



# Maynard F. Jordan Planetarium

## SEASON OF LIGHT

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### **Mission Statement:**

The mission of the Maynard F. Jordan Planetarium of the University of Maine is to provide the University and the public with educational multi-media programs and observational activities in astronomy and related subjects.

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# Cosmic Classroom



Looking for fun and interesting space activities? The planetarium staff has prepared a collection of materials we call the Cosmic Classroom for you to use before and/or after your visit. These materials are entirely for use at your own discretion and are not intended to be required curricula or a prerequisite to any planetarium visit. The Cosmic Classroom is one more way that the Jordan Planetarium extends its resources to help the front line teacher and support the teaching of astronomy and space science in Maine schools.

The lessons in this Cosmic Classroom have been edited and selected for the range of ages/grades that might attend a showing of this program at the Jordan Planetarium. Those activities that are not focused at your students may be adapted up or down in level. Our staff has invested the time to key these materials to the State of Maine Learning Results in order to save you time.

The State of Maine Learning Results performance indicators have been identified and listed for the program, the Cosmic Classroom as a package, and each individual activity within the package. The guide also includes related vocabulary and a list of other available resources including links to the virtual universe. We intend to support educators, so if there are additions or changes that you think would improve, PLEASE let us know.

Thank you, and may the stars light your way.

*The Maynard F. Jordan Planetarium Staff*

## The Program – *Season Of Light*

This show traces the development of many of the world's endearing holiday customs, and how they involve lighting up the winter season -- from the burning Yule log and sparkling Christmas tree lights to the lighting of luminarias and the Hanukkah Menorah. See also some of the historical religious and cultural rituals practiced during the time of winter solstice, as well as some of our more light-hearted traditions.

We are very glad that you have chosen to visit our planetarium with your group. We hope that this guide will help you prepare your group or help you review their experience at the University of Maine's sky theater.

## State Of Maine Learning Results Guiding Principles

The lessons in this guide, in combination with *Season of Light*, will help students to work towards some of the Guiding Principles set forth by the State of Maine Learning Results. By the simple act of visiting the planetarium, students of all ages open an avenue for self-directed lifelong learning. A field trip encourages students to think about learning from all environments including those beyond the schoolyard. A Jordan Planetarium visit also introduces visitors to the campus of the largest post-secondary school in Maine and encourages them to think of this as a place which holds opportunities for their future education, enjoyment and success.

Other sites on the University campus, including three museums, explore a variety of subjects, and the Visitors Center is always willing to arrange tours of the campus. A field trip can contribute to many different disciplines of the school curriculum and demonstrate that science is not separate from art, from mathematics, from history, etc. The world is not segregated into neat little boxes with labels such as social studies and science. A field trip is an opportunity for learning in an interdisciplinary setting, to bring it all together and to start the process of thinking. For a more complete discussion of field trips, please visit the Jordan Planetarium web site.

If used in its entirety and accompanied by the Planetarium visit this guide will help students to:

Become **a clear and effective communicator** through

- A. oral expression such as class discussions, and written presentations
- B. listening to classmates while doing group work, cooperation, and keeping records.

Become **a self-directed and life long learner** by

- A. introducing students to career and educational opportunities at the University of Maine and the Maynard F. Jordan Planetarium.
- B. encouraging students to go further into the study of the subject at hand, and explore the question of “what if?”
- C. giving students a chance to use a variety of resources for gathering information

Become **a creative and practical problem solver** by

- A. asking students to observe phenomena and problems, and present solutions
- B. urging students to ask extending questions and find answers to those questions
- C. developing and applying problem solving techniques
- D. encouraging alternative outcomes and solutions to presented problems

Become **a collaborative and quality worker** through

- A. an understanding of the teamwork necessary to complete tasks
- B. applying that understanding and working effectively in assigned groups
- C. demonstrating a concern for the quality and accuracy needed to complete an activity

Become **an integrative and informed thinker** by

- A. applying concepts learned in one subject area to solve problems and answer questions in another
- B. participating in class discussion

## State Of Maine Learning Results Performance Indicators

In conjunction with the Maynard F. Jordan Planetarium show *Season of Light*, this guide will help you meet the following State of Maine Learning Results Performance Indicators in your classroom.

### Grades 3-4

#### Science and Technology

##### G. Universe

- #2. Trace the sources of Earth’s heat and light energy to the Sun.
- #3. Describe earth’s rotation on its axis and its revolution around the sun.

##### K. Scientific Reasoning

- #1. Give alternative explanations for observed phenomena.

##### L. Communication

- #1. Record results of experiments or activities and summarize and communicate what they have learned.

## **English Language Arts**

### **A. Process of Reading**

- #1. Determine the meaning of unknown words by using a dictionary, glossary, or other reference sources.

### **D. Informational Texts**

- #3. Read for a variety of purposes

## **Mathematics**

### **C. Data Analysis and Statistics**

- #1. Make generalizations and draw conclusions using various types of graphs, charts, and tables.
- #2. Read and interpret displays of data.

