Grade 4-5: Technology of Agriculture

National Science Standard
Science and Technology: Abilities of technological design
National Social Science Standard
World History: Age of Revolutions-causes & consequences of the agricultural and industrial revolutions

Objectives:
The student will

1. identify 3 forms of technology used in modern US agriculture
   biotechnology, pesticides, satellites
2. understand how technology has helped the US change from an agricultural society to an industrial society.

Background
In the mid 1800's the industrial and agricultural revolutions was taking off in the US. The first revolutions involved the move from people growing their own food and providing their own needs to people specializing in trades and crafts that were sold to people outside their family.

Industrial and agricultural revolutions continued to evolve. A second Industrial Revolution, from 1910-1959, saw an increase in the manufacture of consumers goods. At the same time, the farming industry took it's most rapid strides. The development of mechanized farm equipment and the electrification of farms caused an agricultural revolution, which increased the yields of most farmers. In addition in the 1940-50's a huge increase in the number of pesticides available decreased the number of crops lost to pests further increasing the yield.

As the number of new industries developed, at the same time that farming was requiring less labor, farmers had a wider choice of how to make a living.

From 1970 to today, advances in farming have included the improvement of pesticide use, scientific advancements in biotechnology and space.

Pesticide: Pesticides have been used for centuries. Many newer pesticides are more effective in smaller quantities, less persistent in the environment and applied with greater care and concern for safety. Without pesticides bugs would eat almost one-half of the farmers crops. With pesticides bugs only eat one-tenth of the farmers crop.

Biotechnolgy: Scientists can now create plants that have beneficial traits. The methods used to produce these new crops involve changing material within the crops, called genes. Genes are in the cells of all living things. They guide how living things are made and how they function.

Scientists can create plants that are resistant to chemicals that kill weeds, plants that produce chemicals to kill insects, plants that can grow in poor dry soil, and plants that last longer after harvesting. By using biotechnology in this way scientists are helping farmers grow more food on less land- which keeps the cost of food very low in the US.

Space: Global Positioning Satellites (GPS) uses a satellite in outer space to take special pictures of a farmer's field. These pictures can show a farmer how much fertilizer or pesticides needs to be applied in each small area of the field. The satellite then sends these pictures to the computer on the farmer's sprayer and tells it exactly how much fertilizer or pesticides to apply as it travels over the field.

The reason GPS is important is that a farmer's field is actually like a bunch of smaller fields put together. Different areas of the field have very different requirements for the soil. By applying the same amount of fertilizer or pesticides to the entire field, farmers can easily spray the areas of the field that don't need spraying. This is wasteful, expensive and can harm the environment

Instructional Procedure:
1. Review background information.
2. Have the students complete "Agriculture and Technology" activity 1
3. Do assessment 1.

Word Power
- Agricultural society: A society in which crops are grown and people have specialized roles.
- Biotechnology: using scientific discoveries about living things to solve problems
- Genes: the part of a chromosone that determines one of more characteristics that living things inherit from their parent.
- Industrial society: A society in which the production of food and other products is performed by machines, demanding large amounts of energy and resources.
- Pesticides: chemicals used to kill pests on crops.
- Satellite: An object that orbits, or travels around, a planet and carry out a variety of jobs.
- Technology: Using scientific discoveries and inventions to solve problems.
- Global Positioning Satellite: 24 satellites arranged so that several can be seen from any one point on Earth by radio at any given time. Radio signals from the satellites are then used to locate a position on Earth's surface with greater accuracy.

Assessment
1. Using the pictures in the compare and contrast activity, have the students identify, analyze and compare the industry of farming including the tools, machinery, size and role of the farmer.

Name:_____

Activity 1: **Agriculture and Technology**

Technology is using scientific discoveries and inventions to solve problems. The United States leads the world in developing new technology.

➔Choose the correct word to complete each sentence:
more, less, feed, environment

1. Technology allows us to grow _____ food on _____ land.

2. Technology allows farmers to be gentler on the _____.

3. Technology allows farmers to _____ more people.

In the past 100 years, the use of technology has changed the United States from an agricultural to industrial society.

- **Agricultural Society**: a community or nation where farming drives the economy.
- **Industrial Society**: a community or nation where the economy is driven by skilled labor.

➔Identify the type of technological advancement described:

Types of Technological Advances are:

Mechanical advances
Biotechnology
Pesticides
Global Positioning Satellites

1. Engined powered tractors _____
2. Information from this technology allows more controlled application of pesticides_____
3. Inserting plant genes with beneficial characteristics onto other plants to improve their performance. _____
4. Decreases crop destruction so that 90% of crops are usable. _____

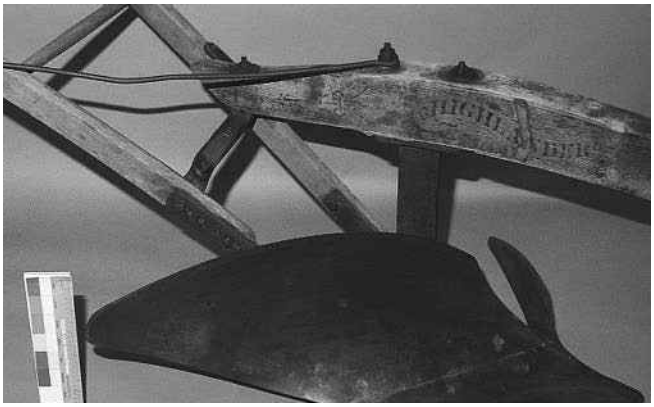
➔In your own words, explain the reason food costs in the United States are the lowest in the world.

Name:_____

Activity 2: Compare and Contrast Agriculture Technology

1. Identify to differences and similarities of the plow.

Early Plows:



Modern Plow: