Name: _____
Partner(s): _____
1101 or 3310: _____
Desk # _____
Date: _____

The Moon

Purpose

- Identify and describe the phases of the Moon.
- Describe orientation of the Moon, Earth and Sun for each phase of the Moon.
- Explain the different rise times for different phases of the Moon.
- Draw the orientation of the Moon relative to the horizon from different observing locations.

Equipment

- Starry Night College
- Assorted spheres
- Flashlight or other light source

For this lab, we assume there is no daylight savings time. Check off the box of "Automatic Daylight Saving Time" under "Location ♡ > Latitude / Longitude".

Question 1: Phases of the Moon. Open the Info Window for the Moon.

a) What is the phase of the Moon tonight?

b) Was the phase of the Moon the same in Vancouver (Canada), Quito (Ecudor), and Buenos Aires (Argentina) on September 13th, 2006? Explain.

c) Draw the Moon as it looks from Vancouver in the following phases. Use a large field of view in Starry Night College.

Draw what you see				
Phase	New moon	First quarter	Full moon	Last quarter
Draw what you see				
Phase	Waxing gibbous	Waning gibbous	Waxing crescent	Waning crescent

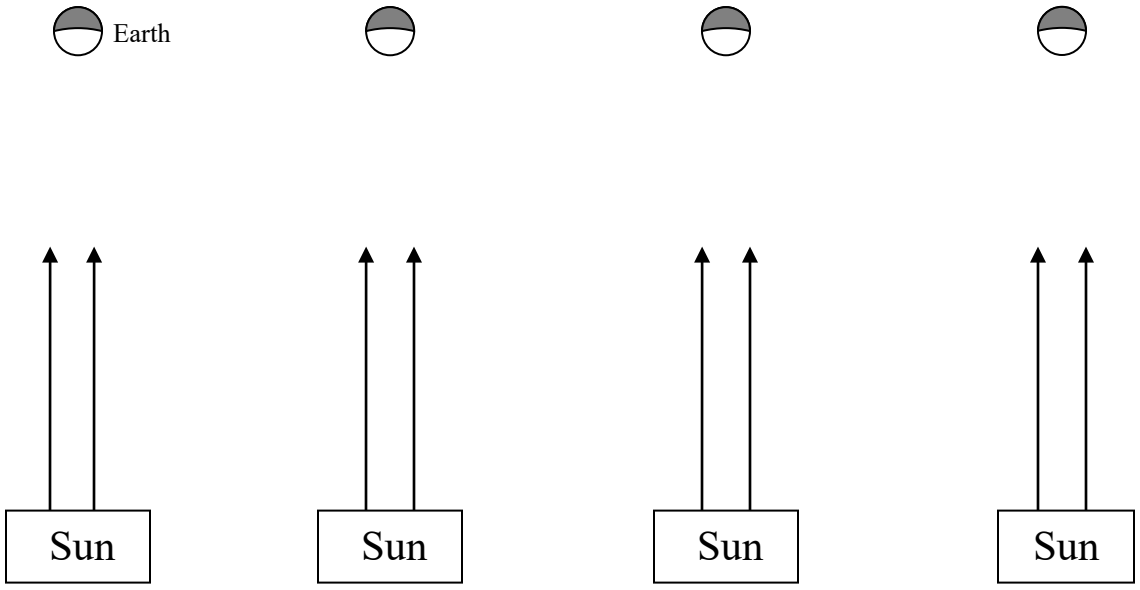
Question 2: Use the **ec**liptic coordinate system and the Hand/Measure Tool .

a) Complete the following table with the angular distance between the Moon and the Sun, as seen from the Earth.

Phase	New	First Quarter	Full	Last Quarter
Angular distance				

b) Complete the top view (as seen from space) of the position of the Moon, Earth and Sun for each of the following phases of the Moon:

New moon First quarter Full moon Last quarter



Question 3: Show the zodiac. Click on the Moon to track its path. Set the time step to one sidereal day and click the time step forward button . Each click should be a sidereal day.

a) How many days does it take for the Moon to be back at the same position relative to the stars? That is the moon's **sidereal period**. Note that the sidereal period is not an integer number of days. Write down your answer to the nearest first decimal place.

b) How many days are in one cycle of phases? That is the **synodic period** of the Moon.

Question 4: Use two objects to represent the Earth and the Moon and a light source to represent the Sun. Prepare a 1 min speech to explain the phases of the Moon. You should be able to answer questions like "Why can we see the full moon almost every month? What is a lunar eclipse?"

You can use the space below to prepare for your speech. Present your speech to your instructor when you are ready.

Instructor's initials: _____

Question 5: The Moon at first quarter. Remember that the Earth spins anticlockwise.

a) Draw a top view of the position of the Earth, Moon and Sun at first quarter, as seen from space. On Earth, draw an N at the location where it is noon, a D at the position where it is dawn, a T the location where it is evening twilight, and an M at the position where it is midnight.

b) At what times of the day are we the most likely to observe the first quarter moon?

c) At what time does the first quarter moon culminate?

