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

Due October 2, along with the rectangular and circular star maps.

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. (Use a ruler or straight edge to improve your accuracy.)

   Vega's RA: _____ Dec: _____

2. While the stars' RA and Dec remain the same throughout the year, the Sun, Moon and planets constantly change. The following table lists the celestial coordinates for the major non-stellar objects on November 1, 2012. Plot all object positions on the **rectangular map**, and the Sun, Mercury, Venus, Mars, and Saturn on the **circular map**. Label each planet. Try to use a different color pen for each object, if possible.

Object	RA	Dec
Sun	14h 30m	-15°
Moon	4h 56m	+20°
Mercury (Mer)	16h 00m	-24°
Venus (Ven)	12h 22m	-1°
Mars (Mar)	17h 11m	-24°
Jupiter (Jup)	4h 56m	+22°
Saturn (Sat)	14h 07m	-11°

3. In the following table, fill in the constellation closest to each object's position on November 1, 2012:

Object	Constellation
Sun	_____
Moon	_____
Mercury	_____
Venus	_____
Mars	_____
Jupiter	_____
Saturn	_____

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4. The sun's location at the first day of each season (northern hemisphere) is given 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.**

5. Is the Moon ***exactly*** on the ecliptic on November 1? How about the planets?