

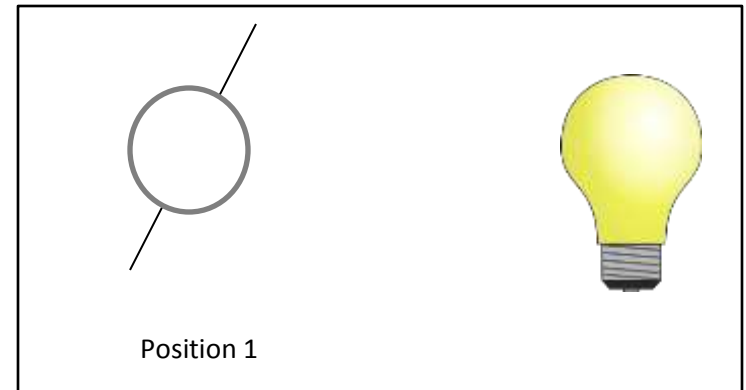
# Reasons for the Seasons

Name: \_\_\_\_\_

Period: \_\_\_\_\_ Date: \_\_\_\_\_

## Procedure

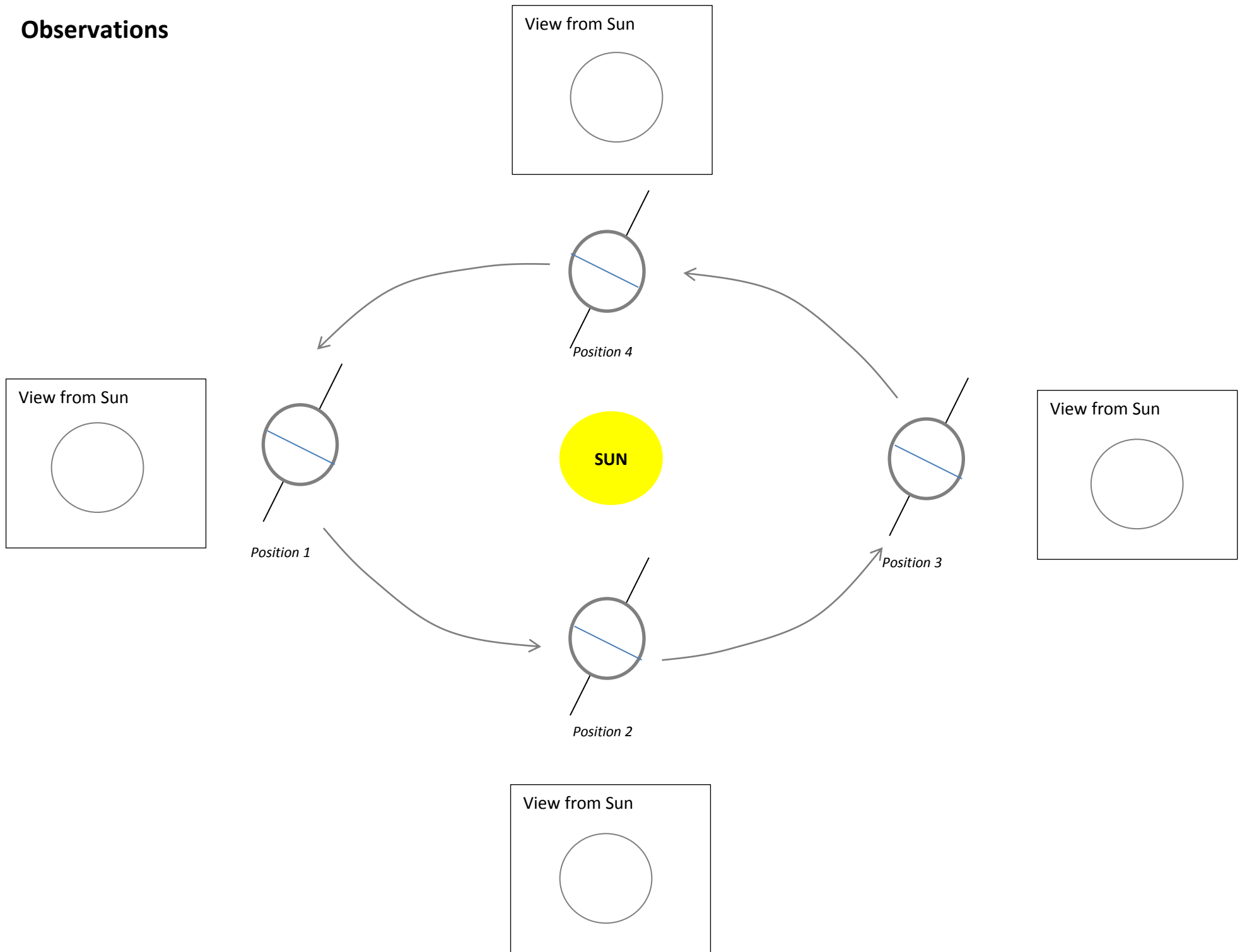
1. Arrange the lamp and globe as shown in the figure below. A distance of 30-50 cm between the globe and the light bulb will work best. Familiarize yourself with the locations of the Tropic of Cancer, Tropic of Capricorn, the equator, and KAHS that are marked on the globe.
2. Ensure that your teacher has darkened the room.
3. Turn on the light bulb either by plugging it into the outlet at your lab table or using the switch.
4. Take the globe and walk it through an orbit around the sun counterclockwise as seen from above (refer to the diagram below). Make sure that you maintain the  $23.5^\circ$  tilt of the axis and keep it oriented in the same direction. While you are walking the globe through the orbit, you should also spin the globe by twisting the “axis” in a counterclockwise direction when looking at the north pole.
5. Make and record observations as you walk the globe through its orbit (use shading, arrows, and labels). Also *write what season is beginning at each position* and draw arrows to show the direction of revolution from this perspective. Use the space on the diagram and in the table to record your observations at each position.
  - North Pole
  - South Pole
  - Tropic of Cancer ( $23.5^\circ N$ )
  - Tropic of Capricorn ( $23.5^\circ S$ )
  - Equator ( $0^\circ$  Latitude)
  - KAHS ( $41^\circ N$ )



