

Grasslands

Teacher's Guide Middle School



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A Message from our Company ...

Dear Educator:

Thank you for your interest in the educational videos produced by the *Visual Learning Company*. We are a Vermont-based, family owned and operated business specializing in the production of quality educational science videos and materials.

We have a long family tradition of education. Our grandmothers graduated from normal school in the 1920's to become teachers. Brian's mother was an elementary teacher and guidance counselor, and his father was a high school teacher and superintendent. This family tradition inspired Brian to become a science teacher, and to earn a Ph.D. in education, and lead Stephanie to work on science educational programs at NASA.

In developing this video, accompanying teacher's guide, and student activities, our goal is to provide educators with the highest quality materials, thus enabling students to be successful. In this era of more demanding standards and assessment requirements, supplementary materials need to be curricular and standards based - this is what we do!

Our videos and accompanying materials focus on the key concepts and vocabulary required by national and state standards and goals. It is our mission to help students meet these goals and standards, while experiencing the joy and thrill of science.

Sincerely,

Brian and Stephanie Jerome



Standards Correlations

National Science Education Standards

(Content Standards: 5-8, National Academy of Sciences, c. 1996)

Science as Inquiry - Content Standard A:

As a result of activities in grades 5-8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Life Science- Content Standard C:

As a result of their activities in grades 5-8, all students should develop an understanding that:

- The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.
- Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

Benchmarks for Science Literacy

(Project 2061 - AAAS, c. 1993)

The Living Environment- Interdependence of Life (5D)

By the end of the 8th grade, students should know that:

- In all environments - freshwater, marine, forest, desert, grassland, mountain, and others - organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. In any particular environment, the growth and survival of organisms depends on their physical conditions.



Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students should be able to do the following:

- Describe the major characteristics of grass;
- Differentiate between the four types of grasslands found in North America and identify the location of each;
- Identify some of the animals that live in the different grasslands and explain how these animals are uniquely suited for their habitat;
- Describe the characteristics that set grasslands apart from other ecosystems;
- Differentiate between the tallgrass prairie, shortgrass prairie, and the mixed prairie;
- Understand how events such as fire play an important role in the preservation of grasslands;
- Identify a bison, or buffalo, and explain how it is well-suited for grassland life; and
- Identify some factors that have contributed to the disappearance of grasslands.



Assessment

Preliminary Test:

The Preliminary Test, provided in the Student Masters section, is an assessment tool designed to gain an understanding of student preexisting knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Video Review:

The Video Review, provided in the Student Masters section, can be used as an assessment tool or as a student activity. There are two main parts. The first part contains questions titled “You Decide” that can be answered during the video. The second series of ten questions consists of a video quiz to be answered at the conclusion of the video.

Post-Test:

The Post-Test, provided in the Student Masters section, can be utilized as an assessment tool following student completion of the video and student activities. The results of the Post-Test can be compared against the results of the Preliminary Test to assess student progress.



Introducing the Video

Before showing the video, take the class on a mini-field trip to the nearest grassy area. Divide the class into small groups and assign each group to a plot of grass. Ask them to closely examine individual pieces of grass and to record their observations. Explain that all pieces of grass have flowers, but they are often small and difficult to see. Ask them if they can identify the flowers. Next, have each group make a list of the plants and organisms that are found in their plot. Once you return to the classroom, have each group present their observations and ask the class to take note of any similarities and differences between the different plots of grass. Next, have the class discuss how their observations would be different if they were to explore grasslands around the world. Tell them to pay close attention to the video to learn about the characteristics of grass, the different types of grasslands, and the plants and animals found within them.

Video Viewing Suggestions

The Student Master “Video Review” is provided for distribution to students. You may choose to have your students complete this Master while viewing the program or to do so upon its conclusion.

The program is approximately 20-minutes in length and includes a ten-question video quiz. Answers are not provided to the Video Quiz on the video, but are included in this teacher’s guide. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.



Student Assessments And Activities

Assessment Masters:

- Preliminary Test
- Video Review
- Post-Test

Student Activity Masters:

- Exploring Grass
- Fire on the Prairie!
- Mapping the Grasslands
- Vocabulary of *Grasslands*



Video Script: Grasslands

1. This animal is an American Bison.
2. These animals once roamed the central part of North America in great numbers.
3. The black-tailed prairie dog is an animal that creates huge burrowing underground habitats.
4. And this is the African lion, one of the most powerful carnivores on earth.
5. What do all these animals have in common?
6. They all live in grassland biomes.
7. During the next few minutes, we are going to take a look at the characteristics of grasslands,...
8. ... examine some of the different types of grasslands, and see where they are located.
9. We'll also explore some of the plants and animals that inhabit grasslands.
- 10. Graphic Transition – What is a Grassland?**
11. As you might expect, grasslands are biomes made primarily of grasses.
12. There are many different kinds of grasslands. Beyond having grass, grasslands share other important characteristics.
13. One common characteristic of grasslands relates to rain fall.
14. Grassland biomes receive between 25 and 75 centimeters of rain per year.
15. That's enough to prevent deserts from forming, . . .
16. . . . but conditions remain dry enough so that cycles of drought and fire prevent forests from forming.
17. Some grasslands, such as those in North America, have drastic seasonal fluctuations in temperature.
18. Winters can be cold and blustery with heavy snow.
19. And summers may be very hot and dry.
20. African grasslands, called savannas, are located closer to the equator. Here the temperatures in the summer are scorching, very little rain falls, and the winters are cool.
21. When studying different types of grasslands, it is important to look at the soil.
22. The grasslands here in North America possess some of the richest soils on the face of the earth.
23. Whereas in Africa, the soils are not as fertile.
24. Soil has a great effect on the type of plants and animals that can survive in a grassland biome.
- 25. Graphic Transition – What is a Grass?**
26. You have walked on grass near your home or school.
27. Or perhaps you have played sports on a grass field.
28. And you have probably seen animals, such as horses . . .
29. . . . or cows, eating grass.



Script (cont.)

30. And you have eaten foods such as corn, which is the seed of a grass.
31. Grasses are found nearly everywhere.
- 32. You Decide!** How many species of grass are there?
33. There are over 9,500 species of grass.
34. Exactly what is a grass?
35. Grasses are flowering plants,...
36. ...although the flowers are usually quite small.
37. Grasses usually have long narrow leaves and round stems.
38. Many grassland grasses have long roots, enabling them to absorb great amounts of water.
39. Grasses are the lifeblood of grasslands, preventing the soil from eroding, and providing cover for animals.
40. Grasses also produce seeds often used by animals and people for food.
- 41. Graphic Transition – Where Can You Find Grasslands?**
42. Every continent on the globe, except Antarctica, possess grasslands.
43. This image illustrates the worldwide distribution of grasslands.
- 44. You Decide!** What are grasslands called in North America?
45. In the United States and Canada, grasslands are often referred to as prairies or plains.
46. Unfortunately, a large portion of the original grasslands has disappeared,...
47. ...replaced by agricultural crops, . . .
48. . . . as well as buildings and roads.
49. In Iowa, for example, only 0.1% of the original grasslands still exist.
50. Today, most of the remaining grasslands are protected in preserves and parks.
51. These remaining grasslands provide us with an opportunity to study and appreciate this fascinating biome.
- 52. Graphic Transition – Types of Grasslands**
53. There are many different types of grasslands.
54. One of the most amazing is the African savanna, located in the tropics.
55. The savanna supports some of the earth's most diverse and exciting animals, including . . .
56. . . . elephants, . . .
57. . . . lions, . . .
58. . . . rhinoceroses, . . .
59. . . . ostriches,...
60. . . . and giraffes, to name just a few.
- 60 Graphic Transition – California, Intermountain, and Desert Grasslands**
61. There are several different types of grasslands in North America. Let's take a look at a few of them.
62. Most grasslands exist on flat or rolling terrain . . .



Script (cont.)

63. . . . with rich soils.
64. Climatic differences, relating to variation and fluctuations in temperature, are primarily responsible for the different grassland types.
65. California grasslands are located along the Pacific Ocean. . .
66. . . . and in the California Central Valley.
67. These grasslands are interspersed with wetlands that provide habitat for thousands of migratory birds.
68. Today, most of the California grasslands have been cultivated into large agricultural areas where fruits and vegetables are grown.
69. Intermountain grasslands, another type of grasslands, extend from Canada southward between the mountain ranges along the Pacific coast and the Rocky Mountains.
70. They are located in eastern Washington, Oregon, Nevada and across Utah.
71. One of the most dominant plants in this region is not a grass, but a shrub called sagebrush.
- 72. You Decide!** How fast can this animal run?
73. The Pronghorn Antelope has the ability to run 70 miles per hour, or over 110 kilometers per hour.
74. Further south are the desert grasslands, which are very dry.
75. Desert grasslands are found in Arizona, New Mexico, and parts of Texas and Mexico.
76. Desert grasslands are arid, warm regions that support life that have adapted to these conditions.
77. Grasses are interspersed with different types of cacti, yucca, and agave plants.
78. Lizards and other reptiles are well adapted to these type of grasslands.
79. Deer and foxes roam these grasslands, . . .
80. . . . as do Javelinas, which are inactive during the day, preferring to forage for food at night.
- 81. Graphic Transition – Shortgrass and Mixed Prairie**
82. The Great Plains are located in the central part of the United States and Canada.
83. Vast stretches of grasslands, also referred to as the prairie, once stretched for huge distances.
84. Here there are two major groups of grasslands: the shortgrass prairie and the mixed prairie.
85. East of the Rocky Mountains, stretching in a narrow belt from Canada to Northern Texas, lies the shortgrass prairie.
86. As the name indicates, grasses here are relatively short.
87. Along with short grasses, prickly pear cactus and other plants flourish.
88. The prairie dog is one of the common animals existing here.
89. Prairie dogs live in groups and develop large mazes of underground tunnels.
90. Over a hundred years ago it was reported that a prairie dog town, with millions of



Script (cont.)

prairie dogs, covered thousands of square kilometers.

91. East of the shortgrass prairie lies the mixed prairie, from the Dakotas south to Texas.

92. This prairie consists of grasses of medium height.

93. The grass called Little bluestem is common to the mixed prairie.

94. The Bison is the animal we most often associate with the prairie.

95. We will discuss the Bison in more detail in a few minutes.

96. A great drought occurred in the 1930s and had a devastating effect on the mixed prairie.

97. You Decide! What phrase described this area?

98. Parts of this region became known as the Dust Bowl, so named for the loose soil that blew through the air.

99. The inability to grow crops forced thousands of people to flee the region in search of a better life.

100. Graphic Transition – The Tallgrass Prairie

101. The Tallgrass Prairie was once a magnificent grassland with towering grasses . . .

102. . . . that stretched from horizon to horizon in Iowa, and parts of Illinois, Missouri and Minnesota.

103. The soil in this region is among the richest in the world.

104. For this reason, over 150 years ago, settlers flocked here to till the rich earth to grow crops.

105. Where Tallgrass prairie once flourished, now lie huge fields of corn.

106. Today, only a small portion of original prairie exists in preserves, such as this one in Iowa.

107. Summers on the Tallgrass prairie tend to be hot and humid,...

108. ...and the wind seems to blow constantly.

109. Precipitation can occur infrequently, and therefore droughts are common.

110. Plants here must be able to adapt to these fluctuations in precipitation.

111. The tallgrass prairie is named for its grasses, which can reach heights of over ten feet, or over 3 meters, high.

112. Big Bluestem and Indian grass are among these tall grasses.

113. A host of other plants flourish here, including Echinacea, which Native Americans used to cure many illnesses.

114. Pink prairie roses are one of the most colorful flowers, ...

115. . . . as is the black-eyed Susan.

116. You Decide! Do trees grow in the tallgrass prairie?

117. Trees do grow in the Tallgrass prairie, especially along streams and rivers.

118. Trees also may grow in clumps away from water, such as this stand of magnificent bur oak trees.

119. But because of the lack of rainfall and fire, large stands of trees are rare.



Script (cont.)

120. The grasses and flowers that dominate the tallgrass prairie would not be able to exist without an event that totally changes the prairie.

121. You Decide! What is this event that is vital in the tallgrass prairie?

122. Fire! The burning of the Tallgrass prairie prevents the encroachment of trees, and releases nutrients for future plant growth. Fire is a very important event in grasslands.

123. An abundant mix of animals flourish in the tallgrass prairie.

124. Birds, such as the red-winged blackbird, feed on insects.

125. And waterfowl, such as Canada geese, form very large flocks.

126. A variety of insects,...

127. ... such as moths . . .

