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Observing Shadows

Procedure:

1. The plastic hemisphere represents the celestial sphere. Notice that there are three solar paths drawn, one for Winter, one for Fall/Spring, and one for Summer. Also notice that sunrise, sunset, and three times of day have been labeled on each solar path.
2. Taking your flashlight, position it at the "Winter Sunrise" position and aim it at the base of the pin so that it creates a shadow. Slowly slide your flashlight along the solar path until you reach 9:00am. Using the data table below, record the length of the this shadow as either long, medium, or short and record the geographical direction the shadow extends.
3. Repeat step 2 for the remaining times of day for the Winter solar path, as well as for the Fall-Spring and Summer paths. Fill your observations in the data table below.

Sun's Path	Time of Day	Shadow Length (L, M, or S)	Shadow Direction (N, NE, E, SE, etc...)
Winter	9:00 am		
	12:00 pm		
	3:00 pm		
Fall/Spring	9:00 am		
	12:00 pm		
	3:00 pm		
Summer	9:00 am		
	12:00 pm		
	3:00 pm		

Conclusion Questions:

1. How does the shape of the ellipse change as the foci get closer together?

   _____

2. How does the eccentricity of an ellipse change as the foci get closer together?

   _____

3. Describe the appearance of an ellipse that has an eccentricity of 0.

   _____

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4. Describe the appearance of an ellipse that has an eccentricity of 0.999.

   _____

5. Which of the ellipses that you drew is ***most eccentric***?

   _____

6. Which of the ellipses that you drew is ***least elliptical***?

   _____

7. Which planet in our solar system has the least eccentric orbit (tip: use your ESRT)?

   _____

8. Which planet in our solar system has the most elliptical orbit?

   _____

9. Describe how the orbits of Jupiter and Neptune are different?

   _____

   _____

10. What object is located at one of the foci of all planetary orbits in our solar system? _____

11. What object in our solar system has the most eccentric orbit? _____

12. On Ellipses #1, label one of the two foci "***Sun.***" Label the location of "***perihelion***" and "***aphelion***" and label where the planet is traveling "***fastest***" and "***slowest***".

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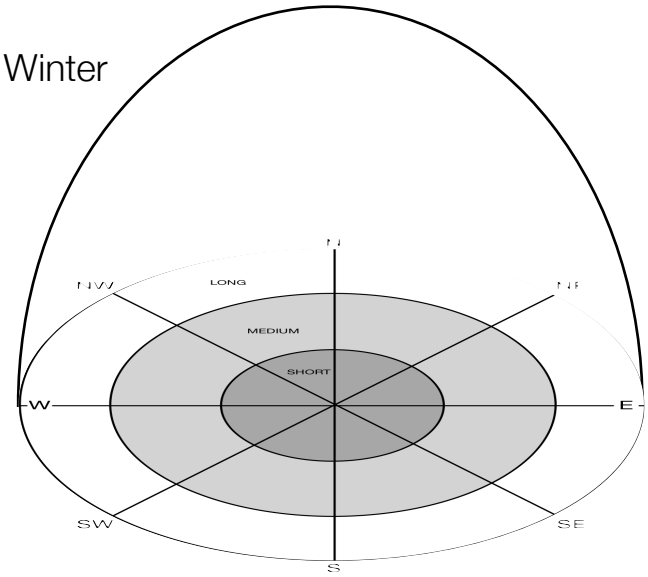
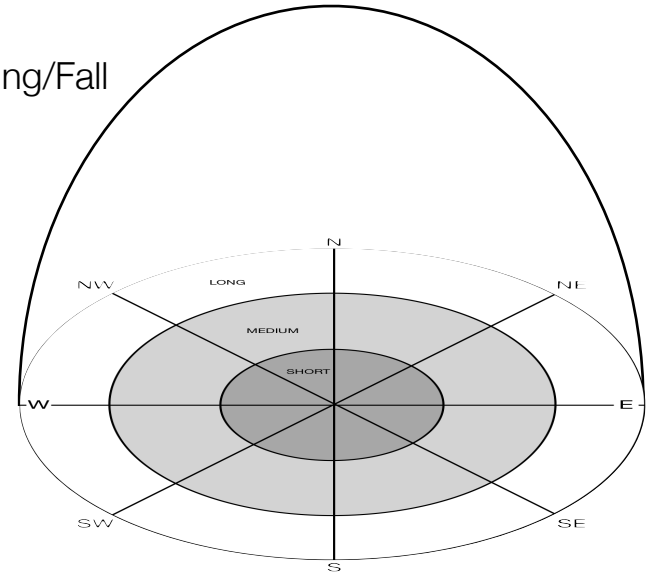
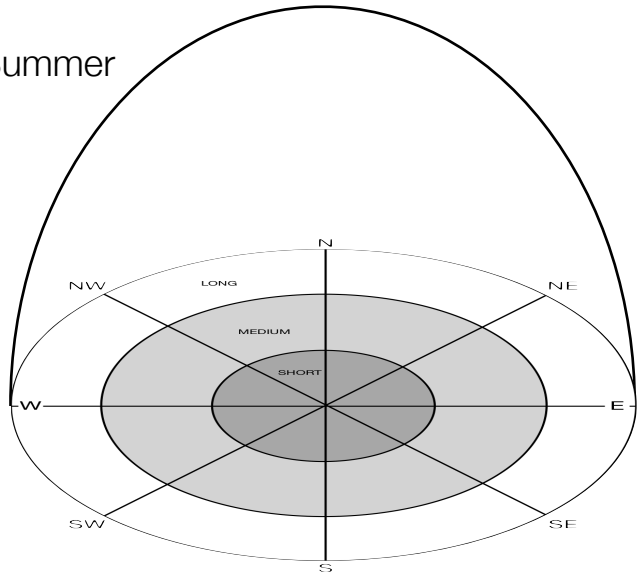
Winter



Spring/Fall



Summer



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