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



# The Moon

### For this lab, assume NO DAYLIGHT SAVINGS TIME (assume Standard Time)

#### 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

Question 1: Look for the Moon on today's date. Right-click it and click "Show Info..."

- a) What is the phase of the Moon tonight?
- b) Was the phase of the Moon the same in Vancouver, Quito, and Buenos Aires, Buenos Aires on September 13<sup>th</sup>, 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.

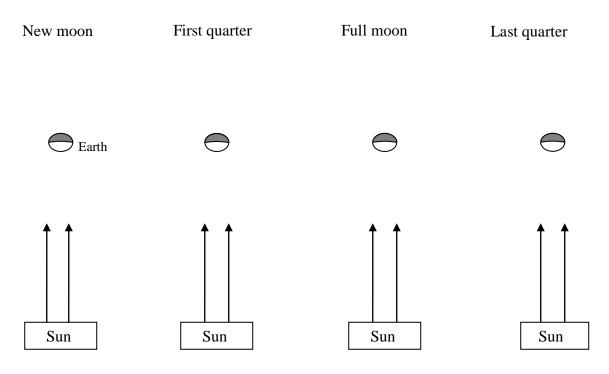
Draw what you see				
Phase	New moon	First quarter	Full moon	Last quarter
Draw what you see				
Phase	Waxing gibbous	Waning gibbous	Waxing crescent	Waning crescent

Question 2: Using the ecliptic coordinate system and the angular separation 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:



**Question 3:** Show the zodiac. Right click on the Moon to select Celestial Path. Set the time step to days and click the time step forward button (the button two to the right of the stop square.) Each click will be a day.

- a) How many days does it take for the Moon to be back at the same position relative to the stars? It won't be an integer number of days so estimate one decimal place. This is the sidereal period of the Moon.
- b) How many days are in one cycle of phases? This 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 1min mini-presentation 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?" Present to your instructor.

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?

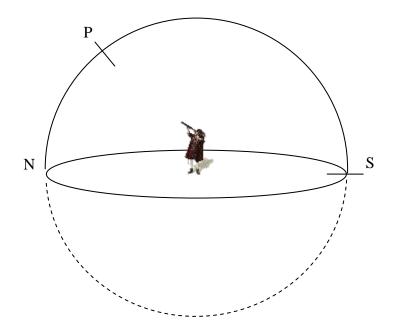
#### **Question 6: The full Moon.**

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.

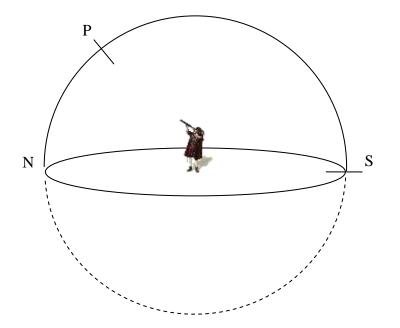
- b) At what times of the day are we the most likely to observe the full moon?
- c) At what time does the full moon culminate?

### **Question 7:**

a) Draw the Sun and the full Moon at midnight in Vancouver on a hypothetical summer solstice. Use the software to check your answer. Seek help if needed.



b) Draw the Sun and the full Moon at midnight in Vancouver on a hypothetical 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 the "night". Your reference is the horizon.

b) Draw the different orientations of the crescent that you observe in 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/when?
  - Waxing crescent
     First quarter
     Waning gibbous
     Third quarter

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

## **Question 9:**

a) If tonight in Vancouver the Moon rises at 6:00 pm, at what time will the Moon rise tomorrow? □ earlier □ 5 min

 $\Box$  12 min

 $\Box$  50 min  $\Box$  120 min

□ later			

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

 I west
 1.3°

□ west	□ 1.3°
□ east	$\Box$ 12°
	$\Box 23.5^{\circ}$
	□ 31°

**Question 10:** You are in Quito on the Autumnal equinox. The Moon is at first quarter. The Moon is culminating. What time is it? Draw a diagram.

**Conclusion:** Write a 3 to 5-line conclusion about this lab.