128. . . . and butterflies, play an important role in pollinating plants.

129. And many different kinds of grasshoppers feed on plants.

130. Larger animals, such as elk, once roamed the tallgrass prairie, . . .

131. . . . as did the Bison.

132. Graphic Transition – Bison

133. These huge, majestic animals once formed large herds on the tallgrass prairie, and more commonly on the mixed prairie.

134. Some estimate their numbers to have exceeded 60 million at one time.

135. Native Americans relied on the Bison, often called Buffalo, for food...

136. . . . and clothing. They followed the great herds across the prairie, depending on them for their sustenance.

137. But westward expansion of European settlers virtually wiped out the herds.

138. By 1869, less than 1100 bison remained in the United States and Canada.

139. These bison are some of the surviving ancestors of those few remaining animals.

140. The roughly 65,000 bison alive today reside on grasslands in protected parks and preserves.

141. You Decide! Why do bison live on grasslands?

142. Bison are ideally suited for living on grasslands, feeding almost exclusively on grass.

143. They continually wander across the prairie and thus do not overgraze any given area.

144. In spring, calves are born.

145. Bison also shed their warm, winter coats in the spring, enabling them to withstand intense, summer heat.

146. Graphic Transition – Summing up

147. During the past few minutes we have learned a great deal about grasslands.

148. We have learned that grasslands are areas that consist primarily of grasses and receive between 25 and 75 centimeters of rain per year.

149. We learned that grasslands exist throughout the world,...

150. ...and that there are many different types of grasslands in North America, including



Script (cont).

California grasslands,...

151. . . . intermountain grasslands, . . .

152. . . . desert grasslands, . . .

153. . . . shortgrass prairie, . . .

154. . . . mixed prairie, . . .

155. . . . and tallgrass prairie.

156. We also explored some of the many interesting plants . . .

157. . . . and animals that inhabit grasslands.

158. So the next time you take a walk on the grass, . . .

159. . . . think about some of the grasslands found throughout the world.

160. You just might think about grasslands a little differently.

161. **Video Quiz:** Fill in the correct word when you hear this tone. Good luck and let's get started.

1. Grasses have _____ stems and narrow leaves.
2. Grasslands in eastern Africa are called _____.
3. The dominant plant in the intermountain grasslands is _____.
4. Prairies with grasses of medium height are _____ prairies.
5. Grasses in the tallgrass prairie may be over _____ meters tall.
6. Most of the tallgrass prairies have been replaced with _____.
7. Native Americans relied on _____ for food and clothing.
8. Corn is the _____ of a grass.
9. _____ grasslands tend to be very dry.
10. _____ is an important event on the tallgrass prairies.



Answers to Student Assessments

Preliminary Test

1. grass
2. soil
3. round
4. flowering
5. eroding
6. climate
7. savannas
8. desert
9. mixed
10. bison
11. true
12. true
13. true
14. true
15. true
16. false
17. false
18. false
19. false
20. false

Video Review

You Decide:

- A. There are over 9,500 species of grass.
- B. Grasslands are referred to as *prairies* in the United States and Canada.
- C. A pronghorn antelope can run up to 70 m.p.h.
- D. The region became known as the Dust Bowl.
- E. Yes, trees grow in tallgrass prairies.
- F. Fire is an important event that takes place in grasslands.
- G. Bison live on grasslands, feeding almost exclusively on grass.

Video Quiz:

1. round
2. savannas
3. sagebrush
4. mixed
5. 3
6. corn
7. bison
8. seed
9. desert
10. fire

Post Test

1. true
2. false
3. true
4. true
5. false
6. false
7. true
8. false
9. false
10. true
11. round
12. savannas
13. eroding
14. bison
15. grass
16. mixed
17. flowering
18. climate
19. desert
20. soil



Answers to Student Activities

Exploring Grass

Part I:

1. awn
2. flower
3. flower cluster
4. seed head
5. node
6. sheath
7. leaf blade
8. ligule
9. shoot

Part II:

Teachers will need to check individual students' work.

Fire on the Prairie

1. B
2. E
3. F
4. E
5. D
6. The reproductive tissue of grasses are located underground, where they are protected from fire. The reproductive tissues of trees and shrubs are located at the tips and are therefore easily damaged by fire.
7. It decreases the ability of other plants to survive, therefore limiting diversity.
8. Fire burns off the layer of dead grass, enabling sunlight to reach the budding grasses, and returning vital nutrients to the soil.
9. Neal Smith National Wildlife Refuge and Konza Prairie Research
10. Paragraphs will vary.

