



The Book Planter



Ag in the Classroom

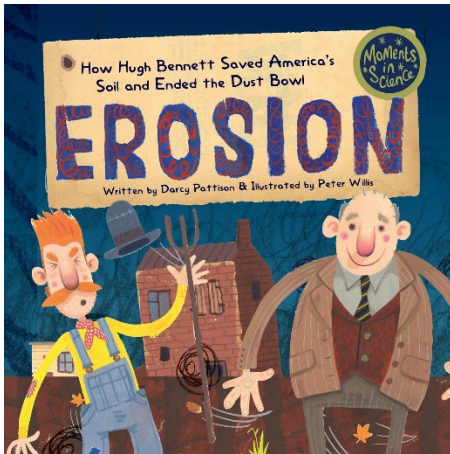
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July 2022

Erosion: How Hugh Bennett Saved America's Soil and Ended the Dust Bowl

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When the dust storms of the 1930s threatened to destroy U.S. farming and agriculture, Hugh Bennett knew what to do. For decades, he had studied the soils in every state, creating maps showing soil composition nationwide. He knew what should be grown in each area, and how to manage the land to conserve the soil. He knew what to do for weathering and erosion.

To do that, he needed the government's help. But how do you convince politicians that the soil needs help? Hugh Bennett knew what to do. He was waiting for the wind.

This is the exciting story of a soil scientist confronting politicians to encourage them to pass a law to protect the land. When the U.S. Congress passed a law establishing the Soil Conservation Service, it was the first government agency in the world dedicated to

protecting the land, to protecting the Earth.

Did You Know?¹

- Dust storms from the Dust Bowl built up static electricity between the ground and airborne dust causing blue flames to leap from barbed wire fences.
- 1 tablespoon of soil has more organisms in it than there are people on earth.
- Only about 1% of soil microorganisms have been identified.
- Hugh Bennett graduated from the University of North Carolina in 1903, and started working for the U.S. Department of Agriculture.

Vocabulary^{1,2}

Conservation tillage: farming methods that reduce the intensity or frequency of tilling in order to maintain some ground cover throughout the year and disturb the soil as little as possible while still providing the conditions needed to grow a productive crop.

Contour plow: a method of plowing that follows the contours of the land to minimize soil erosion—going across a hill versus up and down.

Crop rotation: the practice of growing different crops on the same land or in the same area across a sequence of growing seasons.

Drought: a long period of time in which there is very little or no rain.

Erosion: the process by which the surface of the earth is worn away by the action of water, glaciers, winds, waves, and other natural forces.

Graze: to feed on grass.

Natural Resources Conservation Services (NRCS): (the modern-day Soil Conservation Service) provides financial and technical assistance to help farmers implement conservation practices.

Soil: the part of Earth's surface that includes ground up rock and organic matter like leaves.

Soil conservation: using land in a way that protects it while also making it productive.

Strip cropping: method of farming which involves cultivating a field partitioned into long, narrow strips which are alternated in a crop rotation system.

Terrace steep: the side of a hill that has flat areas (like steps cut into it), where crops or other plants can be grown.

Interest Approach – Engagement²

1. Introduce the topic to your students by sharing the information in the *Background Agricultural Connections* (attached). Use the video [Dirt: Secrets of the Soil-Dust Bowl](#) to show students scenes from the Dust Bowl and illustrations of soil **erosion**.
2. Read *Erosion: How Hugh Bennett Saved America's Soil and Ended the Dust Bowl* by Darcy Pattison to illustrate the connection between literature and history. Ask the students to identify if this is a fiction or nonfiction story.

After Reading Discussion Questions

1. Why is soil important to life?
2. What do we depend on soil for?
3. Who was Hugh Bennett? Why do you think his nickname was "Big Hugh?" Are there details in the book that might explain why this was his nickname?
4. What happened in the U.S. in the 1930s? What states were affected by these events?
5. What is the Dust Bowl?
6. What caused the Dust Bowl?
7. What types of safety measures did people take during the Dust Bowl?
8. Why was Big Hugh the only person knowledgeable about soil?
9. What happened that finally convinced Congress that the Dust Bowl was a problem?
10. What was the outcome?

