NATIONAL SOCIAL SCIENCE STANDARDS

• Growth: Workers can improve their productivity by using physical capital such as tools and machinery.
• US History: Understand the history of the local community and how communities in North America varied long ago.

OBJECTIVES
The student will:
1. identify the time line from the 1930’s- 2000.
2. identify the advance in equipment used for farming.
3. compare and contrast the productivity of a farmer between then and now.

BACKGROUND
Agriculture has been the world’s largest industry for thousands of years. Even in the last 70 years, the lifespan of many of our grandparents, agriculture has changed dramatically.

Seventy years ago, farmers didn’t have many machines to help them grow food, and nearly everything was done by hand. It required a lot of work by people to produce enough food to feed everyone. The basic tools of farming are continually being improved upon, resulting in more efficient use of labor.

In the 1900s, farmers used animal power to pull tools such as plows and seed drills. Engine powered tractors replaced animal power. The tractors of today pull loads that 100 horses could not pull. Plows developed from being able to plow one row at a time to multiple rows at a time.

A combine (kŏm’bĭn) that harvests and separates the grain can clean 5 acres of wheat in 1 hour, a job that used to take 12 workers a whole day.

As farm machines sped up the process of planting and harvesting, fewer people were needed for farm work. Many farmers started branching out into industrial trades and crafts for the manufacture of consumer goods.

In 1930 it took the work of 1 farmer to feed 10 people. Today, 1 farmer feeds 130 people. In 1930 it took 15-20 hours of labor to produce 100 bushels of corn; today, 2.75 hours of labor produces the same amount.
INSTRUCTIONAL PROCEDURE
1. Review background information.
2. Review the concept of a timeline.
3. Have the students complete the “Agriculture Then and Now” activities.

ASSESSMENT
1. Give students copies of Activity 3, Agricultural Facts.
2. In a paragraph form, have the students compare and contrast farming then and now.

WORD POWER

**combine** *n.* A harvesting machine that heads, threshes and cleans grain while moving over a field.

**plow** *n.* A tool used to cut, lift and turn over the soil.

**productivity** *n.* The amount of product that can be made by one man in a specific time period.

**timeline** *n.* A table listed important events for successive years within a particular time period.

**tractor** *n.* A four-wheeled vehicle used to pull farm equipment.

**technology** *n.* The practical use of science to make life better and easier for people.
### AGRICULTURAL TIMELINE

<table>
<thead>
<tr>
<th>Decade</th>
<th>Agricultural Changes</th>
<th>1 Farmer Feeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early 1800</td>
<td>Hand tools and plows</td>
<td>4</td>
</tr>
<tr>
<td>1870</td>
<td>Horse drawn steel plow, reaper, and threshing machine developed</td>
<td>5</td>
</tr>
<tr>
<td>1910</td>
<td>Engine powered tractor developed</td>
<td></td>
</tr>
<tr>
<td>1920</td>
<td>Chemical revolution in all areas • Pesticides developed</td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td>Rubber tire tractor developed</td>
<td>10</td>
</tr>
<tr>
<td>1940</td>
<td>Change from horse drawn equipment to tractor drawn begins</td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td>Tractors outnumber horses and mules • Role of soil nutrients is recognized • Crop rotation begins</td>
<td>16</td>
</tr>
<tr>
<td>1960</td>
<td>Self-propelled combine introduced • Critical link of beneficial insects to the food chain discovered</td>
<td>26</td>
</tr>
<tr>
<td>1970</td>
<td>New fertilizers and Pesticides to feed and protect plants • IPM concept developed</td>
<td>47</td>
</tr>
<tr>
<td>1980</td>
<td>Biotechnology field trials begin • Softer pesticides-less harmful to beneficial insects and environment • Low rate material 1 ounce/acre rather than 2 pounds</td>
<td>76</td>
</tr>
<tr>
<td>1990</td>
<td>Biotech corn, soybeans, and cotton are approved for sale • Computers • Global Positioning Satellites • IPM utilized</td>
<td>133</td>
</tr>
<tr>
<td>2005</td>
<td>Advancements in biotechnology</td>
<td>144</td>
</tr>
</tbody>
</table>

### STATISTICAL AGRICULTURAL FACTS

<table>
<thead>
<tr>
<th>Then (1930s)</th>
<th>Now (2000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55% of the population are farmers</td>
<td>2% of the population are farmers</td>
</tr>
<tr>
<td>1 acre produces 30 bushel of corn</td>
<td>1 acre produces 120 bushels of corn</td>
</tr>
<tr>
<td>1 farmer feeds 10 people</td>
<td>1 farmer feeds 130 people</td>
</tr>
<tr>
<td>15-20 hours of labor produces 100 bushels of corn</td>
<td>2.75 hours of labor produces 100 bushels of corn</td>
</tr>
<tr>
<td>Average life expectancy is 47 years</td>
<td>Average life expectancy is 76.1 years</td>
</tr>
</tbody>
</table>
ACTIVITY 1: AGRICULTURE THEN (1930s) AND NOW (2000s)

FACTS
In 1930, 55% (more than half) of the population was farmers.
   Convert 55% to fraction _____________

In 2000, 2% of the population was farmers.
   Convert 2% to fraction _____________

GRAPHING MISSOURI NUMBERS
The total population of then and now is already graphed. Place a red bar on the graph to indicate the farmer population for each year.