### What to observe:

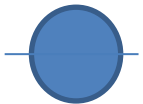
- Shade the non-illuminated half, if possible.
- Latitude of most intense light (brightest/direct light)
- Identify latitude(s) that receive no light
- How intensity (brightness) of light changes for our latitude throughout the “year”

# Observations



## Questions and Conclusions

1. How did the intensity (brightness) of light on your latitude compare between positions 1 and 3?
2. How can you account for the differences in the brightness for your latitude between positions 1 and 3?
3. What season is just beginning at position 1 for the northern hemisphere? How do you know?
4. What season is just beginning at position 3 for the northern hemisphere? How do you know?
5. Which hemisphere receives the most intense light at position 1? Why?
6. Explain how the brightness of light changes for the north pole throughout the year.
7. Explain why it is cooler in the winter than in the summer in terms of light intensity.
8. Explain why the length of day becomes longer as Earth approaches position 1.
9. What seasons are just beginning at positions 2 and 4? What latitude receives the most intense light at these positions?
10. Compare the intensity of light at your latitude when Earth is in positions 2 and 4. How do you think the average temperatures during September and March compare?
11. When it is summer in the United States, where might it be winter?
12. Over the next month, in your location, how will the day length and brightness of light change?
13. How does tilt of the earth cause us to experience different intensities of sunlight throughout the year? How does this affect temperature?
14. Orient the globe so that the axis is tilted to  $90^\circ$ . "Walk" the globe through a complete orbit and observe how light intensity and day length are affected. Write your observations below.



15. Orient the globe so that the axis is tilted to  $0^\circ$ . "Walk" the globe through a complete orbit and observe how light intensity and day length are affected. Write your observations below.