Activity 1: Soil Stories²

1. Divide the class into five groups (alternatively, this activity may be conducted individually).
2. Provide each group with a different [Dark Days Activity Sheet](#).
3. Instruct groups to study and discuss the photographs. Explain that they are going to use the pictures to create a story. The attached photos show the following scenes:
 - **Dark Days—1:** Black Sunday
 - **Dark Days—2:** a farm in Oklahoma
 - **Dark Days—3:** before and after scenes in Grantsville, Utah
 - **Dark Days—4:** a "dust fence" in Grantsville
 - **Dark Days—5:** a haystack full of dust in Grantsville
4. Tell the students that they will have 5 minutes to develop a partial story line about their photograph. One group member should record the group's thoughts, and the group should condense those thoughts into one sentence. Encourage students to write clear sentences that others will be able to understand.
5. After five minutes, each group should write its final sentence in the space provided on the activity sheet and pass the sheet to another group.

6. Each group should study the photograph on their new activity sheet, read the unfinished story line, and then develop the story one step further. A new recorder should condense the second plot development into another sentence. Instruct groups to choose a new recorder each time so everyone has the opportunity to assist in the writing process.
7. When each photograph and story line reaches its last group, ask students to bring the stories to some type of closure.
8. Have one person in each group stand up and read one of the final stories out loud.
9. Discuss the pictures and the impact they had on the tone of the stories. Discuss the way the stories were completed. Were students happy with the twists that stories took as they passed from group to group?

Activity 2: What's Your Soil Story?²

1. Find an illustrative, local example of soil erosion. Any example will work— it may be erosion from construction, agriculture, mining, etc. Your local Soil Conservation District office or your local Cooperative Extension office (contact information for North Carolina Extension can be found at <https://www.ces.ncsu.edu/> and <https://www.ncat.edu/caes/cooperative-extension/>) may be able to help. Consider asking them to visit your class or to provide you with pictures of erosion that has occurred on a local site. You may also take local erosion pictures of your own or conduct the activity as a field trip.
2. Divide the class into groups or use the same groups as in **Activity 1: Soil Stories**.
3. For the local erosion example given, ask each group to determine:
 - How the soil erosion might have occurred?
 - What the soil texture might have been (if possible, bring in a sample from the area)
 - How the erosion could have been prevented
 - What, if anything, is being done to reduce erosion on the site?
4. One person in each group should record the group's response for each question. This will be their report.
5. Ask a spokesman from each group to share the group's report on the site. Compare reports from the groups by constructing a chart of factors and possibilities. The four questions are the factors, and the possibilities are the groups' answers or responses. See the [Example Factors & Possibilities Chart](#).
6. When all the possibilities are listed, ask students to vote individually on which possibility they think is most likely for each factor or question. They do not have to vote for their own group's possibility.
7. Once the votes are tallied, ask a local expert to elaborate on the questions or explain to your students what an expert told you about the given erosion site. Were the class conclusions correct?
8. Discuss similarities and differences between the local erosion example and the erosion associated with the Dust Bowl. Is another Dust Bowl possible?

Activity 3: Dirt Shake³

1. Divide the students into groups of three or four. Provide each group with a soil sample or instruct each group to use one of the samples brought from home. Two notes:
 - This activity will not work with most potting soil. Soil texture is an evaluation of the mineral component of soil; potting soil is mostly organic matter.