### **I. Discrete Mathematics**

- #1. Create and use organized lists, tree diagrams, Venn Diagrams and networks.

## **Modern and Classical Languages**

### **B. Reading, Listening, and Viewing for Understanding**

- #1. Paraphrase brief written passages and personal notes on a familiar topic.

### **E. Cultural Practices, Products, and Perspectives**

- #2. Participate in cultural activities of another culture, such as games, songs, celebrations, storytelling, and dramatizations.

## **Grades 5-8**

## **Science and Technology**

### **F. The Earth**

- #1. Demonstrate how the earth's tilt on its axis results in the seasons

### **K. Scientific Reasoning**

- #1. Examine the ways people form generalizations
- #3. Identify basic informal fallacies in arguments.
- #6. Support reasoning by using a variety of evidence.

### **L. Communication**

- #1. Discuss scientific and technological ideas and make conjectures and convincing arguments.
- #2. Defend problem-solving strategies and solutions.

### **M. Implications of Science and Technology**

- #1. Research and evaluate the social and environmental impacts of scientific and technological developments.

## **English Language Arts**

### **B. Literature and Culture**

- #8. Apply effective strategies to the reading and interpretation of fiction using texts that are appropriately complex in terms of character, plot, theme, structure, and dialogue and appropriately sophisticated in style, point of view, and use of literary devices.

### **H. Research Related Writing**

- #1. Collect and synthesize data for research topics from interviews and field work, using note taking and other appropriate strategies.

## **Mathematics**

### **G. Patterns, Relations, Functions**

- #3. Use patterns and multiple representations to solve problems.





## Create a Constellation



### Objectives and State of Maine Learning Results Performance Indicators:

1. Learners will define the term *constellation* as a pattern made from a group of stars. (3-4. English Language Arts. A.1.)
2. Learners will use a common pattern of stars to design a constellation. (3-4. Mathematics. C.2.) (5-8. Mathematics. G. 3.)
3. Learners will write a short myth about their constellation. (5-8. English Language Arts. B. 8.)
4. Learners will be able to discover that the stars form patterns in the sky (5-8. Science and Technology. K. 6., Mathematics. G. 3.)

### The General Idea:

For centuries, people in all parts of the world have looked at the stars. The patterns remind them of familiar objects or characters from stories. Different cultures have associated mythological creatures and stories with different constellations of stars.

This activity allows students to create their own constellations and stories from a given pattern of stars, and compare them to what other cultures have seen in the same pattern.

### Getting Ready:

Explain to your students that constellations are stars that have been grouped to suggest important cultural objects, animals, story characters, or people. Explain to them that they will be receiving a picture of a pattern of stars, and creating their own constellation from it, as well as writing a short myth about it.

### What you Need:

A copy of "Create a Constellation" pattern for each student  
Overhead transparency of "Create a Constellation"  
Pencils and blank paper.

### What to Do:

1. Ask students to name some constellations they've heard of or observed. Discuss with them how they think the constellations got their names. Define the term *constellation*.
2. Distribute copies of the "Create a Constellation" pattern to each student. Have students observe with the star pattern from any and all possible directions.
3. Have students draw figures or objects using some or all of the stars in the star pattern.
4. Have students write brief stories about their figures and how they came to be found in the stars.
5. Share student-created stories and drawings to emphasize how different people see different figures in the same pattern. The students' stories and drawings can be posted on the bulletin board or put together in a class book.
6. Relate to the students that just as different people in the class saw different figures in the star patterns, so have various cultures when looking at the stars in the night sky. The pattern of stars on the Create a Constellation sheet represent an actual star pattern visible in the night sky.
7. Using the overhead projector, show students where the Big Dipper is found in the Create a Constellation star pattern. This pattern is actually the constellation of Ursa Major. (Astronomers do not consider the Big Dipper as its own constellation, because it is part of a larger group of stars.) If possible, draw the rest of the illustration of the bear.
8. Read stories from different cultures based upon this same star pattern. Students may wish to illustrate these cultural stories using the Create a Constellation pattern sheet.

9. Have students research other constellations. Try to find different cultural stories and myths for the same star group.

### **Suggested Ursa Major myths from Around the World:**

**Greek/Roman** – According to Greek legend, Artemis, the goddess of the hunt had a handmaiden named Callisto. Zeus, the head of all of the gods, fell in love with Callisto and she bore him a son named Arcas. Artemis was outraged by the actions of her handmaid, and changed Callisto into a she-bear. When Arcas grew up, he became a mighty hunter. One day, while out hunting, Arcas spied a great she-bear, which was actually his own mother, Callisto. Arcas wounded but did not kill the bear. Zeus, who still loved Callisto, as well as his son, Arcas, placed Callisto, the great bear (Ursa Major) into the sky and turned Arcas into a bear as well, and placed him in the sky to protect his mother. Hera was not pleased with the placement of Callisto and Arcas in the sky, so she asked her nurse, Tethys, to help. Tethys, a marine goddess, cursed the constellations to forever circle the sky and never drop below the horizon, hence explaining why they are circumpolar. To observers above 41°N, these stars never seem to set.

