



Teacher's Guide

Fall & Winter

Ag-tivities

LEAVES CHANGE COLOR

Fill in the blanks to complete the paragraph on why leaves change color. Use the words from the Word Bank below. (Words can be used more than once)

Photosynthesis is the process plants use to make food. The food they make is called **glucose**. To make **glucose**, plants need **sunlight**. They also need a chemical called **chlorophyll**. **Chlorophyll** gives plants their **green** color. As autumn approaches and days get shorter, plants get less **sunlight**. **Photosynthesis** stops and **chlorophyll** starts to disappear from the leaves. Now other colors also can be seen. The red and purple colors are caused by **glucose** that was trapped in the leaves when **photosynthesis** stopped. The **brown** colors are caused by waste trapped in the leaves. The **orange** and **yellow** colors were always there; they were just hidden by the **green** color of the **chlorophyll**.

Wyoming Content Standards :

SCIENCE:

CONCEPTS AND PROCESSES

Life Systems

- **SC4.1.1** Characteristics of Organisms: Students describe observable characteristics of living things, including structures that serve specific functions and everyday behaviors.
- **SC4.1.2** Life Cycles of Organisms: Students sequence life cycles of living things, and recognize that plants and animals resemble their parents.
- **SC4.1.3** Organisms and Their Environments: Students show connections between living things, their basic needs, and the environments.

Earth and Space Systems

- **SC4.1.6** Changes in Earth and Sky: Students describe observable changes in earth and sky, including rapid and gradual changes to the earth's surface, and daily and seasonal changes in the weather.

THE LANGUAGE OF AUTUMN

Brainstorm nouns, verbs, and adjectives about autumn/fall. Use these words to help you write two different kinds of poems. Share your poems with your classmates.

Acrostic Poems - Beginning with a word and write it down instead of across the paper. The first letter of each line is already written and writers must use those letters to form their word or line of verse. The end product should result in a poem that is related to the word that is written down the paper.

Haiku Poems

The haiku is a Japanese poem comprised of three lines. The first line is five syllables, second line is seven syllables and the third line is five syllables. Haiku poems are often, but not always associated with weather and/or the seasons.

Wyoming Content Standards :

LANGUAGE ARTS:

WRITING - Students use the writing process and use appropriate strategies to write a variety of expressive and expository pieces.

- **LA4.2B** Students write a variety of expressive and expository pieces.
- **LA4.2B.2** Students write and share literary texts (stories, plays, journals, poems, and short personal narratives), using grade-level-

appropriate strategies such as relating ideas, observations, or recollections of an event or experience; and providing a context to enable readers to imagine the world of the event or experience.

SPEAKING AND LISTENING - *Students use listening and speaking skills for a variety of purposes and audiences.*

- **LA4.3.1** Students speak on a focused topic with organization, volume, posture, pace, eye contact, and relevant gestures.
- **LA4.3.2** Students use speaking strategies appropriate to different types of presentations.
- **LA4.3.3** Students understand techniques used in various media such as basic propaganda techniques.
- **LA4.3.4** Students read aloud their own and others' texts fluently and expressively.
- **LA4.3.5** Students speak and listen in small groups cooperatively.

HABITAT CONNECTION

Fill in the blanks to complete the chart on the different winter survival strategies that animals in Wyoming use.

