

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



The Motion of the Sun in Different Locations

Purpose

- Describe the path of the Sun in the sky as seen from the equator of the Earth.
- Describe the path of the Sun in the sky as seen from the poles of the Earth.
- Describe the path of the Sun in the sky as seen from the tropics of the Earth.

Equipment

- Starry Night College
- Plastic hemispheres
- Non-permanent markers

Motion of the Sun in Quito, Ecuador: On your plastic hemisphere, draw N, S, E, W, Z and P (Polaris). Travel to Quito. Check off the box of “Automatic Daylight Saving Time” under “Location \hat{v} > Latitude / Longitude”. Right Click on the Sun and follow it by playing the time from sunrise to sunset. Using the same procedure as in the previous lab, draw the daily path of the Sun on the plastic hemisphere for the equinoxes and solstices (Mar 21, Jun 21, Sep 21, Dec 21).

**Ask your instructor to check your work: _____

Question 1:

- a) Draw the path of the Sun on each equinox and each solstice as seen from Quito:



- b) On which day is the duration of daylight equal to the duration of night (equinox) in Quito? Explain.
- c) In one year, how many times does the Sun reach zenith in Quito?

Question 2: Imagine you are lost in a tropical forest in Ecuador. You know you must head due south and you forgot your compass. You look at the Sun to find your way. Describe how you would head south in each of the following scenarios.

- a) The Sun is culminating (reaches highest altitude) and it is June 21st.

- b) The Sun is culminating and it is Dec 21st.

- c) The Sun is setting and it is March 21st.

- d) Why is it unlikely that you could use Polaris to find your way?

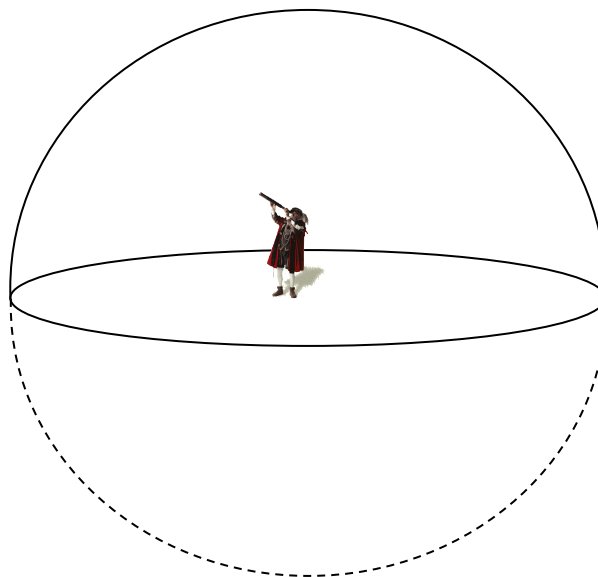
Motion of the Sun at the North Pole: Go to the North Pole. On your plastic sphere, draw Z and P. Draw the daily path of the Sun on the plastic hemisphere for the equinoxes and solstices (Mar 21, Jun 21, Sep 21, Dec 21).

**Ask your instructor to check your work: _____

Question 3:

- a) Explain why you cannot draw the compass points.

- b) Draw the path of the Sun on each equinox and each solstice as seen from the North Pole:



- c) What is the highest possible altitude of the Sun? When does the Sun reach that altitude?
- d) What is the duration of daylight (in a year) at the North Pole?
- e) When does darkness start at the South Pole?

Motion of the Sun at the Arctic Circle: The Arctic Circle is the line of latitude at $66\frac{1}{2}^{\circ}\text{N}$. Along this line the Sun does not set on the day of the summer solstice, roughly June 21. Go to the Arctic Circle. On your plastic sphere, draw N, S, E, W, Z, and P. Draw the daily path of the Sun on the plastic hemisphere for the equinoxes and solstices (Mar 21, Jun 21, Sep 21, Dec 21).

**Ask your instructor to check your work: _____

Question 4:

- a) Draw the path of the Sun on each equinox and each solstice as seen from the Arctic Circle:



- b) Where is the Sun on the summer solstice at noon?
- c) Where is the Sun on the summer solstice at midnight?
- d) Where is the Sun on the winter solstice at noon? What do inhabitants of this place experience that day?

Motion of the Sun at the Tropic of Cancer (23.5°N): The tropics are either of two parallels of latitude 23.5 degrees north and south of the equator representing the points farthest north and south at which the Sun can shine directly overhead once a year. Go to the Tropic of Cancer. On your plastic sphere, draw N, S, E, W, Z and P. Draw the daily path of the sun on the plastic hemisphere. Ask your instructor to check your work.

**Ask your instructor to check your work: _____

Question 5:

- a) Draw the path of the Sun on each equinox and each solstice as seen from the Tropic of Cancer:



- b) On which day does the Sun pass through your zenith at the Tropic of Cancer?
- c) On which day does the Sun pass through your zenith at the Tropic of Capricorn (23.5°S)?

Conclusion: Write a 3 to 5 lines conclusion about this lab, explaining what you learned and how you might use what you learned in your backyard.

Clean and return your hemisphere.