- Remove rocks, roots, and anything else that is clearly not soil from samples and break up any large clumps before beginning.
2. Provide each group with a quart jar. Instruct the students to place 2" to 4" of soil into the jar, measure the level of soil, and record the measurement as "total soil." It's important to measure and record the depth you start with so that you can accurately estimate the sand, silt, and clay fractions.
 3. Add water until the jar is two-thirds to three-fourths full. Add one teaspoon of alum (found on the spice aisle of most grocery stores; it does help the soil settle faster, but is not necessary). Be sure the lid is tight.
 4. Shake the jar vigorously until all the particles have been separated by the water, about two minutes. Set the jar down, and allow the soil to settle.
 5. After 1 minute, measure the amount of soil on the bottom of the jar. Record this measurement and label it as the "sand fraction." Share the [Dirt Shake](#) and [Soil Texture Triangle Handouts](#) with the students.
 6. Allow the sample to settle for 3 to 4 hours, then measure again and record the level. This second layer indicates the silt fraction of your soil.
 7. The remaining clay particles may take as long as a week to settle depending on the composition of the sample. However, you can use the measurements you already have to determine the amount of clay in the soil. Simply subtract the combined sand and silt measurements from the total soil measurement as shown below. Organic matter will float on the surface of the water. Generally, it is a small component that won't affect your measurements, but if there is a floating organic layer large enough to measure, subtract its measurement from the total soil before calculating the clay fraction and before moving on to calculate percentages.
 - Total soil = 2"
 - Sand fraction (first layer) = 1"
 - Silt fraction (second layer) = 1/2"
 - Clay fraction (total soil - sand + silt) = 1/2"
 8. Now convert the measurements into percentages as shown here:
 - Sand percentage (sand/total soil x 100) = $(1 \div 2) \times 100 = 50\%$
 - Silt percentage (silt/total soil x 100) = $(1/2 \div 2) \times 100 = 25\%$
 - Clay percentage (clay/total soil x 100) = $(1/2 \div 2) \times 100 = 25\%$
 9. Once you know these percentages, use the [Soil Texture Triangle Handout](#) to determine the name of the soil type.
 10. Discuss the following questions:
 - Why do the larger particles settle out first?
 - What is the stuff floating in the jar?
 - How does each person's sample compare?



Quick Activities to Illustrate Erosion⁴

Question 1: Does plant matter affect the rate of erosion?

Materials:

- One potted plant
 - One pot similar in size to the potted plant, but filled with just soil
 - Water
1. Tilt both pots. Pour water onto the soil in each pot and observe what happens.
 2. Vary the amount of water and the speed of pouring and record your observations.
 3. Say to the students, “The plant and its root system will hold the soil in place. Without a plant, the dirt will be washed away.”

Question 2: Is erosion affected by how steep a slope is?

Materials:

- Rectangular pan
 - Mixture of soil, sand, and rocks
 - Water
1. Fill the rectangular pan with the mixture of soil, sand and rocks.
 2. Tilt the pan and pour water on it. Vary the amount of tilt.
 3. Ask students, “Does erosion occur faster when the slope is steeper?”
 4. Explain that the steepness of a slope can accelerate erosion. Ask, “Why do you think this happens?”

Writing Activities⁴

1. Big Hugh’s training made him a hero of the Dust Bowl. Think about the idea of heroes and heroism. Write an opinion essay: Can a scientist be a hero?
2. Big Hugh told a story about a drip from a barn roof. Read “Warning! The Story of a Drip” (back of the book) and look at the pictures of Providence Canyon State Park in Georgia. Write a poem about the drip and how it created such a large erosion canyon.
3. Look at the photos of the Dust Bowl in the book. Write a poem about what it would be like to experience a dust storm.



Links

- Dirt: Secrets of the Soil-Dust Bowl (video) (**Interest Approach – Engagement**)
<https://youtu.be/CKt-iaZ1P9g>
- *Dark Days Activity Sheet* (**Activity 1**)
https://cdn.agclassroom.org/media/uploads/2015/11/04/Dark_Days_activity_sheets.pdf
- *Example Factors & Possibilities Chart* (**Activity 2**)
https://cdn.agclassroom.org/media/uploads/2015/11/04/Example_Factors_Possibilities_Chart.pdf
- *Dirt Shake Handout* (**Activity 3**)
https://cdn.agclassroom.org/media/uploads/2015/10/20/Dirt_Shake.pdf
- *Soil Texture Triangle Handout* (**Activity 3**)
https://cdn.agclassroom.org/media/uploads/2015/10/20/Soil_Texture_Triangle.pdf

Other Educational Videos

- Hugh Hammond Bennett: The Story of America's Private Lands Conservation Movement (video)
<https://www.youtube.com/watch?v=G78ihulTx1k>
- History Brief: The Dust Bowl (video)
<https://www.youtube.com/watch?v=n-rBhbkvtn0>

Sources

1. <https://agclassroom.org/matrix/lesson/800/>
2. <https://agclassroom.org/matrix/lesson/373/>
3. <https://agclassroom.org/matrix/lesson/365/>
4. <https://www.patriciamnewman.com/litlinks-soil-scientist-as-hero/>