- **Human Being** – People remain active throughout the winter. In Wyoming, the winters can get very cold so heating and winterizing our homes is often necessary. Wearing warmer, thicker clothes when we need to go outdoors is also necessary. Some people harvest vegetables from summer gardens that will provide food for winter use. Grocery stores and local food establishments provide a constant food source year round.
- **Greater Sage Grouse** – In some areas, where wintering, nesting, and brood-rearing habitat are close, sage grouse are essentially nonmigratory. However, in other areas, sage grouse are migratory, moving between separate summer and winter areas. Seasonal movement follows the availability of herbaceous vegetation and insects during late summer and early fall. Sage grouse generally select relatively tall and large expanses of dense sagebrush during winter. Winter food consists of perennial grasses, forbs, and shrubs.
- **Miller Moth** – In Wyoming, the common 'miller' moth is the migrating adult stage of the army cutworm. The army cutworm spends the winter as a partially grown caterpillar, and resumes feeding the following spring. They become full grown by mid-Spring, burrow into the soil and pupate. Between 3 to 6 weeks later, the adult 'miller' stage of the insect emerges. They then migrate and ultimately settle at higher elevations. There they spend a few months, feeding on nectar and resting in sheltered areas. In late summer, they return to the lower elevations to lay eggs and repeat the cycle.
- **Cutthroat Trout** – Cutthroat Trout remain active throughout the year. During the winter, they move from streams and rivers to well-oxygenated pools to avoid physical damage from ice scouring and to conserve energy. Pools with low gradient meadows and undercut or overhanging banks can provide abundant riparian vegetation for a winter food source.
- **Beef Cattle** – Cattle remain active all year long. If you raise cattle, you may notice that they will grow a thick winter coat to help protect them when they are out in the cold winter weather. Animals that live outside use more energy to keep warm in the winter months. Staying warm uses extra energy, so they need extra food to help them keep weight on during the cold Wyoming winter months.
- **Western Meadowlark** – Western Meadowlarks remain active and flock in winter in single-species groups, or with other blackbirds and starlings. During winter, they can often be found in cultivated fields and wet grasslands. Meadowlarks forage seeds and waste grain on the ground, running or walking, and probing the soil with their bills.
- **Big Brown Bat** – The big brown bat is not a migratory species; it rarely moves more than 50 mi between summer and winter roosts. In winter, the big brown bat hibernates primarily in caves, buildings, and abandoned mines, or tree cavities where air temperatures remain cool but above freezing. It is extremely hardy and is often the last species to enter hibernation in late autumn or early winter. The big brown bat feeds primarily on flying beetles, although it will take other flying insects, including flies, moths, ants, stoneflies, mayflies, and crickets. Its large jaw and robust teeth allow it to take large insects with tough exoskeletons, such as beetles.
- **Hoary Bat** – The hoary bat is a migratory species. Although it has thick body fur, it has not been found hibernating in Wyoming and probably migrates to warmer climates for the winter. (Migrating from the state around August, hibernates in its winter range, and returns to Wyoming around April. During migration, the hoary bat may be found in riparian corridors and other wooded areas. Females precede the males in migration, moving through lowland areas and coastal valleys, while most males travel through foothills and mountains. Migrating outside of Wyoming to hibernate, it can be found in warmer regions living in tree trunks, tree cavities, clumps of Spanish moss, and squirrel nests. The hoary bat primarily eats moths. However, it is an opportunistic feeder and its diet varies daily, seasonally, and geographically. Besides moths, it is also known to eat dragonflies, beetles, flies, grasshoppers, termites, and wasps.
- **Blackfooted Ferret** – Ferrets do not hibernate, but in winter, the distances traveled and the amount of time they are active decrease substantially. The black-footed ferrets' natural habitat coincides with most species of prairie dogs. Prairie dog towns provide the primary source of food and needed cover. Prairie dogs prefer areas of short vegetation and bare ground.

- **Thirteen-lined Ground Squirrel** – Because ground squirrels spend most of their lives below ground, they build extensive burrows. Thirteen-lined ground squirrels make three types of burrows. Hiding, nesting, and hibernating burrows. Their hibernating burrows are below the frost line (20-40 inches deep), and contain a large nest and a plugged entrance. During the summer months Thirteen-lined ground squirrels eat grasses, weeds, seeds, and crops. They also eat earthworms and insects such as grasshoppers, beetles, and ants. These foods help them build up extra layers of fat so they are able to hibernate through the long winter months.
- **Labrador Retriever** – Our pets remain active all year long. We may notice that our cats, dogs, or horse will grow a thick winter coat to help protect them when they are out in the cold winter weather. Animals use more energy to keep warm in the winter months. Cats and dogs may need a little extra food at feeding time if they spend a lot of time outdoors. A horse will also need extra feed to supplement the lack of grasses on winter pastures.
- **Tiger Salamander** – Tiger Salamanders spend most of their time under rocks in moist caves or in the burrows of other animals. They have been found over 2 feet below the surface. This allows them to escape the temperature extremes on the surface and may explain why they have such a wide array of habitat type. During the summer and winter, they spend most of their time underground to avoid temperature extremes. They will emerge at night or during a rainfall even when temperatures approach freezing. The tiger salamander's food source consists of worms, snails, insects, slugs and almost anything else small enough to fit in their mouth.

Wyoming Content Standards:

SCIENCE:

LIFE SYSTEMS

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- **SC4.1.2** Life Cycles of Organisms: Students sequence life cycles of living things, and recognize that plants and animals resemble their parents.
- **SC4.1.3** Organisms and Their Environments: Students show connections between living things, their basic needs, and the environments.

SCIENCE AS INQUIRY

- **SC4.2.1** Students research answers to science questions and present findings through appropriate means.
- **SC4.2.2** Students use the inquiry process to conduct simple scientific investigations.
 - ~ Collect and organize data.
 - ~ Use data to construct simple graphs, charts, diagrams, and/or models.
 - ~ Draw conclusions and accurately communicate results, making connections to daily life.
 - ~ Pose or identify questions and make predictions.
 - ~ Conduct investigations to answer questions and check predictions.

REASONS FOR THE SEASONS

1. Name the four seasons. **summer, autumn (fall), winter, spring**
2. The Earth's seasons caused by the? **tilt of the Earth's axis**
3. During which season do the Sun's rays hit the Earth at the most direct angle? **summer**
4. During which season are the days the shortest? **winter**
5. What is the name of the shortest day of the year? **winter solstice**
6. What is the name of the longest day of the year? **summer solstice**
7. What is the name of a day in which the day and night are of equal duration? **an equinox**

Wyoming Content Standards:

SCIENCE:

Earth and Space Systems

- **SC4.1.6** Changes in Earth and Sky: Students describe observable changes in earth and sky, including rapid and gradual changes to the

Science as Inquiry

- **SC4.2.1** Students research answers to science questions and present findings through appropriate means.

