Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour \_\_\_\_\_\_\_\_\_\_\_

 **Seasons on Earth**

**Part 1:** Go to Ms. Murphy’s blog and click on the “Why Do We Have Seasons?” interactive, and answer the following questions.([https://dptv.pbslearningmedia.org/resource/npls13.sci.ess.seasons/why-seasons/?#.WgmGyluPJdg](https://dptv.pbslearningmedia.org/resource/npls13.sci.ess.seasons/why-seasons/#.WgmGyluPJdg))

A. Explore the interactive, click on the points on Earth’s orbit around the Sun to learn about that time of year. Below write two interesting facts you learned.

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B. Click on the tabs on the right of the interactive read through them and write two interesting facts.

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C. Why do we have seasons? (About Seasons)

**When you are finished with your assignment for any day, please do the following**

-Check that you have a science folder in your Google drive.

-Check that your science folder has your Forces and Motion KWL, Student Record Keeping and Gravity and Space KWL.

- Update your student record keeping.

-Be sure the first two questions on your Gravity and Space KWL is answered.

-Complete the third step of your Invention Convention (Hypothesis and Design)

-Check student connect and turn in any missing work.

**Part II: Angle of Incidence:**

Divide the back of your “eclipse poster” into three sections. Title the first section “What makes the Earth have seasons?” In that section answer your question (min. 3 sentences) and include a diagram that explains the answer (your diagram should include Earth in orbit, the sun and the seasons). In the second section title it “Angle of Incidence” answer the following questions and include a diagram that helps explain what the angle of incidence is.

|  |  |  |
| --- | --- | --- |
| Angle of Incidence | What Makes the Earth have Seasons? |  |

1. What was your angle of incidence?

2. How does the Sun’s position above the horizon affect the angle of incidence?

3. How does the angle of incidence compare between morning and midday? Between morning and evening?

4. What role do you think the role of incidence has in determining seasons?

15. What role does the distance between the Sun and Earth play in determining seasons?

**Part III: Modeling Sunlight on Earth**

In this activity you will work in groups of five-six (Your table groups) to model the sunlight strikes Earth during different times of year. If you are short a person or two in your group someone else in the group will have to complete two roles.

Materials;

-Flashlight

- Globe

-4 Sets of sticker dots (posted)

Procedure

1. Have one student represent the Sun by holding the flashlight at waist height. The light beam emitted by the flashlight represents the most direct rays of sunlight.

2. Have four students represent four locations in Earth’s orbit by forming a square, facing inward, around the student with the flashlight. One of the four students should stand with his or her back to the North Star. (The teacher will designate a place for the North Star).

3. Designate four students “A, B, C, and D”. A is the student with his or her back to the North Star. “B” is to the right of “A” and so on.

4. One set of colored dots or posted should be assigned to each orbit location: A, B, C, and D. If you have a sixth person in your group they will be the recorder.

5. Have “A” hold the globe, waist- high, with the North Pole pointed towards the North, Star, representing Earth’s tilt.

6. Shine the flashlight toward the globe. Keeping the axis pointed toward the North Star, “A” should be able to spin the globe in place. As “A’ rotates the globe on its axis to represent one day, the recorder should mark the top and bottom of the brightest band of light (using the assigned colored dot or posted) around the globe. This is the latitude range of the most direct sunlight.

7. Repeat steps 5 and 6 for the remaining three locations of Earth’s orbit, using the other three sets of colored dots or posted.

8. Fill in the data table below: Dot/posted color and latitude range.

|  |  |  |  |
| --- | --- | --- | --- |
| Orbit Location | Dot/Posted Color | Latitude Range | Season in Northern Hemisphere (Spring, Summer, Autumn, winter) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Questions: Answer the following questions using complete sentences with a restate. \*Be sure to remove your stickers from the globe.

1. Which orbit location produced the most direct sunlight for the Northern Hemisphere? What season does this location represent?

2. Which orbit location produced the lease direct sunlight for the Northern Hemisphere? What season does this location represent?

3. How did the range of sunlight change as the Earth went through its orbit?

4. Discuss and compare how sunlight (or lack of sunlight) might affect equatorial regions, North America, and Polar Regions.

5. If Earth was not tilted on its axis, how would your findings be different? (so if the north pole was not pointed at the north star?

**Part 1V: Seasonal Effects**

Pre-activity questions: Complete these questions using complete sentences and a restate before moving forward to your activity. You may work with your group members but be sure to write in your own words.

1. What are some examples of seasonal changes in the environment?

2. Do all locations on Earth experience the same kinds of seasons?

3. How do seasonal changes affect plants and animals?

4. What kind of data could you gather if you wanted to study seasonal changes?

Activity directions: Explore the “Global View of the Seasons” interactive which can be found on my blog. [https://dptv.pbslearningmedia.org/resource/ess05.sci.ess.eiu.seawifs/global-view-of-the-seasons/?#.Wgmx5FuPJdg](https://dptv.pbslearningmedia.org/resource/ess05.sci.ess.eiu.seawifs/global-view-of-the-seasons/#.Wgmx5FuPJdg) . This interactive provides satellite images of the abundance of plant life on land and in the sea. These images are not photographs but are false-color representations of satellite data that measure subtle differences in the distribution of chlorophyll.

A. Explore the interactive, then answer the following questions.

1. What do the colors represent in these satellite images?

2. What patterns do you notice?

3. Why does the abundance of plant life vary?

4. How does the land vegetation change throughout the seasons? Give specific examples.

5. How does the abundance of phytoplankton change throughout the seasons? Give specific examples.

6. Compare the variation in seasons at the poles versus at the equator.

Extra credit: Research why cold water has more nutrients than warm water.

**Part V: Earth’s Axis Wobbles**

Activity directions: Go to Ms. Murphy’s blog and watch the video “Natural Climate Change in Djibouti, Africa” answer the following questions.

1. What causes the seasons on Earth?

2. What would happen to the seasons if the tilt of Earth was less than 23.5 degrees?

3. What would happen if it the tilt of Earth was greater than 23.5 degrees?

Activity directions (2): Select a question from the list below. Answer your question by completing research. On the back of your eclipse poster write a 5-7 sentence paragraph summarizing your research and answer to your question, also include a colored illustration representing your research. Only two people per table can have the same question.

-Why is it winter in Australia when it is summer in the United States?

-Which is more important in determining climate changes: Earth’s orbit or Earth’s tilt on its axis? Why?

- How can satellite data show seasonal changes on Earth?

-Do you think other planets have seasons? Why or why not?