

Table of Contents

Goals and Materials	1
Teacher Resource Paper	2-8
Word Find	9
Word Find Key	10
Crossword Puzzle	11
Crossword Puzzle Key	12
River Word Scramble	13
River Word Scramble Key	14
Learning from Objects	15-16
Object Identification List	17-22
Comparing Environments	23-24
Word Cubes: Creating Sentences	25-26
Where Do I Live? SD Animals Over Time	27-33
Measuring Up	34-36
Fill It Up: Working a Water Tower	37-39
South Dakota Water Jeopardy!	40-45
Above It All: Design a Water Tower	46-47
Sharing Oahe Dam Water	48-49
Cattle, Sheep & Hogs: Reading Graphs	50-56
Great Grain Matchup	57-66
Stick Game	67-68
Bison coloring sheet	69
Elasmosaurus coloring sheet	70
Mammoth coloring sheet	71
Triceratops coloring sheet	72
T-Rex dot-to-dot sheet	73
Combine coloring sheet	74

Goals and Materials

Goals

Kit users will:

- Recognize that South Dakota's environment has changed over time.
- Identify plants and animals in South Dakota environments, both past and present.
- Recognize the important role of water resources and their management in South Dakota.
- Gain knowledge and experience in learning from objects.

Materials

This kit contains:

(kit 2)

buffalo hide sample	sunflower seed
buffalo rawhide sample	corn seed
deer hide sample	safflower seed
Plains doll	millet seed
Navajo doll	milo seed
Woodlands cattail doll	wheat seed
Pueblo clay pot	soybean seed
Sioux parfleche	oats seed
Woodlands beading sample	Tyrannosaurus Rex model
Navajo dye chart	Triceratops model
Mandan pot shards	Elasmosaurus model
pine needle basket	bison model
birch bark basket	mammoth model
sinew	Triceratops fossil vertebrae
bone awl	Dinosaur bone fossil cross-section
porcupine quills	17 water exhibit panels
wild rice	14-part water tower system model
prairie turnips	4 measuring ropes
sweetgrass braid	80 water Jeopardy! cards
rattlesnake rattle	24 water resource share cards
duck decoy	7 water user cards
toy combine	12 word cubes
feed sack	8 grain field photos
Sokota seed notebook	5 coloring pages (bison, mammoth, Triceratops, Elasmosaurus, combine)
	1 Tyrannosaurus Rex dot-to-dot page

Teacher Resource

South Dakota is a state with a variety of environments. An environment can be as big as the Missouri River or as small as a grassy backyard. Acres of prairie, the rugged peaks of the Black Hills, the eroded Badlands, and thousands of acres of cultivated land form the state's landscape. This paper will examine the state's past environments and how they changed into today's terrain. Water plays a vital role in South Dakota's environments both past and present. Managing the state's water resources involved building dams for irrigation, flood control and hydropower production. Dams have had a significant effect on the state's environment.

Forming the Land

South Dakota covers 77,047 square miles. It is 370 miles long from east to west and 210 miles from north to south.¹ The oldest rocks in South Dakota are granites and metamorphic rocks formed during Precambrian times more than 2 billion years ago. These rocks can be seen in the Black Hills and in formations around Sioux Falls and Milbank. Sioux quartzite – the distinctive pink stone used for buildings and roads – is the remnant of a blanket of sand laid down 1.7 billion years ago. The pink color comes from a film of iron oxide on each sand grain in the rock.² Milbank granite is used all over the world as ornamental building stone. The granites in the Black Hills are too fractured to be used for building.³

As the Precambrian gave way to the Paleozoic era 570 million years ago, South Dakota's environment became warm and tropical. Marine life abounded in the shallow, warm waters covering the state. As the sea level fluxuated, land forms appeared with diverse plant and animal life. Near the end of the Paleozoic, 290 million years ago, the state was a tropical lowland with ferns, trees with grass-like leaves, and palm-like cycads.⁴

Dinosaurs roamed the state during the Jurassic and Cretaceous Periods of the Mesozoic Era, 150 to 66 million years ago. Part of South Dakota was covered by an inland sea and had coastal forest habitat along with broad flood plains and sandy-bottomed stream shores. The climate was

¹ Edward Hogan and Erin Hogan Fouberg, *The Geography of South Dakota* (Sioux Falls: Center for Western Studies, 1998), 6.

² John Paul Gries, *Roadside Geology of South Dakota* (Missoula, MT: Mountain Press Publishing Company, 1996), 11.

³ Martin J. Jarrett, *Geology of South Dakota* (<http://www.northern.edu/natsource/EARTH/Geolog1.htm>, 1994), 3.

⁴ Jim Pizarowicz, *Wind Cave National Park Paleontology* (<http://www.nps.gov/archive/wica/Paleontology.htm>, 2006), 2.

South Dakota Environments

South Dakota State Historical Society Education Kit

warmer and wetter than it is today.⁵ Tyrannosaurus rex, Triceratops, and Apatosaurus (formerly called Brontosaurus) wandered in the state. Fossils from these and other dinosaurs large and small are found in northwestern South Dakota and along the Hogback Ridge in the Black Hills. Triceratops was named South Dakota's state fossil in 1988.

In eastern South Dakota, numerous glacial advances and retreats began about 1.5 million years ago and ended 10,000 years ago.⁶ The ice moved as far as the current Missouri River. Glacial ice thousands of feet thick moved across rock and ground it into glacial drift, particles of all shapes and sizes from dust to large boulders. The landforms left behind by the glaciers are still evident in eastern South Dakota. Moraines are long ridges that form rugged upland areas. Kettles are lowlying wetlands or sloughs. Some larger kettles formed pothole lakes such as Lake Poinsett.⁷ The glacial drift covering eastern South Dakota varies between 40 and 700 feet thick⁸, although some areas have drift over 900 feet thick.⁹ Erosion and weathering have shaped eastern South Dakota's landscape since the glaciers melted.

The western South Dakota landscape was largely unaffected by glaciation. The sedimentary rocks that form its land surface were deposited as mud by a shallow inland sea that once extended from the Arctic to the Gulf of Mexico over 65 million years ago.¹⁰ Pierre shale is the principal surface material in west river country. The shale is weak and flaky when dry but when it gets wet it becomes thick and sticky gumbo. Pierre shale is the most widespread and thickest sedimentary rock formation in the state.¹¹ The current landscape of western South Dakota, outside the Black Hills and the Badlands, has been formed by water carving the weak Pierre shale into river valleys.

The Black Hills formed at about the same time as the Rocky Mountains further west. The Hills started to rise about 62 million years ago, pushing ancient metamorphic rock and granites upward. At that time, the highest peaks might have reached 15,000 feet, but the elevation fell as the sedimentary rock on top of the metamorphic rock eroded away. Today, peaks in the crystalline core of the Hills reach elevations of over 6,000 feet. Harney Peak, the highest, is 7,242 feet high. It is the highest land

⁵ Philip Bjork and Erika Tallman, *Dinosaurs of South Dakota* (<http://www.northern.edu/natsource/EARTH/Dinosau1.htm>, 1995), 3.

⁶ Jarrett, *Geology*, 1.

⁷ Ibid. 2.

⁸ Hogan, *Geography of South Dakota*, p. 10.

⁹ Jarrett, *Geology*, 2.

¹⁰ Gries, *Roadside Geology*, 94.

¹¹ Ibid. 11.

formation east of the Rocky Mountains. The major ridges and valleys of the Black Hills eroded into their present shape about 50 million years ago.¹²

Badlands are regions with little rainfall and high erosion. Water and wind erode the soft sedimentary rock into ridges, buttes and pinnacles. The state's most famous badlands are the White River Badlands in southwestern South Dakota. They are 100 miles long and 3-5 miles wide. Over 243,000 acres have been set aside as Badlands National Park.¹³ The badlands were formed by debris from erosion as the Rocky Mountains and Black Hills rose.¹⁴ Layer after layer of mud, volcanic ash, and sand were deposited. As more layers were added, their weight compressed the sediments into soft rock.¹⁵ Wind and water eroded the soft rock, revealing the many colorful layers. Each layer represents a different geological period of time.

The Lay of the Land

South Dakota is home to a wide variety of topography. Hills, plateaus, plains, and mountains all form part of the state's landscape. The state is divided into three major physiographic regions, or areas where the lay of the land is similar. These are the Central Lowlands of eastern South Dakota, the Great Plains of western South Dakota, and the Black Hills. The three regions contain several distinguishable areas. Two such areas within the Central Lowlands are the Minnesota River–Red River Lowlands and the Coteau des Prairies. Located in the far northeastern corner of the state, the Minnesota River–Red River Lowlands are a broad, flat valley where the north-south continental divide runs between Big Stone Lake and Lake Traverse. Lake Traverse waters flow north eventually draining into Hudson Bay, while Big Stone Lake drains south. Just to the west, the Coteau des Prairies rise sharply about 900 feet above the River Lowlands. The Coteau is the most conspicuous landform in eastern South Dakota.¹⁶ This highland plateau is drained by the Big Sioux River and contains many glacial lakes.

West of the Missouri River in the Great Plains physiographic region, the Northern Plateaus area near Slim Buttes in northwestern South Dakota features a landscape of isolated, eroded buttes. The central section of west river country is covered by the rolling Pierre Hills, until one reaches the Black Hills.

¹² Ibid. 218.

¹³ Joan Steiner, *South Dakota Badlands* (<http://www.northern.edu/natsource/HABITATS/Sdbadl1.htm>, 1993), 2.

¹⁴ Hogan, *Geography of South Dakota*, 24.

¹⁵ Steiner, *Badlands*, 2.

¹⁶ Douglas Malo, *South Dakota's Physiographic Regions*, (<http://www.northern.edu/natsource/EARTH/Physio1.htm>, 1997), 2.

The Black Hills are a mountainous region about 125 miles long and 60 miles wide. Ponderosa pine forest mixed with quaking aspen, Black Hills spruce, bur oak and other species covers much of the Hills.¹⁷ Elevations in the Hills range from 3,700 to 7,200 feet above sea level.

Water

Aquifers – layers of rock with spaces that hold ground water – are located under most of the state. They are found at different depths. Ground water supplies 42% of all water used in South Dakota.¹⁸ Rapid City uses water from wells drilled into the Madison Aquifer. This aquifer is in the Madison Limestone rock formation that is exposed in the Black Hills. Caves such as Wind Cave and Jewel Cave were formed in the Madison Limestone as rainwater dissolved the slightly soluble rock.¹⁹

The Missouri River is the largest river in the state and one of the longest rivers in the United States. In South Dakota the Missouri is fed by seven major tributary rivers and streams – the Grand, Moreau, Cheyenne, Bad, White, James and Big Sioux Rivers.²⁰ Four large dams on the Missouri in South Dakota generate hydroelectric power and provide flood control. The reservoirs behind the dams provide water for irrigation as well as fish and wildlife habitat and recreation areas. The water is piped to municipal and rural water systems throughout the state, too.

Angostura Dam and Belle Fourche Dam (formerly Orman Dam) changed their respective environments in west-river South Dakota. Completed in 1949 on the Cheyenne River near Hot Springs, Angostura Dam was the first completed unit of the Pick-Sloan Missouri Basin Program. The dam is 187 feet high and 2,030 feet long and is made from both concrete and earthfilled embankment. Original plans included generating hydroelectric power at Angostura, but the low water levels on the river made the hydropower plan impractical.²¹ Angostura provides irrigation to over 12,000 acres of farmland in Fall River and Custer counties through a canal system. The 17-mile-long reservoir created by Angostura is the largest warm-water lake within a 100-mile radius. A popular fishing spot, anglers catch walleye, pike, perch, bullhead and other species in the reservoir.

Belle Fourche Dam is found on Owl Creek, about 8 miles east of the city of Belle Fourche. The name means "Beautiful Forks" in French and refers to the confluence of the Redwater and Belle Fourche Rivers. The dam is listed in the National Register of Historic Places. One of the earliest dam

¹⁷ John Ball and David Erickson, *South Dakota Forests*, (<http://www.northern.edu/natsource/HABITATS/Sdfor1.htm>, 1992), 1.

¹⁸ Sarah Chadima, *South Dakota Aquifers*, (<http://www.northern.edu/natsource/EARTH/Aquife1.htm>, 1994), 2.

¹⁹ Arden D. Davis, *Madison Aquifer*, (<http://www.northern.edu/natsource/Earth/Madiso1.htm>, 1995), 1.

²⁰ Clifton Stone, *Missouri River*, (<http://www.northern.edu/natsource/HABITATS/Missio1.htm>, n.d.), 1.

²¹ Robert Autobee, *Pick-Sloan Missouri Basin Program: Angostura Unit*, (<http://www.usbr.gov/projects>, 1996), 11.

projects in the state, construction on the Belle Fourche Project started in 1905 and was completed in 1914. The project provides irrigation water to over 57,000 acres along the Belle Fourche River valley. The principal irrigated crops grown are alfalfa and corn. The reservoir is also used for fishing, swimming and boating.²²

Grasslands

A grassy landscape covers much of South Dakota today. In eastern South Dakota, the grassland has been intensively farmed and has become cropland. In western South Dakota livestock graze on acres of prairie.

Grassland has been a part of earlier South Dakota landscapes as well. Starting about 38 million years ago, the climate in the state became less tropical and grassy savannahs replaced dense forest. The trend toward more grass and fewer forests continued during the Miocene and Pliocene Epochs, 24 to 2 million years ago. Horses, camels and rhinoceros grazed on the land.²³

Three different types of prairie can be found in the state today. Tallgrass prairie is found along the state's eastern edge where rainfall is most abundant. Mixed-grass prairie grows in central and western South Dakota. Shortgrass prairie, the type requiring least moisture, is found in the southwestern corner of the state and in small pockets in the mixed-grass prairie.²⁴

Historically, fire played a vital role in keeping the prairie landscape healthy. Burning every five to ten years, fire stunted the growth of trees and shrubs except along streams and rivers. Fire also released nutrients into the soil. Grasses have extensive root systems, with over half of the plant's biomass underground. This large root system allows the grass to recover quickly after being burned. Bison were attracted to burned areas because the grass was more nutritious and better tasting.²⁵

Forests

Forests cover only about 1.7 million acres in South Dakota, but they provide an important environment for plants and wildlife. Three natural forests exist in the state. The Black Hills forest is mostly made up of ponderosa pine, but also includes Black Hills spruce, quaking aspen, bur oak and

²² Bureau of Reclamation, *Belle Fourche Project*, (<http://www.usbr.gov/projects>, 2009), 1.

²³ Pisarowicz, *Wind Cave Paleontology*, 3.

²⁴ Misty Hays, *South Dakota Prairies*, (<http://www.northern.edu/natsource/HABITATS/Sdprai1.htm>, 1994), 2.

²⁵ *Ibid.*, 4.

other species in its 1.3 million acres. Timber from the Black Hills forest produces enough wood to build 30,000 single-family homes every year.²⁶

A flood plain forest grows along the Missouri River and its tributaries. These trees help keep the riverbanks from eroding and produce firewood, lumber and wildlife habitat. On the state's eastern edge a few upland forests grow in the rolling hills of Sica Hollow and Newton Hills State Parks.²⁷

Agriculture

Over 43 million acres of South Dakota land is used for agriculture. Cropland covers 19 million acres with another 22 million acres used for grazing. Agriculture is the state's number one industry and creates the environment found in the state today. There are 31,169 farms with an average size of 1,401 acres in the state. South Dakota ranks number one in the production of bison, pheasants and honey. The state also has over 3 million laying hens and 2 million turkeys. Corn, soybeans, and wheat are all grown here. The state is the second ranking producer of alfalfa, flax and sunflowers in the nation.²⁸

Conclusion

South Dakota is a land of infinite variety and environments. Over time, the land has been covered by warm seas, lush with tropical forests, and green with waving grasses. A wide variety of plants and animals have made their home in South Dakota. Dinosaurs, large marine reptiles, mammoths and huge herds of bison lived here. Today, the landscape is covered by rolling fields of wheat, corn, and soybeans. Cattle graze on open prairie, and large dams along the state's rivers keep flood waters at bay, produce hydroelectric energy, and make irrigation possible. E. P. Rothrock wrote, "The important thing is to recognize the great variety of topographic features this state presents and to appreciate somewhat the tremendous forces that have labored so many millions of years to bring about this variety. . . . There is no lack of interest in the face of South Dakota."²⁹

²⁶ Ball and Erickson, *South Dakota Forests*, 1.

²⁷ *Ibid.*, 2.

²⁸ *South Dakota Agriculture: The Common Thread*, (South Dakota Department of Agriculture, 2010).

²⁹ Edgar Paul Rothrock, *A Geology of South Dakota*, (State of South Dakota, Vermillion, SD, 1943), 85.

