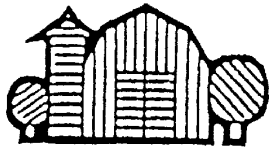
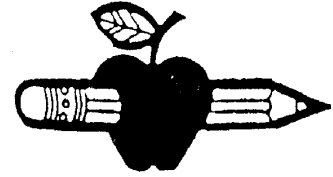


COUNTRY

to



Classroom



Natural Resources



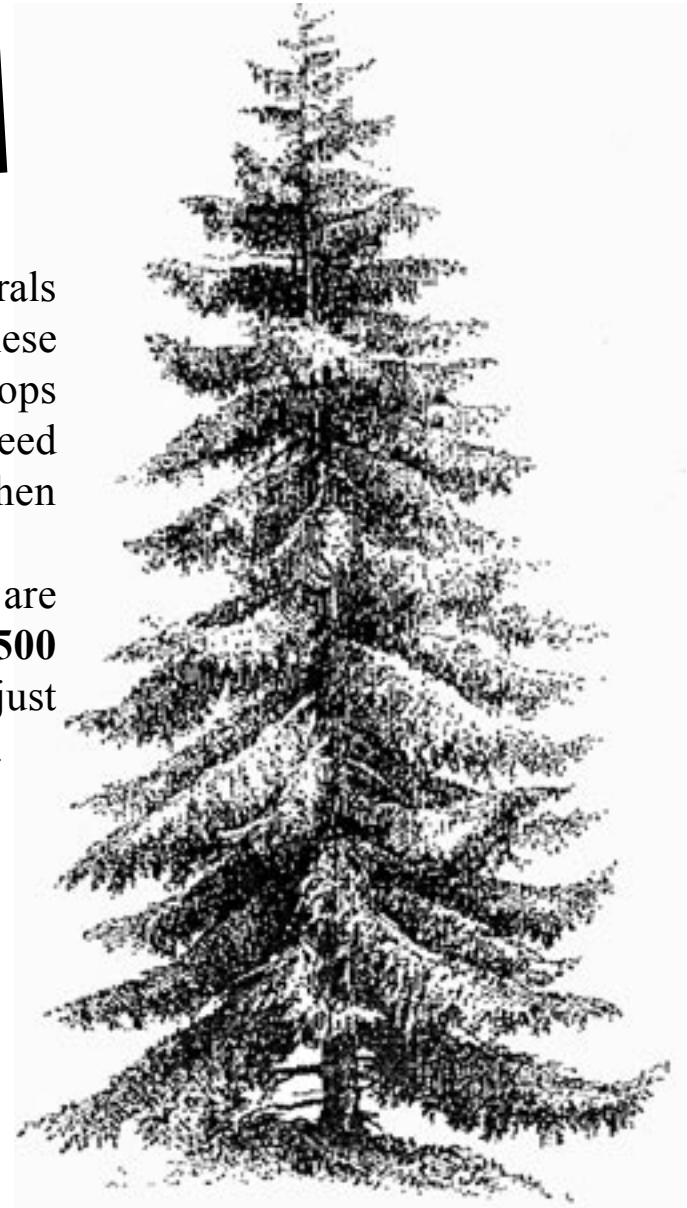
**Exploring Soil,
Water and
Conservation**



What Are Natural Resources?

Natural resources include soil, water, sunlight, fresh air, minerals and natural vegetation including range grassed and forests. These natural resources are needed to produce agriculture products. Crops grow in fertile soil and adequate water and sunlight. Livestock need fresh, clean water, air and food. Forests are harvested for timber then replanted.

These natural resources are not endless. Farmers and ranchers are limited by existing supplies. Soil can be regenerated, but it takes about **500 years to form one inch of topsoil**. An inch of topsoil can wash away in just one afternoon if it isn't protected against strong rain and wind storms.



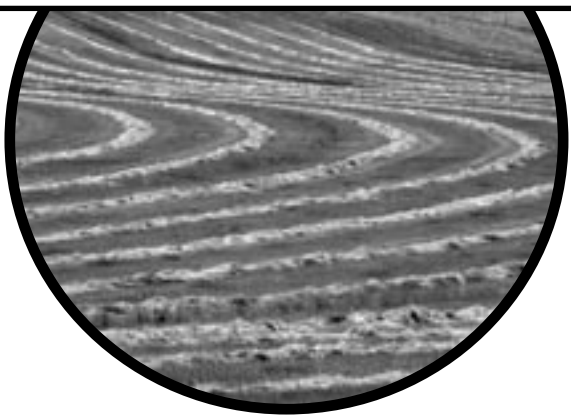
Did you know?