**Irish:** the Great Bear is called *King David's Chariot*, from one of that island's early kings, and in Great Britain it is associated with King Arthur, whose name is derived from Arth or Bear and Uthyr or Luminous. The rest of the constellation was called Arthur's Wagon.

**North American Indian:** When the bear awakens from its long sleep in late spring, it is chased across the heavens by seven hunters who are disguised as stars. All summer long, the hunters chase the bear across the northern horizon. In the fall, with only three hunters left, the bear is struck by hunters' arrows! As the bear rears up, then falls on its back, its blood drips down to Earth. The drops of falling blood turn the leaves red. During the long winter, the wounded bear lies on its back until its spirit enters another bear. When the next spring arrives, the newly enchanted bear starts fleeing across the sky, the next seven hunters in pursuit.

**Aztecs/Mexican:** it is Texcatlipoca, a dark god associated with death and the north. One of his feet is missing and is thought to have been eaten by a heavenly monster. This shows that the entire constellation isn't visible from the part of Mexico where the story originated since the star that represents the missing foot is below the horizon within that area.

# The Maynard F. Jordan Planetarium - Cosmic Classroom Activity



## Reasons for the Season

This lesson is part of the Sixth Grade Science Teacher Resource Book (TRB3) <http://www.usoe.org/curr/science/core/6th/TRB6/>.

Author: Utah LessonPlans

Additional Resources: Alan Gould, Carolyn Willard and Stephen Pompea. The Real Reasons for Seasons Sun-Earth Connections. GEMS Lawrence Hall of Science, University of Berkeley, CA, 2002.

### Objectives and State of Maine Learning Results Performance Indicators:

1. Learners will be able to identify basic informal fallacies in arguments. (5-8. Science and Technology. K. #3)
2. Learners will be able to communicate effectively using scientific language and reasoning. (3-4. Science and Technology. L. #1 )
3. Learners will demonstrate awareness of social and historical aspects of science. (5-8. Science and Technology. M. #1.)
4. Learners will be able to examine the ways people form generalizations. (5-8. Science and Technology. K. #1.)

### The General Idea:

In this activity students will learn how Earth's axis of rotation affects the angle of sunlight and the length of day. Students will first learn the relationship between the height of a light source and the length of the shadow cast by an object in the path of the light source. They will record shadow lengths to infer changes in the sun's angle over at least a 3-month period. They will also record the high temperatures on the days where shadow lengths are recorded. Finally, students will compare day length with the high temperatures.

### Getting Ready:

Describe the relationship between the tilt of Earth's axis and its yearly orbit around the sun.

### What You Need:

- “ Season Survey ”, 2-3 copies per student
- meter sticks or measuring tapes
- lamp or flashlight
- dark room
- outdoor thermometer (a minimum/maximum thermometer would be ideal)
- graphing paper
- sunrise/sunset and temperature dates for the State of Maine (<http://www.erh.noaa.gov/er/gyx/index.php>)

### What to Do:

1. Give each student 2 or more copies of the “Season Survey.” Have each student complete a copy of the survey. Have them ask a family member or friend (not a member of the class) to complete the other(s). When all the surveys have been completed, together as a class, tally the number of responses for each answer choice for each survey question. Discuss with the class to determine which answers are correct. If a particular answer had the highest number of responses, does that mean that it is the correct answer? Explain that historically the majority of people have believed incorrect ideas. Ask if they can think of any examples? (Earth is flat; Earth is center of the universe) Explain that the best way to find out the correct answers is to research the problem. This will be done by making observations and by learning what other scientists have discovered.

