Quiz #3: Right Ascension and Declination Name: _____

Due Oct. 6

Examine the rectangular star map. It represents the entire celestial sphere as a rectangle. Distortions occur when a 3D sphere is drawn as a flat rectangle. The distortions are severe near the top and bottom of the map. You will notice slightly odd shapes elsewhere, for instance, the Big Dipper and Cassiopeia. The distortion is quite workable for most purposes in the center two-thirds of the map. 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 star map represents the celestial equator. Right ascension (RA) is measured (in what units?) along this line from *right to left.* Notice the right ascension scales at the top and bottom of the map.

Declination (dec) is measured (in what units?) perpendicular to the celestial equator. The scales are on the left and right edges of the 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 the map to make certain you understand how this celestial coordinate system works and then answer the questions that follow.

1. Find on the map the star Vega in the constellation Lyra. What is its right ascension, to the nearest 15 minutes, as read from the map?

   What is the declination of that same star, to the nearest 2 degrees?

2. The sun's location at the first day of each season (northern hemisphere) is giving in the table below. Plot its position on the rectangular star map for each date and label it 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 be also thought of as tracing the plane of the earth's orbit. **Label the ecliptic on the map.**

3. Fill in the table below with the constellation closest to the sun's position (that is, the constellation the sun is "in") and the constellation closest to the opposite point in the sky (opposite the sun, 180° away on ecliptic) on each of the seasonal positions.

Season	Constellation sun "in"	Constellation opposite to sun
Autumn	_____	_____
Winter	_____	_____
Spring	_____	_____
Summer	_____	_____

4. 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 August 23? How about May 21? (The month labels on the ecliptic indicate mid-month. Note the direction that the dates increase.)

Date	RA	Dec
August 23	_____	_____
May 21	_____	_____

OVER

5. The following table lists the celestial coordinates for the major planets on October 1, 2009. Plot the planet positions on the map and label each planet. Try to use a different color pen than the sun plotting.

Planet	RA	Dec
Mercury (Mer)	11h 31m	+4°
Venus (Ven)	11h 01m	+8°
Mars (Mar)	7h 36m	+23°
Jupiter (Jup)	21h 20m	-17°
Saturn (Sat)	11h 51m	+3°

6. In the following table, fill in the constellation closest to each planet's position on October 1, 2009:

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

7. The following table lists the moon's coordinates at 5-day intervals for October. Plot the moon's position on the map and label each position with the date. Use a different color pen for this, if possible.

Date	RA	Dec
10/1/09	22h 38m	-6°
10/6	2h 37m	+20°
10/11	7h 35m	+21°
10/16	12h 06m	-6°
10/21	16h 36m	-26°
10/26	20h 54m	-17°

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

Date	Constellation
10/1/09	_____
10/6	_____
10/11	_____
10/16	_____
10/21	_____
10/26	_____