Our states' name is from an Indian word meaning "land of vast plains". This is a good name for our state because Wyoming is the ninth largest and least populated state. Almost 80% of Wyoming is covered with grasses and semidesert shrubs. About 70% of the state's land area is used for grazing livestock. Wyoming is responsible for the production of some of the sheep, lambs, and beef cattle in the United States.

Modern Argriculture Conserves Resources in Many Ways

Plants protect soil from erosion - less erosion means less water pollution

Contour farming is used on steep hillsides to keep soil from washing away. Almost 26 million acres in the United States are managed by contour farming.



Windbreaks are rows of trees and hedges which protect fields from wind which can blow soil away! American farmers have planted over 170,000 miles of windbreaks and plant thousands more each year.



Forested areas are important to all of us. Thinning the forests properly helps to keep them healthy, provides lumber for our use, and improves wildlife habitat. It is important to keep steep hillsides in trees rather than clearing for cropland. Do you know why?

List five products we get from wood: _____



Grazing pastures and rangeland is beneficial. Keeping and improving good native grass cover is an important conservation practice, and keeps livestock and wildlife well fed. Cattle and sheep are good at recycling. They eat the grass and convert it into food and nonfood products for us to use.



List three food products we get from cattle and sheep: _____

List three non-food products we get from cattle and sheep: _____

Some areas in Wyoming do not grow very much vegetation because of the poor soil and lack of rain. These areas usually have more erosion than places with good plant cover. Have you seen some areas like this?

Riparian areas are the lands along the water areas. A good riparian area has grasses, shrubs, trees and other vegetation. This vegetation provides food and shelter for wildlife and livestock. It also filters the water and helps to keep soil from washing away.



A livestock rotation is used by ranchers to conserve the quality of soil resources. Planting different crops and rotating livestock and letting the land rest keeps the soil healthy for growing.



How can we all help protect our water and soil and keep our environment safe? Here are a few examples. You try to think of some other ways.

- Plant grass and shrubs on bare soil to keep it from washing away.
- Plant trees to shade homes and clean the air.

Terracing is done by making wide ridges that go around a hill to prevent water from rushing down the hill too fast



Drip irrigation puts water directly on a plant's roots. Less water is used to grow more plants!



Erosion Activity

For this outdoor activity you will need:

- 2 containers of water or
- a sprinkling can and enough water to fill it twice
- a watch with a second hand
- soil must be protected

1. Find two small hills (on school grounds, in park, in backyard.) Both should be about the same size, but:



one should be covered with bare soil only



the other should have good cover like grass, leaves, plants or moss

2. Pour the same amount of water over each slope and see what happens. Check how long it takes the water to move down each hill.
3. This is what you are looking for:

On which hill did the water go down the fastest? _____

What happened to leaves, sticks or soil on the bare hill? _____

Which hill has a problem? Why? _____

The Earth as an Inner Orange

Consider the earth as an orange. Imagine the following sequence:

Slice an orange into quarters. Set aside three of the quarters. These represent the oceans of the world. The fourth quarter roughly represents the total land area left.

Slice this land quarter in half, giving you two 1/8th world pieces. Set aside one of the pieces. This is land inhospitable to people (the polar areas, desert, swamps, very high or rocky, mountainous areas). The other 1/8th piece is the land area where people live, but not necessarily grow the foods needed for life.

Now slice this 1/8th piece into four sections, giving you four 1/32nd pieces. Set aside three of these pieces. These are areas too rocky, too wet, too cold, too steep, or with soil too poor to actually produce food. They also include the areas of land that could produce food but are buried under cities, highways, suburban developments, shopping centers and other structures that people have built.

This leaves us with a 1/32nd slice of the earth. Carefully peel this slice. This tiny bit of peeling represents the surface, the very thin skin of the earth's crust upon which humankind depends. Less than 5 feet deep, it is quite a fixed amount of food-producing land.