South Dakota Environments

South Dakota State Historical Society Education Kit

Bibliography

- Autobee, Robert. *Pick-Sloan Missouri Basin Program: Angostura Unit*. Bureau of Reclamation, Historic Reclamation Projects, 1996.
- Ball, John and David Erickson. *South Dakota Forests*. Aberdeen, SD: Northern State University, 1992.
<http://northern.edu/natsource/HABITATS/Sdfore1.htm>.
- Bjork, Philip and Erika Tallman. *Dinosaurs of South Dakota*. Aberdeen, SD: Northern State University, 1995.
<http://northern.edu/natsource/EARTH/Dinosa1.htm>.
- Bray, Edmund C., and Martha Coleman Bray. *Joseph Nicollet on the Plains and Prairies*. St. Paul, MN: Minnesota Historical Society Press, 1976.
- Chadima, Sarah. *South Dakota Aquifers*. Aberdeen, SD: Northern State University, 1994.
<http://northern.edu/natsource/EARTH/Aquife1.htm>.
- Foss, Scott E. *Fossils of the Badlands of South Dakota*. Aberdeen, SD: Northern State University, 1995.
<http://northern.edu.natsource/EARTH/Fossil1.htm>.
- Gilbertson, Jay P. *Glaciers in South Dakota*. Aberdeen, SD: Northern State University, 1995.
<http://northern.edu/natsource/EARTH/Glacie1.htm>.
- Gries, John Paul. *Roadside Geology of South Dakota*. Missoula, MT: Mountain Press Publishing Company, 1996.
- Hays, Misty. *South Dakota Prairies*. Aberdeen, SD: Northern State University, 1994.
<http://northern.edu/natsource/HABITATS/Sdprai1.htm>.
- Heaton, Timothy H. *South Dakota Ice Age Mammals*. Aberdeen, SD: Northern State University.
<http://northern.edu/natsource/EARTH/Iceage1.htm>.
- Hogan, Edward and Erin H. Fouberg. *The Geography of South Dakota*. Sioux Falls, SD: Center for Western Studies, 1998.
- Jarrett, Martin J. *The Geology of South Dakota*. Aberdeen, SD: Northern State University, 1994.
<http://northern.edu/natsource/EARTH/Geolog1.htm>.
- Martin, James E. *Marine Reptiles of South Dakota*. Aberdeen, SD: Northern State University, 1995.
<http://northern.edu/natsource/EARTH/Marine1.htm>.
- Malo, Douglas. *South Dakota's Physiographic Regions*. Aberdeen, SD: Northern State University, 1997.
<http://northern.edu/natsource/EARTH/Physio1.htm>.
- Pisarowicz, Jim. *Paleontology*. Wind Cave National Park, 2006.
<http://www.nps.gov/archive/wica/Paleontology.htm>.
- Rieger, Bryan. "Demographics of Western South Dakota Wetlands and Basins." MS Thesis, South Dakota State University, 2004.
- Rothrock, Edgar Paul. *A Geology of South Dakota*. Vermillion, SD: State of South Dakota, 1943.
- Smithsonian Institute. *Jurassic Life*. National Museum of Natural History, Department of Paleobiology.
<http://paleobiology.si.edu/geotime/main/htmlVersion/jurassic2.html>.
- South Dakota Agriculture: The Common Thread*. South Dakota Department of Agriculture, 2010.
- State Historical Society of North Dakota Plains Talk. "Corridor of Time Now Open." 37, no. 3, (2006) 2-3.
- Steiner, Joan. *South Dakota Badlands*. Aberdeen, SD: Northern State University, 1993.
<http://northern.edu/natsource/HABITATS/Sdbad11.htm>.
- Stone, Clifton. *Missouri River*. Aberdeen, SD: Northern State University.
<http://northern.edu/natsource/HABITATS/Missio1.htm>.
- U.S. Department of the Interior. *Eastern South Dakota Wetlands*. U.S. Geologic Survey.
<http://www.npwrc.usgs.gov/resource/wetlands/eastwet/overview.htm>.

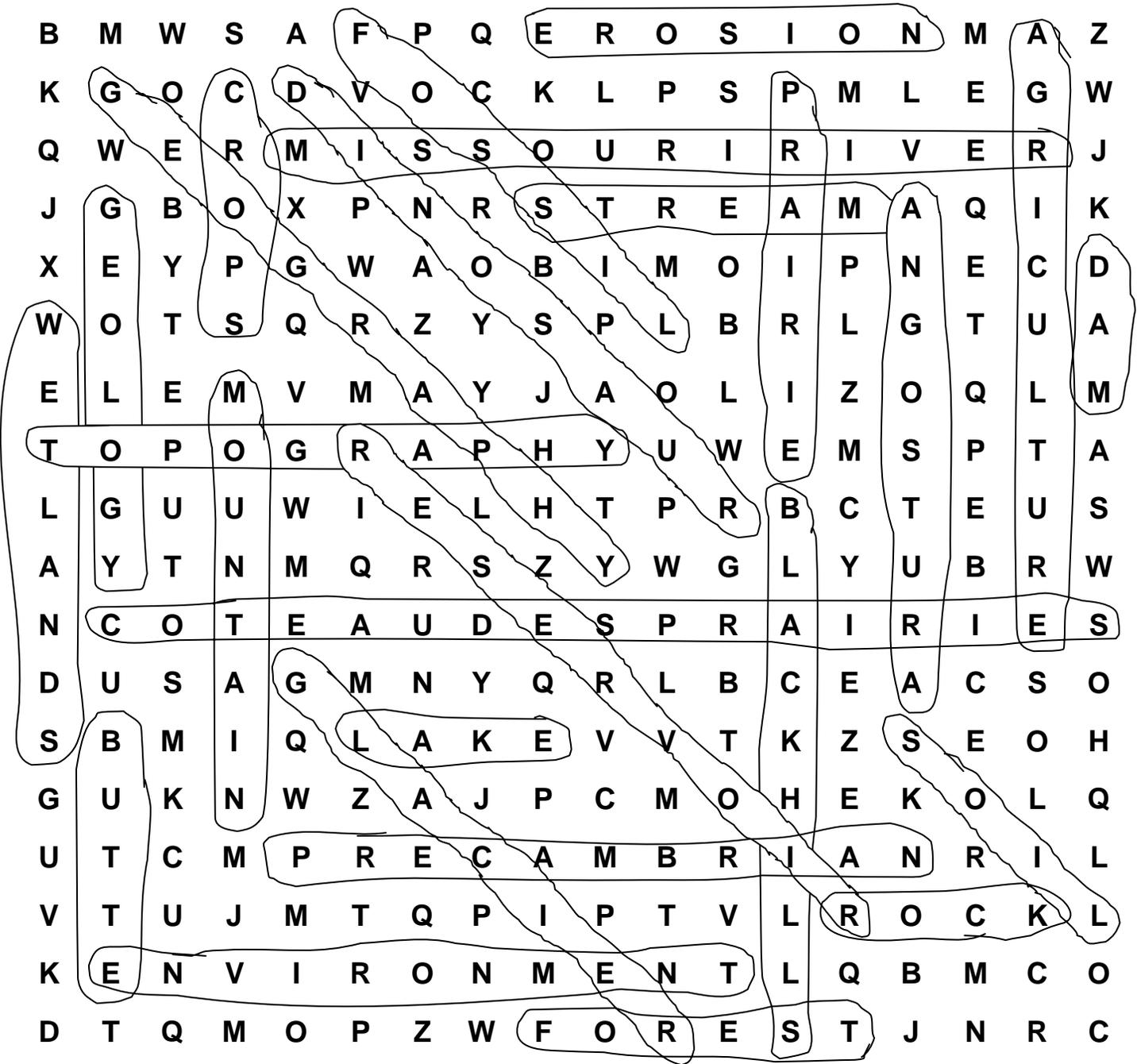
Name _____

Word Find

B M W S A F P Q E R O S I O N M A Z
K G O C D V O C K L P S P M L E G W
Q W E R M I S S O U R I R I V E R J
J G B O X P N R S T R E A M A Q I K
X E Y P G W A O B I M O I P N E C D
W O T S Q R Z Y S P L B R L G T U A
E L E M V M A Y J A O L I Z O Q L M
T O P O G R A P H Y U W E M S P T A
L G U U W I E L H T P R B C T E U S
A Y T N M Q R S Z Y W G L Y U B R W
N C O T E A U D E S P R A I R I E S
D U S A G M N Y Q R L B C E A C S O
S B M I Q L A K E V V T K Z S E O H
G U K N W Z A J P C M O H E K O L Q
U T C M P R E C A M B R I A N R I L
V T U J M T Q P I P T V L R O C K L
K E N V I R O N M E N T L Q B M C O
D T Q M O P Z W F O R E S T J N R C

ENVIRONMENT	BLACK HILLS	GEOGRAPHY	PRAIRIE	ANGOSTURA	
MISSOURI RIVER	AGRICULTURE	WETLANDS	TOPOGRAPHY	PRECAMBRIAN	
ROCK	GLACIER	EROSION	LAKE	DINOSAUR	FOSSIL
RESERVOIR	STREAM	MOUNTAIN	GEOLOGY	SOIL	BUTTE
DAM	FOREST	CROPS	COTEAU DES PRAIRIES		

Word Find Key

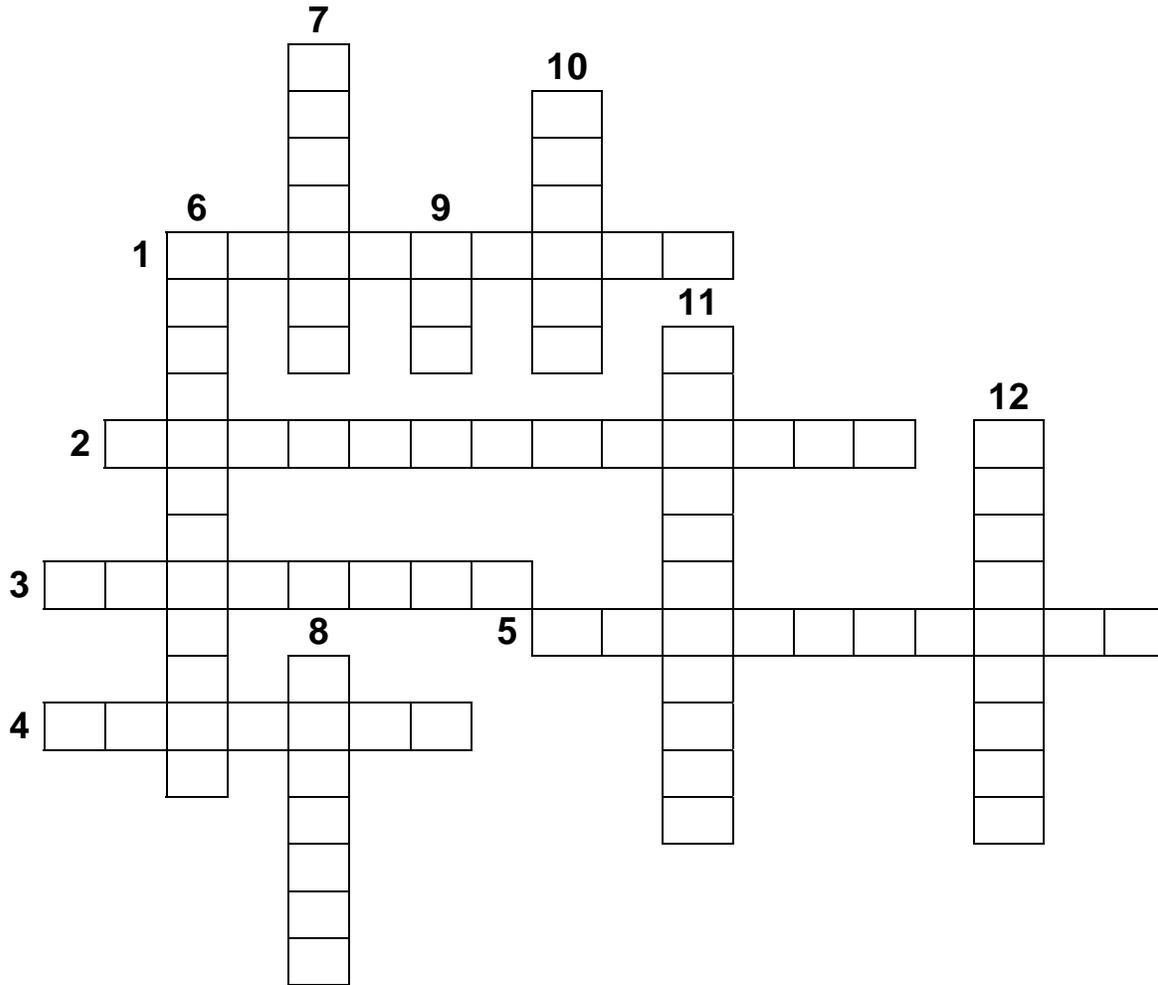


ENVIRONMENT	BLACK HILLS	GEOGRAPHY	PRAIRIE	ANGOSTURA
MISSOURI RIVER	AGRICULTURE	WETLANDS	TOPOGRAPHY	PRECAMBRIAN
ROCK	GLACIER	EROSION	LAKE	DINOSAUR
RESERVOIR	STREAM	MOUNTAIN	GEOLOGY	SOIL
DAM	FOREST	CROPS	COTEAU DES PRAIRIES	

Name _____

Crossword Puzzle

Missouri River	climate	ice age	triceratops
Black Hills	badlands	highlands	glacial drift
grassland	mammoth	buffalo	sea



Across

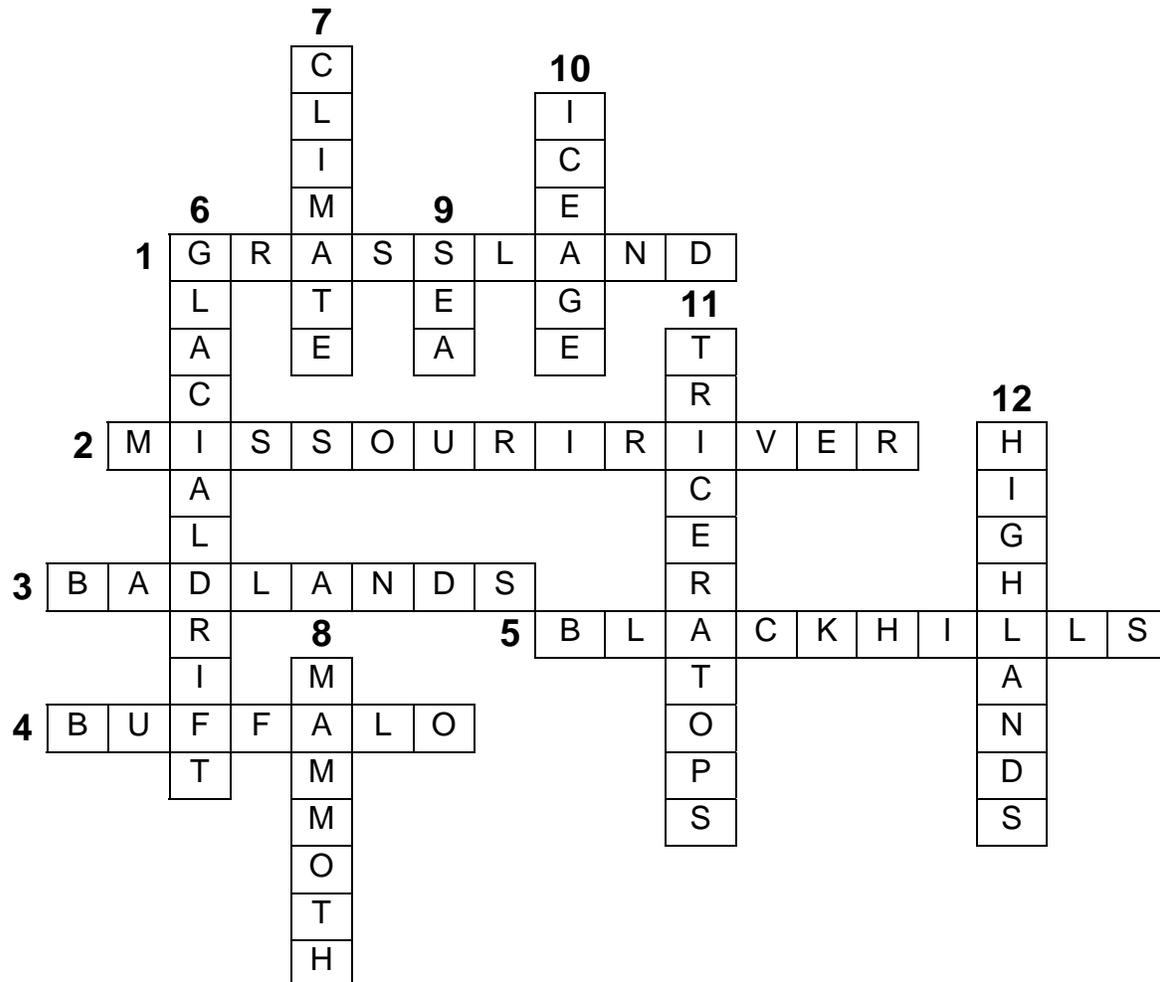
1. Much of South Dakota today is covered by a _____ environment.
2. Dams along the _____ provide hydroelectric power.
3. The strange formations of the _____ were formed by erosion.
4. Millions of _____ once roamed the Great Plains.
5. The _____ are the highest points in South Dakota.

Down

6. _____ forms the rich, deep soils of eastern South Dakota.
7. From tropical to icy, the _____ in South Dakota has changed many times.
8. The wooly _____ roamed the state during the Ice Age.
9. A warm inland _____ covered South Dakota during the Cretaceous Period.
10. Glaciers during the _____ covered the state as far as the Missouri River.
11. The three-horned _____ is South Dakota's state fossil.
12. The coteau des prairies is a _____ plateau along the Minnesota border.

Crossword Puzzle Key

Missouri River	climate	ice age	triceratops
Black Hills	badlands	highlands	glacial drift
grassland	mammoth	buffalo	sea



Across

- Much of South Dakota today is covered by a _____ environment.
- Dams along the _____ provide hydroelectric power.
- The strange formations of the _____ were formed by erosion.
- Millions of _____ once roamed the Great Plains.
- The _____ are the highest points in South Dakota.

Down

- _____ forms the rich, deep soils of eastern South Dakota.
- From tropical to icy, the _____ in South Dakota has changed many times.
- The wooly _____ roamed the state during the Ice Age.
- A warm inland _____ covered South Dakota during the Cretaceous Period.
- Glaciers during the _____ covered the state as far as the Missouri River.
- The three-horned _____ is South Dakota's state fossil.
- The coteau des prairies is a _____ plateau along the Minnesota border.

Name _____

River Word Scramble

Vermillion	Big Sioux	Bad	Grand
James	Belle Fourche	Missouri	
Moreau	White	Cheyenne	

1. This river forms the border between South Dakota and Iowa.

___ 2 ___ 4 ___ ___ ___ G B I X I U O S

2. The ___ River flows into the Missouri near the town with the same name.

___ ___ ___ 1 ___ ___ ___ L L E V M I N O I R

3. This river often floods in the spring as it flows south from Brown County.

___ ___ ___ 3 E M J A S

4. Lewis and Clark found grizzly bear tracks where the ___ River meets the Missouri.

___ 5 ___ ___ ___ E M O U R A

5. Erosion from the ___ River formed the Badlands.

___ ___ ___ 8 T E H W I

6. This river's name means "beautiful fork" in French.

___ ___ ___ ___ ___ ___ 6 ___ ___ ___ L E L E B H F U R O C E

7. The ___ River flows into the Missouri at Fort Pierre.

___ ___ ___ D B A

8. The ___ River runs east across Corson County.

___ 7 ___ ___ ___ N A R D G

9. Angostura Dam is found on this river.

___ ___ ___ ___ ___ ___ N Y N E E H C E

Fill in the letters from the numbered spaces above to find the answer below.

