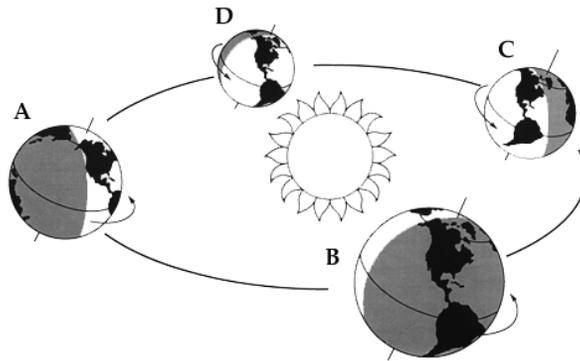


Teacher Idea Kit for

# Reasons for the Seasons



## A Space Science Program For Grades 3 – 4

Presented by

ABBITT  
PLANETARIUM



*Funded in part by:*



**Langley**  
Federal Credit Union  
Spirit of community. Warmth of family.  
Pride of membership.

## **Reasons for the Seasons**

### **Suggested for Grades 3-4**

#### **Objectives**

After visiting the planetarium for Reasons for the Seasons, the student should be able to:

1. Explain the reason why we have four seasons.
2. Locate the approximate rising and setting points of the Sun for each of the four seasons.
3. Discuss the type of weather patterns that occur during the seasons.
4. Differentiate between rotation and revolution.

#### **State Standards of Learning Objectives**

This planetarium presentation meets the following Virginia State SOL's:

Science: 3.8, 4.8

#### **Vocabulary**

|             |  |
|-------------|--|
| rotation:   | The motion of a body around its axis. The time to complete one rotation determines the length of a planet's day.           |
| revolution: | The motion of a body around a central body. The time to complete one revolution around the Sun determines a planet's year. |
| meridian:   | An imaginary line running from the Northern to the Southern horizon passing directly through the zenith.                   |
| ecliptic:   | The apparent path of the Sun and the planets through the sky.  |
| sunset:     | The time of day when the Sun appears to sink below the Western horizon.  |
| sunrise:    | The time of day when the Sun seems to climb above the Eastern horizon.   |
| seasons:    | The four periods of the year each characterized by differing temperatures and weather patterns.                            |
| month:      | One of twelve standard divisions in a year. One month is approximately the length of one lunar cycle.                      |
| year:       | The time for the Earth to complete one revolution around the Sun.  |
| tilt:       | An incline or angle from the vertical.   |
| South:      | One of the four compass directions. If you are facing the North Star, South is behind you.                                 |
| East:       | One of the four compass directions. If you are facing the North Star, East is to your right.                               |
| West:       | One of the four compass directions. If you are facing the North Star, West is to your left.                                |
| North:      | One of the four compass directions. If you are facing the North Star, you are facing North.                                |

- Spring: One of the four seasons. It is characterized by a gradual warming of temperatures and the beginning of new growth of plants.
- Summer: One of the four seasons. It is characterized by hot temperatures and high humidity. The Earth is tilted towards the Sun in summer.
- Autumn: One of the four seasons. It is characterized by gradually cooling temperatures and the leaves falling from the trees.
- Winter: One of the four seasons. It is characterized by cold temperatures and snowfall. The Earth is tilted away from the Sun during winter.

### **Background Material for Reasons for the Seasons**

In ancient times, people used the sky as a calendar. By noting when certain celestial objects rose or set, they knew when to begin planting, when to harvest crops, when a new year had begun, and when the times of most or least daylight were. Special buildings like pyramids, or rings of standing stones like Stonehenge, were constructed to be precise measuring devices for various celestial events. People had a very close relationship with the sky, although they did not understand all of the reasons why the sky appeared as it did.

Modern people no longer have the intimate relationship that their ancestors had with the sky. Our modern calendar has replaced the skies as a means of determining the timing of significant events. However, the modern calendar still notes dates like the vernal equinox and the summer solstice. Young children may wonder what the significance of those dates are, and how we know about them.

In this program, the student will learn about the Sun-Earth system, and how the tilt of our planet causes us to experience different seasons during the 365-day revolution period of the Earth around the Sun. The apparent motion of the Sun in our skies will be explained, and the four changes in season, the two equinoxes and two solstices, will be discussed. This live program is appropriate for fourth and fifth graders, and includes many exciting aspects using the digital planetarium projector to demonstrate concepts and explore the Sun-Earth system. A question and answer period is included, time permitting, to address specific questions from the students.

### **Concepts Covered During the Planetarium Visit**

1. The Sun follows a predictable path through the sky. It rises in the Northeast in summer, the Southeast in winter and due east on the spring and Autumnal equinoxes. It sets in the Northwest in summer, the Southwest in winter, and due West on the spring and Autumnal equinoxes. In the summer, the Sun is high in the sky at noon, while in the winter it is low in the sky. All of this is due to the fact that the Earth is tilted by approximately 23.5 degrees from vertical, to the plane of its orbit around the Sun.