Now you realize that protecting our land resources are important too. Advanced agriculture technology has enabled the world to feed many of its people. But, with a fixed land resource base and an ever increasing number of people trying to feed themselves from the fixed base, each person's portion becomes smaller and smaller and more important to the individual person. We must protect the environmental quality of our air, water and land.

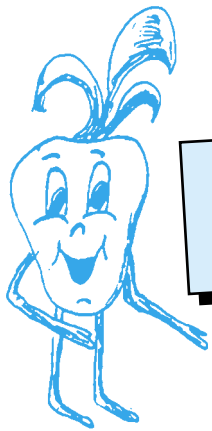


Water by percent

97.20 salt water
2.15 ice
.63 ground water
.02 surface water (lakes, rivers)

Inner orange

Orange (crust)
1/2 fruit (mantle)
1/2 fruit (outer core)
core (inner core)



Investing Soils

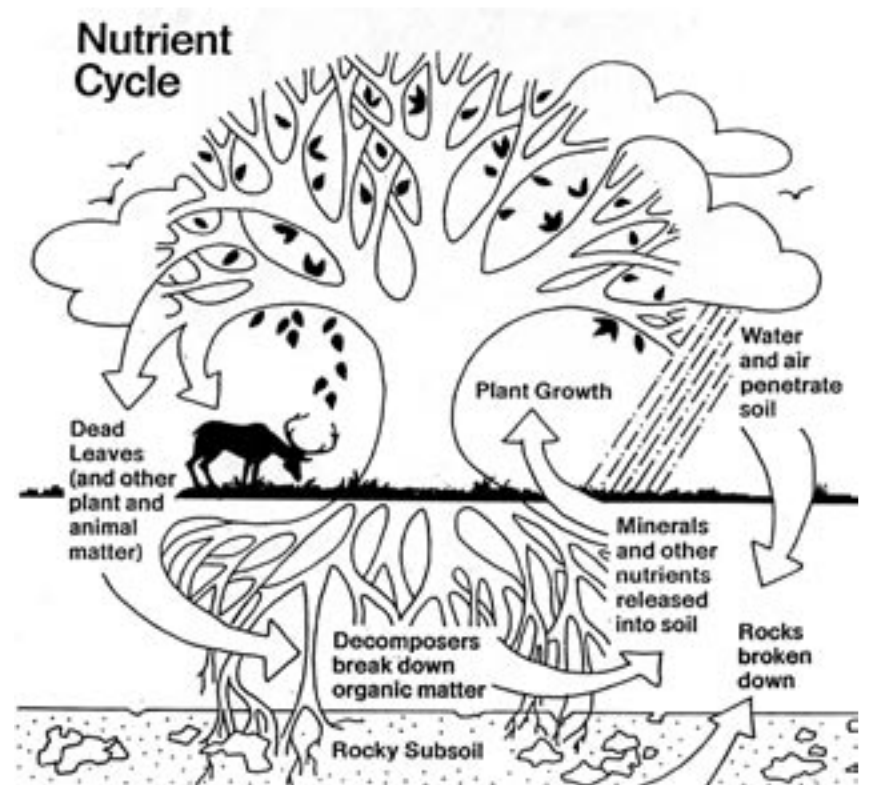
The soil beneath our feet is full of life. Many animals, such as moles, badgers, and prairie dogs use the soil to find food and shelter. Earthworms and many insects also live in the soil. As these animals burrow and tunnel, they mix the soil, allowing air and water to penetrate beneath the ground's surface. Plant roots stretch down through the soil where they can absorb the air, water, and nutrients needed for growth.

In addition to these plants and animals, billions of microscopic organisms, such as bacteria and algae, inhabit the soil. They, along with fungi, earthworms, and other soil creatures play an important role in the decomposition of organic material. Decomposers help break down dead plant and animal tissue. Nutrients are returned to the soil, where they become available once again to plants.

The next time you stand on the soil, think about the billions of organisms at work beneath you. They are part of a cycle that returns valuable nutrients to the soil. Without these unseen creatures, the plants we depend on for food could not grow, and the life-sustaining cycle on earth would be broken.

Using the Nutrient Cycle, answer the following questions:

- What evidence of plant life do you see in this soil profile? _____
- What animals live here? _____
- What role do these plants and animals play in the ecosystem? _____
- How do they use the soil? _____
- How do they contribute to the nutrient cycle? _____
- Can you see different soil layers? _____
- Do some plants extend their roots into the subsoil layer? _____





You must have water to live...