Mapping the Grasslands

- bison - mixed prairie, tallgrass prairie
 - Canada geese - tallgrass prairie
 - elk - tallgrass prairie, intermountain grassland
 - prairie dogs - shortgrass prairie
 - pronghorn antelope - intermountain grassland, shortgrass prairie
 - bighorn sheep - desert grasslands
 - mule deer - intermountain grassland
 - California vole - California grassland
 - collared peccary - desert grassland
 - kangaroo rat - mixed prairie
 - western harvest mouse - California grassland
 - jack rabbits - shortgrass prairie
 - sagebrush - intermountain grassland
 - blue grama - desert grassland, shortgrass prairie
 - buffalo grass - shortgrass prairie, mixed prairie
 - purple needlegrass - California grassland
 - needle-and-thread - shortgrass prairie
 - little bluestem - mixed prairie
 - big bluestem - tallgrass prairie
 - Kentucky wheatgrass - mixed prairie
 - compass plant - tallgrass prairie
 - bluebunch wheatgrass - intermountain grassland
 - velvet grass - California grassland
 - slender grama - desert grassland
- ### Vocabulary
1. grasses, f
 2. California, i
 3. intermountain, h
 4. prairies, b
 5. shortgrass prairie, j
 6. savannas, c
 7. adaptations, d
 8. pampas, a
 9. grasslands, e
 10. bison, g

Assessment and Student Activity Masters





Preliminary Test

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. Grasslands are composed primarily of _____.
2. _____ type is a major factor in determining the types of plants that live in the grasslands.
3. Grasses have _____ stems and narrow leaves.
4. Grasses are _____ plants.
5. Grasses in the grasslands prevent soil from _____.
6. Differences in _____ are partly responsible for different grassland types.
7. _____ are grasslands found in eastern Africa.
8. Warm, arid grasslands found in New Mexico are called _____ grasslands.
9. A _____ prairie consists of grasses of medium height.
10. A grassland animal that almost became extinct in the late 19th century is the _____.

climate
flowering
bison
soil
round
savannas

eroding
grass
mixed
steppes
desert
square



Preliminary Test

Directions: Decide whether the answer is True (T) or False (F).

- | | | |
|---|---|---|
| 11. Grasslands tend to have rich soil. | T | F |
| 12. Grasses in the tallgrass prairie can exceed 3 meters in height. | T | F |
| 13. Grasses are plants that develop small flowers. | T | F |
| 14. Fire plays an important role in the survival of the grasslands. | T | F |
| 15. Many of the original grasslands have been replaced by agricultural crops. | T | F |
| 16. Echinacea is a poisonous plant found in prairies. | T | F |
| 17. Grasslands receive over 200 centimeters of rain per year. | T | F |
| 18. All seven continents contain some sort of grasslands. | T | F |
| 19. Intermountain grasslands are located east of the Appalachian mountains. | T | F |
| 20. Trees do not grow on the tallgrass prairie. | T | F |



Video Review

Directions: During the course of the program, answer the “You Decide” questions as they are presented in the video. Answer the Video Quiz questions at the end of the video.

You Decide:

- A. How many species of grasses are there? Answer _____
- B. What are grasslands called in North America? Answer _____
- C. How fast can this animal run? Answer _____
- D. What phrase described this area? Answer _____
- E. Do trees grow in the tallgrass prairie? Answer _____
- F. What is this event that is vital in the tallgrass prairie? Answer _____
- G. Why do bison live on grasslands? Answer _____

Video Quiz:

1. Grasses have _____ stems and narrow leaves.
2. Grasslands in eastern Africa are called _____.
3. The dominant plant in the intermountain grasslands is _____.
4. Prairies with grasses of medium height are _____ prairies.
5. Grasses in the tallgrass prairie may be over _____ meters tall.
6. Most of the tallgrass prairies have been replaced with _____.
7. Native Americans relied on _____ for food and clothing.
8. Corn is the _____ of a grass.
9. _____ grasslands tend to be very dry.
10. _____ is an important event on the tallgrass prairies.



Post Test

Directions: Decide whether the answer is True (T) or False (F).