K-5 Subject Areas

Reading, Writing, Speaking and Listening, Science, and Social Studies

NC Standard Course of Study

Reading

- **RL.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RL.K.3** With prompting and support, identify characters, settings, and major events in a story.
- **RL.K.9** With prompting and support, compare and contrast the adventures and experiences of characters in familiar stories.
- **RL.1.1** Ask and answer questions about key details in a text.
- **RL.1.2** Retell stories, including key details, and demonstrate understanding of their central message or lesson.
- **RL.1.3** Describe characters, settings, and major events in a story, using key details.
- **RL.1.9** Compare and contrast the adventures and experiences of characters in stories.
- **RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RL.3.3** Describe characters in a story and explain how their actions contribute to the sequence of events.
- **RL.4.3** Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text.
- **RI.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RI.K.2** With prompting and support, identify the main topic and retell key details of a text.
- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **RI.1.1** Ask and answer questions about key details in a text.
- **RI.1.2** Identify the main topic and retell key details of a text.
- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.3.2** Determine the main idea of a text; recount the key details and explain how they support the main idea.
- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.2** Determine the main idea of a text and explain how it is supported by key details; summarize the text.
- **RI.4.5** Describe the overall structure of events, ideas, concepts, or information in a text or part of a text.
- **RI.4.7** Interpret information presented visually, orally, or quantitatively and explain how the information contributes to an understanding of the text in which it appears.
- **RI.5.2** Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question or to solve a problem efficiently.
- **RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably

Writing

- **W.K.5** Participate in shared investigation of grade appropriate topics and writing projects.
- **W.K.6** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- **W.1.5** Participate in shared research and writing projects.
- **W.1.6** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- **W.2.5** Participate in shared research and writing projects.
- **W.2.6** Recall information from experiences or gather information from provided sources to answer a question.
- **W.3.2** Write informative /explanatory texts to examine a topic and convey ideas and information clearly.
- **W.3.5** Conduct short research projects that build knowledge about a topic.
- **W.3.6** Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
- **W.4.2** Write informative /explanatory texts to examine a topic and convey ideas and information clearly.
- **W.4.5** Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- **W.5.2** Write informative /explanatory texts to examine a topic and convey ideas and information clearly.

- **W.5.5** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

Speaking and Listening

- **SL.K.1** Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
- **SL.K.2** Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
- **SL.K.3** Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
- **SL.K.4** Speak audibly and express thoughts, feelings, and ideas clearly.
- **SL.K.5** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.1.1** Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- **SL.1.2** Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
- **SL.1.3** Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
- **SL.1.4** Produce complete sentences to describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.
- **SL.1.5** Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.
- **SL.2.1** Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
- **SL.2.2** Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
- **SL.2.3** Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
- **SL.2.4** Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent and complete sentences.
- **SL.3.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.3.2** Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.3.3** Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- **SL.3.4** Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly in complete sentences at an understandable pace
- **SL.4.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.4.2** Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.4.3** Identify the reasons and evidence a speaker provides to support particular points.
- **SL.4.4** Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; adjust speech as appropriate to formal and informal discourse.
- **SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.5.2** Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.5.3** Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
- **SL.5.4** Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; adapt speech to a variety of contexts and tasks.

Science

- **K.P.2.2** Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc.) from which objects are made and how they are used.
- **K.E.1** Understand change and observable patterns of weather that occur from day to day and throughout the year.
- **1.E.2** Understand the physical properties of Earth materials that make them useful in different ways.
- **1.L.1.3** Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering).
- **1.L.2** Summarize the needs of living organisms for energy and growth.
- **2.E.1** Understand patterns of weather and factors that affect weather.
- **3.E.2** Compare the structures of the Earth's surface using models or three-dimensional diagrams.
- **3.L.2** Understand how plants survive in their environments.
- **4.E.2.3** Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.
- **4.L.1.1** Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.
- **4.L.1.3** Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).

Social Studies

- **K.B.1.1** Identify cultural practices in local communities and around the world.