Water is a natural resource that directly benefits the quality of life in Wyoming. Water covers 3/4 of the earth's surface, but 99 percent either contains salt or is frozen in glaciers or icecaps. So where do we get our fresh water? Freshwater comes from surface water such as lakes, streams and rivers. Freshwater is also located below the earth's surface. Formations of gravel, soil and rocks form aquifers, areas where water collects.

Vocabulary Words on Water

POINT SOURCE POLLUTION: This type of pollution is easily recognized and identified. It is a specific source where water is being contaminated. For example, a pipe discharging pollution directly into a stream or river is POINT SOURCE.

NON POINT SOURCE POLLUTION: Any pollution that is not a point source. For example, if too much fertilizer is put on a lawn in town or a crop on a farm, it may runoff and the excess fertilizer may cause pollution to surface water or to the water under the ground. Nonpoint source pollution is not always easy to identify. It can be from many sources.

Read the sentences below then decide if the pollution problem is Point Source or Nonpoint Source. Place a "PS" for Point Source and a "NPS" for Nonpoint Source.

___ 1. Sam changed the oil in his car. Some of the oil spilled onto the driveway and washed away into the storm gutter when it rained.

___ 2. A truck overturned into a river spilling barrels of paint into the water.

Read the sentences below. Place a "R" in the blank if the statement shows the right way to use, store or dispose of chemicals; place a "W" if it is the wrong way.

___ 1. Sue empties a can of paint on the ground behind her house.



___ 2. To keep the weeds from growing in his garden, Tim uses a thick layer of grass clippings for a mulch instead of a weed killer.

___ 3. Cindy reads the directions and uses the correct fertilizer on her lawn.

___ 4. Jennifer leaves open cans of paint thinner and gasoline in her basement.

___ 5. Jeff uses insecticides (bug spray) to kill every insect and spider in his garden.

___ 6. Sam keeps his household chemicals in a locked cabinet, with the lids on tight.



Just like you and me, ranchers and farmers are learning new ways to help fight water pollution. Some of the ways they are doing this are:

- Farmers and ranchers are using insects to control weeds. Some types of insects will eat harmful weeds.
- Sheep and goats are used to help control weeds. Sheep and goats eat many kinds of weeds.
- Insecticides and fertilizers are used with greater care and used less often whenever possible.
- Proper grazing of pastures and rangeland is important. This means grazing just enough livestock to maintain the grass and protect the soil from eroding away. Proper grazing is good for the land.

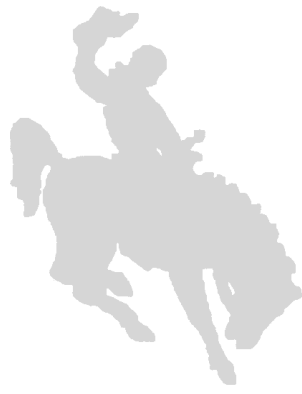


What are some ways we can help to protect and conserve our water?

Did you know?