- | | | |
|--|---|---|
| 1. Grasses are plants that develop small flowers. | T | F |
| 2. All seven continents contain some sort of grasslands. | T | F |
| 3. Many of the original grasslands have been replaced by agricultural crops. | T | F |
| 4. Grasslands tend to have rich soil. | T | F |
| 5. Grasslands receive over 200 centimeters of rain per year. | T | F |
| 6. Intermountain grasslands are located east of the Appalachian mountains. | T | F |
| 7. Grasses in the tallgrass prairie can reach over three meters in height. | T | F |
| 8. Echinacea is a poisonous plant found in prairies. | T | F |
| 9. Trees do not grow on the tallgrass prairie. | T | F |
| 10. Fire plays an important role in the survival of the grasslands. | T | F |



Post Test

Directions: Fill in the blank with the correct word. Choose from the list of possible answers at the bottom of the page.

11. Grasses have _____ stems and narrow leaves.
12. _____ are grasslands found in eastern Africa.
13. Grasses in the grasslands prevent soil from _____.
14. A grassland animal that almost became extinct in the late 19th century is the _____.
15. Grasslands are composed primarily of _____.
16. A _____ prairie consists of grasses of medium height.
17. Grasses are _____ plants.
18. Differences in _____ are partly responsible for different grassland types.
19. Warm, arid grasslands found in New Mexico are called _____ grasslands.
20. _____ type is a major factor in determining the types of plants that live in the grasslands.

eroding
grass
mixed
steppes
desert
square

climate
flowering
bison
soil
round
savannas



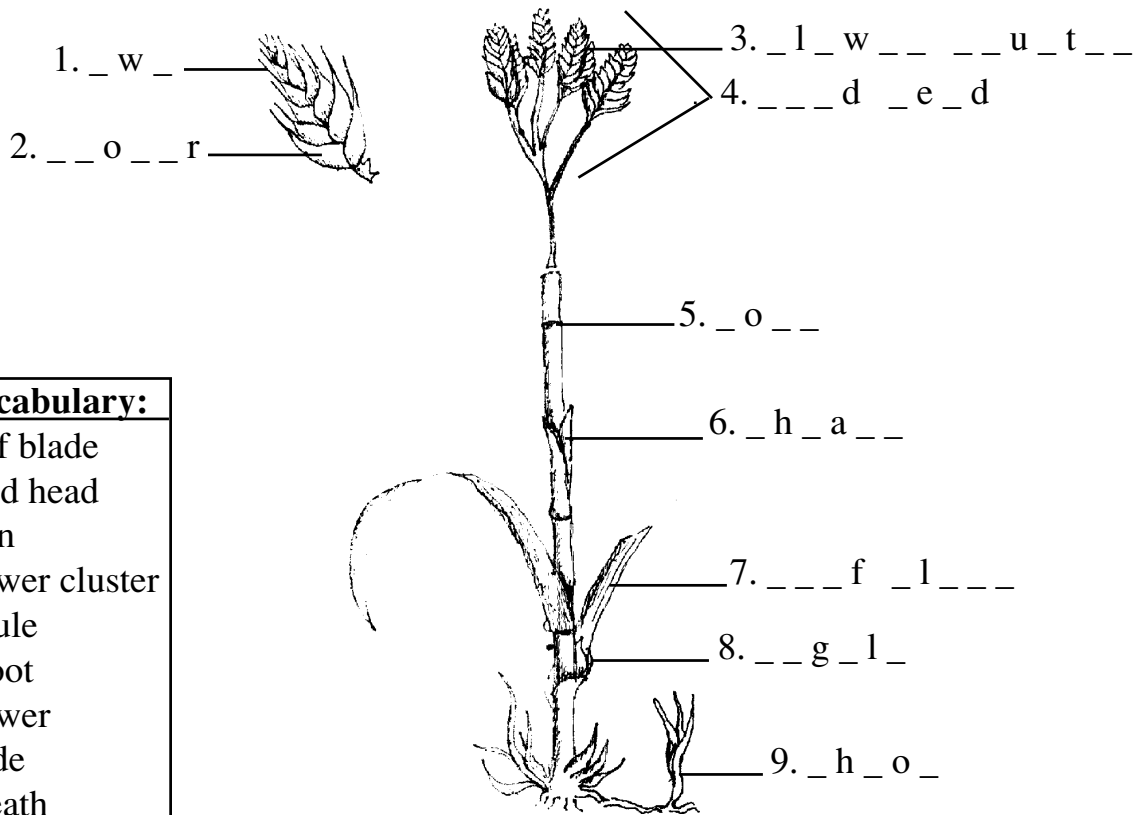
Exploring Grass

Objective: In this activity, students will learn about the structure of grass.