10. The largest South Dakota river, its nickname was the Big Muddy.

1 2 3 4 5 6 7 8

River Word Scramble Key

Vermillion	Big Sioux	Bad	Grand
James	Belle Fourche	Missouri	
Moreau	White	Cheyenne	

2. This river forms the border between South Dakota and Iowa.

B I G S I O U X G B I X I U O S
 2 4

2. The ____ River flows into the Missouri near the town with the same name.

V E R M I L L I O N L L E V M I N O I R
 1

3. This river often floods in the spring as it flows south from Brown County.

J A M E S E M J A S
 3

4. Lewis and Clark found grizzly bear tracks where the ____ River meets the Missouri.

M O R E A U E M O U R A
 5

5. Erosion from the ____ River formed the Badlands.

W H I T E T E H W I
 8

6. This river's name means "beautiful fork" in French.

B E L L E F O U R C H E L E L E B H F U R O C E
 6

7. The ____ River flows into the Missouri at Fort Pierre.

B A D D B A

8. The ____ River runs east across Corson County.

G R A N D N A R D G
 7

9. Angostura Dam is found on this river.

C H E Y E N N E N Y N E E H C E

Fill in the letters from the numbered spaces above to find the answer below.

10. The largest South Dakota river, its nickname is the Big Muddy.

M I S S O U R I
 1 2 3 4 5 6 7 8

Learning from Objects

Objectives:

- Participants will examine objects.
- Participants will draw conclusions based on direct observation.
- Participants will recognize that much information can be acquired about an object from direct observation.

South Dakota Social Studies Standards

K	1st	2nd	3rd	4th	5th	6th
K.E.1.2	1.E.1.1	2.US.1.2 2.US.2.1 2.E.1.1	3.E.1.1 3.US.2.2	4.G.1.1 4.US.1.2 4.W.2.1	5.US.1.1	

South Dakota Communication Arts Standards

K	1st	2nd	3rd	4th	5th	6th
K.LVS.1.2 K.LVS.1.7	1.LVS.1.2 1.LVS.1.5 1.LVS.1.6	2.LVS.1.2 2.LVS.1.5 2.LVS.1.6	3.LVS.1.1	4.LVS.1.1	5.LVS.1.3	

South Dakota Science Standards

K	1st	2nd	3rd	4th	5th	6th
K.P.1.1	1.P.1.2	2.P.1.1	3.P.1.1 3.E.1.2			

Timeframe: 30-60 minutes

Materials:

Included in kit

All objects

Object Identification Sheet

Why Learn from Objects?

There are many ways to learn about the world. One way is to listen and hear information – auditory learning. Another way to get information is by reading, watching a TV or video program, or looking at photographs – visual learning. This kit lets participants learn in another important way – by handling three-dimensional objects. This develops kinesthetic skills, or learning by touch. Participants can see physically how objects are alike and how they are different. They can consider what use an object may have – is it a stand-in for something, like a live animal or a physical place? Is it an object that was made or used by people from a different culture? The kit’s written information and three-dimensional objects allow participants to practice all three learning styles.

Activity Steps:

South Dakota Environments

South Dakota State Historical Society Education Kit

1. Arrange the participants so that it is easy to pass objects from one to another. Pass the objects around one at a time, allowing the participants to handle and examine them.
2. While the participants are examining the objects, use the points below to start discussion about the materials, construction and history of the objects. Encourage the participants to share the visual and tactile information they get from the objects. You may ask each participant to consider a different aspect of the object-history, material, etc. Have the participants respond so the entire group can hear and enter into the discussion.
3. After an object has been examined, share the information found on the Object Identification Sheet with the group.

Materials & Construction:

- What material is the object made out of? (wood, paper, plastic, rubber, metal, fabric, feathers, straw)
 - Is the material made by man or by nature?
 - If it is natural, has it been changed by people? (carved, cast, molded, glued, sewed)
- Is the object sturdy or fragile?
- Is the object light or heavy?
- Is the object hard or soft?
- How would you describe the texture of the surface of the object?

History & Function:

- What might be the purpose of the object?
- Why might it be included in the kit? What might the object be trying to show?
- Does the object look or feel like something from long ago, or is it something from recent times?
- Is this object still used today?
- What has changed about the object today?
- Was the object used for a special task or occasion or was it an everyday item?
- What questions do you have about the object?
- Where could you find the answers to your questions?

Object Identification List

kit 1

T-1996.2.4A

Buffalo hide sample

Buffalo once roamed all across South Dakota. They were a vital part of the environment for the plains tribes like the Sioux who depended on the buffalo for food, clothing and shelter. Buffalo hide was used for tipis, blankets and clothing. Today, small herds are found on tribal land, in Custer State Park and Wind Cave Park, and on buffalo ranches in western South Dakota.

T-1996-01-05

Buffalo rawhide sample

Rawhide is a hard, untanned leather. Plains tribes used it to make parfleches, rope, drums and other useful items. Items made from the tough hide lasted a long time.

T-2001-121

Deer hide sample

Tanned deer hide made good household items and clothing for tribes in plains, woodland and desert environments. Deer are abundant in South Dakota today.

T-2010-099

Plains doll

Made from hide, this Plains doll wears a leather dress and a necklace of seeds. Her hair is horsehair. Some tribes do not put a face on a child's toy.

T-2010-100

Navajo doll

This cloth doll wears a traditional Navajo velvet dress. Navajo woman traditionally do not wear headdresses but tie their hair back into a knot or bun. The sequined bead at the neckline looks like traditional turquoise and silver jewelry.

T-2010-101

Woodlands cattail doll

Grasses, twigs and bark were used to make toys in all environments. Woodland tribes twisted cattails into dolls.

T-1996-02-010

Pueblo clay pot

Natural clay pot made by hand and hand-painted with traditional patterns and colors of the Tigua Indian Pueblo.

T-1996-02-002

Parfleche

Plains tribes make durable rawhide containers called parfleches to store food and other items. Some parfleches are box-style, like this example, and others are flat, folding envelopes. Parfleches could be painted in a variety of designs.

T-2010-105

Sinew

Sinew is the tendons of buffalo. Plains tribes like the Lakota used sinew as thread to sew hides together for tipis and clothing.

T-2010-096

Woodlands beading sample

Many tribes used beads as decoration on clothing and household items. Different tribes used different beading patterns. Woodland tribes often used floral patterns like the one on this moccasin upper.

T-1992-02-003

Bone awl

An awl is a sharp, pointed tool used to punch holes in leather before sewing pieces together. These tools were often made from buffalo rib or leg bones.

T-1996-02-09B, T-1996-02-09C

Pot shards, Mandan

The Mandan tribe lived along the Missouri River and used clay from its banks to make pots. The Mandan shards are much thicker than the Pueblo pot from the desert southwest.

T-2010-106, T-2010-107

Porcupine quills

Porcupine quilling is an old Native American art practiced especially on the east coast and the plains. Bags, moccasins, clothing and household items were frequently decorated with quillwork. When seed beads became commonly available beading replaced quilling, but quilling never died out completely. Porcupine quills could be dyed with plants and minerals from the soil.

T-2010-095

Pine needle basket

Thick pine forests in woodland environments provided a ready resource to baskets like this from pine needles. This modern variety has a walnut-shell basket center and two acorns decorating the handle.

T-1996-02-014

Birch bark basket

Woodlands tribes used bark to make useful items like this basket. Some tribes made their houses from birch bark.

T-2010-119

Wild rice

Wild rice grows in ponds, swamps, and along marshy streams in the central and eastern United States. The Ojibwa tribe depended on the rice as an important food source.

T-2010-127

Navajo dye chart

Navajo weavers used native plants from their desert environment to dye the wool they used in their rugs. This chart shows the colors produced by different plants.

T-2010-121

Prairie turnips

Plains tribes like the Lakota dug these roots by hand and tied them in braids to dry in the sun. The little roots were an important food source and delicious in soups or stews.

T-2010-122

Sweetgrass braid

Many Plains tribes burn pleasant-smelling sweetgrass for incense in smudging rituals. Sweetgrass tea is also used as medicine.

T-2010-120

Duck decoy

Birds and animals are abundant in South Dakota environments today. Wetlands provide vital habitat for nesting waterfowl – and good hunting, too. Floated on a slough, this decoy lures in ducks on their migrating flights.

T-2009-110

Rattlesnake rattle

Prairie Rattlesnakes and other reptiles are a part of the SD environment today. They are found in the prairies of western South Dakota and along the east side of the Missouri River. The Prairie Rattlesnake is the only venomous snake in South Dakota. They eat worms, insects, small rodents, birds, frogs, salamanders, and other reptiles.

The snake makes its distinctive rattling sound when shaking its tail causes the rattle segments to bump together. There is nothing inside the rattle. Rattles are made of a substance much like fingernails. Snakes add a rattle segment each time they shed their skin, 2-4 times per year.

T-2010-118

Combine

Combines are a common site in South Dakota's fields every fall. These large machines are used to harvest wheat, corn, soybeans and other crops. The front section or header can be changed so one combine can be used to harvest all types of crops. The spinning header is used to harvest wheat and other grains. The rigid header with the teeth is designed to harvest corn and other row crops. The teeth feed each row into the combine as it moves through the field.

T-2010-126

Feed sack

Agriculture forms much of the environment in the state. Cattle, hogs, sheep and other livestock are raised throughout the state. Special feeds like this "Tail Curler" fattened young pigs.

T-2010-124, T-2010-125

1965 Sokota notebook, Handbook for Farmers and Ranchers

Seed companies provided small, handy notebooks like this to their customers as giveaways. Farmers carried the notebooks to jot down information about crops and livestock. The books often contained information on planting, crop yields, and other farming business.

T-2010-110

Sunflower seed sample (A)

Two types of sunflowers – oilseed and confectionery – are grown in South Dakota. Confectionery sunflower seeds are slightly larger than the oilseed variety and are the type we eat. They are also used in birdseed. Oilseed sunflowers, like this sample, are used to make sunflower oil. South Dakota ranks second in sunflower seed and oil production in the United States.

T-2010-111

Corn sample (B)

More than 4 million acres of corn are planted in South Dakota in an average year, producing over 400 million bushels. Corn is the crop most frequently irrigated in the state. It is used for livestock feed, ethanol production and in hundreds of industrial products like plastics. Corn syrups are a major source of food sweeteners.

T-2010-112

Safflower seed sample (C)

Safflower is a spring crop planted in late April to early May and harvested in late September. Safflower is a thistle-like plant with seeds that look a bit like small white sunflower seeds. Safflower is used to make oil and birdseed.

T-2010-113

Millet seed sample (D)

Two different types of millet are grown in central and western South Dakota. Foxtail millet is used for hay and Proso millet is used as birdseed. The growing season for millet is much shorter than most grain crops.

T-2010-114

Milo seed sample (E)

Milo, also known as sorghum, is primarily grown as a feed grain. Sorghum grows much like corn, but has a shorter growing season and does not get as tall. It is fed to beef cattle. Forage varieties of sorghum grow taller and are cut, dried, and baled like hay.

T-2010-115

Soybeans seed sample (F)

South Dakotans plant almost 4 million acres of soybeans each year, producing 100 million bushels. A 60-pound bushel of soybeans will yield 48 pounds of meal and 11 pounds of oil. Soybean meal and oil are used for animal feed, bakery products, shortening and printing ink.

T-2010-116

Wheat seed sample (G)

South Dakota produces hard red winter wheat, hard red spring wheat, and durum wheat. Winter wheat is planted in the fall and is harvested in mid-summer. Spring and durum wheats are planted in the spring and harvested in late summer to early fall. Most winter wheat is planted in central and western South Dakota and most spring wheat is planted in eastern South Dakota. The hard wheats grown in South Dakota are high in protein so they make excellent bread-making flour. Durum wheat is used to make pasta. In an average year, more than 3 million acres of wheat will be planted in South Dakota.

T-2010-117

Oats seed sample (H)

South Dakota produces more than 50 million bushels of oats annually. Most is grown as animal feed and never leaves the farm. People do eat some oats, mostly in the form of rolled oats or oatmeal, or as whole oat flour.

T-2010-097

Tyrannosaurus Rex model

A carnivore, or meat-eating, dinosaur, T-Rex roamed South Dakota during the late Cretaceous period 68 million years ago. No one knows what color T-Rex really was, but these great dinosaurs had scaly skin similar to today's alligator. They could smell food several miles away.

One of the most complete T-Rex fossil skeletons ever found comes from South Dakota. Named SUE in honor of fossil hunter Sue Hendrickson who found her near Faith in 1990, SUE is on exhibit at the Field Museum in Chicago.

NOTE: The small human figure attached to T-Rex's leg is for showing how big T-Rex was compared to a human. Humans and T-Rex DID NOT live in South Dakota at the same time.

T-2010-103

Triceratops model

Triceratops lived in South Dakota at the same time as T-Rex, during the late Cretaceous period about 68 million years ago. Their name means three-horned face. An herbivore, or plant-eating, dinosaur, Triceratops ate low-lying plants and defended itself with its horns. T-Rex hunted and ate Triceratops. South Dakota's state legislature designated the Triceratops as our state fossil in 1988.

T-2010-098

Elasmosaurus model

Elasmosaurus lived in the warm sea that covered South Dakota in the Cretaceous period. They are not dinosaurs, but marine reptiles. They grew over 40 feet in length and fed on fish. Lewis and Clark discovered the backbone of an Elasmosaurus on their journey through South Dakota in 1804.

T-2010-104

Bison model

The largest mammal in North America, bison thrived on the grassland environment of South Dakota. Plains tribes like the Sioux depended on the bison for food, clothing and shelter. Every part of the animal was useful.

T-2010-102

Mammoth model

Mammoths roamed South Dakota during the last Ice Age, about 10,000 years ago. Woolly mammoths had thick coats of long hair and large tusks. The tusks were useful for scraping away snow to reach the plants underneath. Mammoths were herbivores, or plant eaters. People lived at the same time as mammoths and cave paintings of woolly mammoths have been found in France and Spain.

In South Dakota, the Mammoth Site at Hot Springs is the world's largest mammoth research site. It is built over a sinkhole that trapped the mammoths as they entered to drink and could not climb out. Most of the mammoth fossils at the Site are from the larger Columbian mammoth, but three woolly mammoths have also been discovered there.

T-2010-108

Fossil, dinosaur bone

Dinosaurs roamed South Dakota about 68 million years ago. Their fossilized bones are found in the northwestern area of the state. Triceratops became the South Dakota State Fossil in 1988. Fossil bones give scientists good clues about life in earlier South Dakota environments.

T-2010-109

Fossil, dinosaur bone cross-section

Fossils are the remains left behind from plants and animals that died and were buried in sediment or mud long ago. As the animal or plant decayed, minerals replace the space that once held the remains. As these minerals harden, they make an impression of the original animal or plant part that had been buried in the sediment. The fossil has the same shape as the original animal or plant part, but is chemically more like a rock. Hold this fossil up to the light to see how the original dinosaur bone looked inside.

T-2010-128

Water exhibit panels

Water is a vital element in South Dakota's environment today. This 17-panel exhibit looks at where the state's water comes from and how it has been used and managed over time. The Missouri River dams, Angostura Dam, glacial lakes, rural water systems, and community water towers are discussed in the exhibit. The panels are used in the South Dakota Water Jeopardy! activity.

T-2010-123

Water tower system model

These components are used for the *Fill It Up: Working a Water Tower* activity.

Objectives:

- Participants will identify three different environments.
- Participants will compare items from three different environments for differences and similarities.
- Participants will examine objects to determine which environment produced them.

South Dakota Social Studies Standards

K	1st	2nd	3rd	4th	5th	6th
K.E.1.2	1.E.1.1	2.US.1.2 2.US.2.1 2.E.1.1	3.E.1.1 3.US.2.2	4.G.1.1 4.US.1.2 4.W.2.1	5.US.1.1	

South Dakota Communication Arts Standards

K	1st	2nd	3rd	4th	5th	6th
K.LVS.1.2 K.LVS.1.7	1.LVS.1.2 1.LVS.1.5 1.LVS.1.6	2.LVS.1.2 2.LVS.1.5 2.LVS.1.6	3.LVS.1.1	4.LVS.1.1	5.LVS.1.3	

Timeframe: 45-60 minutes

Materials:

Included in kit

Plains Items

- Buffalo hide sample
- Buffalo rawhide sample
- Parfleche
- Sinew
- Bone awl
- Prairie turnips
- Sweetgrass braid
- Plains doll
- Pot shards, Mandan

Woodlands Items

- Pine needle basket
- Birch bark basket
- Wild rice
- Woodlands cattail doll
- Woodlands beading sample

Desert Items

- Navajo dye chart
- Pueblo clay pot
- Navajo doll

More than one environment

- Deer hide sample
- Porcupine quills

Background Information:

The early Indians lived all over America in different environments. Some lived where it was hot and dry while others lived where it was cool and wet. Each group used the resources in their environment to provide food, shelter, clothing, household items, toys, and anything else they needed. They used the land, water, plants and animals in their environments to meet their needs. In this activity, objects from three different environments – plains, desert and woodlands – will be examined and discussed.

Plains

Some early North American Indians lived in a plains environment. Plains tribes included the Sioux, Mandan, and Cheyenne. The plains environment is one of grass-covered prairie. Summers are hot and winters can be very cold with a lot of snow. Plains tribes depended on animals that ate the grass, especially the buffalo, for food, clothing and shelter. The buffalo provided meat to eat and a tough hide for making tipis, clothes, and household goods like parfleches. The buffalo also provided

South Dakota Environments

South Dakota State Historical Society Education Kit

sinew for thread and its bones made handy tools like awls. Plains tribes used plants from their environment, too. Prairie turnips provided a good source of food. Sweetgrass was burned as incense for cleansing rituals and was used as medicine.

The Mandan people lived in villages along the Missouri River. They used clay from their river environment to make thick clay pots for cooking and storing food. They baked the clay pots in a special oven called a kiln to make them hard and dry.

Desert

The southwest part of the United States is mostly desert. The desert environment is very dry with lots of sunshine. The Hopi and Navajo tribes live in the desert area. Large animals like the buffalo did not live in the desert. Desert dwellers hunted smaller animals, like rabbits, for food. Some tribes found ways to grow things in the desert. The Hopi tribe planted corn at the bottom of mesas, high, flat, land formations with steep sides. When it rained, the water ran down the mesa to the planted corn. Desert tribes used clay to make pots for cooking and storing food. The Navajo people raised sheep and used the wool to make rugs, an important item in their culture. They used plants from their environment to make colorful dyes for the wool.

Woodlands

A woodlands environment has many trees and plenty of rain. Long ago, the greatest forests were near the Great Lakes. The Ojibwa is a tribe from this area. Woodlands people got their food in many ways, depending on the season. During the spring, they collected tree sap to sweeten and add flavor to their foods. In summer, they planted vegetables and collected berries. In the fall, they gathered wild rice from the swamps. Fishing and hunting provided food, too. People in forest environments used things from trees to make containers and baskets. The needles from a pine tree and the bark from a birch tree both make good baskets.

Deer live on the plains, in the woods, and in the desert so people in all three environments used deer hide. Both woodlands tribes and plains tribes used porcupine quills to decorate clothing and household goods. Plants and berries were used to dye the quills.