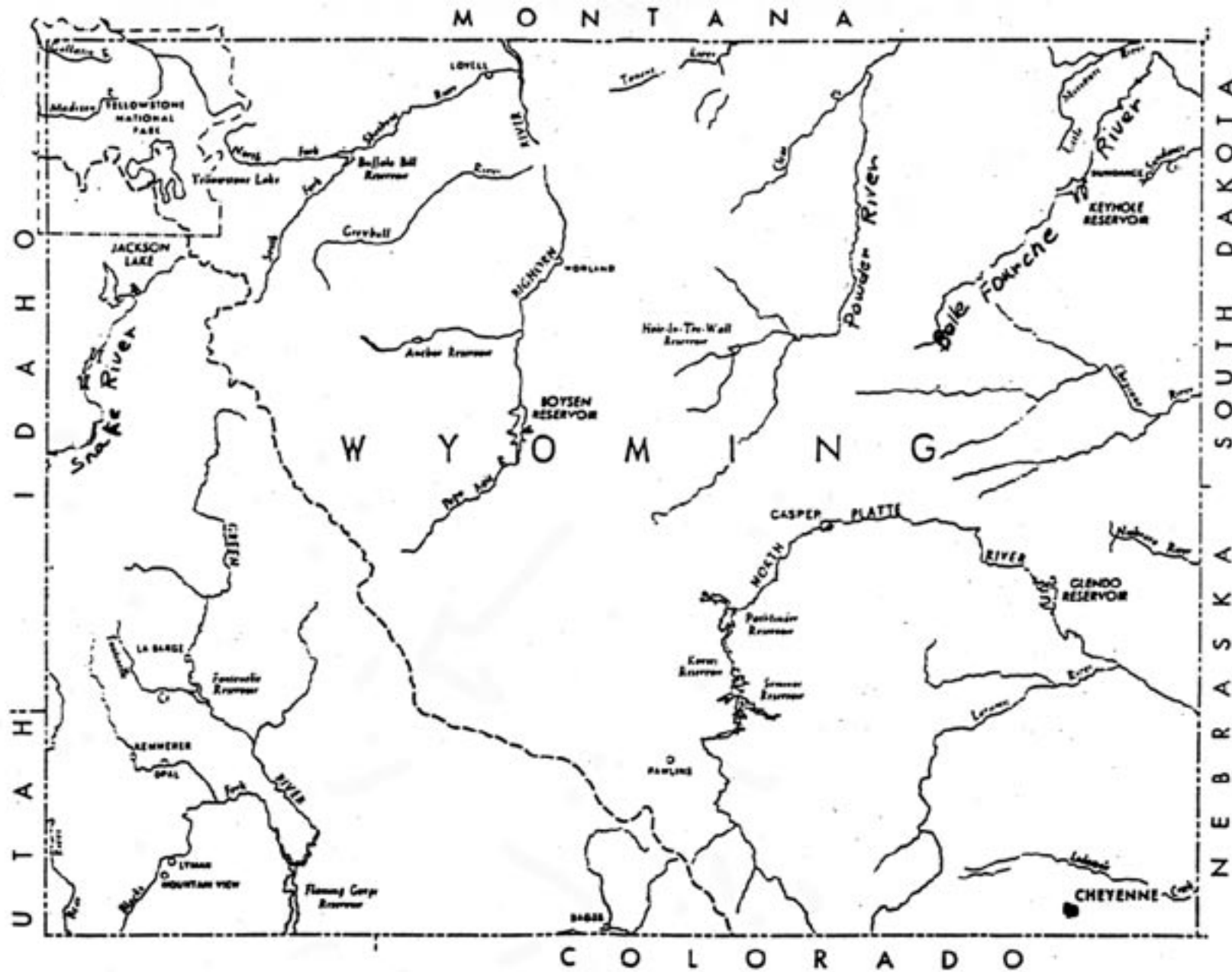
Americans enjoy the safest and the greatest variety of food in the world.

Headquarters of the



West!

Streams flow from Wyoming in all directions to the major river systems of the western United States



Color Code Your Map and Map Key:

Look at the map key, color the box by the North Platte River blue. Find the North Platte River on the map above, color the river blue. Use a different color for each river and complete your map and map key.

The dotted line on the map is the Continental Divide.

1. What direction from the Continental Divide does the North Platte River flow?
2. Put an **X** by the water source for your house or school. If you live on a ranch, this might be a creek, small river, or well.
3. Put a \triangle by all the reservoirs and lakes you have been to in Wyoming.

Map Key

- North Platte River
- Snake River
- Powder River
- Belle Fourche River
- Green River
- Big Horn River

The Continental Divide crosses Wyoming from the south central portion of the state, northwest and leaving the state through Yellowstone National Park. Partly because of the divide, Wyoming contributes to the headwaters of three major North American river systems - the Colorado, the Columbia, and the Missouri rivers. Most of the farming in Wyoming is near rivers and reservoirs. Why?



Investigating Grazing

QUESTION: How do you think grazing animals affect the amount of grass produced on a plot of land?

Mary and Tony were arguing about this question. Mary thought that if animals were eating the grass it would cause

more grass to be produced. She used her lawn as an example. It seems like they are continually mowing, but their neighbors moved and their lawn headed out and "stopped" growing. Tony disagreed - he thought that if you measured the amount you cut off it wouldn't be any more than what would grow naturally.

What do you think?

Plant grass in two equal sized containers. Place in the sun and keep them watered thoroughly. When the grass is about 3-4 inches high begin your measurement. Cut the grass in one container and weigh the amount produced.