Background: Grass is all around us. It is found on our lawns and in front of our schools, on the fields where we play sports and in the parks where we relax. Grasses are found everywhere, and there are over 9,500 different types. Although you may be very familiar with grass, have you ever taken the time to closely examine a blade of grass? Even after doing so, you may be surprised to learn that grasses are flowering plants. The flowers are often quite small and easily overlooked by the human eye. Let's learn more about the structure of plants.

Directions:

Part I: Below is a diagram of a piece of grass. Choose from the list of words at the bottom of the page to label the diagram.



Vocabulary:
leaf blade
seed head
awn
flower cluster
ligule
shoot
flower
node
sheath

Part II: Bring a blade of grass to class. Try to find as long of a blade as possible, one that has not recently been mowed. Tape the blade to a piece of paper and label each part, as you did with the diagram above.



Fire on the Prairie!

Hundreds of years ago, the tallgrass prairie blanketed much of the mid-West, including Iowa and Minnesota, and parts of Kansas, Nebraska, and the Dakotas. The land remained unplowed until the 19th century, when new plows were developed, enabling settlers to begin plowing as they moved west. Highways, farm crops, and cities have since replaced much of the prairie. Today, only a small amount of the original prairie remains. For example, only 0.1% of Iowa's original prairie remains, with 200 acres being the largest piece of original prairie. As with all biomes, any change can disrupt the ecological balance, often causing natural ecological processes to cease. Therefore, it has become the responsibilities of humans to attempt to recreate these once-natural processes. Aware of the importance of this biome, great efforts are being made to preserve what little remains of this wondrous landscape. One example of these efforts is the use of crop circles, in which people mow specific areas that are being overrun by plants uncharacteristic of the tallgrass prairie, such as Canada thistle and sweet clover. This process, referred to as spot mowing, allows people to mow "problem areas" while allowing plants characteristic of the tallgrass prairie to grow.

Many are shocked to learn that fire is also used to preserve the tallgrass prairie. Fire allows plants characteristic of the prairie to flourish by destroying foreign plants that have the potential to take over the tallgrass prairie, such as trees and shrubs. The ability of grasses to survive and actually thrive after a fire has to do with their unique structure and root system. Plants characteristic of the prairie, such as big bluestem and Indian grass, have an extensive root system, with 65% to 90% of the total mass of the prairie's vegetation existing underground. During the winter, grasses die down to the ground, creating a layer that insulates the roots. Due to this insulation-like layer, the roots are able to withstand extreme hot and cold temperatures. While surface temperatures can reach 400 degrees Fahrenheit (204 degrees Celsius), the temperature will only rise a few degrees below the surface. This structure differs from the reproductive tissues of trees and shrubs, which are located at the tips, and are therefore very sensitive to extreme fluctuations in temperature. Humans often burn areas overrun by woody plants, knowing that grasses will quickly recover.

The process of burning the tallgrass prairie also directly enhances the growth of plants that are native to the tallgrass prairie. Spring fire is particularly beneficial to the plants of the tallgrass prairie, resulting in the removal of grass that has died and settled throughout the winter. Although this grass acts as a protective layer that enables new grass to survive harsh temperatures, it also keeps out sunlight and nutrients that are essential for regrowth. Burning this layer allows the sunlight to reach emerging plants, and also recycles nutrients, transferring them from dead plants to those that are budding.

Although fire has many beneficial effects, it also has the potential to be detrimental to the tallgrass prairie. For example, increasing the growth of plants characteristic of the tallgrass prairie simultaneously limits the ability of other wanted plants to compete for vital nutrients. This leads to a reduction in plant diversity. To ensure that human efforts are not actually harming the prairie, it is important to have extensive knowledge of the prairie and the effects of fire. Providing farmers and land managers with this knowledge is one of the main goals of many organizations that work to preserve the tallgrass prairie, such as Iowa's Neal Smith National Wildlife Refuge and Konza Prairie Research Natural Area in Manhattan, Kansas. It is largely due to the work of these organizations that prairies continue to exist.