2. In a darkened room have a student hold a meter stick upright where everyone will be able to see the shadow. Move the lamp or flashlight up and down to show that when the light source is high, the shadow cast by the meter stick is short. When the light source is low, the shadow is long. Have another student sit near the meter stick and have them point to the light source with their extended arm. The angle of the student's arm is large when the light source is high and smaller when the light source is low.  
 [Sun Shadow Observations - WARNING! - Never look directly at the sun! ]
3. Begin shadow measurements on a sunny day. Select a straight up and down object on the school grounds such as a flagpole, tetherball pole, or basketball standard. Choose a time of day when students will be able to consistently make measurements (perhaps a recess break). It is very important that the shadow be measured at the same time of day each time it is measured. With the whole class watching, demonstrate how to measure the shadow cast by the object. It is also important that it is measured consistently each time. Before going outside to measure, decide on a format for keeping track of the records in student science journals. Have students record the date, time and length of the shadow in their science journals.
4. Arrange for an outdoor thermometer to be placed outside your classroom (not in direct sunlight). Have students record the high temperature for the days they observe the sun's shadow. You will need to work out a system for finding the high reading. Thermometers are available with a remote sensor so they could be read inside. Or, if you use a minimum/maximum thermometer it will automatically register the high (and low) temperature each day. An alternative to tracking and recording the actual temperatures is to find and record the official weather temperatures in the newspaper or on the Internet.
5. Continue to make observations with the whole class for about a week. Little change will be noticed, but it will set the pattern for further observations.
6. Organize the class in teams of two or three to continue making observations. Arrange a schedule for the class observations and a method for sharing information with other class members. Continue to make records for a period of at least 3 months. Ideally it would be best to keep records through the school year so students could see the seasonal changes.
7. Periodically discuss with your class what is happening to the length of the shadow. Have them note what is happening to the amount of daylight. This is a good time to discuss sunrise and sunset times. Discuss why this is happening. Be sure students know that Earth's axis of rotation is the reason for the sun's changing position in the sky.
8. Have students calculate the length of daylight for two days each month. Or you may have students gather information from newspaper or Internet sources or from class observations.
9. After sufficient data is collected, organize students in small groups to make the following series of graphs: a graph showing the shadow changes, a graph showing temperature highs, and a graph showing length of daylight. Compare the similarities and differences of the three graphs. Students may notice that the coldest days are not the days with the shortest shadow or the least amount of daylight. Help them understand that one reason for this discrepancy is because the materials Earth is made of take time to cool and warm.

Extra Activities:

- Students locate and use Internet sources to keep track of sunrises and sunsets and daily temperatures.
- Have students make two or three graphs on the same graph paper to show comparisons.
- Use this demonstration to show students how water heats and cools relatively slowly. Fill a pan with water and place it on a hot plate, turned on high. Help students notice that the pan heats up quickly, but the water does not. Monitor the temperature of the water throughout the experiment. Turn the hot plate down slightly to medium-high. Observe whether the water becomes immediately cooler. It does not. Actually the water temperature may go up. The water temperature does not respond quickly to temperature changes. Relate this to how the earth's surface (3/4 water) does not heat up or cool down immediately.

Assessment Plan:

- Refer to the original survey students took at the beginning of the unit. Have them take the survey again. Discuss the correct answers.
- Have students choose one misconception about the way people erroneously think about the seasons and write why the misconception is false and what the correct answer is.





## The Four Seasons

<http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=4&DocID=256>

### Objectives and State of Maine Learning Results Performance Indicators:

1. Learners will be able to demonstrate how the earth's tilt on its axis results in the seasons.(5-8. Science and Technology. F. #1)
2. Learners will be able to trace the sources of earth's heat and light energy to the sun. (3-4. Science and Technology. G. #2)
3. Learners will be able to describe the earth's rotation on its axis and its revolution around the sun. (3-4. Science and Technology. G. #3)

### Purpose

To understand that it is the tilt of earth's axis that causes the seasons.

### The General Idea:

From their earth studies in grades 3 through 5, students have learned about earth itself and earth in relation to the sun. Students should understand that earth is on an axis and rotates (resulting in night and day) and that earth takes about a year to orbit the sun. More specifically, students should "reasonably understand the relative size, motion, and distance of the sun, moon and the earth," or they will face a great challenge in understanding the phenomena of seasons.(*Benchmarks for Science Literacy*, p. 335-336 (<http://www.project2061.org/tools/benchol/ch15/findings.htm>.)

There is a common misconception of people of all ages regarding the seasons, and that is the notion that earth heats up because it is nearer to the sun. Though earth does make an elliptical orbit around the sun, it is not the distance that causes the seasons, it is the tilt of earth's axis that results in the seasons: sunlight hits different latitudes at different angles at different times of year

### What You Need:

- Misconceptions About the Seasons worksheet
- Four Seasons Mission sheet
- Cosmic Map (unmarked section)
- Materials to demonstrate earth orbiting the sun. We recommend that you use an apple for the earth and poke a pencil through it to show the axis. A large ball is needed for the sun, and the bigger it is, the better. You can also use other materials. For example, clay works to make an earth and you can use a basketball for the sun (just remind students that the sun in proportion is much, much bigger than the earth).
- Chart Paper
- Magic Markers

### What to Do:

The following questions will help you ascertain what your students think about how the seasons occur. Ask students the following questions and write their answers on chart paper. Save the chart paper so that you can review these answers later and allow students an opportunity to revise them.

1. What are our seasons like? (These answers will of course depend on where you live. Be sure students explore weather changes and the difference in length of day when answering this question.)
2. What are seasons like in other parts of the world? (Students may know that some parts of the world are warmer or colder. They may also know that some places are in darkness for most of the winter.)
3. What do you think causes the seasons? (Students may come up with all sorts of suggestions, some of which may be wrong. Do not confirm or criticize their ideas, but ask them to elaborate, or reason out their ideas.)