Activity Steps:

1. Place the items from each of the three environments – plains, desert, and woodlands – in separate piles so participants can easily see, handle and compare them.
2. Share the background information with the group.
3. Have participants examine the items from each environment, either as a large group or working in smaller groups. When everyone has had an opportunity to look at the items, discuss:
 - What three environments are items from? (plains, desert, woodlands)
 - Could items from different environments be used for the same task? (plains parfleche, woodlands baskets, Pueblo pot are all storage items)
 - Some items from different environments are the same type, but are very different. Can they find an example? (Pueblo pot and Mandan pottery shards are both pottery, but different in style and clay used)
 - Pick out the three dolls and discuss the similarities and differences between them. How are they similar or different from modern dolls?

Word Cubes

Creating Sentences

Objectives:

- Participants will identify nouns, verbs and adjectives as parts of speech.
- Participants will write a sentence using a specific noun, verb, and adjective.
- Participants will draw a picture to illustrate their sentence.

South Dakota Communication Arts Standards

K	1st	2nd	3rd	4th	5th	6th
K.W.1.1	1.W.1.1	2.W.1.3	3.W.1.1	4.W.1.2	5.W.2.2	
K.W.2.1	1.W.1.2	2.W.2.4	3.W.2.3	4.W.2.2		
K.LVS.1.1	1.W.2.1	2.R.1.1	3.R.1.1			
	1.W.2.3					
	1.R.1.1					

Timeframe: 30-45 minutes. Word cubes can also be set up as an activity center with participants working individually or in small groups.

Materials:

Included in kit
 12 word cubes

Provided by instructor/participants
 pencil / writing paper
 drawing paper
 crayons

Background Information:

Travelers to the area that became South Dakota have described the prairie landscape using wonderful descriptive language. In 1839, Joseph Nicollet wrote:

There is something magical in the variety of impressions one gets from the sight of the prairies. One never wearies of it. . . . The fresh breeze that springs up from time to time, the absence of any danger close by (as one can see all around), the lack of difficulty on the route, the sweet verdure everywhere, the flowers bedecking it, the blue of the sky, the variations of the atmosphere operating always on a grand scale, all of these things combine to arouse one, to free one’s spirit.

Lewis and Clark painted beautiful word pictures of the prairie in their journals, too. On September 17, 1804, Lewis wrote:

. . . found the country in every direction for about three miles intersected with deep ravines and steep, irregular hills . . . at the tops of these hills the country breaks off as usual into a fine, level plain extending as far as the eye can reach . . . this scenery, already rich, pleasing, and beautiful, was still further heightened by immense herds of buffalo, deer, elk, and antelope which we saw in every direction feeding on the hills and plains.

In this activity, participants will write their own descriptive sentence using nouns, verbs and adjectives from the word cubes. Since the participants don’t know which words they must use until they roll the cubes, sentences may be serious, silly, or poetic. Participants will also draw a picture to illustrate their sentences.

Activity Steps:

1. Word cubes are color-coded. Nouns are yellow, verbs are red, and adjectives are green. There are four different word cubes in each color. Set up four rolling stations with one cube of each color at each station.
2. Share the background information with the group.
3. Have participants go to one of the rolling stations (they only need to go to one station) and roll the three colored cubes. Have them write down the three words that appear on the top of each cube after their roll so they have one noun, one verb and one adjective.
4. Using those three words, participants must compose a sentence. They may use other words as well, but their sentence must contain the three words from their roll. Have them write their sentence on a piece of scratch paper. Remember, sentences can be silly.
5. On a sheet of drawing paper, have participants neatly write their sentence along the bottom of the sheet. They must then draw a picture illustrating their sentence on the paper above it.
6. Hang up the illustrated sentences and have participants find the noun, verb and adjective in each one.

Option: Have participants roll two cubes of each color at a time so they have two nouns, two verbs and two adjectives to compose into one sentence.

Objectives:

- Participants will identify four animals that have lived, or currently live, in South Dakota.
- Participants will identify four different environments that have existed in the state.
- Participants will match each animal to its South Dakota environment.

South Dakota Science Standards

K	1st	2nd	3rd	4th	5th	6th
K.L.1.1	1.L.3.1	2.L.3.3	3.L.1.2 3.L.2.1 3.L.3.2	4.L.2.1		

Timeframe: 30-45 minutes

Materials:

Included in kit:

- Bison model
- Triceratops model
- Elasmosaurus model
- Mammoth model
- Environments A,B,C,D coloring sheets
- Where Do I Live? 4-animal worksheet

Provided by instructor/participants:

- Crayons
- Scissors
- Glue
- Pencil

Background Information:

The environment of South Dakota has gone through many changes over time. The land has been covered by warm seas. At other times the landscape has been green and lush with tropical vegetation. Cold, snowy steppes and mountains have been a part of past environments. Today, grassy plains cover much of the state. Animals adapted to each of these environments and made South Dakota their home. In this activity, participants will identify four animals that once inhabited the state – or possibly still do! They will match each animal to its SD environment by cutting them out and glueing them to the appropriate environment coloring sheet.

Activity Steps:

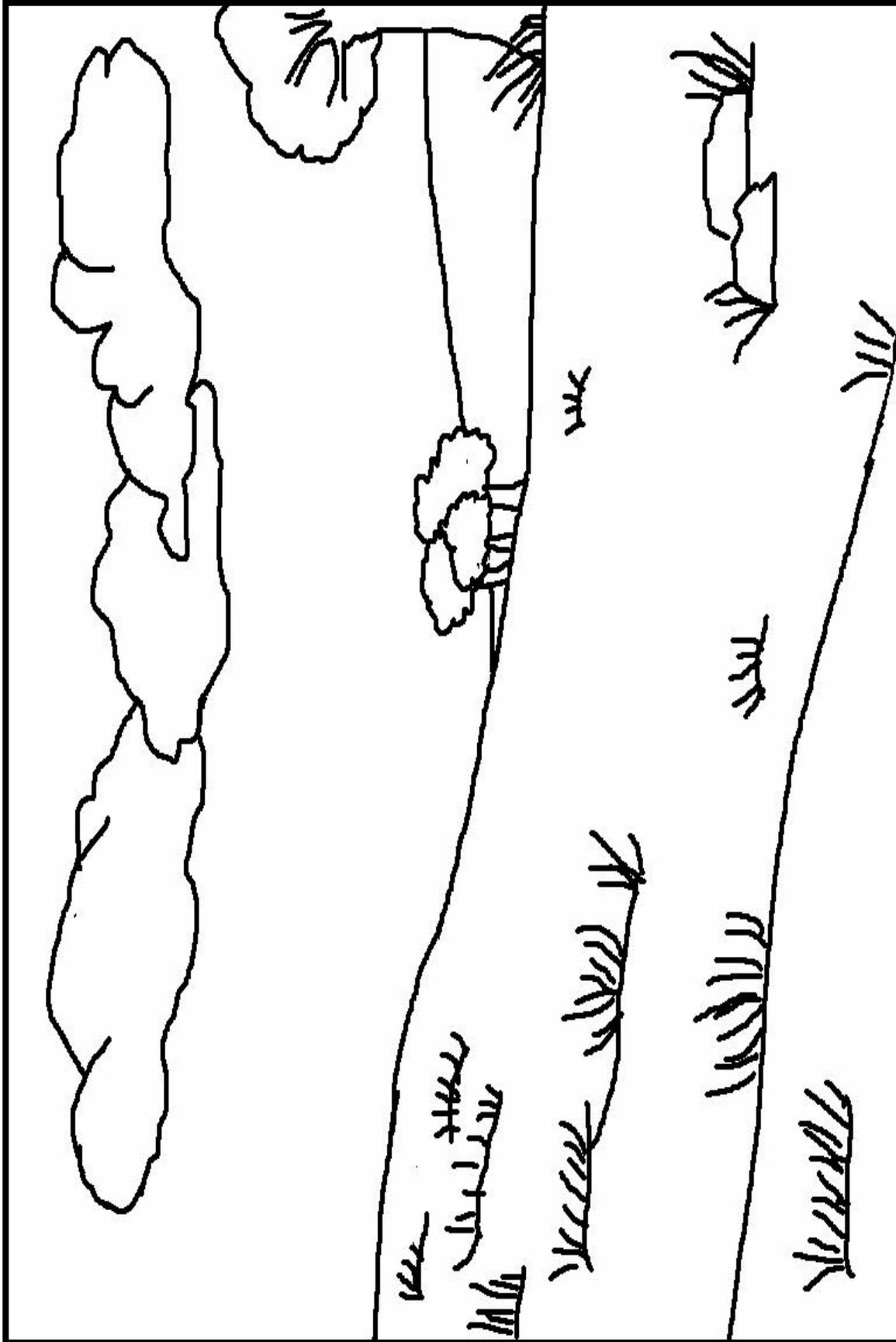
1. Give each participant a copy of Environments A,B,C, and D coloring sheets and the *Where Do I Live?* worksheet with the four animals on it. Share the background information with the group.
2. Set the bison, elasmosaurus, triceratops, and mammoth model in a place where everyone can see or handle them. As a group:
 - Identify each of the four animals. Have participants draw a line from the animal’s name to its picture on the worksheet.
 - Discuss similarities and differences between the animals. Consider:
 - Which animal looks like it lived underwater? How can you tell? (flippers on elasmosaurus)
 - What does the heavy wooly coat on the mammoth tell you about its environment? (it was cold)
 - Do the animals have ways of defending themselves? What are some of their defenses? (triceratops face horns, mammoth tusks, elasmosaurus teeth)
 - What did the animals eat? Were they plant eaters or meat eaters? (plant eaters – bison, mammoth, triceratops; meat eater – elasmosaurus)

South Dakota Environments

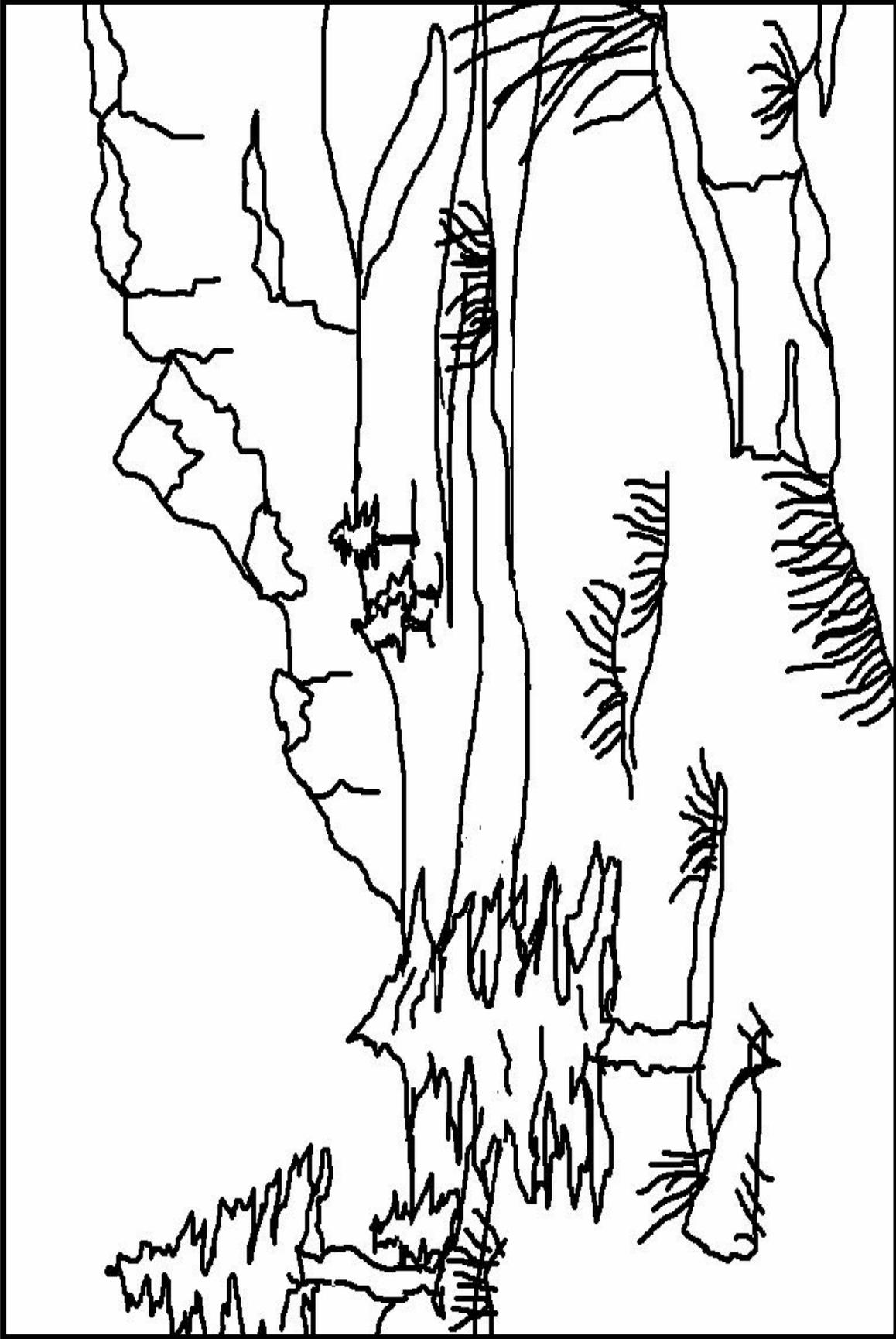
South Dakota State Historical Society Education Kit

- Do any of these animals still live in South Dakota today? (bison)

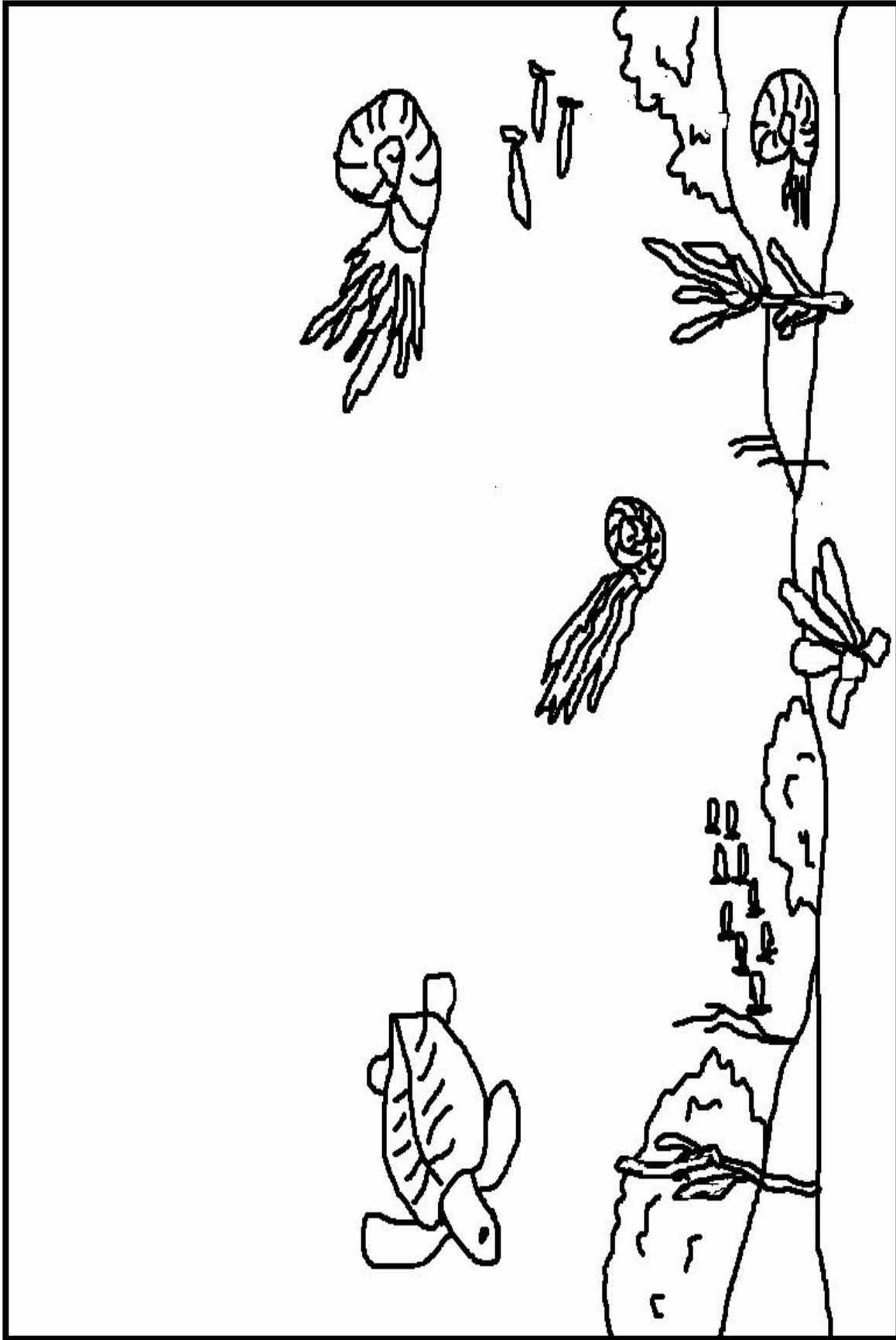
3. As a group, look over all four of the Environments coloring sheets and discuss:
 - Which environment looks like it is underwater? (Environment C)
 - Which environment looks most like South Dakota today? (Environment A)
 - One environment looks very jungle-like and tropical. Which one? (Environment D)
 - A steppe is a grassland with a few scattered trees. Which environment looks most like this? (Environment B)
4. Have the participants color the four environment sheets, and the four animals on the worksheet.
5. Cut out the animals and glue them into their appropriate environment. (Bison – A, Mammoth – B, (Elasmosaurus – C, Triceratops – D)



- Environment A
- Holocene Epoch (12,000 years ago – present)
 - Grass-covered prairie



- Environment B
- Pleistocene Epoch or Ice Age (2.6 Million – 12, 000 years ago)
 - Cold, snowy plains



Environment C

- Late Cretaceous Period (100 – 65 Million years ago)
- Warm, shallow sea



Environment D
• Late Cretaceous Period (100 – 65 Million years ago)
• Tropical forests

