The Sun's Path

_____

NAME

Observations

The purpose of this laboratory experiment is to have students collect data regarding the sun's path and other related phenomenon such as: length of shadows, length of day, where sunrise and sunset occur, relationship between latitude and the sun's altitude at solar noon throughout the year. The website: http://solar.anu.edu.au/level_1/Sun/SunPath/index.html is used to collect data for this lab. These questions must be completed as part of the Sun's Path Lab which counts as 240 minutes (6 lab periods) toward the State requirement of 1200 minutes.

Observations for the Graphs on Page 3

1. **For each of the locations, describe how the duration of insolation changes from March through December.**

   For example: 43°N: It increases, then decreases.

   a. North Pole: _____

   b. Equator: _____

   c. 43°S: _____

   d. South Pole _____

2. **How do the graphs for the Northern and Southern Hemispheres compare?**

   _____

3. **On what days of the year is the duration of insolation the same everywhere?** _____
   What are these days called? _____

Observations for data table on page 3.

1. **How does the data for June and December compare?**

2. **What location always has the same length of day? _____**

3. **How is the duration of insolation at the Poles different than at other locations?**

4. **Using the diagram below, in which hemisphere (north or south) are the most direct rays on June 22? _____ Based on the data table, which hemisphere is receiving the greatest duration of insolation (hours of sunlight)? _____**

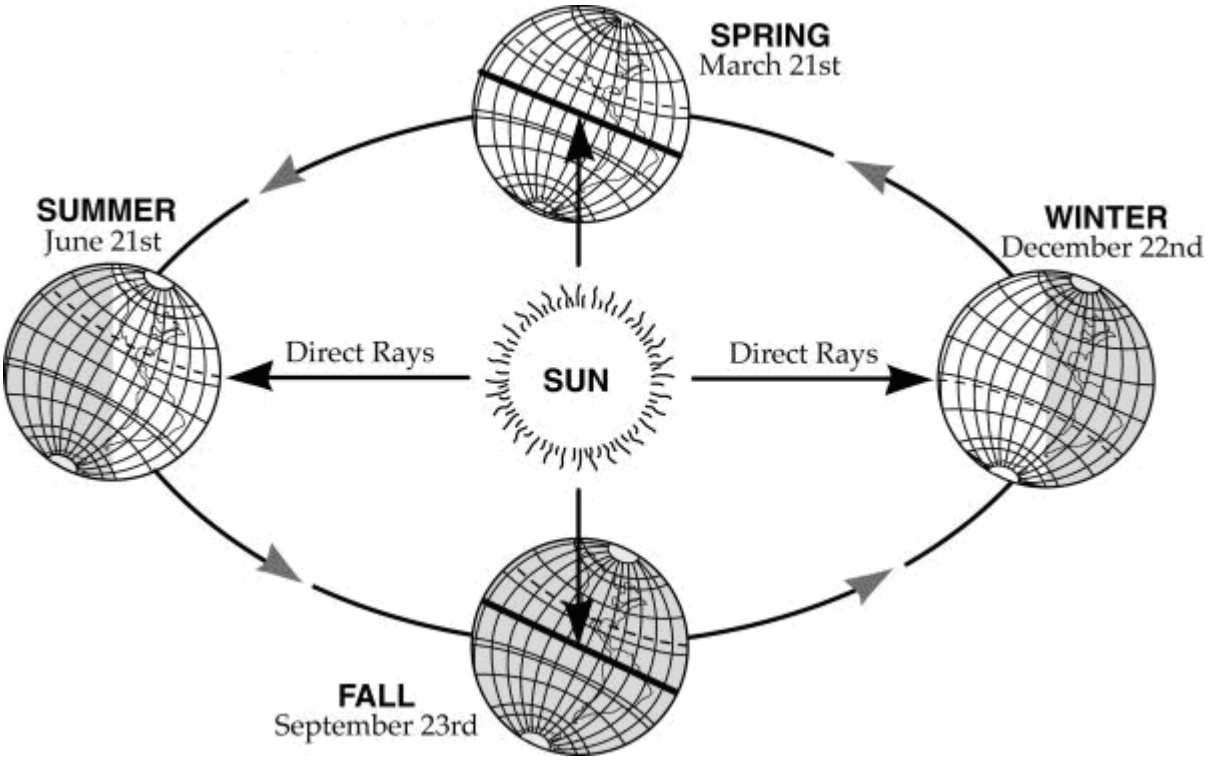
   Make a statement about why this hemisphere has more hours of sunlight on June 22.