Mapping the Grasslands

Objective: In this activity, students will learn about the characteristics of the different grasslands within North America, including their location and the plants and animals that live within them.

Background: Grasslands are located throughout the world, from the east African savannas to the South American pampas. Although all grasslands are primarily composed of grasses, they differ from one another based on their climates and the plants and animals that are able to survive and flourish within them. These differences not only occur from continent to continent, but also within North America, as climates differ greatly within the continent. The various climates across North America support a variety of grasslands, including the California, intermountain and desert grasslands and the shortgrass, mixed and tallgrass prairies. The different characteristics of these grasslands are listed in the chart below.

Type of Grassland	Location	Climate	Animals	Plants
California grasslands	Pacific coast and central valley of California	mild, rainy, winter; hot, dry summer	rodents: Western harvest mouse, California vole	purple needlegrass, velvet grass, sweet vernal grass
Intermountain grasslands	eastern WA; OR; NV; UT; southeast British Columbia, Canada	extremely arid	pronghorn antelope, elk, mule deer	sagebrush, bluebunch wheatgrass
Desert grasslands	Arizona; New Mexico; parts of Mexico	arid, warm	bighorn sheep, collared peccary	blue grama, sprucetop grama, slender grama
Shortgrass prairie	MT; eastern CO; eastern WY; northern TX; Saskatchewan & Alberta, Canada	high wind; low precipitation: 10 inches/year (25 cm/year)	prairie dogs, pronghorn antelope, jack rabbits	buffalo grass, blue grama, needle-and-thread
Mixed prairie	Dakotas; NB; KS; central OK; north-central TX; Saskatchewan & Manitoba, Canada	high winds, 14-23 inches/year (36-58 cm/year) of precipitation	bison, deer mouse, Ord's kangaroo rat	little bluestem, buffalo grass, Kentucky bluegrass
Tallgrass prairie	IA; MN; eastern edges of KS; NB; the Dakotas; Manitoba, Canada	hot and humid summers; constant wind; infrequent precipitation	bison, Canadian geese, elk, meadowlark	grasses up to 10 feet (3 meters) tall, including big bluestem and Indian grasses; compass plant, black-eyed Susans



Mapping the Grasslands (cont.)

Procedure: Below is a map of the United States. Located next to the map is a key of the six different grasslands described on the previous page. Select a color for each type of grassland and color in the box to complete the key. Below each grassland, describe the climate. Next, use the correct color to shade in the area of the map in which the grasslands are located. Below the map are two keys: an animal key and a plant key. Color in the boxes in the key so that the plants and animals are matched with the correct grassland (some plants and animals are found in more than one grassland). Use the chart on the previous page to assist you with this activity.



- California grassland
- intermountain grassland
- desert grassland
- shortgrass prairie
- mixed prairie
- tallgrass prairie

- bison
- Canada geese
- elk
- prairie dogs
- pronghorn antelope
- bighorn sheep
- mule deer
- California vole
- collared peccary
- kangaroo rat
- western harvest mouse
- jack rabbits

- sagebrush
- blue grama
- buffalo grass
- purple needlegrass
- needle-and-thread
- little bluestem
- big bluestem
- Kentucky bluegrass
- compass plant
- bluebunch wheatgrass
- velvet grass
- slender grama



Vocabulary of Grasslands

- _____ 1. sresasg
- _____ 2. lifcaorian
- _____ 3. matinontruien
- _____ 4. areirisp
- _____ 5. ghstrossar reipari
- _____ 6. nvaansas
- _____ 7. patniadsota
- _____ 8. pmapsa
- _____ 9. gsldnssara
- _____ 10. nsobi

- a. South American grasslands
- b. United States and Canadian grasslands
- c. African grasslands
- d. the characteristics animals have developed in order to survive in certain habitats
- e. biome composed primarily of grass
- f. small, flowering plants abundant in grasslands
- g. a large animal found in United States prairies; provided food and clothing for Native Americans
- h. a type of California grassland that is found between mountain ranges
- i. grasslands located along the Pacific Ocean
- j. one of the two major groups of grasslands located in the Great Plains; known for its short grasses