NATURE OF WINTER - *Science Activities*

When Food Freezes

When winter's cold temperatures and ice arrive, food becomes scarce for animals in the wild. Fill ice trays with water and drop a small chunk of fruit or vegetable into each section. Allow the water to freeze. Then pop out the cubes and smell each ice cubes. Can they smell the fruit or vegetable? Try to eat the food chunks out of their ice cubes. How difficult is it in wintry conditions for animals to find and get to food. This is why there is a low food supply for many animals in winter. Hibernating animals eat all summer and fall to fatten their bodies. The stored fat provides fuel to help the animals survive during their winter hibernation, which can last as long as six or seven months.

Conserving Energy

Hibernation not only eliminates the need for winter food-gathering, but also lets an animal conserve its body energy by slowing down its heart rate and breathing. Set a timer during a rest period and take your pulse during a one-minute interval. Write down the results along with descriptions of your breathing during this time. Then in an open area, have them perform vigorous exercises such as jumping, running, and hopping for several minutes. Afterward, sit and take your pulse again. How do the results differ? How does their breathing compare? Does rest or activity require more energy?

Temperature Experiment

While the average body temperature for a mammal is 99°F, a hibernating animal's temperature drops to around 43°F. This is less than half the normal temperature and only 11 degrees above freezing! The lower temperature reduces the amount of energy an animal must use to keep warm. To check this out, fill a plastic bucket half way with warm water and measure the temperature using a thermometer. Stir in one ice cube at a time and take a temperature reading after each addition, until the water reaches 43°F. Then place one of your hands in the water to experience the body temperature of a hibernating animal. Do you think you could sleep comfortably at this temperature?

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 - ~ Conduct investigations to answer questions and check predictions.

LITERATURE CONNECTION

Read and discuss the following books on the seasons and animal hibernation.

Why do Leaves Change Color?

In a clear text, Betsy Maestro explains the concepts of photosynthesis, pigments, and chlorophyll in terms children can understand. She includes activities children can do with leaves, and even a list of places known for brilliant fall colors that children can visit with their families.

There are also detailed pictures of leaves in different sizes, shapes, and colors.

Author: Betsy Maestro

ISBN: 0060228741 (lib. bdg.), 0064451267 (pbk.), 0785756035

The Reasons for Seasons

Gibbons uses simple words and clear, colorful pictures to explain the seasons, the solstices, and the equinoxes. Besides discussing the earth's tilt and orbit, she also comments on what people and animals do in each season of the year.

Author: Gail Gibbons

ISBN: 0823411745

Winter Moon (Seasons of the Moon, Vol 2)

In this series, acclaimed naturalist and Newbery Medal -- winning author Jean Craighead George takes readers on a wondrous journey through each season of the year as she captures the lives of thirteen different North American animals in their natural habitats. Survive an icy night under a December moon with a song sparrow stalked by a midnight predator in Ohio's suburban meadowland. Navigate through underground passageways with a mole in the chilly darkness of December and January beneath the Great Plains of Kansas. Experience January moonlit courtship with a hooting horned owl in the forests of the Catskill Mountains. Prepare for hibernation with a female bear as February's ice crystals replace the dew in the Smoky Mountains of Tennessee.

Author: Jean Craighead George,

ISBN-10: 0064421708, ISBN-13: 978-0064421706

Do Not Disturb : The mysteries of animal hibernation and sleep

An easily read, thorough, and up-to-date exploration of hibernation; estivation (summertime hibernation); and sleep in mammals, birds, and fish. Utilizing the latest research on animal survival in both hot and cold climates, Facklam explains new information clearly and with style. Unfamiliar words are always defined. The process of hibernation as well as its possible value in future space flights are discussed. The three types of hibernation--deep sleep, light sleep, and daily dormancy--are carefully explained with examples.

Author: Margery Facklam

ISBN: 0316273791

Wyoming Content Standards :

LANGUAGE ARTS, (There is a wide variety of the Wyoming Content Standards that can be used in this literature Connection)

1. **READING** - *Students use the reading process to demonstrate understanding of literary and informational texts.*

LA4.3.1, LA4.3.2, LA4.3.3, LA4.3.4, LA4.3.5

2. **WRITING** - *Students use the writing process and use appropriate strategies to write a variety of expressive and expository pieces.*

LA4.2A, LA4.2A.1, LA4.2A.2, LA4.2A.3, LA4.2A.4, LA4.2A.5, LA4.2A.6, LA4.2A.7, LA4.2A.8, LA4.2A.9, LA4.2B, LA4.2B.1, LA4.2B.2, LA4.2B.3

3. **SPEAKING AND LISTENING** - *Students use listening and speaking skills for a variety of purposes and audiences.*

LA4.1A, LA4.1A.1, LA4.1A.2, LA4.1A.3, LA4.1A.4, LA4.1A.5, LA4.1A.6, LA4.1A.7, LA4.1A.8, LA4.1A.9, LA4.1A.10, LA4.1B, LA4.1B.1, LA4.1B.2, LA4.1B.3, LA4.1B.4, LA4.1B.5, LA4.1B.6, LA4.1C, LA4.1C.1, LA4.1C.2, LA4.1C.3, LA4.1C.4