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Grade	
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Exploring the Sky:  
*Stellarium Web*

## Pre-Lab Quiz

Record you team's answer as well as your reasonings and explanations.

1.

2.

3.

4.

## Part 1: Stellarium Web

In *Stellarium Web* (see the lab webpage for this lab for the link to this program and its user instructions):

- Change the current location to Iowa City
- Change the time to today's date, 23:00 (11:00PM)

Note the details about the following terms:

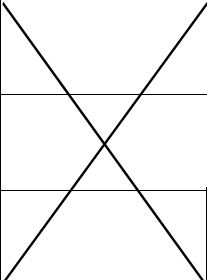
*right ascension (RA,  $\alpha$ ) and declination (DEC,  $\delta$ )* – Coordinates of stars are often listed in terms of right ascension and declination, which are similar to longitude and latitude. Right ascension runs from 0 to 24 hours. Declination runs from  $-90^\circ$  to  $+90^\circ$

*apparent magnitude* – The ancient astronomer Hipparchus ranked stars based on their brightness. Ptolemy expanded upon his idea, assigning the brightest stars to 1<sup>st</sup> magnitude and down onto the faintest at 6<sup>th</sup> magnitude. Astronomers nowadays use a more precise definition for apparent magnitude based on a mathematical formula that is similar to Ptolemy's system.

**If you are in a fall semester lab, skip questions 4, 5, 6, and 10**

**If you are in a spring semester lab, skip questions 1, 2, 3, and 9**

1. (Fall labs only) Search for each object and record the values listed. Feel free to round to the nearest integer.

Object	Type	Apparent Magnitude	Distance (light years)
Vega	Star		
Deneb	Star		
Altair	Star		
Polaris	Star		
M31	Galaxy		
M13	Globular Cluster		
M82	Galaxy		

2. (Fall labs only) Vega, the 5<sup>th</sup> brightest star in the night sky, is used to define the magnitude scale. It is around 40 times more luminous than our Sun. You recorded the distances to Vega and the blue supergiant star Deneb above. How many times further away than Vega is Deneb?

3. (Fall labs only) How many times further away than Altair is Polaris?

4. (Spring labs only) Search for each object and record the values listed. Feel free to round to the nearest integer.

Object	Type	Apparent Magnitude	Distance (light years)
Sirius	Star		
Betelgeuse	Star		
Procyon	Star		
Capella	Star		
M31	Galaxy		X
M45	Open Cluster		
M42	Nebula		

5. (Spring labs only) You recorded the distances to Sirius, the brightest star in the night sky, and Betelgeuse above. How many times further away than Sirius is Betelgeuse?

6. (Spring labs only) How many times further away than Procyon is Capella?

7. On August 21, 2017, parts of the United States experienced a total solar eclipse. Let's simulate what the sky will look like during the next North American total solar eclipse.

- Change the current location to Bloomington, Indiana
- Change the time to 2024/04/08, 14:05 (2:05PM)
- In the bottom menu, turn on Constellations

Find the three brightest planets that will be visible, identify what constellation(s) they will be near, and list their apparent magnitude.

Planet	Constellation(s)	Magnitude

8. Making sure the Sun or the Moon is centered in the field of view, determine how long the entire eclipse lasts and write this below. Remember to include units. (Record the entire time from start of eclipse when the Moon first begins to pass in front of the Sun to end of eclipse when the Moon stops passing in front of the Sun, not just the few minutes of totality when the Sun is fully blocked by the Moon.)

- Change the current location back Iowa City
- Change the time back to today's date, 23:00 (11:00PM)
- Turn on Constellations (if not already on) and Constellations Art

9. (Fall labs only) In what constellations are the stars of the Summer Triangle found and what objects do these constellations represent?

Star	Constellation	Object
Vega		
Deneb		
Altair		

10. (Spring labs only) In what constellations are the stars of the Winter Triangle found and what objects do these constellations represent?

Star	Constellation	Object
Sirius		
Betelgeuse		
Procyon		

11. In the bottom menu, turn on the Equatorial Grid and find the North Celestial Pole. Zoom out so that you can see most of the sky. Simulate an entire day by changing the hour and watch the constellations move.

a) List some constellations that never went below the horizon. We call these constellations *circumpolar constellations*.

b) Change the location to the South Pole. Simulate an entire day and then a year. What do you notice about the path of the stars?

- Change the current location back Iowa City
- Consider turning off Constellations, Constellations Art, and Equatorial Grid if not already off
- Start this question by changing the time back to today's date, 23:00 (11:00PM), though you will change this time and date as directed and required below

12.

- a) What time of year is the star Vega at the zenith at 3:00AM?
- b) What time of year is the star Vega at the zenith at 9:00AM?
- c) What time of year is the star Vega at the zenith at 3:00PM?
- d) What time of year is the star Vega at the zenith at 9:00PM?

13.

- a) What time of year is the star Sirius rising in the East at 3:00AM?
- b) What time of year is the star Sirius rising in the East at 9:00AM?
- c) What time of year is the star Sirius rising in the East at 3:00PM?
- d) What time of year is the star Sirius rising in the East at 9:00PM?