

From Shelter to Playing Fields

Oklahoma Sod

Objective

Students will read about the importance of sod in Oklahoma history and as an Oklahoma-grown product in today's economy. Students will complete math problems related to sod. Students will conduct experiments with a purchased roll of sod. Students will conduct an experiment to demonstrate the usefulness of sod in preventing soil erosion.

Background

Oklahoma is a grassland—short grass prairie in the west, tall grass prairie in the east and mixed grass prairie in the central part of the state. When the land was open for non-native settlement, settlers found an ocean of grass, with a thicker, tougher root structure than the grass we have in our lawns today. The grass roots were so thick and tough that the prairie sod could not be cultivated until the blacksmith John Deere invented a steel plow that could cut through it.

Our Oklahoma state grass is Indian Grass, which is native to the tall-grass prairie, along with big bluestem, little bluestem, and switchgrass. Two major short grasses were blue grama and buffalograss. In the mixed-grass prairie there were needle-and-thread grass, sideoats grams and western wheatgrass, along with many more species.

The thick, tough roots of prairie grass came in handy for settlers as they built their first homes. The prairie had few trees or other standard building materials, but sod from the thickly-rooted prairie grass was abundant.

The first step was clearing grass from a large area with a cutting plow drawn by mules, oxen or horses. The sod was cut in rectangular bricks that were 2 feet wide, 1 inch deep and 6 feet long. Construction involved stacking the bricks to form walls. If the sod bricks sat in the sun and dried, they would crumble, so settlers could only cut enough sod as could be used in one day. The sod was laid like bricks, in side-by side rows. Bricks were always laid with the grass side down so the roots would grow into the brick above and stabilize the structure. Three rows of sod would make a thick wall that could support the weight of the house. Seams between the sod bricks were staggered to keep the walls as tight as possible. Every third or fourth layer of sod was laid crosswise to bind the stacks together.

Windows were the most expensive part of a sod house and were difficult to install. After setting a wooden frame into the wall, the builder continued to lay rows of sod around it. When the bricks reached the top of the window frame the builder left off two layers of brick and laid a cedar pole over the gap. The resulting space, stuffed with grass or rags, protected the windows from breaking as the house settled.

For the roof, cedar poles held up layers of brush tied into bundles, along

Oklahoma Academic Standards

GRADE 3

Economics: 1,2,3.

Geography: 1E,2AB.

Oklahoma History: .3,12

Numbers & Operations: 1.1;

2.1,2,3,4,5,6,7,8; 3.1,2,3;

Algebra: 3,2.1,2; Geometry and Measurement: 1,2,3,7

Life Science.4-3,4. Earth

Systems: 3-1

Materials

one or more rolls of sod from a lawn supply store

aluminum baking pans

garden soil

grass seeds

clear cups

sprinkler watering can

math manipulatives (cuboid)

Vocabulary

abundant—possessing a large quantity
cedar— any of a genus of usually tall trees related to the pines and noted for their fragrant durable wood
climate— the average weather conditions of a particular place or region over a period of years
construction— the process, of building
consumer— a person who buys and uses up goods
cultivate— to prepare land for the raising of crops
erosion— the action or process of wearing away by the action of water, wind, or glacial ice
fertilize— to apply a substance used to make soil produce larger or more plant life
frame— an arrangement of parts that gives form or support to something
gap— a space or separation
install— to set up for use or service
insulated—separated from conducting bodies by means of nonconductors so as to prevent transfer of electricity, heat, or sound
interior— the internal or inner part of something
landscaper— someone who improves the natural beauties of a piece of land by grading, clearing, or gardening
lawn— ground covered with grass that is kept mowed
maintenance— the care of property or equipment
minimize— to make as small as possible
non-native— not born in a particular place or country
prairie— a large area of level or rolling grassland
precision— designed for very accurate measurement or operation
residential— of or relating to the place where people live
settle— to make one's home
sod— the grass-covered and herb-covered surface of the ground
standardized— to compare with or make agree with something set up by authority or by general consent as a rule for measuring or as a model
structure— something constructed
stucco— a plaster used to cover exterior walls or decorate interior walls
transport— to transfer or convey from one place to another
vulnerable— open to attack or damage

with mud, grass and more sod.

The resulting structure was a well-insulated but damp dwelling that was very inexpensive. Sod houses required frequent maintenance and were vulnerable to rain damage. Stucco or wood panels often protected the outer walls. Canvas or plaster lined the interior walls, and muslin sheets covered the ceiling to keep dirt from dropping into food or an occasional snake from falling onto the bed.