<table>
<thead>
<tr>
<th>Year</th>
<th>Missouri Population (approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>3,600,000 people</td>
</tr>
<tr>
<td>2000</td>
<td>5,500,000 people</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent of farmers in population</th>
<th>Total population in Missouri</th>
<th>Farmer Population in Missouri</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>55%</td>
<td>3,600,000</td>
<td>1,980,000</td>
</tr>
<tr>
<td>2000</td>
<td>2%</td>
<td>5,500,000</td>
<td>110,000</td>
</tr>
</tbody>
</table>

QUESTIONS
Circle the choice that correctly fills in each sentence.

1. The population of Missouri has (increased/decreased) between 1930 and 2000.
2. The number of farmers in Missouri has (increased/decreased) between 1930 and 2000.

DISCUSSION
In the past 70 years the number of farmers has decreased but the population has increased. What has changed to help the farmer meet the demand for food?
ACTIVITY 2 — AGRICULTURE THEN (1930s) AND NOW (2000s)
### Activity 2 — Agriculture Then and Now

#### Timelines

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Agricultural Changes</th>
<th>Paste Correct Picture in the Proper Range in This Column</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900 and before</td>
<td>• Animal pulled plows and equipment</td>
<td></td>
</tr>
<tr>
<td>1910</td>
<td>• Average farm size: 147 acres • Engine powered tractors introduced (metal wheels)</td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td>• Rubber tire tractor introduced • 1/3 farms have electricity</td>
<td></td>
</tr>
<tr>
<td>1940</td>
<td>• Average farm size: 175 acres • Change from horse pulled equipment to tractor pulled equipment begins</td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td>• Average farm size: 216 acres • Rural Electrification: Most all farms have electricity • Number of tractors exceeds the number of horses and mules</td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>• Self-propelled combines introduced</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>• Sugar beets and cotton harvested mechanically, no hand labor used</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>• Average farm Size 460 acres • Improved farming methods such as no-till and sustainable farming</td>
<td></td>
</tr>
<tr>
<td>1990/2000</td>
<td>• Global Positioning Satellites</td>
<td></td>
</tr>
</tbody>
</table>
ACTIVITY 3 — AGRICULTURE THEN AND NOW

COMPARE—CONTRAST
In paragraph form, compare and contrast farming then and now.

THEN (1930s)
- 55% of the population are farmers
- 1 acre produces 30 bushels of corn
- 1 farmer feeds 10 people
- 15-20 hours of labor to produce 100 bushels of corn

NOW (2000s)
- 2% of the population are farmers
- 1 acre produces 120 bushels of corn
- 1 farmer feeds 144 people
- 2.75 hours of labor to produce 100 bushels of corn
NATIONAL SOCIAL SCIENCE STANDARD
• Economics: Markets-Price and quantity determination

OBJECTIVES
The student will:
1. understand the law of supply in relation to low US food costs.
2. identify the use of technology in agriculture as the reason for adequate low cost food supply.
3. understand low food costs benefits the economy.

BACKGROUND
Technology in agriculture has allowed for an abundant food supply in the US. Increased yields are the result of using modern farm equipment, pesticides, biotechnology, and farming applications with the global positioning satellites. One of the principles of economics is the law of supply and demand. Supply and demand determines the cost of everything you buy.

Because the US has an adequate supply of food for our population, the cost is very low. If there were a limited supply of food and the demand remained the same, the cost of food would be higher.

INSTRUCTIONAL PROCEDURE
1. Review background information.

2. Have students complete Activity 1 “Agricultural Abundance” and Activity 2 “Grocery Costs.”

ASSESSMENT
Have the student explain what would happen in the following scenario:
A Midwestern drought caused a decrease in corn and soybean production. What would be the effect on you? How would a drought resistant corn or soybean plant developed with biotechnology change the situation?
ACTIVITY 1 — AGRICULTURAL ABUNDANCE

CORN AND SOYBEAN HUNT

Corn and soybeans are grown for food, human medicine, cloth, and much more.

Send half of the students on a “corn hunt” and half the students on a “soybean hunt” either at home or at a local supermarket. Have them check ingredient labels to find products that contain some form of corn or soybean.

Divide the products into two lists, one that includes foods that are primarily made from corn/soybean and those which have corn/soybean-based additives such as corn syrup, dextrose or cornstarch. Circle the crop for which you are hunting.

FOODS MADE FROM CORN/SOYBEAN
examples: corn tortillas, corn chex, hominy

FOODS WITH CORN/SOYBEAN ADDITIVES
examples: ketchup, pudding, soft drinks
ACTIVITY 2 — GROCERY COSTS

TYPICAL BAG OF GROCERIES
- 1 gallon of milk
- 12 eggs
- 5 pounds of sugar
- 1 pound of cheese
- 1 pound of sirloin steak
- 2 pounds of apples

COMPARATIVE SHOPPING
Groceries cost different amounts around the world.

