of the moon's positions on the rec. map as well as the first two dates on the circular map. Label each position with the date. Use a different color pen for this, if possible.

Date	RA	Dec
10/1/2011	16h 37m	-23°
10/8/2011	22h 46m	-3°
10/15/2011	4h 13m	+21°
10/22/2011	10h 20m	+4°

7. In the following table, fill in the constellation closest to each moon position.

Date	Constellation
10/1/2011	_____
10/8/2011	_____
10/15/2011	_____
10/22/2011	_____

8. Recall that the sun is always on the ecliptic. Is the moon ***always exactly*** on the ecliptic? How about the planets?