### Activity One:

Begin the lesson with a brief reading of the "Four Season Mission". After they finish reading, ask the following question:

- If you are earth, as you orbited the sun, were you always in the same relation to the sun? (Clearly, the answer is no, but if students did not recognize this, have one pair do the exercise again. Have the "earth" student stop at various places and ask if she is facing the sun the same way.)

This exercise should help students visualize that the axis is always pointed in the same direction. It is not exactly analogous to earth orbiting the sun, however, because it doesn't directly demonstrate how earth's axis, in conjunction with the annual orbit, changes earth's relation to the sun.

For instance, it is important for students to understand that the Northern Hemisphere "leans" toward the sun during part of the year resulting in more intense sunlight in that area of earth. During another part of the year it leans away, resulting in less intense sunlight and cooler weather.

### Activity Two:

The next exercise will demonstrate visually the "tilt" of earth and how different areas receive more intense sunlight throughout the year.

Put a large ball on a desk. Hold up an apple, stem facing up, and draw the equator with a marker explaining as you go along. Now poke a pencil all the way through the apple from top to bottom and explain that the top (where the stem comes out) is in the area of the Northern Hemisphere.

Ask students:

- If the earth is tilted on its axis how should I tilt the earth (apple)?

Now, with your earth (apple) tilted properly, be sure to keep the pencil pointed in the same direction as you start to walk it (orbit) around the bigger ball (sun). It is easiest to keep the pencil facing toward the same wall. Do one full orbit, then do another orbit and stop at when the Northern Hemisphere is leaning toward the sun.

Ask the following questions:

- Where is the Northern Hemisphere pointed? (It is pointed toward the sun.)
- Do you think the Northern Hemisphere is warmer during this time of the year? (Yes, because sunlight is hitting it directly. Be sure that students don't think it is because that part of earth is closer to the sun.)

Now, keep orbiting until the Northern Hemisphere is pointed away from the sun and ask the following:

- When the Northern Hemisphere points away from the sun, then what? (Now, the Northern Hemisphere gets cooler.)
- Why does the Northern Hemisphere get cooler? (Again it is important for them to realize that it is the sunlight falling less intensely that causes it to be cooler. )
- What about the Southern Hemisphere? (The Southern Hemisphere receives direct rays and is now warmer than it usually is.)

Students at this point should understand that sunlight falls more intensely on different parts of the earth throughout the year. Now, give them a sense of time. They probably know that it takes earth a year to orbit the sun, but may not have thought about it in the context of seasonal changes.

Asking this question will help students realize a complete picture of the seasons:

- How many months do you think go by between when the Northern Hemisphere receives direct rays from the sun as opposed the Southern Hemisphere? (About six months. This should bring home the idea that as the earth orbits, the seasons on different parts of the planet change. You may need to demonstrate the orbit one more time, stopping at each quarter to show that earth is in a different position in relation to the sun throughout the year.)
- Now have students do the Cosmic Map activity. This activity is a fun way to reinforce what they've just learned.

### **Assessment**

Review students' original ideas about what causes the seasons (discussed in the Motivation). You may want to use different color markers to amend certain ideas on the chart paper, or to add new ideas.

Discuss how their thoughts might have changed:

- Do you have the same ideas about why we have seasons?
- If not, what is different? (Students should recognize that they might have had misconceptions.)
- Does this make you wonder if you have ideas about other things that might not be exactly right? (Invite students to feel comfortable with the fact that they may have wrong ideas about some things, and that they should never assume they are right.)

To assess student understandings of the seasons, ask them to demonstrate with either a drawing, poster, or model how and why the seasons change. Regardless of how they demonstrate this concept, students should show that:

- the earth is tilted on an axis
- different parts of earth receive direct rays from the sun at different times of the year
- the relation of earth's hemispheres in relation to the sun are what result in different seasons





## Interplanetary Christmas

<http://www.thursdaysclassroom.com/09dec99/teach1.html>

### Objectives and State of Maine Performance Indicators:

1. Learners will be able to read supplied text for a variety of purposes. (3-4. English Language Arts. D. #3.)
2. Learners will complete a "pro and con" chart using the information in the article. (3-4. Mathematics. C. #1, I. #1.)
3. Learners will be able to communicate effectively in the application of science and technology. (3-4. Science and Technology. L. #1.) (5-8. Science and Technology. L. #5.)

### The General Idea:

This is a fun way to review basic information about the planets in our solar system. The pre-reading activity promotes retention and motivation. The Pro and Con chart develops organizational thinking skills.

### You Will Need:

Copies of the Christmas Around the Solar System article

Copies of the Interplanetary Christmas chart. The following web links may also come in handy as sources of basic facts about the planets:

<http://www.nineplanets.org/> -- Pictures and facts about the all the planets and their moons.

