

Write one important fact from each paragraph in this space.

## Science Shorts -8

### What Causes the Seasons?

Let's get rid of some common misconceptions about the seasons. The Earth's orbit is in the shape of an ellipse, so that sometimes the Earth is a little bit closer to the Sun than at other times. Is this the cause of the seasons?

You can imagine that if the seasons were caused by the Earth's orbit, people in the northern hemisphere and people in the southern hemisphere would have the same seasons. For example, if winter occurred because Earth was far away from the Sun, everywhere on the Earth would be cold at the same time.

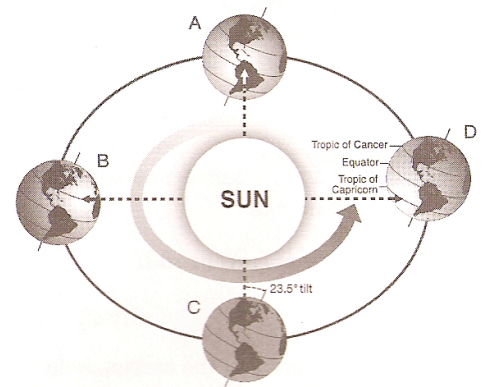
But this is not what happens. Summer in the northern hemisphere occurs at the same time as winter in the south, and vice-versa. It turns out that the Earth's orbit is nearly perfectly circular, and the difference between its closest point and its furthest point is very small. In fact, the Earth is furthest away from the Sun in June when it is summer in the northern hemisphere.

The tilt of the Earth's rotational axis and the Earth's orbit work together to create seasons. As the Earth travels around the Sun, it remains tipped in the same direction, toward the star Polaris. This means that sometimes the northern half of the Earth is pointed towards the Sun (summer) and sometimes it is pointing away (winter).

Notice that when the northern hemisphere is tilted towards the Sun, the southern hemisphere is tilted away. This explains why the hemispheres have opposite seasons.

On two days each year, the noon sun is overhead at either  $23.5^\circ$  south or  $23.5^\circ$  north. Each of these days is known as a solstice. The winter solstice in the northern hemisphere occurs around December 21 each year and it is the shortest day of the year. Similarly, the summer solstice occurs around June 21 and it is the longest day of the year.

Halfway between the two solstices, neither hemisphere is tilted toward or away from the sun. This situation happens on only two days of the year. Each of these days is known as an equinox. The spring equinox occurs around March 21 and the autumn equinox around September 21.



1. What is the cause of the seasons?
  - a. the tilt of the Earth's axis
  - b. the orbit of the Earth around the sun
  - c. the distance the Earth is from the sun
  - d. the tilt of the Earth's axis and the orbit of the Earth
  
2. When it is winter in the northern hemisphere, what season is it in the southern hemisphere?
  - a. winter
  - b. spring
  - c. summer
  - d. autumn
  
3. To what star does the Earth's axis point?
  - a. Rigel
  - b. the Sun
  - c. Polaris
  - d. Antares
  
4. When does the winter solstice occur in the northern hemisphere?
  - a. June 21
  - b. December 21
  - c. March 21
  - d. September 21
  
5. When does the autumn equinox occur in the northern hemisphere?
  - a. June 21
  - b. December 21
  - c. March 21
  - d. September 21
  
6. In the diagram below label the following items:

Sun  
 Axis  
 Equator  
 Earth's orbit  
 Winter (northern hemisphere)  
 Summer(northern hemisphere)