Cutting	Weight
1st	_____
2nd	_____
3rd	_____

Continue taking cuttings until the grass in container 2 has stopped getting taller. Now clip the grass in both containers to one inch and make final weighings.

Now use your containers as grazing areas for animals. Put three crickets in container 1. Put 20 crickets in container 2. Record your observations.

What did you find out?

	Container 1	Container 2
Day 1		
Day 2		
Day 3		

What Happened?

Millions of acres in the United States are public lands and these lands are for your use.

If you took a long walk through these lands you would find many wonderful things. Public lands provide habitat for wildlife, and recreational activities such as hunting, fishing, and hiking. These lands produce many goods and products to enrich the lives of all Americans. Coal, the nation's largest energy source, is mined on this land. Oil and gas from mineral leases help us reduce our dependence on foreign oil. The timber in the forests provides lumber to build our homes. Cattle and sheep graze the range land and provide us with food and many valuable products. The money received from these grazing, timber, and mining leases helps support education and the cost of building our roads. This money is important to Wyoming's economy.

Math C O D E D



I've got a wacky riddle for you. All you have to do is

Crack the code!

Ranchers who lease public land work with the Bureau of Land Management, the Forest Service, and the state to help care for the land. Ranchers provide water supplies which benefit all the animals, break ice off the watering holes in the winter, and manage their animals to maintain a good grass supply.

A	B	C	D	E	F	G	H	I	J	K	L	M
12	19	81	13	23	2	14	3	20	4	15	25	5
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
16	21	6	17	27	22	8	18	9	24	10	26	11

Q. What is the prettiest vegetable?

A.



- Solve the math problem.
- Use the code to figure out the answer to the wacky riddle.

4	9	6	72	9	6
$\times 3$	$\times 9$	$\times 3$	-64	$+5$	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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72	65	5	4	80	9
$+9$	-47	$\times 1$	$+8$	-57	$\times 3$
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GOOD LUCK!



Wyoming Ag in the Classroom

Volume 3 TEACHER GUIDE

Dear Teachers,

Annually, the Wyoming Beef Council provides support for many Wyoming Agriculture in the Classroom activities. WAIC would like to thank the Wyoming Beef Council for all of the

support and information that they give to us and for sponsoring this issue of the Country to Classroom. If you would like more information on the programs and classes that Wyoming Agriculture in the Classroom has to offer, please contact us at our office (307) 777-6618.

Sincerely,

Sarka J. White, M.Ed.

Education Coordinator WDA/WAIC

Potpourri...Discussion Prompts and Projects

1. Interview a farmer or rancher about his/her job and what he/she is accomplishing for conservation. Your local Conservation District can give you names of agriculture people to contact.

2. Many of the techniques used to conserve soil and water also attract wildlife. Can your students think of some conservation techniques. For example, grassland ditches and waterways as well as grass strips around fields provide habitat for ground nesting birds. Shrubs and trees planted for windbreaks provide shelter for livestock and wildlife. Crops and rangeland provide food for wildlife and livestock. Reservoirs, ponds, and windmills are a major water source for livestock and wildlife.

3. If a soil erosion problem exists on school property, have your class develop a reclamation plan for that area. Then with proper permission from the administration, carry out the plan. You can get help with planning from your local Conservation District. Consider doing a similar project within your community.

4. Inform your students they are stranded on an island and can have only 10 items with which to survive indefinitely. In small groups, have students select the items and rank them in order of importance. Discuss the lists and the reasons for selecting the items. Several of the items should enable to establish agriculture on the island.

5. Have the students collect magazine pictures of various types of land use, i.e. Forest, cropland, rangeland, shopping areas, mining, highways. Then have the students create a community using the pictures. Have them discuss what is important to them living the community. Ask if it is important for them to keep some land as agriculture land and why.

6. Write a history of your community's natural resources and ways to conserve those natural resources in the future.

Teacher Activity

Objectives:

1. Students will conduct research on the Dust Bowl era.
2. Students will compose short stories about the impact of the Dust Bowl on the individual.

Supplies Needed: research materials

Begin by reading the following paragraphs.

"Soil erosion is an expensive national problem. Each of us pay for it in higher food bills and higher taxes. Eroded soils cannot grow as much food per acre. Silt and sediment must be dug more often from our harbors and rivers to clear the way for boat and ship traffic.