Name _____

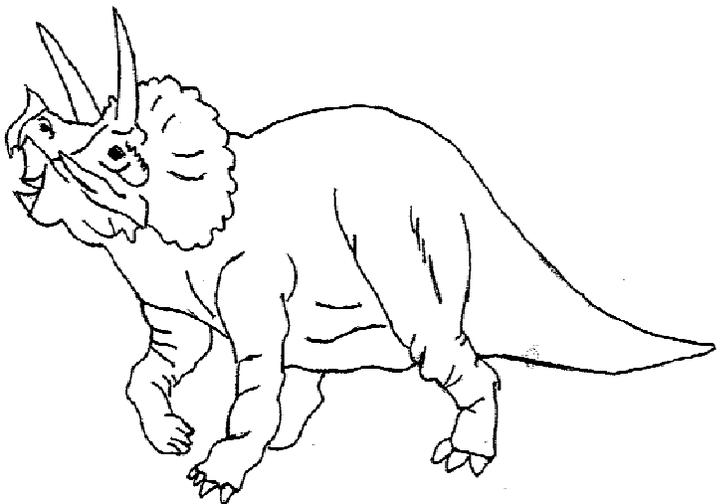
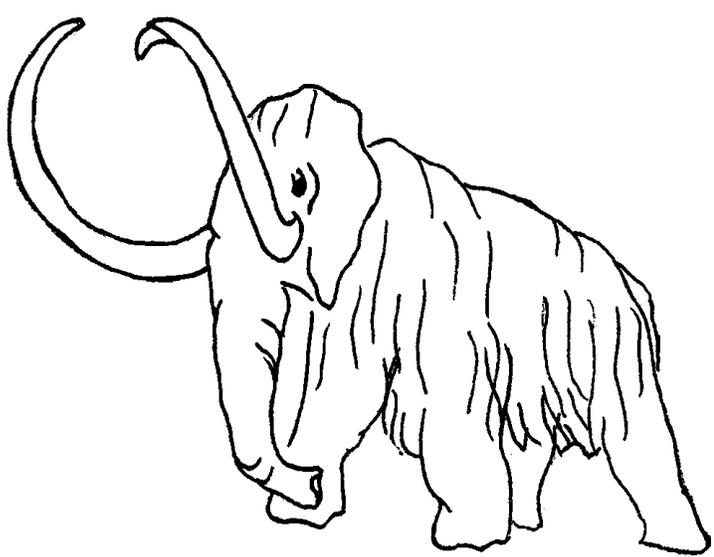
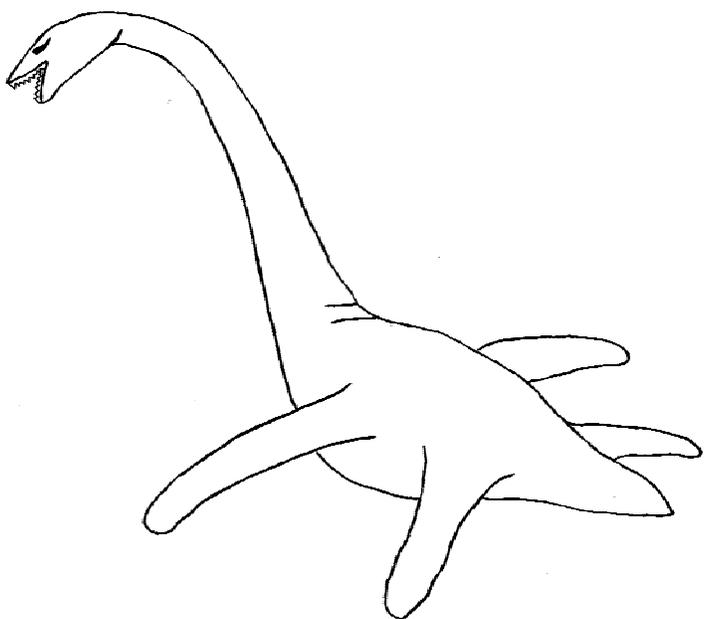
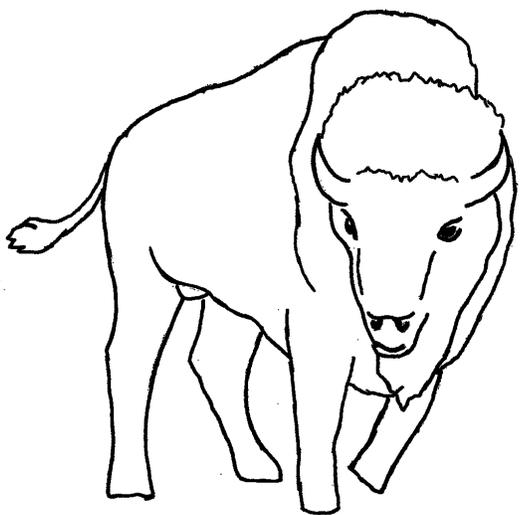
Where Do I Live?
South Dakota Animals Over Time
Worksheet

BISON

MAMMOTH

TRICERATOPS

ELASMOSAURUS



Measuring Up

Objectives:

- Participants will identify four animals that have lived in South Dakota.
- Participants will compare the size of each of the animals using measuring ropes.
- Participants will use themselves and other students as measuring tools to determine how many are needed to measure up to each of the four animals.

South Dakota Math Standards

K	1st	2nd	3rd	4th	5th	6th
K.M.1.4 K.M.1.5	1.M.1.5	2.M.1.6	3.M.1.4	4.M.1.3	5.M.1.4	

Timeframe: 30-45 minutes

Materials:

Included in kit

Measuring Up worksheet

Bison, Triceratops, Mammoth, Elasmosaurus models

4 measuring ropes

Provided by participants/instructor

Pencil

Long hallway or gym

Background Information:

Big animals have lived in many of South Dakota's environments over time. Large marine reptiles like the elasmosaurus swam in the warm seas that covered the state in the Cretaceous Period. Triceratops munched on the tropical vegetation that grew alongside the seas and in the forests. Thousands of years later great woolly mammoths wandered the cold grassy landscape. Mammoths shared the landscape with early people who hunted the great beasts for food. In more recent times enormous herds of bison roamed the plains of South Dakota providing food, clothing and shelter to the tribes who lived here. Bison are still found on private ranches and in places like Custer State Park. In this activity, participants will identify four large animals that once made South Dakota their home. They will compare the size of the animals.

Activity Steps:

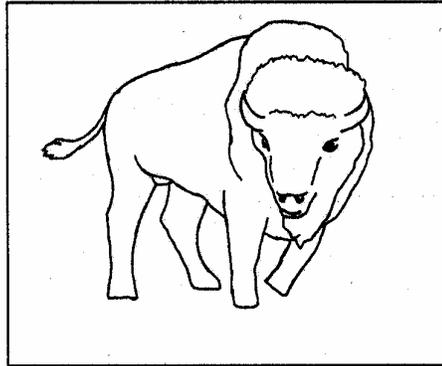
1. Give each participant a copy of the Measuring Up worksheet. Set the bison, triceratops, mammoth and elasmosaurus models out so the group can see them. Working individually or as a group, complete the worksheet.
2. Divide group into four teams. Give each team one measuring rope and have them bring one copy of the worksheet for reference. Move into the hallway or gym. Bring the four animal models along.
3. Have each group spread out their measuring rope and decide which animal the rope corresponds with. The ropes have a colored tab every foot along their length. Have the team choose their animal from the four models. Have teams lay the ropes next to each other on the hallway or gym floor. (red tabbed rope – elasmosaurus; white – bison; blue – triceratops; yellow – mammoth)
4. Have participants lay down next to the ropes (if the floor is clean enough) and determine how many of them it takes to measure up to each of the four animals. Try it with different classes or groups – how many high schoolers does it take? Kindergarteners? Adults? What if you combine groups – how many does it take of each?

Name _____

Measuring Up Worksheet

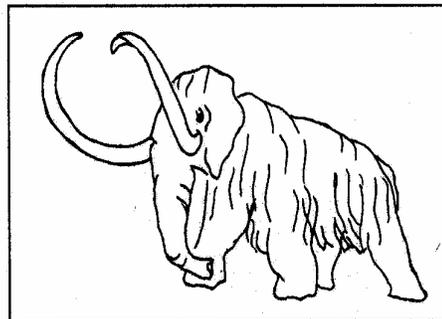
Draw a line from the description on the left to the correct animal. Draw another line from the animal to its name.

- I scrape snow with my tusks to get to the grass underneath.
- I am about 12 feet long.
- I eat 700 pounds of plants every day.
- I live 60 to 80 years.



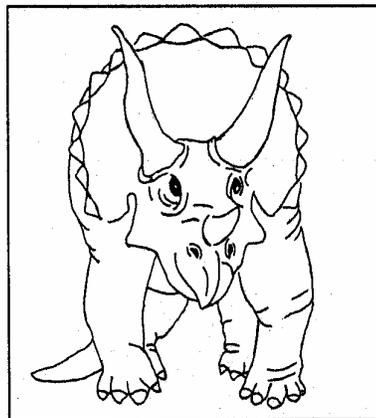
Triceratops

- I am a marine reptile, not a dinosaur.
- I can grow 46 feet long.
- I breathe air.
- I have a small head with lots of sharp teeth.



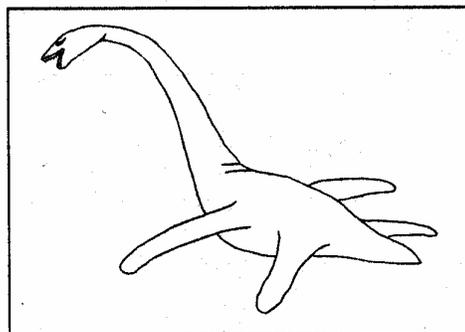
Bison

- I am the largest mammal in North America today.
- I am about 8 feet long.
- My top speed is 35 miles per hour.
- I can live up to 40 years.



Elasmosaurus

- My name means three-horned face.
- I can get to be 26 feet long.
- I am a herbivore, or plant-eater.
- I lived 65 million years ago.

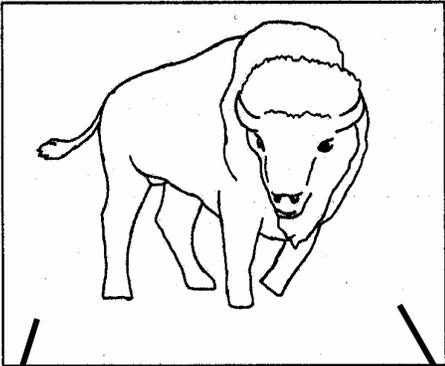


Mammoth

Measuring Up Worksheet Key

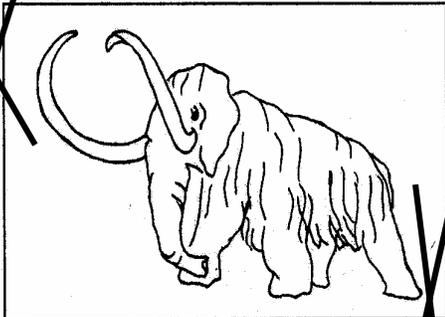
Draw a line from the description on the left to the correct animal. Draw another line from the animal to its name.

- I scrape snow with my tusks to get to the grass underneath.
- I am about 12 feet long.
- I eat 700 pounds of plants every day.
- I live 60 to 80 years.



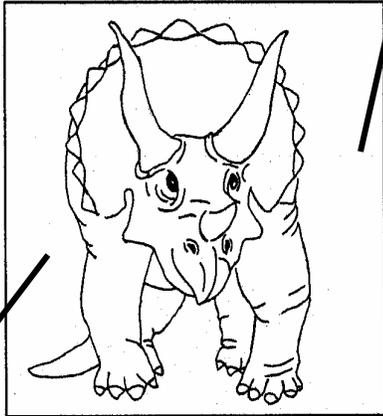
Triceratops

- I am a marine reptile, not a dinosaur.
- I can grow 46 feet long.
- I breathe air.
- I have a small head with lots of sharp teeth.



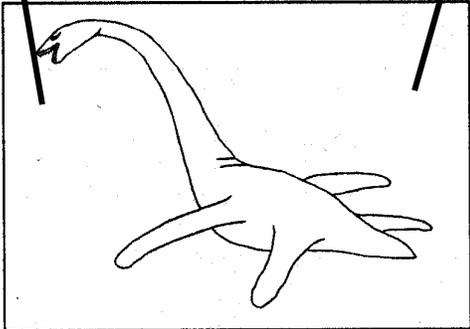
Bison

- I am the largest mammal in North America today.
- I am about 8 feet long.
- My top speed is 35 miles per hour.
- I can live up to 40 years.



Elasmosaurus

- My name means three-horned face.
- I can get to be 26 feet long.
- I am a herbivore, or plant-eater.
- I lived 65 million years ago.



Mammoth

Fill It Up: Working a Water Tower

Objectives:

- Participants will assemble components in the proper sequence to make a water tower system model.
- Participants will hypothesize on their expectations of the model's effectiveness and test the model.
- Participants will write up their observations of the water tower system model.

South Dakota Science Standards

K	1st	2nd	3rd	4th	5th	6th
			3.S.1.1	4.S.1.1	5.P.2.2	6.N.2.1
						6.E.1.2
						6.S.1.1
						6.S.2.1

Timeframe: 60 minutes

Materials:

Included in kit

14 water tower components

Provided by instructor/participants

- Large sink or tub
- 2 bath towels
- Water – ½ to 1 gallon
- Bucket
- Blue food coloring (optional)
- Masking tape
- pencil/pen
- writing paper
- pliers (to loosen components when taking the model apart, if needed)

Background Information:

Water towers are very simple devices. They are large, elevated tanks of water. The towers are tall so they can use pressure or gravity to allow water to flow into a town's water system. The water tower tank is usually large enough to hold about a day's worth of water for a community. As towns grow, more water towers or larger towers are built.

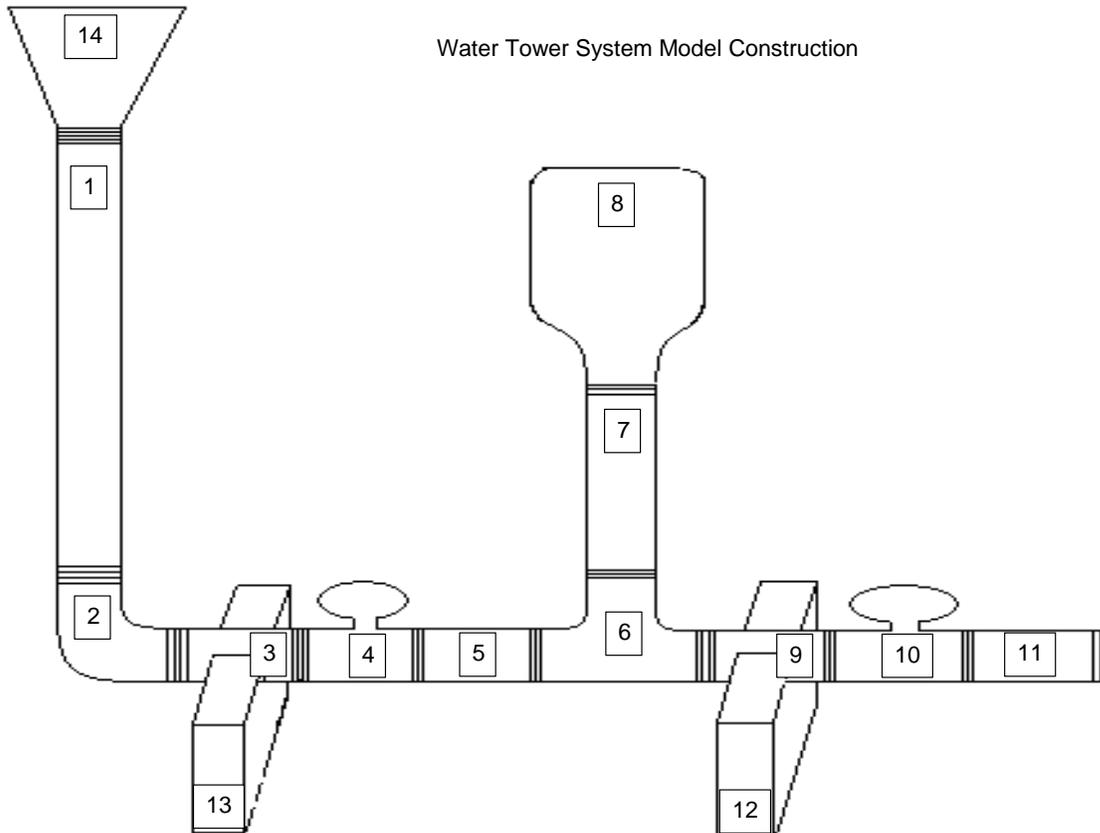
Water towers save money by making it possible for a town to built their water pumping system for *average* rather than *peak* water demand. For example, when everyone is getting ready for work or school in the morning, a community is using a lot of water. It would be very expensive to built a pumping system to meet that peak demand. The water tower's water can flow out into the system during peak water use times when the pumping system may not be big enough to meet the demand. During very slow water use times – like the middle of the night – the pumping system refills the water tower so it is ready for the next peak use time.

In this activity, participants will build a water tower system model. They will hypothesize about how the system may work, and then test it to see if they are correct. They will write up the findings of their experiment.

While community water systems use pumps to supply water to their customers and to fill the water tower, this model uses gravity to fill the water tower.

Activity Steps:

1. Set up the work space for the water tower, either in a large sink or tub.
2. Share the background information with the participants.
3. Have participants work together to assemble the water tower components. The components are numbered.



4. Set the water tower model inside the sink or large tub. It may need to be held to keep it from slipping.
5. Have participants hypothesize about what how the water tower will work, writing their conjectures down on their paper.
6. Fill the bucket with $\frac{1}{2}$ gallon of water. Add blue food coloring to the water, if desired. Be sure that Valve 4 is open, and Valve 10 is closed.
7. Slowly pour water into the funnel. Watch as the water rises in the bottle. Once the bottle is full, close Valve 4.
8. To get the water from the tower out, open Valve 10.

9. Cover the 3 holes poked into the bottle with masking tape. Open Valve 4 and close Valve 10. Pour water slowly into the funnel again and observe what happens. Open Valve 10 and drain the system.

10. Discuss:

- Why did the bottle not fill when the holes were covered? (Air pressure inside the bottle could not escape and let the water into the bottle).
- Does all the water in a community come from the water tower? (No, the water system pump provides water most of the time. The water tower water only flows into the system during peak use times.)

11. Have participants write down the results of the water tower experiment. Did they accurately predict what would happen?

South Dakota Water Jeopardy!

Objectives:

- Participants will recognize the importance water plays in South Dakota.
- Participants will locate answers to questions about SD water resources and use on 17 exhibit panels.
- Participants will define aquifer, artesian well, and irrigation.