Oklahomans don't live in sod houses anymore, but our state is still a great place to grow grass for a variety of uses—lawns, golf courses, sports fields, etc. In residential construction, sod, or turfgrass, is sold to landscapers, home builders or home owners who use it to establish a lawn quickly to avoid soil erosion. Sod can be used to repair a small area of lawn, golf course, or athletic field that has died. Sod also cools the landscape, improves air and water quality, and prevents flooding by draining water.

Sod is grown on special sod farms. In 2014, Oklahoma had 48 farms, with 13,577 acres in sod production, according to the US Department of Agriculture (USDA). Nationwide there were 1,292 farms with 320,566 acres of sod in production.

Sod is usually grown locally (within 100 miles of the target market) to minimize both the cost of transport and also the risk of damage. Sod farms may have many varieties of grass grown in one location to best suit the consumer's use and preference of appearance.

Sod is usually harvested 10 to 18 months after planting, depending on the growing climate. On the sod farm it is fertilized, watered and mowed frequently and vacuumed to remove the clippings. It is harvested using specialized equipment, precision cut to standardized sizes. Sod is typically harvested in small square slabs, rounded rectangles, or two- by five-foot rolls.

Social Studies

1. Read and discuss background and vocabulary.
2. Students will use online or library resources to research and report back to the class on one of the following topics.
 - Find other parts of the world where sod was or still is used as a building material.
 - What native American tribes used sod to build houses?

Math

1. Hand out copies of the “Sod Math Problems,” included with this lesson, for students to solve.
2. Students will use math manipulatives to build their own sod houses.

Science

1. Contact a lawn supply business about purchasing 2- by 4-foot rolls of sodgrass. Use a garden spade or other sharp instrument to cut the roll into pieces
 - Provide each group with two or more pieces of the sodgrass roll.
 - Students will inspect the roll and record their observations.
 - Students will stack one piece of the roll on top of another, root side up.
 - Students will keep the sodgrass piece watered and observe the roots for several days to see if the roots from the bottom piece grow into the top piece.
 - Students will work in groups to design and conduct their own experiments with the sodgrass roll.
 - Students will present their experiments to the class.
2. Besides its use for beautifying lawns, sod is also useful for preventing erosion, especially on construction sites. Students will work in groups to conduct an experiment to demonstrate the usefulness of grass in preventing soil erosion.
 - For each group provide two aluminum baking pans with holes punched in the bottom, grass seed and garden soil. Students will conduct the following experiment:
 - Fill one baking pan with garden soil, scatter seeds on top, water and place in a sunny location.
 - Keep the grass watered and wait for it to grow.
 - When the grass has sprouted and filled the surface of the first pan, fill the second pan with garden soil and mix in water so the soil is just damp.
 - Tilt the two pans at an identical angle.
 - Set a catch pan at the end.
 - Use a sprinkler watering can to pour water over each of the pans, one at a time.
 - Pour the water you caught into a clear cup and let it sit.
 - Pour water into the other pan and repeat.
 - Students should observe that the water from the grassy pan has less soil than the one without grass.
 - Students will pull out a section of the grass to observe the roots.

Marshal McCully and Oklahoma’s Last Remaining Sod House

At one time thousands of sod houses dotted the plains of North America. Oklahoma’s only remaining sod house built by settlers is preserved within The Sod House Museum, near the town of Aline. Built by Marshal McCully in 1894, it was listed on the National Register of Historic Places in 1970.

McCully took part in the largest of Oklahoma’s land runs when the Cherokee Outlet opened for settlement at noon on September 16, 1893. Like most other settlers, McCully first lived in a one-room dugout, hollowed out of a ravine bank.

McCully hitched his team to an 18-inch sod plow and split the grass into long rows. Using a flat shovel, he chopped the rows into 18-inch lengths. He then laid the sod blocks like bricks to form the walls. To make the roof, McCully split poles from the few trees growing in the area and laid them across the top of the walls for rafters. Twelve inches of sod laid on the rafters completed the roof. Unlike many sod houses, McCully plastered the interior walls with alkali clay.



Additional Resources

ONLINE RESOURCES

Building a Sod House interactive quiz: <http://amhistory.si.edu/ourstory/f/sodhouse.html>

“There are No Renters Here: Homesteading in a Sod House,” Women of the West Museum, <https://theautry.org/explore/exhibits/sod/daily.html>

Sod House Math (Multiply and Divide)

For each of the problems below, write an equation and then solve it.

You are building a sod house measuring 20 feet by 10 feet. Your sod bricks are 1 foot wide, 3 feet long, and 4 inches deep. Your front wall will be 20 feet wide and 8 feet tall. Make a scale drawing of your wall with the correct number of bricks. Write an equation and solve each of the following problems.