The Dust Bowl era is the best example of how erosion can affect people. The Dust Bowl occurred during the 1930's in Texas, Kansas, Oklahoma, New Mexico and Colorado. Drought and harsh winds created large dust storms. Eroded soils filled the skies with dust. The sun looked blood-red through the grey haze. Farm equipment, houses and roads were buried. Soil was blown so high into the air that it traveled as far away as Washington D.C."

After reading the paragraphs, have the students brainstorm other ways that soil erosion affects us. List the answers on the board. Students should conclude that there are no benefits to soil erosion.

Next, read these facts about the Dust Bowl era:

1. The nation was in the Great Depression. Jobs were scarce and money was in short supply.
2. Tough prairie grasses were replaced with less drought-resistant crops of corn and wheat.
3. Many acre of rangeland were overgrazed and were left bare or with little cover crop.
4. A series of severe droughts occurred in 1931, '34, '36 and '37.
5. Millions of acres of corn and wheat withered and died on the plains because of the drought.
6. Farmers could not make payments on loans. Many lost their homes and farms to banks and loan companies.
7. Huge dust storms eroded the soils. In some places from 2 inches to 1 foot of topsoil were lost.
8. Thousands of unemployed, poor farm families left the Dust Bowl area. Many of them headed for California. They often became migratory workers living in camps.
9. There was a sense of gloom, confusion, misery and hopelessness among the many people who lived in the Dust Bowl.
10. The Dust Bowl was caused by a combination of three facts: the Great Depression, drought and poor agricultural practices.

You can add any other information to emphasize the tragedy of the Dust Bowl. You could also read all or portions of the first chapter of John Steinbeck's *The Grapes of Wrath*. This short chapter includes a realistic description of what the dust storms looked like. It also has brief section on how the storms affected farmers.

Then ask "How would you have felt living in the Dust Bowl era? Would your family have left for a different part of the country? Where would you have gone? What kind of jobs would you have done?"

To conclude the lesson, ask your students to conduct any research that they need to write a short story or other creative expression. Students could read books about creative expression. Students could read books about the Dust Bowl era or read articles in magazines from that time. Students could also interview persons who lived then. Contact your local Soil Conservation Service for information on how the Dust Bowl could have been prevented. The short stories or other forms of creative expression should be written as if the student lived through the Dust Bowl. You might also invite a person that lived during the Dust Bowl era to speak to your class. Or, as an alternative, tape record an interview with that person. Such an experience would be an excellent culmination to this activity. Then have the students write a short story or other creative expression about the Dust Bowl. It does not need to be long, just a few paragraphs will do. If your students need help, use one of these sentences to get you started:

"Christmas of 1937 would have made Mr. Scrooge happy...."

"The porch swing banged behind me as I tried to escape the terrible heat of the long afternoon."

"As a rural mail carrier I hated the letters I had to deliver from banks to small farmers."

"No one answered my question: Would we have to leave Rex behind?"

"Pa kicked at the dry stubble -- all that was left of a promising spring crop."

"We could have prevented the Dust Bowl if only we had..."

After the short stories are completed, have the students share them with the class to conclude the activity.

Wyoming Content and Performance Standards 4th and 8th Grade

Language: 1. Reading; 2. Writing; 3. Speaking and Listening.

Science: 1. Concepts and Knowledge; 2. Science as Inquiry; 3. History and Nature of Science in Personal and Social Decisions.

Social Studies: 2. Culture/Cultural Diversity; 3. Production, Distribution, and Consumption; 4. Time, Continuity and Change; 5. People, Places and Environment.

Mathematics: 1. Number and Operation; 2. Geometry; 3. Measurement; 5. Data Analysis and Probability.

"COUNTRY TO CLASSROOM" is a publication of WYOMING AGRICULTURE IN THE CLASSROOM.

Wyoming Agriculture in the Classroom is a cooperative effort of many Agriculture organizations and individuals around the state. Materials are compiled from Wyoming Department of Agriculture, United States Department of Agriculture, Wyoming Beef Council, Wyoming Ag in the Classroom, Montana Ag in the Classroom, Minnesota Ag in the Classroom, National FFA, Oklahoma Ag in the Classroom, and several other sources.