South Dakota Language Arts Standards						
K	1st	2nd	3rd	4th	5th	6th
	1.LVS.1.2	2.LVS.1.2 2.LVS.1.6	3.R.2.1 3.LVS.1.2	4.R.1.2 4.R.2.1	5.R.1.2 5.R.2.1 5.LVS.1.3	6.R.1.2 6.R.2.1

South Dakota Science Standards						
K	1st	2nd	3rd	4th	5th	6th
	1.L.1.3		3.L.3.3 3.E.1.2	4.S.1.1 4.S.1.2	5.S.1.1	6.E.1.2 6.S.1.1

Timeframe: 30-60 minutes

Materials:

Included in kit

17 water exhibit panels
 80 (4 color sets of 20) question/answer cards

Provided by instructor or participants

4 crayons – purple, red, yellow, green
 box or opaque bag to hold crayons
 masking tape (optional)
 timer (optional)

Background Information:

Water is a vital resource in South Dakota. The water exhibit panels explain where SD water comes from and how water resources are used in the state. Aquifers, dams, and underground pipeline water systems are discussed. Floods, historic use of the Missouri River, irrigation, and water towers are also part of the exhibit. In this activity, participants use information found on the panels to answer questions about SD water in a jeopardy-style game or as a simple question-and-answer hunt.

Activity Steps:

1. Sort the colored cards into two piles for each color – one of numbered answers (with a plain background) and one of questions (with a patterned background). NOTE: The exhibit panel that contains the answer to each question is on the lower right of each question/answer card. You may cover these clues with masking tape or allow participants to use them to help find answers.
2. Set up the water exhibit panels along a whiteboard railing, windowsill or table so participants can view them easily.
3. Have participants spend a few minutes looking at the exhibit panels.
4. Set the four piles of colored numbered answer cards facedown on a table or desk. Assign one participant or instructor as the card flipper/scorekeeper. Put the four crayons in the box or bag – pulling a crayon will determine the order in which the teams are asked questions.

South Dakota Environments

South Dakota State Historical Society Education Kit

5. Divide the group into four teams and give each team one set of colored question cards (with the patterned background). They may look at the questions.
6. Have the card flipper pull one crayon from the box or bag. That team goes first. Have the card flipper flip over the top card on the team's pile and read the information aloud. Give the team a set amount of time to come up with a corresponding question that matches up with the information. For example, "The most common source of water in South Dakota" is answered by the question "What are aquifers?" Using a timer helps keep the time given for each question consistent. If the team comes up with the correct answer within the allotted time, they get one point. The scorekeeper keeps track of all points for the teams on the board or a sheet of paper.
7. Keep the first crayon out of the box or bag and pull another crayon to decide which team goes second, third, and fourth. Once all teams have had a turn, put the crayons back and start the draw again. The game continues until all the information cards have been read and answered. The team with the most correct answers wins.
8. As a group, discuss:
 - What is an aquifer? Artesian well? Irrigation?
 - Why is water so important in South Dakota?
 - Name several ways participants use water every day – drinking, washing, flushing the toilet, etc.
 - Does your town have a water tower? Is there anything on it?

Water Jeopardy! Answer Sheet By Number

Purple cards	Answer question	Panel
1. The most common source of water in South Dakota	What are aquifers?	3
2. The rolling, hilly terrain of eastern South Dakota was shaped by these	What are glaciers?	4
3. This devastating event occurred June 9, 1972 in Rapid City after fifteen inches of rain had fallen on the Black Hills	What is a flash flood?	5
4. Lewis & Clark's Corps of Discovery traveled the Missouri during these years	What is 1804-1806?	6
5. The Works Progress Administration built this Montana dam in the 1930s	What is Fort Peck Dam?	8
6. Irrigating this valley with water from the Oahe Reservoir was a key factor in Pick-Sloan	What is the James River Valley?	11
7. This dam was the first Pick-Sloan project to be completed	What is Angostura Dam?	12
8. Angostura irrigates farmland in these two counties	What are Fall River and Custer Counties?	13
9. Applying water to farmland via artificial means	What is irrigation?	14
10. One of the tallest structures in many small towns	What is the water tower?	16
Red cards		
11. South Dakota has enough of this to circle the earth 1.5 times	What is underground pipeline?	15
12. These are dug in drier areas to catch rainwater and runoff for watering livestock	What are stock dams?	4
13. Ice jams on the Missouri created extreme flooding that damaged Yankton, Vermillion and Pierre in this year	When was 1881?	5
14. This group organized to stop the Oahe Irrigation Project	What are the United Family Farmers?	11
15. Fast currents, sandbars, and snags did not keep these vessels off the Missouri	What are steamboats?	7
16. Oahe, Big Bend, Fort Randall and Gavins Point are all this type of dam	What is a rolled-earth dam?	9
17. Anglers, boaters, and swimmers made this big business on the Missouri River reservoirs	What is recreation?	10
18. These French-Canadians explored parts of the Missouri in their search for a water route to China	Who are the Verendrye Brothers?	6
19. This 60-mile system first delivered irrigation water from Angostura in 1953	What are main and lateral canals?	13
20. This windy device has a gearbox that turns a rod to pump water	What is a windmill?	3

Yellow cards		
21. The essential element shaping life in South Dakota	What is water?	17
22. Overhead pipe on wheel-mounted towers moves across a field with this irrigation system	What is sprinkler irrigation?	14
23. The amount of irrigation water South Dakota uses per day	What is 292 million gallons?	14
24. The Cheyenne River's low water flow made production of this impractical at Angostura	What is hydropower production?	12
25. Congress authorized this water project to pipe Missouri River water to northeastern South Dakota	What is the Walworth – Edmunds - Brown (WEB) water project?	11
26. Over half of the 611,642 acres lost when the dams were built was this type of land. Its residents were forced to move.	What is tribal land?	10
27. Two plans to dam the Missouri were combined into this one plan	What is the Pick-Sloan Plan?	8
28. This artist painted a picture of Fort Pierre in 1833	Who is Karl Bodmer?	7
29. These two tribes lived along the Missouri and depended on in for trade and protection	Who are the Arikara and the Sioux?	6
30. Tapping a pressurized aquifer creates this dramatic well	What is an artesian well?	3
Green Cards		
31. This imaginary line serves as a dividing line between wet and dry areas in the state	What is the 100th Meridian?	4
32. Completed in 1914, this is one of the earliest dam projects in South Dakota	What is Orman Dam?	14
33. This body of water is the largest warm-water recreation lake in a 100-mile radius in the southern Black Hills	What is Angostura Reservoir?	13
34. These make handy spots to paint a town's name and school mascot	What is the water tower?	16
35. This dam's name means "narrow opening" in Spanish	What is Angostura?	12
36. Hundreds of Indian families were forced to relocate because of this	What is dam construction?	10
37. From 1948-1962 this large dam was under construction near Pierre	What is Oahe Dam?	9
38. The last major flood occurred in this South Dakota town in 1952	What is Pierre?	8
39. This company established a large trading post at Fort Pierre in 1832	What is the American Fur Company?	7
40. This steamboat was the first to navigate the upper Missouri River	What is the <i>Yellowstone</i> ?	7

Water Jeopardy! Answer Sheet by Exhibit Panel Number

Numbered question/answers	Answer question	Panel
1. The most common source of water in South Dakota	What are aquifers?	3
20. This windy device has a gearbox that turns a rod to pump water	What is a windmill?	3
30. Tapping a pressurized aquifer creates this dramatic well	What is an artesian well?	3
2.The rolling, hilly terrain of eastern South Dakota was shaped by these	What are glaciers?	4
12. These are dug in drier areas to catch rainwater and runoff for watering livestock	What are stock dams?	4
31. This imaginary line serves as a dividing line between wet and dry areas in the state	What is the 100th Meridian?	4
3.This devastating event occurred June 9, 1972 in Rapid City after fifteen inches of rain had fallen on the Black Hills	What is a flash flood?	5
13. Ice jams on the Missouri created extreme flooding that damaged Yankton, Vermillion and Pierre in this year	When was 1881?	5
4. Lewis & Clark’s Corps of Discovery traveled the Missouri during these years	What is 1804-1806?	6
18. These French-Canadians explored parts of the Missouri in their search for a water route to China	Who are the Verendrye Brothers?	6
29. These two tribes lived along the Missouri and depended on in for trade and protection	Who are the Arikara and the Sioux?	6
15. Fast currents, sandbars, and snags did not keep these vessels off the Missouri	What are steamboats?	7
28. This artist painted a picture of Fort Pierre in 1833	Who is Karl Bodmer?	7
39. This company established a large trading post at Fort Pierre in 1832	What is the American Fur Company?	7
40. This steamboat was the first to navigate the upper Missouri River	What is the <i>Yellowstone</i> ?	7
5. The Works Progress Administration built this Montana dam in the 1930s	What is Fort Peck Dam?	8
27. Two plans to dam the Missouri were combined into this one plan	What is the Pick-Sloan Plan?	8
38. The last major flood occurred in this South Dakota town in 1952	What is Pierre?	8
16. Oahe, Big Bend, Fort Randall and Gavins Point are all this type of dam	What is a rolled-earth dam?	9
37. From 1948-1962 this large dam was under construction near Pierre	What is Oahe Dam?	9
17. Anglers, boaters, and swimmers made this big business on the Missouri River reservoirs	What is recreation?	10

South Dakota Environments
 South Dakota State Historical Society Education Kit

26. Over half of the 611,642 acres lost when the dams were built was this type of land. Its residents were forced to move.	What is tribal land?	10
36. Hundreds of Indian families were forced to relocate because of this	What is dam construction?	10
6. Irrigating this valley with water from the Oahe Reservoir was a key factor in Pick-Sloan	What is the James River Valley?	11
14. This group organized to stop the Oahe Irrigation Project	What are the United Family Farmers?	11
25. Congress authorized this water project to pipe Missouri River water to northeastern South Dakota	What is the Walworth – Edmunds - Brown (WEB) water project?	11
7. This dam was the first Pick-Sloan project to be completed	What is Angostura Dam?	12
24. The Cheyenne River's low water flow made production of this impractical at Angostura	What is hydropower production?	12
35. This dam's name means "narrow opening" in Spanish	What is Angostura?	12
8. Angostura irrigates farmland in these two counties	What are Fall River and Custer Counties?	13
19. This 60-mile system first delivered irrigation water from Angostura in 1953	What are main and lateral canals?	13
33. This body of water is the largest warm-water recreation lake in a 100-mile radius in the southern Black Hills	What is Angostura Reservoir?	13
9. Applying water to farmland via artificial means	What is irrigation?	14
22. Overhead pipe on wheel-mounted towers moves across a field with this irrigation system	What is sprinkler irrigation?	14
23. The amount of irrigation water South Dakota uses per day	What is 292 million gallons?	14
32. Completed in 1914, this is one of the earliest dam projects in South Dakota	What is Orman Dam?	14
11. South Dakota has enough of this to circle the earth 1.5 times	What is underground pipeline?	15
10. One of the tallest structures in many small towns	What is the water tower?	16
34. These make handy spots to paint a town's name and school mascot	What is the water tower?	16
21. The essential element shaping life in South Dakota	What is water?	17

Above It All: Design a Water Tower

Objectives:

- Participants will recognize water towers as a place where community identity is shown in words and pictures.
- Participants will identify water towers in their area.
- Participants will create a water tower art project.

South Dakota Visual Art Standards

	K	1	2	3	4	5	6
Std. 1: Visual art as communication, benchmark 2	x	x	x	x	x	x	x
Std. 2: Understand media, techniques, processes, benchmark 1	x	x	x	x	x	x	x
Std. 2: Understand media, techniques, processes, benchmark 2	x	x	x	x	x	x	x
Std. 4: Demonstrate capacity for response to visual art, benchmark 3	x	x	x	x	x	x	x

Timeframe: 60 minutes

Materials:

Provided by instructor or participants

styrofoam cups

4 pencils, approximately the same length, for each participant

crayons or markers

aluminum foil, about 1.5 square feet per participant

1 sheet notebook paper

Background Information:

Water towers are a visible part of South Dakota's environment. Most communities have one or more of these impressive structures towering over the town. A water tower tank offers prime space for the town name and perhaps the school team name and mascot. In this activity, participants will create their own water tower and design a mascot/name for their tower. They will also consider what the water tower in their community looks like and what information a visitor can glean about their community from the tower.

Activity Steps:

1. Share the background information with the participants. Discuss:

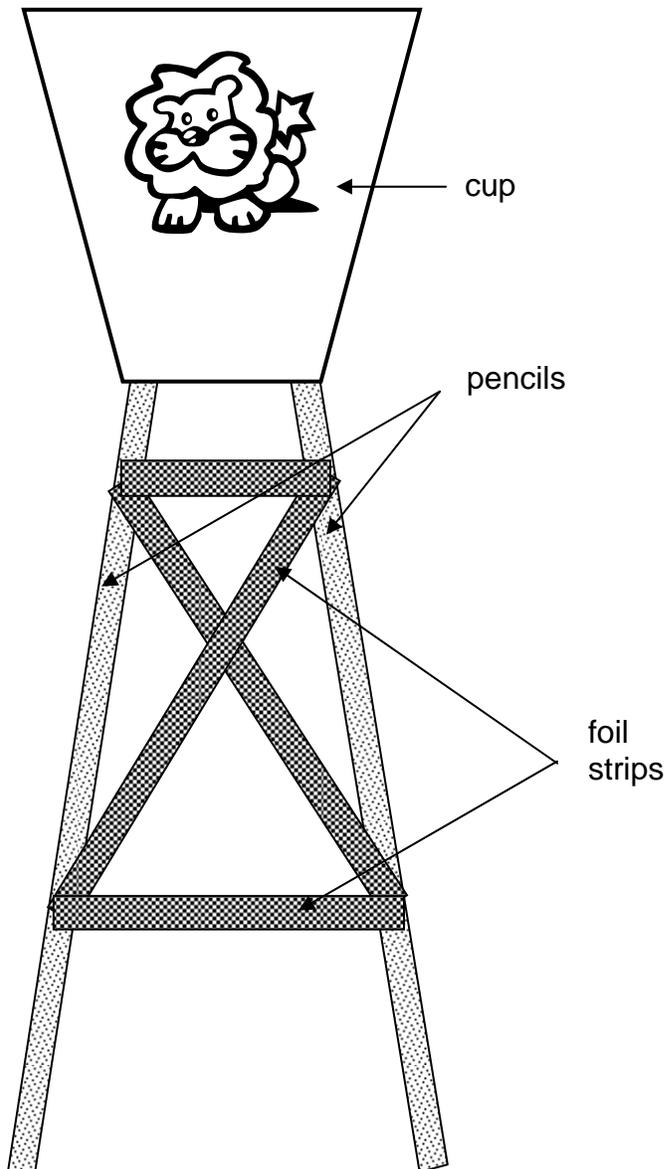
- Does their community have a water tower and if so, what does it look like?
- Does the water tower have anything written/drawn on it? What?
- What could a stranger traveling through town learn from the tower?
- Are participants familiar with any other water towers? What do the towers tell about their communities or locations?

2. Give each participant a styrofoam cup. The cup will be their tower's water tank, although no water will be put in the cup. Each participant will also need 4 sharp pencils approximately the same length and a square of aluminum foil.

3. Have participants decorate their cups/water tanks with crayons or markers. They can draw an image, write words or use abstract designs on their cups.

4. To form their tank's legs, have participants tear strips from their aluminum foil square and wrap their four pencils.

5. Crumple the notebook paper and place it inside the cup. Poke the four pencils through the bottom of the cup to form legs on the water tower.
6. Fold $\frac{1}{4}$ " strips of aluminum foil and wrap the strips around the tower legs as supports.



Sharing Oahe Dam Water

Objectives:

- Participants will explain three effects the dams have had on the Missouri River.
- Participants will identify seven groups that use Oahe dam water.
- Participants will work as a group to decide how to share the water resources.

South Dakota Social Studies Standards

K	1st	2nd	3rd	4th	5th	6th
	1.E.1.2	2.C.2.1 2.E.1.2	3.W.1.1 3.E.1.2	4.US.1.1 4.US.1.2 4.G.1.2 4.G.2.1 4.E.1.1		6.E.1.1

South Dakota Language Arts Standards

K	1st	2nd	3rd	4th	5th	6th
K.LVS.1.2 K.LVS.1.6	1.LVS.1.2 1.LVS.1.5 1.LVS.1.6	2.LVS.1.2 2.LVS.1.5 2.LVS.1.6	3.LVS.1.1	4.LVS.1.1 4.LVS.1.4	5.LVS.1.3	6.LVS.1.3

Timeframe: 30-60 minutes

Materials:

Included in kit

- 7 water user description cards
- 24 water resource share cards

Background Information:

The Missouri was once a wild river. Heavy spring runoffs flooded the towns and farms along its banks. Tons of sediment darkened the water of the “Big Muddy” as it made its way downstream to the Mississippi River.

A plan to control the river was implemented starting in the 1940s. The Pick-Sloan Plan dammed the river. The plan’s goals were to control flooding, provide electric power and make water available for irrigation. Between 1940 and 1963, seven dams were constructed, four of them in South Dakota. Fort Randall Dam was completed near Pickstown in 1952. Three years later Gavins Point Dam went up near Yankton. The largest of the Missouri River dams, Oahe, was built near Pierre in 1958. Big Bend Dam near Ft. Thompson was completed in 1963.

The dams and their large reservoirs have had both good and bad effects. The state’s Indian reservations lost millions of acres when the reservoirs flooded. Entire towns had to be relocated. Much wildlife habitat was lost as well, and species that depended on the wild river suffered. Widespread irrigation never developed. On the plus side, flooding is largely under control. The great reservoir lakes behind the dams provide fishing, boating, and other recreation opportunities. The tamed river provides drinking water via underground pipelines to many of the state’s residents. The dams are a major source for electricity.

For this activity, participants will decide how to split up the water from the Oahe dam to meet a variety of user needs. Every user group cannot have all the water they would like, so the participants

will need to work together and compromise to reach some agreement. Everyone may not be happy with the end result.

Activity Steps:

1. Share the background information on the Missouri River and the dams with the group.
2. Have participants verbally share some of the effects building the dams had on the river.
3. Divide participants into 7 groups. Give each group one user description card and two water resource share cards. The instructor holds on to the remaining ten water resource cards. Each user group ideally needs four water shares. Groups may voluntarily give up one of their two shares during the course of the discussion, but every group must hold on to at least one water share.
4. Read the user description card for each water user group aloud to the entire group.
5. Set a discussion time limit, moderate discussion and have the entire group consider:
 - Which users do they think should get more water? Why? If consensus is reached, give additional water share cards as determined by the group.
 - Are some groups willing to give one of their water cards to another group?
 - Does the group think some water needs are more important than others? Why?
 - Four is the ideal number of water shares each user group needs. Are some groups willing to settle for less than the ideal? Three cards instead of four?
6. When time is up, discuss:
 - Was the group able to come to a consensus on how to divide up the water?
 - Did some groups get all the water they wanted? Why or why not?
 - Was it easy to make decisions about who get the water?
 - Were all the participants happy with the final outcome?
 - What did participants learn from this activity?