[http://nssdc.gsfc.nasa.gov/photo\\_gallery/](http://nssdc.gsfc.nasa.gov/photo_gallery/) -- from the National Space Science Data Center

### What to Do:

1. Start off by asking students to predict what problems Santa might face if he had to start delivering gifts to space colonies. This should be a fun discussion.
2. Tell them that the article they are going to read is an imaginary interview with Santa by NASA scientists. Divide the students into 8 groups or have various pairs work on different planets. Assign each group one planet and have them skim the article and report one key fact about their planet that would affect Santa's delivery system.
3. Distribute the Pro and Con sheet. Review the directions so that students will have a focus as they read. Read the article either as a class, in partners, or individually.

4. Discuss the reading. Some possible questions include:

Which planet would be the best colony for Christmas celebrations in your opinion? Why?

Which planet would be the worst? Why?

What questions do you think the NASA scientists would have liked to ask?

Are there any questions you would like to ask?

Do you have any recommendations for Santa?

5. Have students look at their charts. Can anyone see how it was organized? With the students, complete the chart for the planet Mercury. If they seem to understand, let them complete the chart independently. Discuss the results.

## The Maynard F. Jordan Planetarium - Cosmic Classroom Activity



### Star of David

<http://www.education.com/common/resources/lp/soc/97121540.html>

#### Objective:

Students will honor the Jewish winter holiday of Hanukkah by creating a Star of David symbol.

#### Materials:

Activity sheet  
glue  
scissors  
hole punch  
string  
glitter (optional)  
two contrasting colors of construction paper  
books and other materials on world holidays

#### Directions:

- The Jewish festival of Hanukkah is also known as the Festival of Lights. It is celebrated for eight days and usually starts in December. (It follows the Jewish calendar.)
- Hanukkah commemorates the triumph of the Maccabees over the great army of the Syrian king, Antiochus IV, in 165 B.C., as well as the universal message that all people have the right to be free.
- It also celebrates the fact that when Jews wanted to reconsecrate the temple destroyed by the Syrian army by burning an eternal flame, the small amount of oil burned eight days, enough time for a messenger to return with a new supply of oil.
- Students can construct paper Stars of David by following the directions on the activity sheet and use them to decorate the room as part of a winter holiday celebration.
- Recipes for latkes (potato pancakes) and applesauce (the traditional accompaniment) can be made with the class or sent home for students to try (see next page).

Internet Link: Kid's Domain Holidays

### Potato Pancakes with Apples

1 lb. russet potatoes, peeled	salt
1 apple, peeled and cored	gr. pepper
1 large egg	canola oil
1/4 c flour	powdered sugar

Grate potatoes and apples in food processor (work quickly to avoid discoloration). Squeeze out liquid . Add egg and flour, salt and pepper to taste. Mix well. In large non-stick skillet, heat enough oil to cover bottom of the pan. Spoon out the batter into pan, being careful not to crowd. Cook until crisp and brown on one side, then turn and fry on other side. Keep finished pancakes warm in oven until all pancakes are fried. Drain on paper towels. Sprinkle with powdered sugar if desired just before serving. Makes 10 pancakes. 68 calories 2 g fat.

### N. African Sweet Potato Pancakes

2 1/2 lb. sweet potatoes or yams, peeled  
1 1/2 tsp. salt  
1/2 tsp. white pepper  
5 eggs, lightly beaten  
canola oil for frying

Loosely grate potatoes in food processor and place in mixing bowl. Season to taste with salt and pepper. Mix in eggs. Cover and refrigerate (up to 4 hours) until time to fry. In large non-stick skillet, heat enough oil to cover bottom of the pan. Spoon out the batter into pan, being careful not to crowd. Cook until crisp and brown on one side, then turn and fry on other side. Keep finished pancakes warm in oven all pancakes are fried. Drain on paper towels. Makes around 26 pancakes. Each pancake only has 2g of fat and 69 calories plus beta-carotene!!

### Classic Potato Latkes

4 medium potatoes (about 1-1/2 pounds)	1/2 teaspoon salt
3 tablespoons rendered chicken fat (schmaltz)	2 tablespoons cooking oil
2 slightly beaten eggs	Sour cream (optional)
2 cloves garlic, finely minced	Applesauce (optional)

1. Peel and finely shred potatoes. In a mixing bowl combine potatoes with chicken fat, eggs, garlic, and salt. Using 1/3 cup mixture for each latke, press mixture into patties about the size of the palm of your hand, squeezing out excess liquid.
2. In a large skillet heat chicken fat over medium-high heat. Carefully slide patties into hot fat.
3. Cook over medium-high heat about 2 minutes or until latkes are golden brown, turning once.
4. Repeat with remaining batter. Add additional fat during cooking, as needed. If necessary, reduce heat to medium to prevent overbrowning. Drain on paper towels and keep warm. Serve with sour cream or other toppings, if desired. Makes about 10 latkes. (*Nutrition facts are per latke with 1 teaspoon sour cream.*)

### **Latke Cooking Tips**

- Always press the water out of the potatoes (using your hands or a colander) after you grate them but before you mix in other ingredients--it makes for a firmer latke!
- Anything can be made low-fat just by changing how you cook the latke! For a lower fat version, just fry for a minute or two on each side, and bake latkes for about 10 minutes at 400-450 degrees, then another 5 minutes on the other side.
- Always use canola or peanut oil for frying. Lighter-tasting oils are essential for the flavors of the latkes to emerge without being overpowered by a lot of a strong-flavored oil.