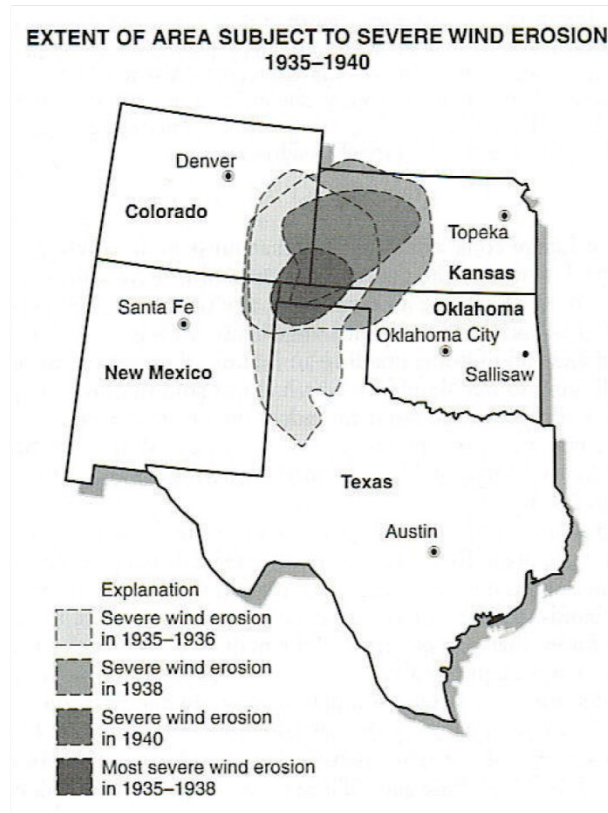
- **1.G.2.1** Explain ways people change the environment (planting trees, recycling, cutting down trees, building homes, building streets, etc.).
- **1.G.2.2** Explain how people use natural resources in the community.
- **2.G.1** Understand how interaction between humans and the physical environment is impacted by movement and settlement.
- **EX.2.G.1** Use geographic representations and terms to describe surroundings.
- **3.H.1.3** Exemplify the ideas that were significant in the development of local communities and regions.
- **4.E.1.3** Explain ways in which factors of production are influenced by the availability of resources in North Carolina.

Math

- **2.MD.1** Measure the length of an object in standard units by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- **2.MD.10** Organize, represent, and interpret data with up to four categories.
- **3.OA.3** Represent, interpret, and solve one-step problems involving multiplication and division.
- **3.OA.6** Solve an unknown-factor problem, by using division strategies and/or changing it to a multiplication problem.
- **3.OA.7** Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10.
- **3.NF.1** Interpret unit fractions with denominators of 2, 3, 4, 6, and 8 as quantities formed when a whole is partitioned into equal parts.
 - Explain that a unit fraction is one of those parts.
 - Represent and identify unit fractions using area and length models.
- **3.NF.2** Interpret fractions with denominators of 2, 3, 4, 6, and 8 using area and length models.
 - Using an area model, explain that the numerator of a fraction represents the number of equal parts of the unit fraction.
 - Using a number line, explain that the numerator of a fraction represents the number of lengths of the unit fraction from 0.
- **3.NF.3** Represent equivalent fractions with area and length models by
 - Composing and decomposing fractions into equivalent fractions using related fractions: halves, fourths, and eighths; thirds, and sixths.
 - Explaining that a fraction with the same numerator and denominator equals one whole.
 - Expressing whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
- **4.NF.1** Explain why a fraction is equivalent to another fraction by using area and length fraction models, with attention to how the number and size.
- **4.NF.4** Apply and extend previous understandings of multiplication to:
 - Model and explain how fractions can be represented by multiplying a whole number by a unit fraction, using this understanding to multiply a whole number by any fraction less than one.
 - Solve word problems involving multiplication of a fraction by a whole number.
- of the parts differ even though the two fractions themselves are the same size.
- **5.OA.2** Write, explain, and evaluate numerical expressions involving the four operations to solve up to two-step problems. Include expressions involving:
 - Parentheses, using the order of operations.
 - Commutative, associative and distributive properties.
- **5.NF.3** Use fractions to model and solve division problems.
 - Interpret a fraction as an equal sharing context, where a quantity is divided into equal parts.
 - Model and interpret a fraction as the division of the numerator by the denominator.
 - Solve one-step word problems involving division of whole numbers leading to answers in the form of fractions and mixed numbers, with denominators of 2, 3, 4, 5, 6, 8, 10, and 12, using area, length, and set models or equations.

Background Agricultural Connections – Dust Bowl²

Dust Bowl describes both a time and a place. The dust bowl region of the United States covers the southern portion of the Great Plains, including parts of Texas, Oklahoma, New Mexico, Colorado, and Kansas. But Dust Bowl—with a capital *D* and *B*—refers to the time during the 1930s when drought, prairie winds, and poor land use practices combined to make life in this region miserable and farming nearly impossible.



