

# Teaching through Trade Books

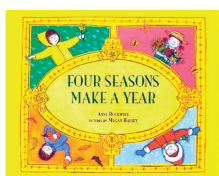
Activities inspired by children's literature

## A Season to Inquire

What could be more “real” in the lives of students than the seasons of the year? Aside from learning about naturally occurring cycles that happen over time, students can learn about the cause of the seasons. Through activities based on this month's books, students can deepen their conceptual understanding of seasonal change.



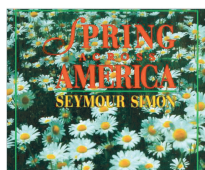
### This Month's Trade Books



*Four Seasons Make a Year*  
By Anne Rockwell.  
Illustrated by Megan Halsey.  
32 pp. Walker & Company. 2004.  
ISBN 0-8027-8883-1 (HB).

### Synopsis

This book, most appropriate for primary age children, addresses the traditional cycle of seasons by examining how life on a farm is affected. The illustrations are mixed media, and they are accompanied by clear, concise text located at the margins of the illustrations. The book starts with the planting of a sunflower seed, which remains the focus as it grows into a plant, is harvested, and later is used to provide food for animals.



*Autumn (Winter & Spring) Across America* (three books).  
By Seymour Simon.

32 pp each. Hyperion. 1993, (1994, 1996, respectively).

ISBN 1562824678 (Autumn Across

America); 0786800194 (Winter Across America); 0786800690 (Spring Across America)

### Synopsis

This three-book series from Seymour Simon covers the majority of the school year. Ideal for upper elementary age children, it provides detailed information regarding each of the seasons. The information is provided in two-page formats with one page of text and the other page consisting of one or more photographs that connect directly to the text. References to a variety of seasonal changes, animals, and plants make this series of books appropriate wherever one lives in North America, while an introduction to the causes of the seasons opens the door to inquiry.

### Curricular Connections

While each of the seasons may represent themselves differently in various locations across the globe, seasonal change is observable in most locations. It may not snow in southern Florida, but changes in trees and the increase in some populations of migratory animals signal the onset of winter. Similarly, the softening of permafrost and the arrival of those famous mosquitoes signal the onset of summer in the far northern reaches of Alaska.

The study of seasons is a very traditional introduction to the natural sciences for most elementary students. Far before the *National Science Education Standards* called for them to do so, students were drawing trees to track their development through the seasons and inquiring as to seasonal whereabouts of those creatures that live in the trees. In this and in other ways, the study of seasons can introduce students to inquiry, to the characteristics of living things, and to the concept of cycles in science.

At a deeper level, however, seasons can be used to study changes in the Earth and sky in order to define how populations are affected by the changing seasons. The following activities have younger students making observations about such things and students in grades 4–6 beginning to understand the cause of the seasons.

Tracking the number of daylight hours throughout the school year helps students to make observations and look for patterns, skills identified in the *National Science Education Standards* for K–4, as well as explore the relationship between the length of daylight hours and the seasons.

The activity for older students helps them discover that different hemispheres of Earth receive different amounts of sunlight, which is the “major source of energy for phenomena on the Earth's surface. Seasons result from variations in the amount of the Sun's energy hitting the surface, due to the tilt of the Earth's rotation on its axis and the length of the day” (NRC 1996, p.161).

## Trade Book–Inspired Investigations

The following activities can be used to bring clarity to the concepts associated with the seasons. The K–3 activity focuses on the cyclical nature of the seasons and the traditional characteristics of the seasons, and the 4–6 activity helps students begin to understand the cause of the seasons.

### For Grades K–3: Seeing Changes

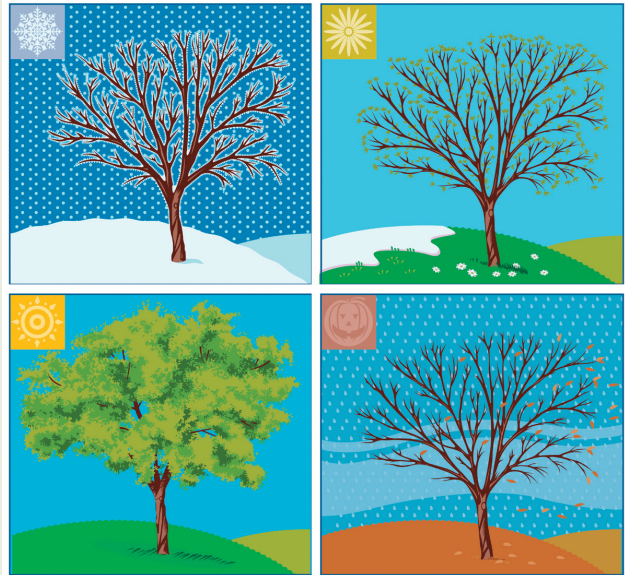
This activity adds a twist to an old activity by adding shadow and daylight measurements to yearlong observations of seasonal change. Early in the school year, ask students to look out of the school classroom window or venture to the schoolyard to make seasonal observations. While observing, ask students to discuss the flora and fauna that reveal themselves as well as any other physical characteristics, such as bodies of water in puddles, streams, or drainage features. Ask students to draw the scene with as much detail as possible.