## **Christmas in Other Countries: A Venn Diagramming Activity**

<http://www.educationworld.com/>

### Brief Description

Students will diagram similarities and differences in Christmas celebrations around the world using a Venn Diagram.

### Objectives and State of Maine Performance Indicators:

Students will be able to

- Learn about how people celebrate Christmas around the world. (5-8. Science and Technology. L. 5.)
- Compare and contrast their celebration of Christmas with the celebrations of others. (3-4. Modern and Classical Languages. E. #2).
- Create Venn diagrams to compare their Christmas celebration with that of another country. (3-4. Mathematics. I. #1).
- Demonstrate awareness of the culture and geography pertinent to the texts they read. (3-4. Modern and Classical Languages. B. #1).

### Materials Needed

1. Internet access or printouts from <http://www.christmas.com/worldview>
2. Copy of Venn diagram worksheet
3. Pens or pencils

### What to Do:

1. Introduce the Venn diagram to students. A Venn diagram is a simple graphic organizer that students can use to compare and contrast their Christmas celebration with the celebrations of children in other lands.
2. In this activity, each student will research the Christmas celebration in another country. If students do not have Internet access, the teacher can print explanations of how Christmas is celebrated in more than 100 countries throughout the world from the Christmas Worldview Web site (see above). The teacher can provide each student with the printed resource for one country.
3. Each student should make a list of facts, symbols, and key words associated with Christmas as he or she knows it and as it is celebrated in the student's assigned country. Students will transfer that information to Venn diagrams. Section A of the Venn diagram will include information about Christmas as the student knows it, Section B will include information about Christmas in the assigned country, and Section C (the overlapping area of the diagram) will include information that is common to both Christmas celebrations.

### Assessment

Students share their completed Venn diagrams with their classmates. They talk about the major similarities and differences. The completed diagrams can be displayed around a world map in the classroom. Students can use lengths of yarn to connect each diagram to the country the student learned about.



# Vocabulary List

Axis	An imaginary straight line around which an object rotates.
Constellation	A group of stars that forms a pattern in the night sky.
Day	The time it take for a planet to make one full rotation (on Earth, 24 hours).
Equator	An imaginary line dividing the earth into two halves called hemispheres.
Equinox	Two times of the year when night and day are about the same length. The Sun is crossing the Equator (an imaginary line around the middle of the Earth) and it is an equal distance from the North Pole and the South Pole.
Light	Radiation that can be detected by the human eye.
Orbit	A specific path followed by a planet, satellite, etc.
Planet	A massive object orbiting a star.
Reflection	The return of light or sound waves from a surface.
Revolution	The circling of a smaller object around a larger object.
Rotation	The spinning of an object on its axis.
Scale	Reducing all objects and distances by a percentage so that they are within a workable size.
Solar System	The system of planets, moons, and other objects revolving around a star (in our case, the Sun).
Star	A massive, self-luminous celestial body of gas that shines by radiation derived from its internal energy sources.
Star Pattern	A group of stars that forms a pattern within a constellation.
Summer Solstice	The first day of the Season of Summer. On this day (JUNE 21 in the northern hemisphere) the Sun is farthest north and the length of time between Sunrise and Sunset is the longest of the year.
Ursa Major	Great Bear; the Big Dipper is a star pattern in it.
Venn Diagram	A diagram using circles to represent sets, with the position and overlap of the circles indicating the relationships between the sets.
Winter Solstice	The first day of the Season of Winter. On this day (DECEMBER 22 in the northern hemisphere) the Sun is farthest south and the length of time between Sunrise and Sunset is the shortest of the year.
Year	The time it takes for a planet to make one full revolution around a star, in our case, the Sun (on Earth, 365.25 days).



## Some Good Books To Use With *Season Of Light*

### **A Stargazer's Guide.**

Asimov, I. & F. Reddy. 1995, Gareth Stevens.  
*Introduces the sky for each season and more.*

### **The Big Dipper.**

Branley, Franklyn Mansfield. 1991, HarperCollins.  
*Explains basic facts about the Big Dipper, including which stars make up the constellation.*

### **Constellations**

Sipiera, Diane M. 1997, Children's Press.  
*Identifies the groups of stars known as constellations and discusses their origin, uses, and observation.*

### **The Glorious Constellations: History and Mythology**

Sesti, Giuseppe Maria. 1991, Abrams.