1. If your bricks are 3 feet long, and your front wall will be 20 feet wide, how many bricks do you need for one row, if you lay the bricks end to end lengthwise? (Round off your answer to the nearest whole number.)
2. If your bricks are 4 inches deep (tall), how many rows of brick do you need to lay for the first foot?
one foot = 12 inches. $12 / 4 = 3$ rows
3. If your wall will be 8 feet tall, how many rows do you need to lay? (Use the answer from Question 2.)
4. How many bricks do you need total to build your front wall? (Use your answers from Questions 1 and 3.)
5. Sod house walls were built three deep in order to support the weight of the roof. Use your answer from Question 4 to decide how many bricks you would need to build a wall three deep.

Your front wall will also need space for a door and a window. Your door is 2 feet wide and 6 feet tall. Your window is 24" by 24." On your scale drawing, color in the correct number of bricks to represent your door and your window.

6. How many rows do you leave open for your door? (Use your answer from Question 1.)
7. How many rows do you leave open for your window? (Use your answer from Question 1.)

Name _____

Sports Field Math (Geometry)

Sod, or turf, is widely grown on sod farms for use on lawns, golf courses and sports fields.

For each of the following, use the dimensions provided to figure the perimeter and the area.

1. Sod is sometimes sold in 2- by 5-foot rolls

Perimeter: _____ Area: _____

2. Sod may also be sold in 450 square-foot pallets.

Perimeter: _____ Area: _____

3. There are approximately 3.3 pieces of grass per square yard, or 150 pieces per pallet. Pieces measure approximately 16"x24".

Perimeter: _____ Area: _____

4. A regulation football field is 360 feet long and 160 feet wide.

Perimeter: _____ Area: _____

5. A soccer field is a maximum 130 yards long and 100 yards wide.

Perimeter: _____ Area: _____

6. Mr. Johnson needs to buy sod for his front lawn. The lawn measures 36 by 45 feet.

Perimeter: _____ Area: _____

Make a scale drawing of a football field or a soccer field.

Sod House Math (Answers)

SOD HOUSE MATH (MULTIPLY AND DIVIDE)

You are building a sod house measuring 20 feet by 10 feet. Your sod bricks are 1 foot wide, 3 feet long, and 4 inches deep. Your front wall will be 20 feet wide and 8 feet tall. Make a scale drawing of your wall with the correct number of bricks. Write an equation and solve each of the following problems.

1. If your bricks are 3 feet long, and your front wall will be 20 feet wide, how many bricks do you need for one row, if you lay the bricks end to end lengthwise? (Round off your answer to the nearest whole number.)
 $20 \div 3 = 6.666$, rounded to 7
2. If your bricks are 4 inches deep (tall), how many rows of brick do you need to lay for the first foot?
one foot = 12 inches; $12 \div 4 = 3$ rows of brick
3. If your wall will be 8 feet tall, how many rows do you need to lay? (Use the answer from Question 2.)
 $3 \times 8 = 24$
4. How many bricks do you need total to build your front wall? (Use your answers from Questions 1 and 3.)
 $7 \times 24 = 168$
5. Sod house walls were built three deep in order to support the weight of the roof. Use your answer from Question 4 to decide how many bricks you would need to build a wall three deep.
 $168 \times 3 = 504$

Your front wall will also need space for a door and a window. Your door is 2 feet wide and 6 feet tall. Your window is 2 foot by 2 foot. On your scale drawing, color in the correct number of bricks to represent your door and your window.

6. How many rows do you leave open for your door? (Use your answer from Question 2)
1 foot = 3 rows \times 6 feet = 18 rows
7. How many rows do you leave open for your window?
1 foot = 3 rows \times 2 = 6

Sports Field Math (Geometry)

Sod, or turf, is widely grown on sod farms for use on lawns, golf courses and sports fields.

For each of the following, use the dimensions provided to figure the perimeter and the area.

1. Sod is sometimes sold in 2- by 5-foot rolls

Perimeter: 14 feet

Area: 10 feet

2. Sod may also be sold in 450 square-foot pallets.

Perimeter: 900 feet

Area: 450 square feet

3. There are approximately 3.3 pieces of grass per square yard, or 150 pieces per pallet. Pieces measure approximately 16"x 24".

Perimeter: 80 inches

Area: 384 square inches

4. A regulation football field is 360 feet long and 160 feet wide.

Perimeter: 1040 feet

Area: 57,600 square feet

5. A soccer field is a maximum 130 yards long and 100 yards wide.

Perimeter: 460 yards

Area: 13,000

6. Mr. Johnson needs to buy sod for his front lawn. The lawn measures 36 by 45 feet.

Perimeter: 162 feet

Area: 1,620 square feet

Make a scale drawing of a football field or a soccer field.