In the early 1900s, gas-powered tractors enabled farmers to cultivate millions of acres and enjoy bountiful harvests. In the southeastern Great Plains, farmers used the newly invented steel plow to dig up acres of perennial prairie grasses and plant annual crops like wheat. When the economy declined in the late 1920s, farmers were forced to cultivate more land to pay their bills. Poorer quality land was tilled, and conservation practices were abandoned to reduce costs. Few recognized that they were setting the stage for mass erosion. In 1930, farmers tilled

and planted their fields, but the rains never came, so their crops didn't grow. The **drought** continued through the 1930s, leaving acres of dry soil vulnerable to the wind with no plant cover to hold it in place.

On Sunday afternoon of April 14, 1935, clouds of dust moved through the southern Great Plains and turned the sky black. People had to cover their noses and mouths so they could breathe. The day would go down in history as Black Sunday. Robert E. Geiger was a writer for the Associated Press who visited the area during that time. In a series of firsthand articles for the *Washington Evening Star*, Geiger described “pelting winds full of topsoil” and was the first to call the area the “Dust Bowl.”

During this same time, Utah had its own centers of soil erosion. Grantsville, located in the heart of the Tooele Valley, suffered dust storms that caused economic and ecological problems similar to those of the Great Plains. Grantsville residents recall the 1930s as dark and dirty. When the Tooele Valley was first settled in 1847, abundant grass covered

the valley floor, and the valley quickly became one of the most popular winter **grazing** areas in the west. Large outside trail herds, making their way to Idaho and Nevada, traveled across the valley, lingering to pick up any available feed. Slowly, the grass disappeared and sagebrush took its place. Overgrazing stunted and scattered the sagebrush until what was once a range of plenty became almost barren.

From time to time, brush fires swept through Tooele Valley, destroying what little perennial vegetation was left. Residents of the valley needed to increase their income. They plowed up many acres that, without irrigation, couldn't yield crops on the yearly rainfall of 12 inches or less. The wind whipped up small dust clouds, sending them into the city. Then came drought, and that was a recipe for ecological disaster. Suffering from the catastrophe was not confined to Grantsville. Soil from the Tooele Valley settled as far away as Salt Lake City, Ogden, and Logan. Even Idaho got some of Utah's dust.

In the case of both dust bowls, government actions helped reverse the situation. The Soil Conservation Service (SCS), a special branch of the United State Department of Agriculture that is called the **Natural Resources Conservation Service (NRCS)** today, was created and went to work. The SCS used carefully planned conservation methods to restore grasses and helped farmers implement techniques like **conservation tillage** to reduce erosion. Local Soil Conservation Districts were established, which still promote conservation on public and private lands today. As vegetation was restored, farmers and ranchers moved back onto the land. Using improved farming and grazing management practices, agriculture has returned to the Tooele Valley and the Great Plains.

The Dust Bowl is now remembered as one of the worst environmental tragedies in US history. Drought has returned to the dust bowl region over the years, but farmers are prepared. Crop farmers plant wind breaks and use conservation tillage techniques to protect the soil. Suboptimal lands are not used to cultivate annual crops. Ranchers move quickly to remove livestock and preserve as many plants as possible on the range. Livestock can graze on rangelands if they are managed properly, arid lands can be used for agriculture with conservation techniques, and we can learn from our mistakes!

Dark Days—1

Write a story about the photograph below.



Photo by G.L. Risen, Haskell Pruette Collection, courtesy of Oklahoma Historical Society, 207790.ST.DU.1.4.

1. _____

2. _____

3. _____

4. _____

5. _____

Dark Days—2

Write a story about the photograph below.



Photo by B.C. McLean, Edd Roberts Collection, courtesy of Oklahoma Historical Society, 20778.AG.SCS.OKLA.197.

1. _____

2. _____

3. _____

4. _____

5. _____

Dark Days—3

Write a story about the two photographs of the same landscape pictured below.



*Grantsville, Utah, 1935
Courtesy of Grantsville Soil Conservaiton District*



*Grantsville, Utah, 1937
Courtesy of Grantsville Soil Conservation District*

1. _____

2. _____

3. _____

4. _____

5. _____

Dark Days—4

Write a story about the photograph below.