As the days become shorter (and the shadows become longer), changes will be observed. The arrival, departure, or transit of migratory animals into, out of, or through your area can be a sign of change. Some plants may appear and flourish, some may dwindle or even die, and still others may become dormant, only to grow again during a subsequent season.

Ask students to predict what will happen to their scene throughout the course of the school year. Students may respond that children will play on the playground or that birds will nest in trees. Following this discussion, have the students brainstorm what they know about the seasons. Generate a list on chart paper to refer to throughout the school year.

Explain to students they will be drawing the same scene throughout the school year, as well as recording the length of daylight hours and measuring the length of an object’s shadow once each month for the entire school year. (The number of daylight hours can be found on your local newspaper’s weather page or at The Weather Channel website, [www.weather.com](http://www.weather.com).)

After making and recording observations about natural objects, ask students to locate any tall objects that cast a shadow—another building, a flag pole, or a tree. Have the students measure the length of the shadow cast by the



object and record the length and direction. Teachers should make sure that the shadow of the object is measured at approximately the same time each day (once a month) throughout the year. Measuring and tracking the length of the shadow will allow students to make observations about the position of the Sun in the sky. After a month or two of observation, ask your students to forecast or predict what they expect might happen over the next month or months. (The predictions will vary depending on when you start this process and the latitude at which you live. If students start to track the shadow during the fall in the northern hemisphere, their shadow will begin to get “longer” over time because the Sun follows a “lower” path in the sky from the fall throughout the winter and then begin to get shorter as it climbs higher in the sky as spring and summer approaches.)

### For Grades 4–6: Explaining Seasons

Older students can begin to investigate how the tilt of the Earth’s axis results in different amounts of sunlight—thus different amounts of heat—hitting the different hemispheres depending on the season. The first activity has students compare the amount of heat that is received depending on the angle of the light, which is one of the concepts associated with understanding how the tilt of the Earth’s axis causes the seasons.

Each group of students will need two thermometers, two pieces of black construction paper, a stopwatch, and two flashlights. Ask the students to place one thermometer on each piece of the black paper and record the initial temperature. Students may wish to develop a data table that will allow them to record the temperature of each thermometer at different time intervals, such as the one suggested below.

	Thermometer 1 Light directly overhead (90 degree angle)	Thermometer 2 Light at an angle ( 23.5 degrees)
Initial Temperature		
1 minute		
5 minutes		

The students should hold one flashlight directly over Thermometer 1 (centering the center of the flashlight beam on the bulb is a way to control for variables) at a 90° vertical angle approximately 60 cm above the table. They can measure this using a string precut to the appropriate length. This allows the surface to receive more rays of light from the “Sun,” which is what happens during the summer.

The other flashlight should be held at approximately a 23.5° angle so that the flashlight beam hits the second thermometer’s bulb. (If students understand the use of a protractor, they can use a protractor to determine this angle. If not, students can estimate approximately one quarter the distance between the table and the initial position. As they did earlier, they can maintain the distance using a string precut to the appropriate length.) In this setup, where the flashlight is slanted, the “Sun’s” rays are being spread out over a larger area, which is what happens during winter.

Ask the students to record the temperature at the time intervals indicated. Was there a temperature change? Was the temperature change the same for both thermometers? What is a possible explanation of this? Students can expand on this investigation by tracing the pattern of the light shape with a white

crayon or chalk to illustrate the area covered by the light at the two different angles.

Once the initial two trials have been completed and the thermometers return to room temperature, students can investigate what happens to the temperature when the flashlight is held at different angles. They can trace the shape of the light distribution and record the temperature at the five-minute mark for each trial. A pattern should develop showing that the more distributed the light is (or spread out over a larger area) the less the gain in temperature.

This is what happens as the Earth revolves around the Sun in its orbit throughout the year—depending on the season and the hemisphere, the Earth receives more direct rays resulting in a heating of its surface. For example, in the northern hemisphere, the Earth’s axis is tilted towards the Sun in summer, which means that the northern hemisphere is receiving more direct rays and it gets warmer. In winter the opposite happens. (Note there are other factors such as the latitude of the position on the Earth that affect the directness of the rays.) The equator receives fairly consistent amounts of sunlight and therefore there are no seasons at the equator. In general, seasonal temperatures vary more the farther away from the equator one gets.

Activities in which students investigate seasonal patterns themselves and construct their own knowledge can help students understand what causes the seasons and prevent them from developing misconceptions.

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## Resources

National Research Council (NRC). 1996. *National Science Education Standards*. Washington, D.C.: National Academy Press.

## NSTA Connection

For an additional activity on shadows and the position of the Sun, see “Celestial Studies” in the *Teaching Through Tradebooks* column in *S&C’s* September 2004 issue.