

How Important Is the Tilt?

The Earth's axis is tilted at an angle of 23.5° from the vertical. As Earth revolves around the sun, its axis is tilted away from the sun for part of the year and toward the sun for part of the year even though the North Pole always points to Polaris the North Star. This tilt is the reason we have seasons. Summer and winter are not affected by changes in Earth's distance from the sun. In fact, when the Northern Hemisphere is having summer, Earth is at its greatest distance from the sun.

The diagram below shows an enlarged view of the planet Earth's yearly orbit around the sun. The tilt of the Earth's axis is 23.5° . Let's see what effect that has on our seasons.

Materials: 2 Earthballs , 2 stands, flashlight on stand, Orbit placemat



What To Do:

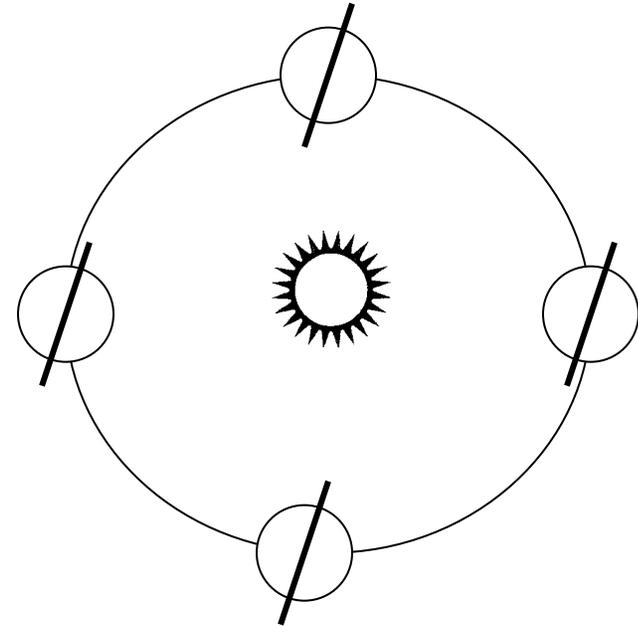
With the model

1. Place the orbit placemat in the center of your group's table.
2. Place the flashlight on the stand in the center.
3. Place the one Earthball stand on #1 and another on #3.
4. Tilt the axis of the Earthballs toward the North Star in the classroom and place them on the stands.
5. Make sure the flashlight is pointing toward the Earthball on #1.
6. Turn on the flashlight and observe where the brightest light (direct rays) is hitting the Earthball.

7. Turn the flashlight to the Earthball on #3 and observe where the brightest light is hitting the Earthball.
8. Move the Earthballs to #2 and #4 and repeat with the flashlight.

On the diagram

1. Draw the equator on each planet in the diagram.
2. Label the Northern and Southern Hemispheres on one planet.
3. Label the axis on one planet.
4. Draw where the direct rays of the sun will hit the earth in each position of the planet.
5. Label the seasons. (spring, summer, fall and winter)



Questions:

1. Where does the northern axis always point?

2. Where do the direct rays of the sun hit in our spring?

3. Where do the direct rays of the sun hit in our summer?



4. Where do the direct rays of the sun hit in our winter?

5. Where do the direct rays of the sun hit in our fall?

6. When it is summer in the Northern Hemisphere what season is it in the Southern Hemisphere? _____
7. When it is winter in the Northern Hemisphere what season is it in the Southern Hemisphere? _____
8. Why do the Northern and Southern Hemispheres have different seasons at the same time of the year?

The diagram shows an enlarged view of the planet Mercury's yearly orbit around the sun. The tilt of Mercury's axis is 0°. Let's see what effect that has on its seasons.

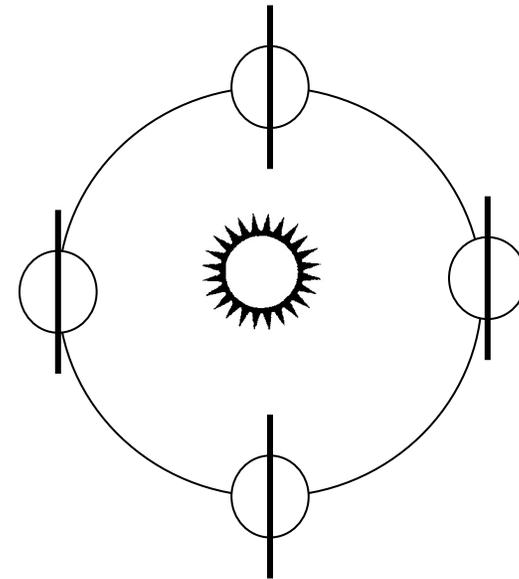
What To Do:

With the model

1. Place the axis of the planet (now Mercury) straight up and down.
2. Place the planets at # 1 and #3 on the orbit placemat.
3. Turn on the flashlight and observe where the brightest light (direct rays) falls on Mercury.
4. Move the planet and flashlight around the placemat observing where the direct rays fall.

On the diagram

1. Draw the equator on each planet in the diagram.
2. Label the Northern and Southern Hemispheres on one planet.
3. Label the axis on one planet.
4. Draw where the direct rays of the sun will hit Mercury in each position of the planet.



Questions:

1. Where do the direct rays of the sun always hit Mercury?

2. Does Mercury have different seasons? _____
3. Why is this so? _____

Conclusion: (equator, seasons, direct, tilted, rays, hemispheres, Polaris)

Earth has different _____ because the axis is _____.
The direct _____ of the sun hit in different _____ during different seasons. The northern axis always point to _____. Mercury does not have any seasons because the _____ rays of the sun always hit on the _____.



Name _____ period _____

EXIT TICKET

How Important is the Tilt?

1. When the direct rays of the Sun are in the Southern Hemisphere, what season is in the Northern Hemisphere?

- A. Summer C. Winter
B. Fall D. Spring

2. The main reason we have different seasons is because –

- A. The Earth is tilted on its axis
B. The Sun is tilted on its axis
C. The Earth is at different distances from the Sun during the various seasons
D. The Sun sends hotter rays during different seasons

3. The Earth's northern axis is pointed toward –

- A. Vega C. Alpha Centauri
B. Polaris D. Orion

4. Mercury does not have different seasons because –

- A. Its axis is tilted backwards
B. Its axis is tilted horizontally
C. Its axis is not tilted
D. Its axis is upside down

5. How much is the tilt of the Earth's axis?

- A. 23.5° C. 25.3
B. 32.5° D. 52.3°



Name _____ period _____

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