Cattle, Sheep & Hogs

Reading Graphs

Objectives:

- Participants will identify four different animals important to SD agriculture today.
- Participants will read graphs for information.
- Participants will create their own graph.

South Dakota Math Standards

K	1st	2nd	3rd	4th	5th	6th
	1.S.1.2	2.S.1.3	3.S.1.1 3.S.1.2	4.S.1.1	5.S.1.1	6.S.1.2

Timeframe: 30-45 minutes

Materials:

Included in kit

4 animal inventory graphs
Reading Graphs worksheet

Provided by instructor/participants

graph paper
pencil
colored pencils or crayons

Activity Steps:

1. Give each participant a copy of the Reading Graphs worksheet. Have several copies of the four graphs available for participants to use.
2. Working together as a group, in pairs, or as individuals have participants complete the worksheet and discuss:
 - Which worksheet answers were the hardest to find? Why?
 - Compare the million head and thousand head scales on the worksheets. Did having graphs with two different scales make answering the worksheet questions tricky?
3. Give each participant a sheet of graph paper. Have them choose either milk cows/sheep OR hogs/beef cows and graph the inventory for each for the year 2009. How high must their measuring scale go to make an accurate graph? Would it be possible to successfully graph an inventory done in thousands of head and one in millions of head on the same graph? Why or why not?

Name _____

Cattle, Sheep & Hogs Reading Graphs Worksheet

1. List the four animals inventoried in the graphs.

a. _____

c. _____

b. _____

d. _____

2. List the two graphs that are measuring animal inventories in millions of head of livestock:

a. _____

b. _____

3. List the two graphs that are measuring animal inventories in thousands of head of livestock:

a. _____

b. _____

4. The hog inventory in South Dakota was highest in what year? _____

5. The sheep inventory in South Dakota was lowest in what year? _____

6. About how many head of milk cows were there in SD in 1998? _____

7. Were there more beef cows or hogs in SD in 1991? _____

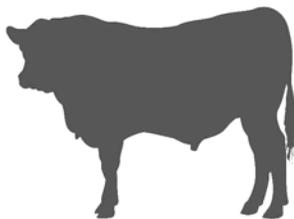
8. Were there more beef cows or dairy cows in SD in 1985? _____

9. What year were there 1.2 Million head of hogs in SD? _____

10. There were about 425 thousand head of sheep in SD during which four consecutive years?

a. _____ b. _____ c. _____ d. _____

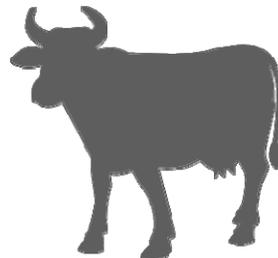
11. Write the year of the lowest inventory for each animal on their shape below:



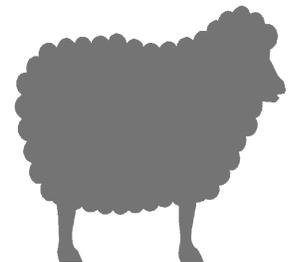
beef cow



hog



milk cow



sheep

Name _____

Cattle, Sheep & Hogs Reading Graphs Worksheet Key

1. List the four animals inventoried in the graphs.

a. milk cow

c. beef cow

b. hog

d. sheep

2. List the two graphs that are measuring animal inventories in millions of head of livestock:

a. hog

b. beef cow

3. List the two graphs that are measuring animal inventories in thousands of head of livestock:

a. milk cow

b. sheep

4. The hog inventory in South Dakota was highest in what year? 1991

5. The sheep inventory in South Dakota was lowest in what year? 2009

6. About how many head of milk cows were there in SD in 1998? 100,000

7. Were there more beef cows or hogs in SD in 1991? hogs

8. Were there more beef cows or milk cows in SD in 1985? beef cows

9. What year were there 1.2 Million head of hogs in SD? 1996

10. There were about 425 thousand head of sheep in SD during which four consecutive years?

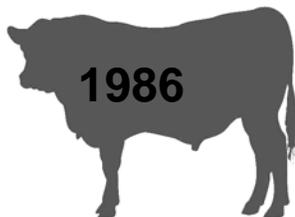
a. 1998

b. 1999

c. 2000

d. 2001

11. Write the year of the lowest inventory for each animal on their shape below:



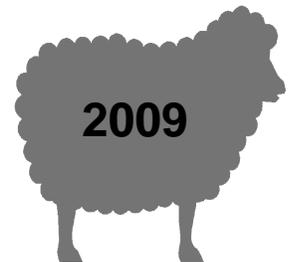
beef cow



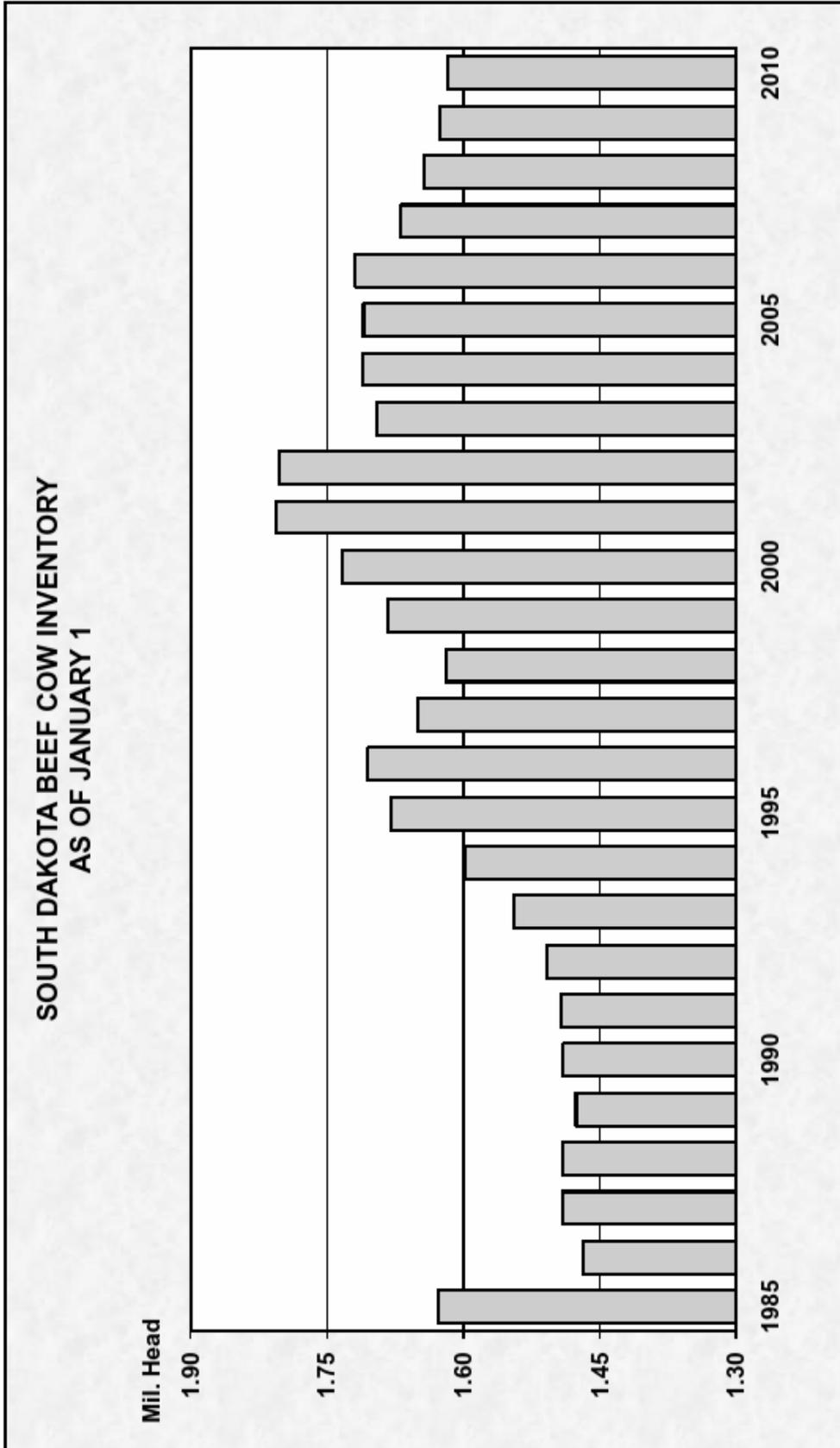
hog



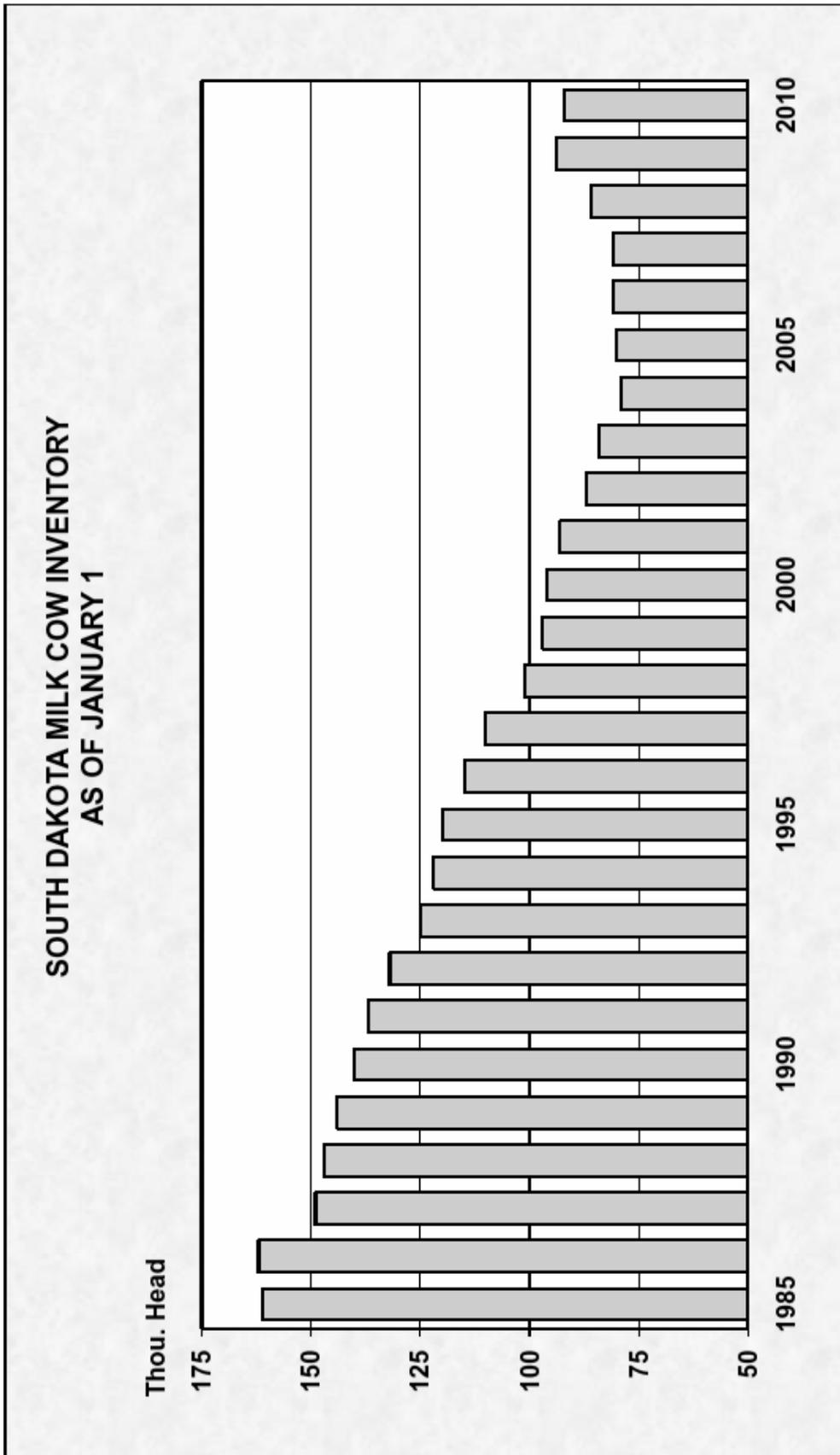
milk cow



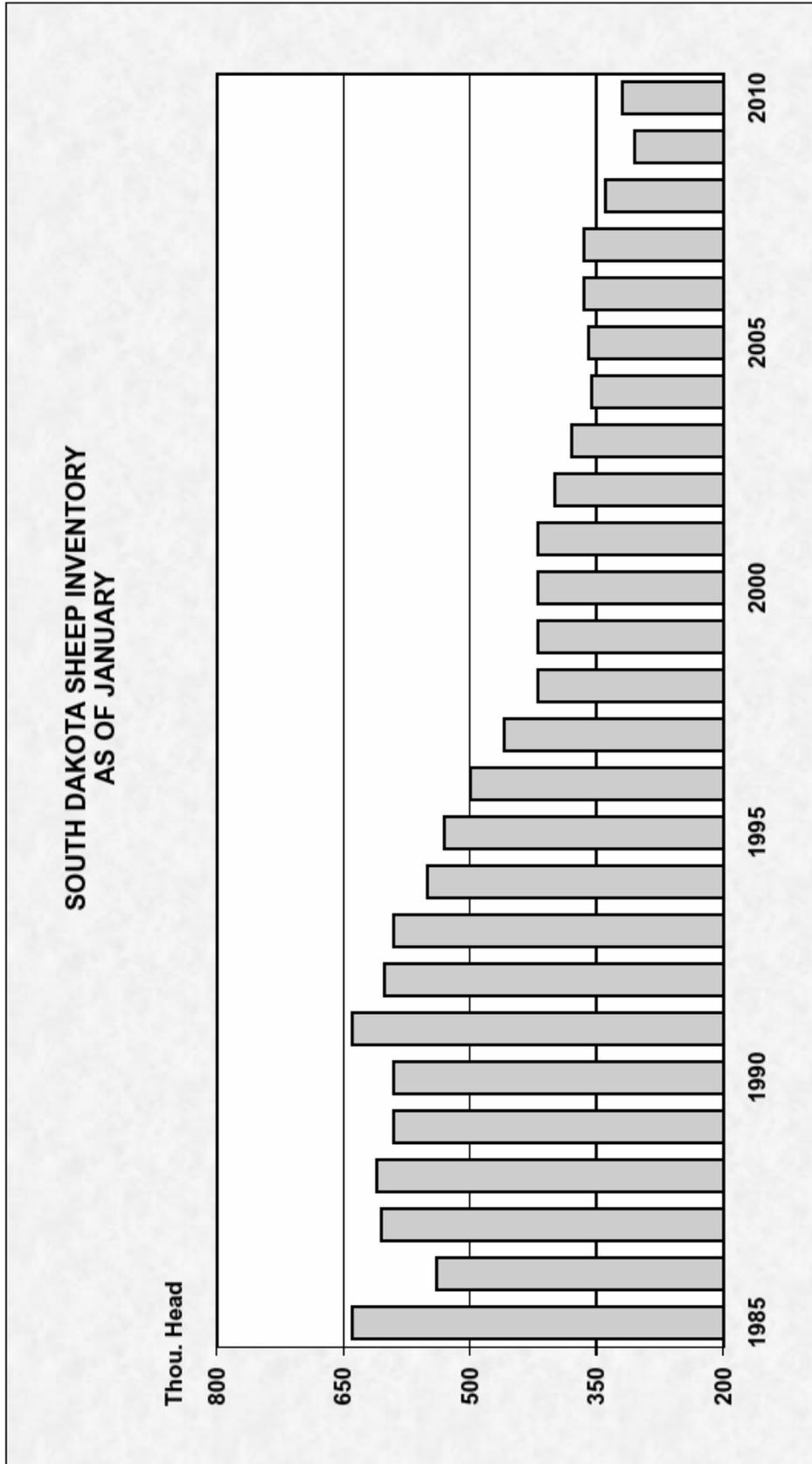
sheep



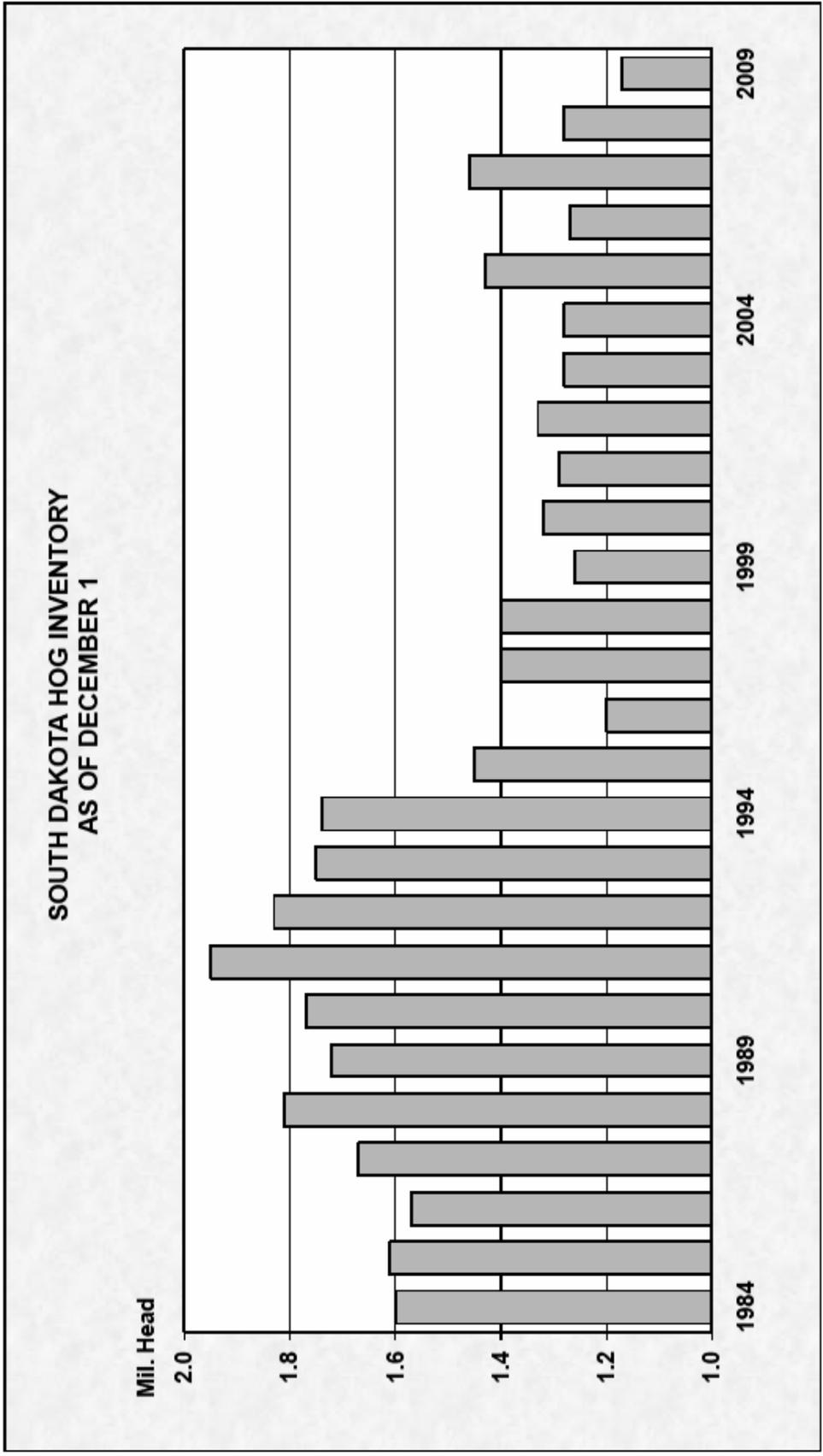
Source: USDA-NASS South Dakota Field Office - January 2010



Source: USDA-NASS South Dakota Field Office - January 2010



Source: USDA-NASS South Dakota Field Office - January 2010



Source: USDA-NASS South Dakota Field Office - January 2010

Great Grain Matchup

Objectives:

- Participants will identify eight grains grown in South Dakota.
- Participants will match grain samples to field photos of the crops.
- Participants will specify one use for each grain.