Photograph courtesy of Granstville Soil Conservation District.

1. _____

2. _____

3. _____

4. _____

5. _____

Dark Days—5

Write a story about the photograph below.



Photograph courtesy of Grantsville Soil Conservation District.

1. _____

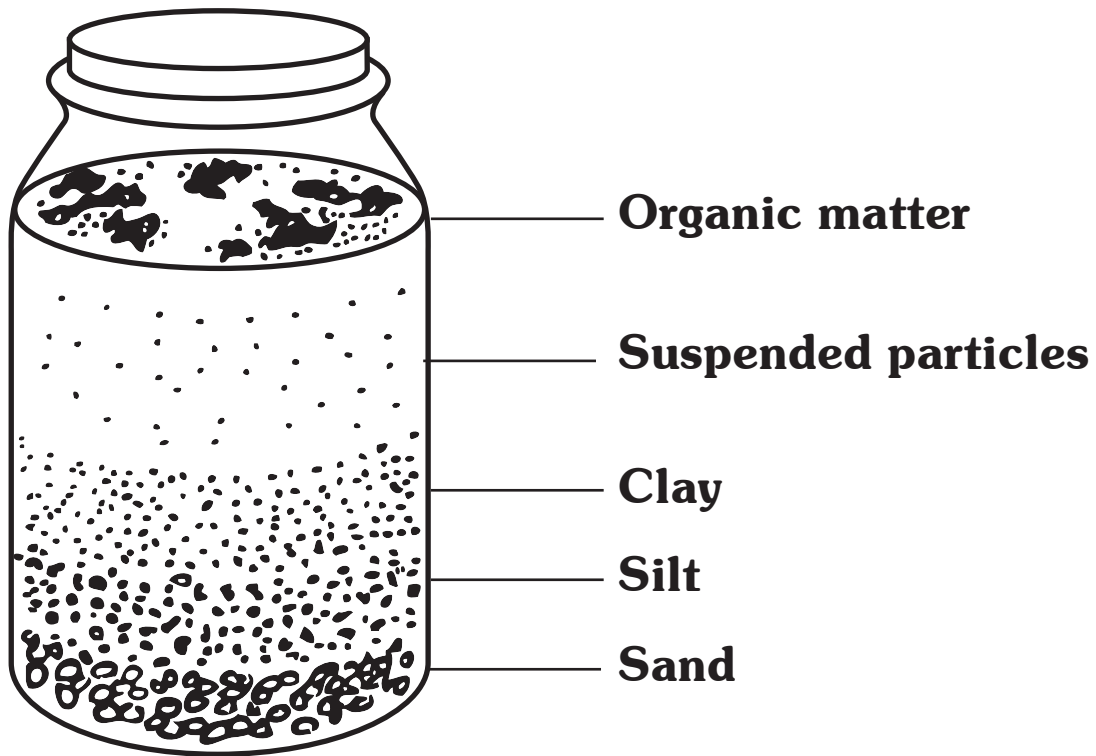
2. _____

3. _____

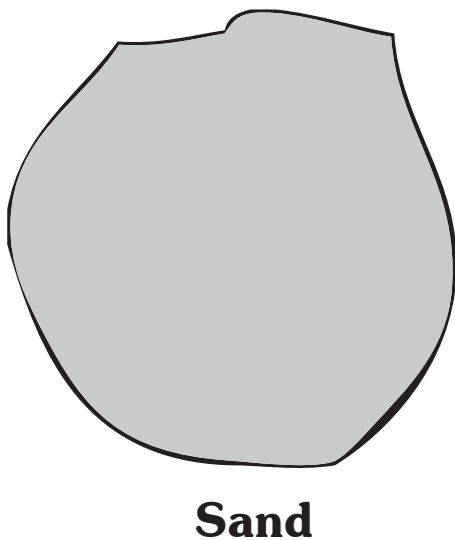
4. _____

5. _____

Dirt Shake



Particle Size



This illustration shows relative particle sizes of sand, silt, and clay. Silt and clay cannot be seen with the naked eye, but sand can.



Soil Texture Triangle

To find the texture of your soil, read percentages of sand, silt, and clay in the direction of the arrows at the sides. For example, a soil with 20% clay and 40% each of sand and silt is a loam.