### **Whitney's Star Finder**

Whitney, C., 5th ed. 1989, Knopf.  
*Clear, basic primer on sky phenomena & constellations.*

### **Christmas Customs and Traditions**

Muir, Frank. 1977, Taplinger Publishing Company, New York.  
*Explores the customs and traditions of the Christmas season.*

### **Benchmarks for Science Literacy**

American Association for the Advancement of Science, 1994, Oxford University Press, New York.

## Some Good Web Sites To Use With *Season Of Light*

### **[domeofthesky.com/clicks/constlist.html](http://domeofthesky.com/clicks/constlist.html)**

Find out the names of each constellation and the stories behind those names.

### **[www.astro.wisc.edu/~dolan/constellations/constellations.html](http://www.astro.wisc.edu/~dolan/constellations/constellations.html)**

A constellation information page compiled by Chris Dolan at the University of Wisconsin-Madison, Department of Astronomy.

### **<http://wilstar.com/xmas/xmassymb.htm>**

Explains some of the most common symbols of Christmas, including mistletoe and holly, the poinsettia, the candy cane, the Christmas Tree, and Santa Claus.

### **<http://www.novareinna.com/festive/xmas.html>**

The traditions of Christmas.

### **[http://teacher.scholastic.com/lessonrepro/k\\_2theme/holiday.htm](http://teacher.scholastic.com/lessonrepro/k_2theme/holiday.htm)**

Christmas customs around the world.

### **<http://www.candlegrove.com/home.html>**

Explores the ancient pagan traditions of the Winter Solstice Festival, the Sacaea-Saturnalia, and the Yule Feast which have contributed so many customs to our modern celebration of Christmas. Includes information on the Yule elf, the Yule cat, mistletoe, and the Yule log.

**<http://www.circlesanctuary.org/pholidays/SolsticeArticle.html>**

Customs, lore, symbols, and rituals associated with "Christmas" which are actually linked to Winter Solstice celebrations of ancient Pagan cultures.

**<http://www.historychannel.com/exhibits/holidays/hanukkah/>**

The history and traditions of Hanukkah.

**[http://rats2u.com/christmas/hanukkah\\_index.htm](http://rats2u.com/christmas/hanukkah_index.htm)**

All things Hanukkah.

**<http://www.kidsdomain.com/holiday/>**

Great holiday site for kids with lots of activities. Covers most major holidays.

## Lessons From The World Wide Web

**<http://www.eduref.org/cgi-bin/lessons.cgi/Science/Astronomy>**

Astronomy lesson plans based of the popular PBS series, Newton's Apple.

**[www.thegateway.org](http://www.thegateway.org)**

Sponsored by The U.S. Department of Education's National Library of Education and ERIC Clearinghouse on Information & Technology, this site offers lesson plans for all subjects and all grades.

**<http://teacher.scholastic.com/fieldtrp/science/seasons.htm>**

Explore Web sites and lesson plans about the four seasons.

**<http://www.nationalgeographic.com/xpeditions/activities/matrix.html>**

National Geographic's Activities website.

## Astronomy Web Sites Worth A Visit

**[www.galaxymaine.com](http://www.galaxymaine.com)**

The Maynard F. Jordan Planetarium and Observatory home page.

**[www.galaxymaine.com/SA/SA.htm](http://www.galaxymaine.com/SA/SA.htm)**

The teacher resources and bibliography page on the Maynard F. Jordan Planetarium web site.

**[space.jpl.nasa.gov](http://space.jpl.nasa.gov)**

NASA's Jet Propulsion Laboratory web site.

**[ssd.jpl.nasa.gov](http://ssd.jpl.nasa.gov)**

A site about our solar system maintained by the Solar System Dynamics Group of the Jet Propulsion Laboratory.

**[seds.lpl.arizona.edu/nineplanets/nineplanets/nineplanets.html](http://seds.lpl.arizona.edu/nineplanets/nineplanets/nineplanets.html)**

A Multimedia Tour of the Solar System from the Students for the Exploration and Development of Space.

**[www.dustbunny.com/afk](http://www.dustbunny.com/afk)**

A web site about astronomy, designed for kids, with tons of information.

**[www.stardate.org](http://www.stardate.org)**

Learn what's going on TODAY in astronomy on the "Star Date" web page, maintained by the University of Texas' McDonald Observatory.

*The Maynard F. Jordan Planetarium does not guarantee that the information given on the above web sites to be accurate, accessible, or appropriate for students.*

## Activities/Worksheets

“Create a Constellation” worksheet

Ursa Major line drawing

Season Survey

Misconceptions about Why Seasons Occur – Teacher Background

Four Seasons Mission sheet

Cosmic Map (unmarked for students, marked for teachers)

Interplanetary Christmas Article

Interplanetary Christmas Chart

Venn Diagram worksheet

Star of David worksheet