South Dakota Social Studies Standards

K	1st	2nd	3rd	4th	5th	6th
			3.E.1.1 3.E. 1.2			

South Dakota Science Standards

K	1st	2nd	3rd	4th	5th	6th
	1.L.1.1	2.L.1.1	3.L.1.1			

Timeframe: 30-45 minutes

Materials:

Included in kit

8 grain samples A-H

8 field photos

Background Information:

Agriculture is a vital part of South Dakota’s economy. Many people make a living raising crops and livestock. The environment of the state makes it possible to raise many different crops. Corn, wheat, and soybeans are widely produced. Other crops such as oats, sunflowers, milo, millet and safflowers are also raised in the state. Potatoes, melons, sweet corn and pumpkins grow in the state too. In this activity, participants will identify the seeds of eight grain crops and match the seeds to photos of the grains in the field. They will also identify at least one way the grain is used.

Activity Steps:

1. Set up the photos so participants can view all of them easily.
2. Pass one grain sample around so the participants can get a close look at it. Do not taste the sample! After everyone has seen the sample, have the group identify the grain if they know it.
3. Once the grain has been identified, have the group look over the photos and choose the field that matches the grain. (Each photo is identified on the back).
4. When the group has chosen a photo, turn the photo over and read the information about the grain on the back of the photo.
5. Continue with the other seven grain samples. Once all the samples have been identified and matched to a field photo, discuss:
 - Can participants identify one use for each of the grains? (on back of photos)
 - Do they know of other grains grown in the state? What are the grains used for?

Grain Samples:

A – Sunflowers

C – Safflowers

E – Milo or Sorghum

G – Wheat

B – Corn

D – Millet

F – Soybeans

H – Oats

Great Grains Field Photo Information

G. Sunflowers

Two types of sunflowers – oilseed and confectionery – are grown in South Dakota. South Dakota ranks second in sunflower seed and oil production in the United States.

- Confectionery sunflower seeds are the type we eat. They are also used in birdseed.
- Oilseed sunflower seeds make sunflower oil and are slightly smaller than confectionery sunflower seeds.

A. Corn

More than 4 million acres of corn are planted in South Dakota in an average year. It is used for:

- Livestock feed
- Ethanol
- Food sweetener (corn syrup)

E. Safflowers

Safflower is a thistle-like plant with seeds that look a bit like small white sunflower seeds. It is used for:

- Oil
- Birdseed

B. Millet

Two different types of millet are grown in South Dakota. The growing season for millet is much shorter than most grain crops.

- Foxtail millet is used for hay
- Proso millet is used as birdseed

C. Milo or Sorghum

Sorghum grows much like corn, but has a shorter growing season and does not get as tall.

- It is fed as grain to beef cattle
- Forage varieties grow taller and are cut, dried, and baled like hay

F. Soybeans

South Dakotans plant almost 4 million acres of soybeans each year. Soybeans are used for:

- Animal feed
- Shortening
- Printing ink

H. Wheat

South Dakota produces hard red winter wheat, hard red spring wheat, and durum wheat. In an average year, more than 3 million acres of wheat will be planted in South Dakota. Wheat is used for:

- Bread-making flour
- Pasta

D. Oats

South Dakota produces more than 50 million bushels of oats annually. It is used for:

- Animal feed
- Rolled oats or oatmeal



A.



B.



C.



D.



E.



F.



G.



H.

Stick Game

Objectives:

- Participants will identify common elements from the environment that can be used as game pieces.
- Participants will recognize playing games as a common practice across all cultures and time periods.
- Participants will design their own game pieces.

South Dakota Social Studies Standards

K	1st	2nd	3rd	4th	5th	6th
		2.US.1.2 2.US.2.1	3.E.1.1		5.US.1.1	6.E.1.1

South Dakota Communication Arts Standards

K	1st	2nd	3rd	4th	5th	6th
K.LVS.1.6	1.LVS.1.6	2.LVS.1.6	3.LVS.1.1	4.LVS.1.1	5.LVS.1.1 5.LVS.1.3	

South Dakota Mathematics Standards

K	1st	2nd	3rd	4th	5th	6th
K.A.4.2 K.N.3.1	1.N.3.1	2.N.3.1	3.A.2.2			

Timeframe: 45 minutes

Materials:

Provided by instructor or participants

3 popsicle sticks per participant
 blue and red crayons or markers
 paper
 pencil

Background Information:

Play is a common element shared by children in all environments and in time periods. Everybody plays. Simple objects often became toys and game pieces. Sticks, bones, leaves and rocks became playthings. In this activity, participants will create pieces for a toss-and-count game from popsicle sticks.

Activity Steps:

1. Give each participant 3 plain popsicle sticks. Have them decorate one side of two of the sticks using red. Decorate one side of the remaining stick using blue. They should end up with three plain sides, two red sides and one blue side on their sticks.
2. Divide the group into teams of two or three. Each team needs a sheet of paper and pencil to keep score.
3. Have team members take turns tossing the sticks in the air, letting them fall, and then adding up their points based on the following:

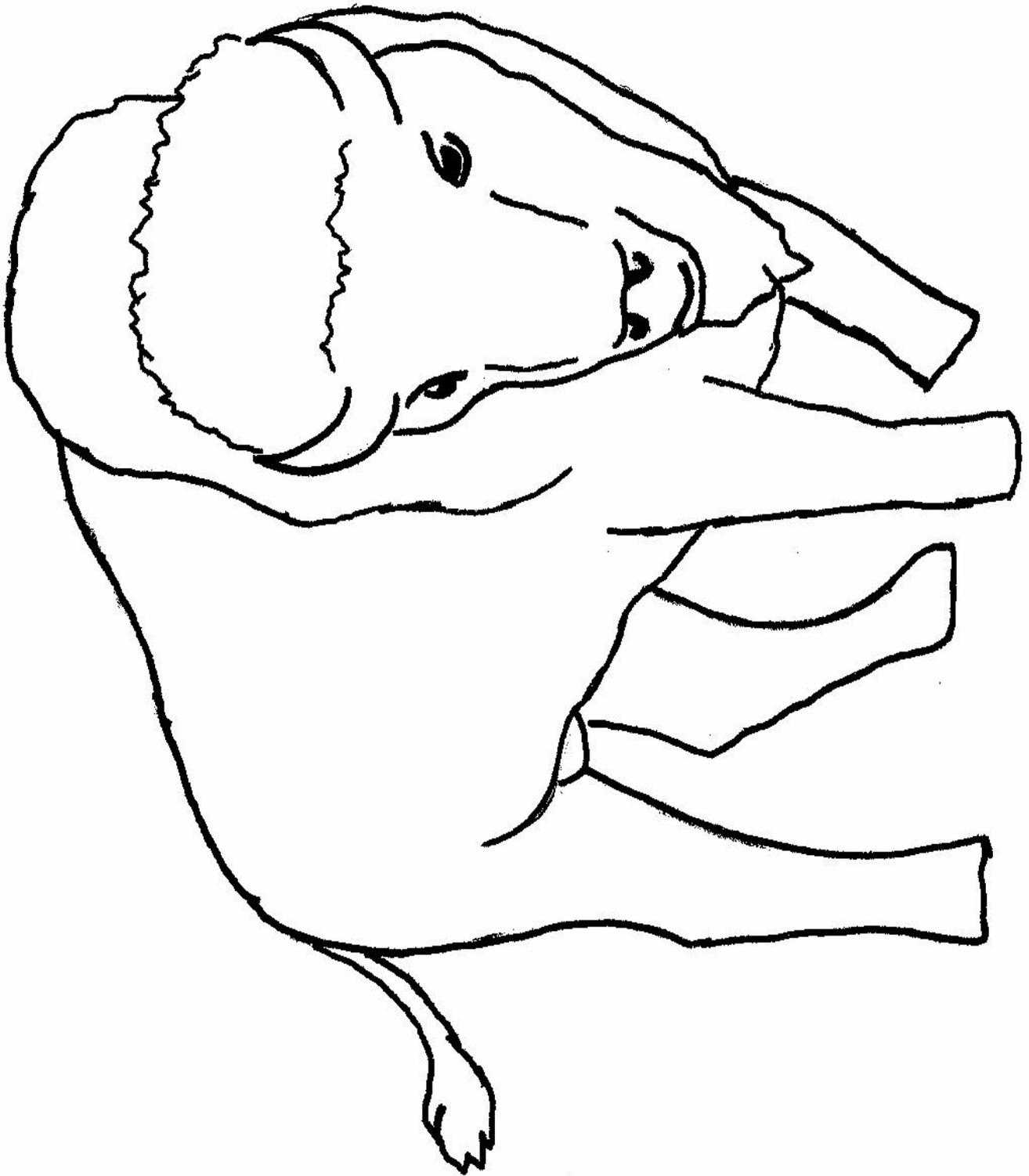
Red is a snake
Blue is a person

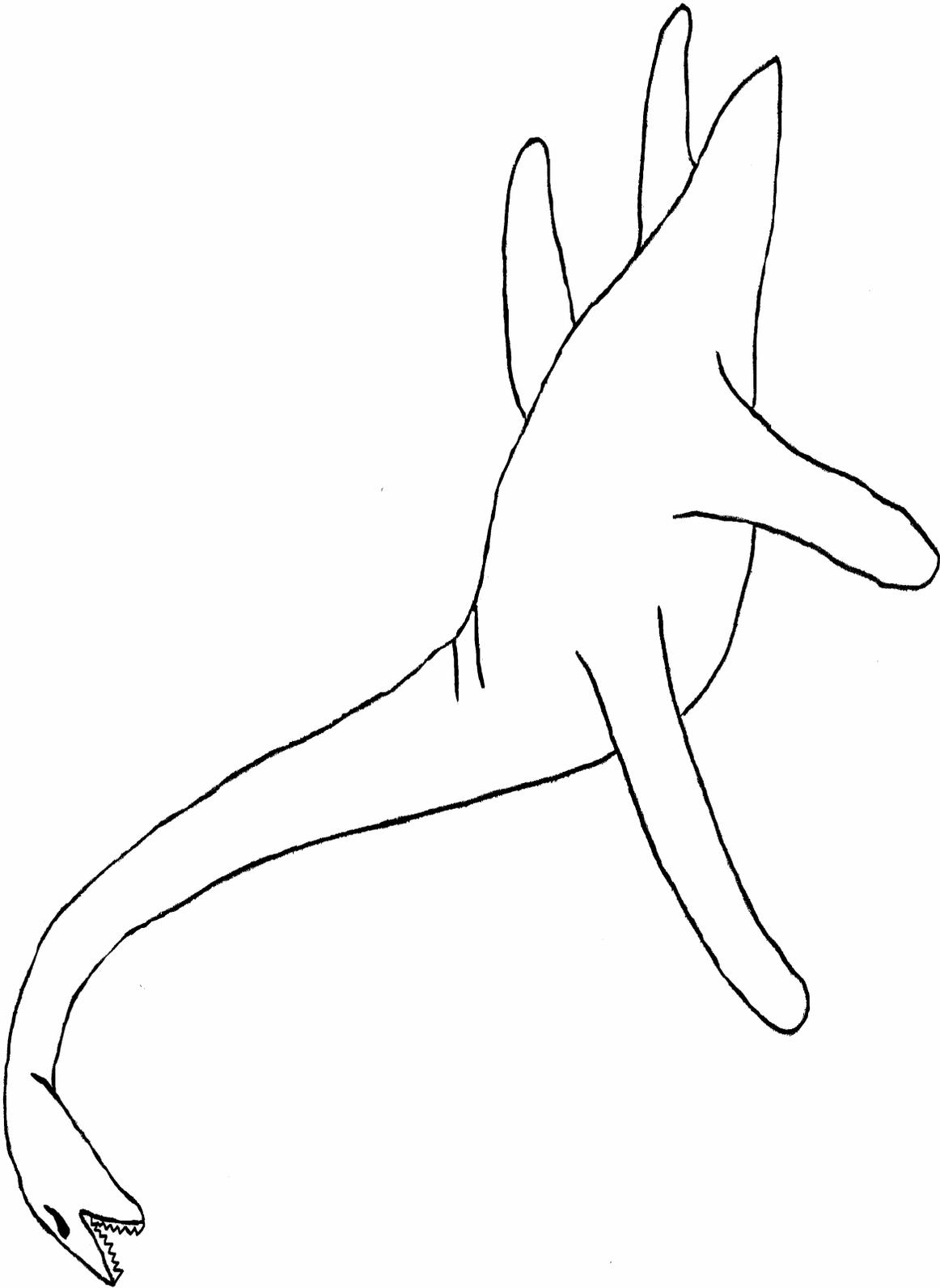
Toss	Points
all plain	3
2 snakes, 1 person	4
2 snakes, 1 plain	5
2 plains, 1 snake	6
1 plain, 1 snake, 1 person	1

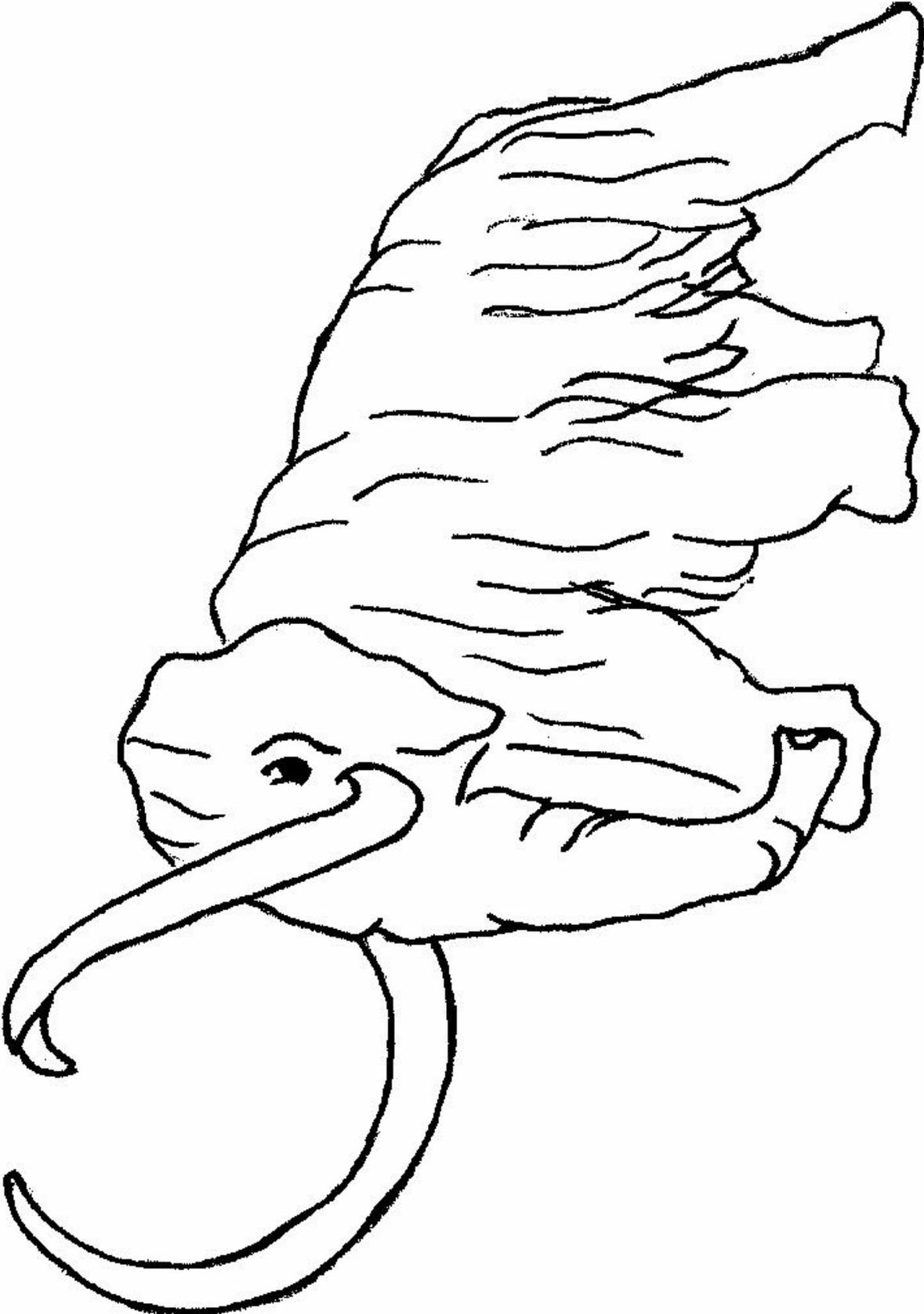
The game can continue until one player reaches a specific score, or played for a set amount of time.

4. After playing the game, discuss:

- What kinds of things might children of long ago used as toys?
- Can the group devise a different game that could be played with the popsicle sticks?
- What other materials in the classroom could be used to play a game?
- Do games have rules? Do all the players need to agree on the rules before playing? What happens if they don't agree?









South Dakota Environments
South Dakota State Historical Society Education Kit