   _____

5. **Using the diagram below, in which hemisphere (north or south) are the most direct rays on December 22? _____ Based on the data table, which hemisphere is receiving the greatest duration of insolation (hours of sunlight)? _____**

   Make a statement about why this hemisphere has more hours of sunlight on December 22.

   _____



Observations for Yearly Shadows (page 4):

1. **Compare the length of the shadow at solar noon for each of the two locations. State whether the shadow is long, short, or average for each date.**

Date	43°N	43°S
03/22		
06/22		
09/22		
12/22		

2. **On what day(s) of the year is the length of the shadow the same for each location?** _____

3. **In the United States, what direction will one's shadow always point at solar noon?** _____

4. **If you lived in South America, what direction would your shadow always point at solar noon?** _____

5. **What causes the length of shadow to change during the course of the year at solar noon?**

Observations for Daily Shadows (page 5):

1. **At what times of the day do the shadows point in the same direction?** _____

2. **In the Northern Hemisphere, the shadow moves in what direction?** _____

3. **In the Southern Hemisphere, the shadow moves in what direction?** _____

4. **If you were lost in the woods, what three times of the day could you use to help you find which direction you were headed?** _____

5. **If your shadow moves from west to east in a period of 12 hours, how many degrees per hour is your shadow moving? Show all calculations below with the correct units.**

6. **What is causing your shadow to move at this speed?**

Observations for Altitude of Sun (page 6):

1. Where is the sun directly overhead (90°) at solar noon on each of the dates the seasons change?

Date	The Sun is Directly Overhead at Solar Noon at:
03/22	
06/22	
09/22	
12/22	

2. How many degrees difference is there in the altitude of the Sun between each season? _____

3. The Tropic of Cancer and the Tropic of Capricorn are how many degrees of latitude from the Equator? _____

4. How do the answers in Question #2 and #3 compare? _____

5. Why is this number important (what else is it equal to)? _____

_____

Observations for Sun's Path Across the Sky (page 7)

1. How does the location of sunrise and sunset compare for each date at the different locations?

2. Where does the sun rise and set on each of the days (be specific)?

Date	Sunrise	Sunset
03/22		
06/22		
09/22		
12/22		

3. On the equinoxes (03/22 and 09/22) where does the sun rise? _____ Set? _____

4. For 43°N, what direction does the path of the sun always tilt? _____

5. For 43°N, what direction would one's shadow always point at solar noon? _____

6. For 43°S, what direction does the path of the sun always tilt? _____

7. For 43°S, what direction would one's shadow always point at solar noon? _____

8. For the equator, what type of shadow (long, short, none) would you have at solar noon on the equinoxes? _____ Why? _____

9. If you were to plot the sun's path for all three locations on the same diagram for a particular date, how many degrees apart would each of the lines be? _____ Why? _____

10. In NY State (43°N), what side of a house would receive the greatest duration of insolation? _____ Why? _____

11. In South America (43°S) what side of a house would receive the greatest duration of insolation? _____ Why? _____

12. For 43°N, what day of the year is the sun highest in the sky at solar noon? _____ Lowest? _____

13. For 43°S, what day of the year is the sun highest in the sky at solar noon? _____ Lowest? _____

14. For the equator, on what day(s) of the year is the sun highest in the sky at solar noon? _____

Observations for Sun's Path at the Poles (page 8):

1. **On the equinoxes (03/22 and 09/22) how do the paths of the sun at the North and South Pole compare?**

2. **Describe the path of the sun at the North Pole (90°N) on June 22.**

3. **Describe the path of the sun at the South Pole (90°S) on June 22.**

4. **Complete the chart below:**

Date	Duration of Insolation at North Pole	Duration of Insolation at South Pole
03/22		
06/22		
09/22		
12/22		