Graph the costs of these groceries for each of the following countries:
- United States: $19.00
- England: $24.00
- Spain: $29.00
- France: $31.00
- Japan: $75.00
NATIONAL SOCIAL SCIENCE STANDARD

- Physical Systems: Understand the physical processes that shape the patterns of Earth’s surface.

OBJECTIVES

The student will:

1. identify the amount of the earth’s surface available for food production.
2. identify characteristics of the earth’s surface that are not conducive to food production.

BACKGROUND

One of the most natural resources on the earth’s surface is soil. Many living things depend on it as a source of food, either directly or indirectly.

Our food producing land remains the same and yet the world population continues to grow. Consequently, each person’s food portion becomes smaller and smaller. It is the responsibility of each generation to use the soil wisely to ensure the future. You can conduct the following demonstration to show how little of the earth’s surface is actually used for food production as compared to growing populations.

INSTRUCTIONAL PROCEDURE

1. Inform the students that the apple in Activity 1 represents the earth.

2. Conduct Activity 1.

3. Have students complete Activity 2.

ASSESSMENT

Review activity 2.

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ACTIVITY 1 — A SLICE OF SOIL

INSTRUCTIONS
1. Cut the apple into four parts. Three parts represent the oceans of the world. The fourth part represents the land area.

2. Cut the land section in half lengthwise. Now you have two 1/8th pieces. One section represents land such as deserts, swamps, Antarctic, artic and mountain regions. The other 1/8th section represents land where man can live and may be able to grow food.

3. Slice this 1/8th section crosswise into four equal parts. Three of these 1/32nd sections represent the areas of the world which are too rocky, too wet, too hot, or where soils are too poor for production, as well as areas developed by man.

4. Carefully peel the last 1/32nd section. This small bit of peeling represents the soil of our earth on which mankind depends for food production.

SUPPLIES
- LARGE APPLE (SOFTER APPLES WORK BETTER)
- PARING KNIFE (OR HEAVY PLASTIC KNIFE)
ACTIVITY 2 — NATURAL RESOURCES

PROVE YOUR POINT

Supporting details are the facts and information that explain or give examples of the main idea.

Read each main idea and the sentences that follow it. Write an X before each sentence that gives supporting details.

1. The amount of soil on the earth to grow food is limited.
   ____ Most of the earth is covered in water.
   ____ Deserts are too dry to grow food.
   ____ Some areas of earth are too rocky, too wet or too hot to grow food.
   ____ The earth has seven continents.

2. The Antarctic and artic are not good places to grow crops.
   ____ The temperatures are very cold.
   ____ The sunlight is limited.
   ____ The Antarctic and Artic are on opposite poles of the earth.
   ____ People are unable to live in the artic and Antarctic.

3. Developed urban areas (city) are not used for crop productions.
   ____ A city has limited amount of open land area.
   ____ A city has a dense population of people.
   ____ Urban areas are dispersed around the United States.

THINK FOR YOURSELF

Think of another main idea about amount natural resources in relation to growing food?
Write the main idea with three supporting details.
NATIONAL SOCIAL SCIENCE STANDARD
- World History: Major global trends since WWII

NATIONAL SCIENCE STANDARD
- Personal and Social Perspectives: Populations, resources and environments.

OBJECTIVE
The student will relate cause and effect to agriculture.

BACKGROUND
The global population is growing at a very fast rate. Since 1950 the global population has tripled. Scientists estimate that the earth’s population will reach 10 billion before the year 2050.

Most of this growth is taking place in underdeveloped countries. The Slice of Soil lesson (grade 4/5) addresses that the earth has a limited amount of surface area covered with soil to grow food. With a growing global population (cause) farmers are challenged with growing more food on less land (effect). Farmers need to protect their crops and increase their crop yields.

INSTRUCTIONAL PROCEDURE
1. Review background material and Slice of Soil (grade 4/5) lesson.
2. Discuss the concept of cause and effect.
3. In groups of two have the students do Activity 1.
4. Discuss their responses.
5. Discuss the need for ways for farmers to protect their crops from damage from weather, weeds and insects.

ASSESSMENT
Have the student explain what would happen in the following scenario:
A Midwestern drought caused a decrease in corn and soybean production. What would be the effect on you? How would a drought resistant corn or soybean plant developed with biotechnology change the situation?
ACTIVITY 1 — CAUSE & EFFECT IN AGRICULTURE

CAUSE / EFFECT
For each cause write a possible effect (outcome).

1. It was a very hot and dry summer for the farmer’s crops.

2. The heavy spring rains caused the farmer to plant the seeds very late in the season.

3. The weeds in the cornfields grew very tall so the corn plant did not get enough sun or air.

4. One-half of a farmer’s crop of wheat is eaten by bugs.

5. Unused plant material from a crop is left to decay (composted) and mixed in with the soil.

6. The world population tripled since 1950, but due to land development the amount of land to grow food on has decreased.