

The Earth's Orbit and Season Demonstration

Goal of the activity:

To demonstrate why we see different star patterns at different times of the year and why it's warmer in the summer and cold in the winter.

Materials Required:

1. 12 pieces of Bristol board
2. A globe with the tilted axis
3. A flashlight

Instructions:

Divide the students into 12 groups by the Zodiac sign if possible. Have the students draw their Zodiac sign and star pattern as large as possible on the Bristol board. See attached for sample Zodiac images.

When the signs are finished, place a student in the centre of a dark room with a flashlight. Around the room equally space 12 students holding the Bristol board Zodiac star patterns and signs in the following order. Moving counterclockwise start with Capricorn, Aquarius, Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio and Sagittarius.

Have one student stand between the flashlight and the constellation Sagittarius holding the globe with the axis pointing towards the sun. This is the Earth position in summer.

Note the following:

1. Due to the tilt of the earth the Northern Hemisphere day is much longer than its night. The day is 16 hours long for Toronto. This is where the earth is on June 21 our first day of summer.
2. The Southern Hemisphere is the exact opposite. This is their first day of Winter June 21.
3. Looking at the Sun notice the constellation directly across from the Sun, Gemini. On June 21 when the Sun appears in the constellation Gemini this is the first day of summer. Rotate the earth on its axis until North America is directly opposite the sun, midnight. Notice the constellation directly in front of North America, Sagittarius Winter Solstice. In six months the Earth will travel around the sun to the other side and the Sun will appear in the constellation Sagittarius and Gemini will be visible at midnight.
4. Notice the constellations that would appear in the night sky.

Without moving the direction of the axis of the globe, have the student walk in front of the constellation Pisces. This is where the earth is on September 21, the first day of fall. Note that the day and night length are the same. Also note the constellation visible in the night sky.

Again without moving the direction of the axis of the globe, have the student walk in front of the constellation Sagittarius. This is where the earth is on December 21, the first day of winter. Due to the tilt of the earth the day is only about 8 hours long for Toronto. Also note the constellation visible in the night sky.

Continuing with the earth's orbit, have the student move in front of the constellation Virgo. This is where the earth is on March 21, the first day of spring. The day and night length's are the same. Also note the constellation visible in the night sky.

