

Names: _____ Date: _____

Module 3A: Reason for Seasons 3-D Model

Materials per group:

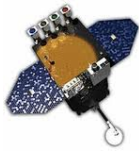
- 4 small Styrofoam globes
- Fine point Sharpie
- 1 large ball or index card labeled “The Sun”
- 8 toothpicks
- Lump of modeling clay
- Pencil
- 9 index cards labeled “Spring Equinox”, “Fall Equinox”, “Summer Solstice”, “Winter Solstice”, “September 21”, “June 21”, March 21”, “December 21”, and “North Star (Polaris)”

1. Take one Styrofoam globe and label the Equator and Northern and Southern hemispheres on it using the Sharpie. Place one toothpick halfway into the globe at the North Pole and one toothpick at the South Pole. Repeat these steps with the other three globes.
2. Secure the object representing the Sun to the center of a table or desk with a small piece of modeling clay. Place the “North Star” card to the right side of the Sun, towards the edge of the table. Using all four of the Earth models construct a 3-D model of Earth’s orientation around the Sun to represent the start of each season as Earth orbits the Sun in one year. Use modeling clay to secure the Earth models to the table via the South Pole toothpick.

Hint: Earth’s 23.5° tilt ALWAYS points in the same direction, towards the North Star, as Earth revolves around the Sun in a counter-clockwise direction. The seasons break the year into four equivalent time periods so Earth’s equinox and solstice positions are perpendicularly spaced around the Sun.

3. Place the correct date card and equinox/solstice card at each of the four orbital locations to identify the start of each season along Earth’s orbit around the Sun.
4. Verify that the tilt of the Earth points in the correct direction and check that each orbital location has the appropriate season identified with the correct date card and equinox/solstice card.

Hint: When a hemisphere is most tilted toward the Sun, it is summer in that hemisphere, and the opposite is true for winter.



5. Diagram (neatly drawn and written):

From a birds-eye view of the Northern Hemisphere, accurately draw and label a diagram of Earth's orbit around the Sun to include:

- The Sun and North Star (Polaris)
- Earth (four orbital "Earth" locations with equator and hemispheres correctly drawn and labeled)
- Four seasons labeled with the correct date and corresponding equinox or solstice
- Tilt of Earth's axis in the correct and consistent direction
- Counter-clockwise arrows indicating Earth's direction of orbit (revolution) around the Sun

6. Discussion Question:

Using your 3-D seasonal model for reference, what are the corresponding seasons at each equinox and solstice in the Southern Hemisphere?