Question 6: The full Moon.

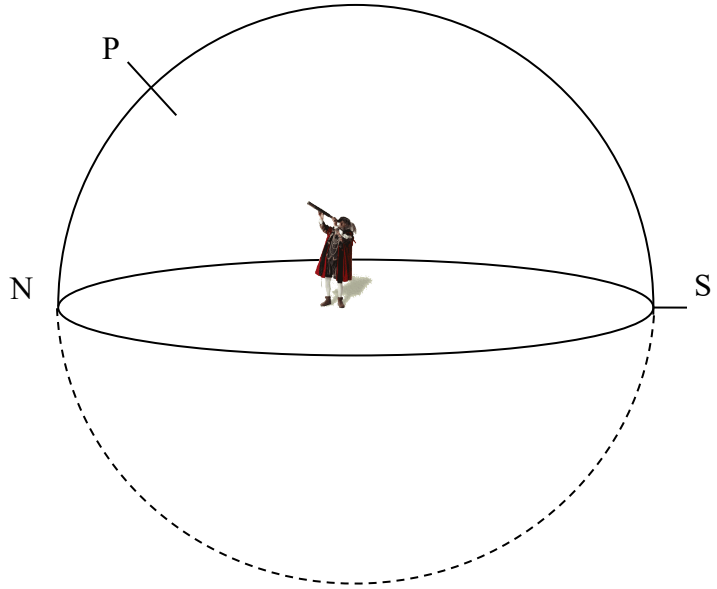
a) Draw the position of the Earth, Moon and Sun at full moon. Draw an N for noon, a D for dawn, a T for evening twilight, and an M for midnight.

b) At what times of the day are we the most likely to observe the full moon?

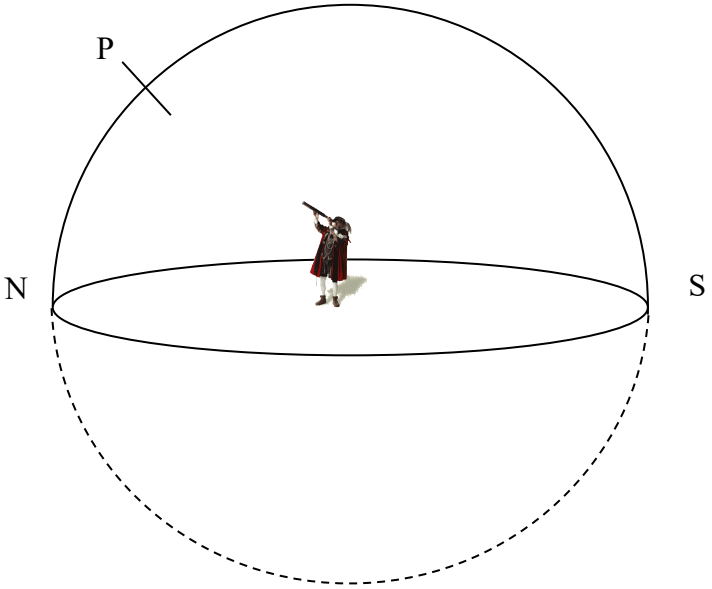
c) At what time does the full moon culminate?

Question 7:

a) Draw the Ecliptic, the Sun and the <u>full Moon at midnight</u> in Vancouver on the summer solstice. Use the software to check your answer. Seek help if needed.



b) Draw the Ecliptic, the Sun and the <u>full Moon at midnight</u> in Vancouver on the winter solstice.



Question 8: Orientation of the crescent moon. Set the age of the Moon to roughly 4 days. Display the Ecliptic. Right click on the Moon and track its local path.

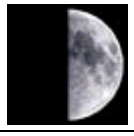
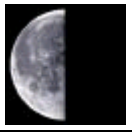
a) Draw the different orientations of the waxing crescent that you observe in Vancouver over the course of a night. Your reference is the horizon.

b) Draw the different orientations of the crescent that you observe in Santiago, Chile. Your reference is the horizon.

c) Compare your two sets of observations and comment.

d) Is it possible to observe a waxing crescent like this:  ? Where?

e) Fill in the following table. Draw the phases of the Moon:

	Waxing crescent	First quarter	Waning gibbous	Third quarter
Vancouver				
Ushuaia				

Question 9:

a) If the Moon rises at 6:00 pm tonight in Vancouver, at what time will the Moon rise tomorrow?

☐ earlier
☐ later

☐ 5 min
☐ 12 min
☐ 60 min
☐ 120 min

b) If the Moon is eclipsing Regulus tonight at 8:00 pm, where will the Moon be at 8 pm tomorrow?

☐ west
☐ east

☐ 1.3°
☐ 12°
☐ 23.5°
☐ 31°

Question 10: You are in Quito on the Autumnal equinox. The Moon is at first quarter. The moon is culminating. (The altitude of the Moon is close to 90°.) What time is it? Draw a diagram.

Conclusion: Write a 3 to 5-line (complete sentences) conclusion about this lab.