

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

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

### **Season Simulator(s) Activity** Astronomy

**Introduction:** The justification for seasons on Earth has a lot to do with movement around the Sun, the rotation axis, and much more. In order to combine all of these variables into one, simulators are used to show the resulting effects. Follow the instructions below to see all of the different simulators that astronomers can use to help see this.

#### **First, Let's Review!**

*... in complete sentences, of course!*

1. Compare and contrast rotation, revolution, and orbiting. How are they all similar and how are they different?
2. Describe how the seasons are caused here on Earth? How would the Earth have to be in order for there to be no seasonal change? Explain
3. What is the incline of Earth's axis?
4. What are the four alignments that occur when Earth orbits the Sun? Explain each.
5. Why do different seasons see such temperature differences? Explain.
6. How do sunlight hours align with the seasons? Explain with a diagram.

#### **Simulator 1**

<http://astro.unl.edu/classaction/animations/coordsmotion/eclipticsimulator.html>

1. What are the three viewpoints that this simulator shows you? Explain the benefit of each.
  - A.
  - B.

C.

2. Why would these angles be helpful to watch together when it comes to the development of our seasons? Explain.
3. Is the orbit view or the celestial sphere more helpful for you when it comes to visualizing this concept? Explain why.

### **Simulator 2**

[http://highered.mheducation.com/sites/007299181x/student\\_view0/chapter2/seasons\\_interactive.html](http://highered.mheducation.com/sites/007299181x/student_view0/chapter2/seasons_interactive.html)

1. Adjust the simulator to show labels and sun trails. How is this simulator set up differently from the first one? Do you feel it's a more effective set-up? Explain.
2. What does this simulator allow you to visualize that the first one didn't? We haven't talked about the other planets' inclinations much, but why do you think those are here? Explain.

### **Simulator 3**

<https://www.khanacademy.org/science/cosmology-and-astronomy/earth-history-topic/earth-title-topic/p/season-simulator>

1. What variables and conditions are visible in this simulator that were not in the first two? Why do you think the designer felt it was important to include these when explaining and demonstrating the seasons?

2. This simulator uses AUs to show the variation in the orbit pattern. Give the AU measurements for both solstices and equinoxes.

3. According to this simulator, does the light intensity and the amount of time the sun spends in the sky the same for these select locations? Explain.