2. This tilt is also responsible for the different seasons. When the part of the Earth we are on is tilted toward the Sun, we have summer. When we are tilted away from the Sun, we have winter. In the Southern Hemisphere, the seasons are the reverse of ours: they have summer when we have winter.

3. The days on which the seasons change are interesting celestial events. The Winter solstice is the shortest day of the year. The Summer solstice is the longest day of the year. On the spring and Autumnal equinoxes, day and night are roughly equal.

### **Pre-Visit Activities**

We recommend that you conduct at least one of these activities with the class before your visit to the planetarium theater. Be sure to raise questions that can be left unanswered until the discussion period in the show.

1. Discuss the four different seasons, which one the student likes best, and why.
2. Study the motion of the Earth around its axis and around the Sun.
3. Discuss with your students the four seasons of the year and how they are different from each other. You may also wish to discuss the four compass directions. Does the Sun always rise in the same place?

### **Post-Visit Activities**

We recommend that you conduct at least one of these activities with your class following their visit to the planetarium theater.

1. Have them draw pictures of the seasons. Include the position of the Sun, either rising, setting, or at noon.
2. Draw a picture of the Earth in space, showing how its axis is tilted towards the North Star.
3. A stick stuck in the ground in a sunny spot makes an excellent solar observatory. With it you can:
  - a. Measure the length of the stick's shadow at the same time of day every day for a few weeks. Is there a pattern?
  - b. If you look at the shadow of your stick at exactly noon (1pm if we are in daylight savings time), it will help you find your compass directions.
  - c. Measure the length of the stick's shadow at noon (1pm during daylight savings time) between June 15-25 and December 15-25. In June, the day of the shortest shadow is the Summer solstice. In December, the day of the longest shadow is the Winter solstice.

### **Recommended Books and Web Sites**

*Planisphere*: A planisphere is a device used to find objects in the sky. It shows the user a picture of the night sky at the precise day and time in question. Planispheres can be purchased online as well as in the VLM Gift Store.

*The Sky Observer's Guide: A Golden Guide* by R. Newton Mayall, Margaret Mayall and

Jerome Wyckoff, Golden Press, New York.

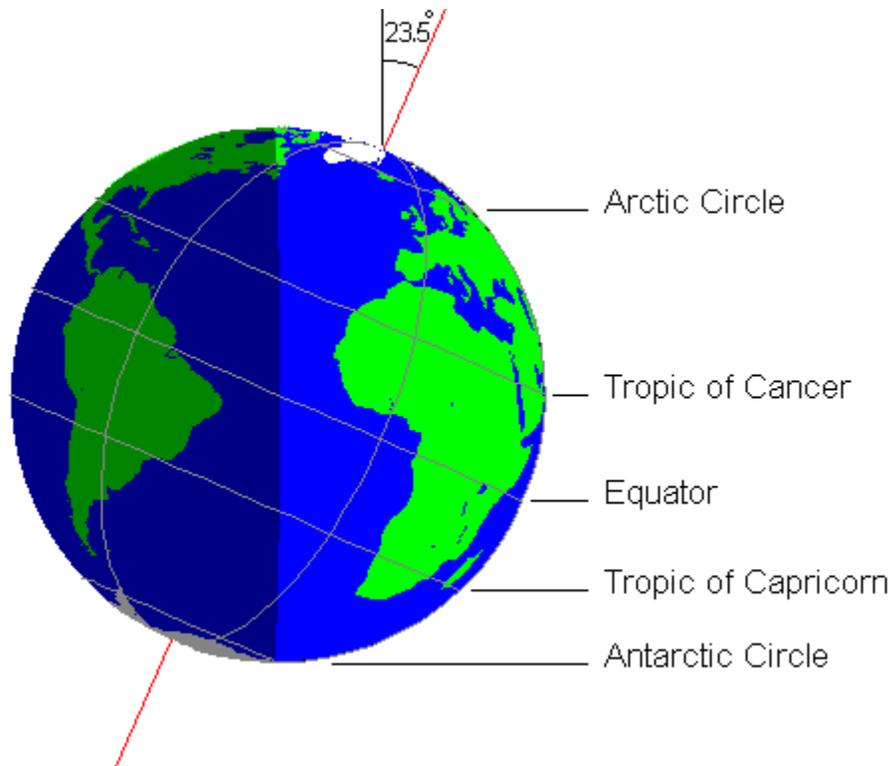
Planets: A Golden Guide by Mark Chartrand, Golden Press, New York.

Stars by Herbert S. Zim, Robert H. Baker, and Mark Chartrand.

*SpaceWeather:SpaceWeather.com*

*Jet Propulsion Laboratory Homepage:* <http://www.jpl.nasa.gov>

*Astronomical Museum:* <http://boas3.bo.astro.it/dip/Museum/MuseumHome.html>



NASA: <http://nasa.gov>

The National Radio Astronomy Observatory: <http://www.nrao.edu/>

Virginia Living Museum Astronomy: <http://www.thevlm.org>