Objective
Students will explore and research a variety of careers in agriculture. Students will read about rapid advances in agriculture now and in American history.

Background
Production farming and ranching are the backbone of agriculture. But behind the farmer and rancher are people in many different kinds of work providing support for those who produce our food and fiber. There are the truckers who drive the products to processing plants. There are people who work in the processing plants, turning crops into products to be sold in the grocery store. There are the grocers and the people who run warehouses where the products are stored.

Even before the farmer gets to work, there are scientists and engineers in many fields doing the research needed to produce the best crops, provide the best care for farm animals, provide the best equipment and more.

There are careers in agriculture for all education levels and all interests, for those who want to work outdoors and those who prefer working inside, at a computer, for those who like working with their hands and those who enjoy research, for those who like working with people and those who prefer working alone. You don’t have to have a college degree for many of the rewarding careers in agriculture. Some require just a high school degree or a two-year associate degree.

If you like math, you might consider a career in agricultural finance. Farmers and ranchers need basic math knowledge as well, to keep track of their herds, crops and their finances.

If you like science, agricultural research might be the career for you. Agricultural research covers every area of scientific research, from biology to earth science, to physics and more.

If you like social studies, you might get involved in public policy related to agriculture or you might pursue geography and the exciting field of geospatial positioning systems.

There are even careers in agriculture for those whose favorite subjects are art or English. Artists are needed to design packaging and promotional materials. Writers are needed to communicate the advantages of different products or to keep the public informed about our food system.

The possibilities are endless and are changing rapidly. Preparing for any career means acquiring knowledge in a broad range of school subjects. Most careers require effective communication, including speaking and writing. Most careers require knowledge of basic math and scientific principles.

In addition to knowledge gained through the classroom, skills are also important for achieving success. Working with other people may not be a subject for classroom study, but it is essential in the working world. Everyone

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has different skills. There are some things you do better than your friends and some things they do better than you. Skills employers want include the ability to multi-task, the ability to communicate, the ability to work with others, the ability to work with computers, and skills specific to the job.

Albert Einstein said “Education is not the learning of facts. It’s rather the training of the mind to think.” This is true of training for your career. Because everything is changing so quickly, the best preparation is learning how to learn and how to find the information you need when you need it.

English Language Arts
1. Read and discuss background and vocabulary.
2. Provide copies of the two reading pages about advances in agriculture.
   — Students will read them individually or in groups.
   — Students will answer the comprehension questions.
   — As a class discuss the rapid changes in agriculture and the need for flexibility in career planning.
3. Students will complete the “I Would Like to...” questionnaire included with this lesson.
   — Students will determine their preferred career areas based on the largest number of items they have checked.
   — Students will select a career in their preferred career area from the list of careers in agriculture included with this lesson.
   — Students will use online resources to research the preferred career. A list of links to information about careers in agriculture has been provided. Students will find as much information as possible about the career, including education and training needed, potential employers (public or private), kind of work, salary range, etc.
   — Students will write short reports about the careers and make presentations to the class by taking on the persona of a person in the career they have researched. Students may use props, such as lab coats, etc., and describe a few of their duties, education, etc. Students will work in career groups to make their presentations.
4. Review guidelines for writing a resume.
   — Students will write resumes to apply for at least three of the jobs within their preferred career area.

Additional Reading
Gillman, Scott, Food, Agriculture and Natural Resources (Top Careers in Two Years).
Owen, Ruth, Growing and Eating Green: Careers in Farming, Marketing and
Vocabulary

agriculture — the science or occupation of cultivating the soil, producing crops, and raising livestock

career — a profession followed as a permanent occupation

combine — a machine that harvests, threshes, and cleans grain while moving over a field

commercial — designed mainly for profit

communication — transmission of information so that it is satisfactorily received or understood

crop — a plant or animal or plant or animal product that can be grown and harvested

engineering — the art or science of making practical application of the knowledge of pure sciences, as physics or chemistry, as in the construction of engines, bridges, buildings, etc.

farming — raising crops or animals

finance — the system that includes the circulation of money, the providing of banks and credit, and the making of investments

geography — a science that deals with the location of living and nonliving things on earth and the way they affect one another

government — in the US, the system of people, laws and officials that define and control a city, county, state or the country

hectare — a unit of land measure equal to 2.471 acres

husker — something used to strip the usually thin dry outer covering of barley or corn

incubator — a piece of equipment providing suitable conditions (as of warmth and moisture) for hatching eggs

job — a position at which one regularly works for pay

labor — the services performed by workers for wages

manufacturing — to make from raw materials by hand or by machinery

multitask — the ability to do more than one thing at a time

policy — a course of action chosen in order to guide people in making decisions

private — not under public control

processing — changing or preparing by special treatment

production — the act of bringing something out by work

promotional — helping increase the sales of something

public — relating to or engaged in the service of the community or nation

ranching — working on a a place for the raising of livestock (as cattle, horses, or sheep) on range

reaper — a machine for cutting grain or clearing a field

research — careful study and investigation for the purpose of discovering and explaining new knowledge

revolution — a sudden, extreme, or complete change

sickle — a tool with a sharp curved metal blade and a short handle used to cut grass

skill — a developed or acquired ability

subsistence — the minimum (as of food and shelter) necessary to support life

threshing — separating seed from a harvested plant especially by using a machine or tool

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A Revolution in Agriculture

The revolution in agriculture – paralleling that in manufacturing after the Civil War – involved a shift from hand labor to machine farming, and from subsistence to commercial agriculture.... The farmer of 1800, using a hand sickle, could hope to cut a fifth of a hectare of wheat a day. With the cradle, 30 years later, he might cut four-fifths. In 1840 Cyrus McCormick performed a miracle by cutting from two to two-and-a-half hectares a day with the reaper, a machine he had been developing for nearly 10 years. He headed west to the young prairie town of Chicago, where he set up a factory – and by 1860 sold a quarter of a million reapers.

Other farm machines were developed in rapid succession: the automatic wire binder, the threshing machine, and the reaper-thresher or combine. Mechanical planters, cutters, huskers, and shellers appeared, as did cream separators, manure spreaders, potato planters, hay driers, poultry incubators, and a hundred other inventions.

Scarcely less important than machinery in the agricultural revolution was science. In 1862 the Morrill Land Grant College Act allotted public land to each state for the establishment of agricultural and industrial colleges. These were to serve both as educational institutions and as centers for research in scientific farming. Congress subsequently appropriated funds for the creation of agricultural experiment stations throughout the country and granted funds directly to the Department of Agriculture for research purposes. By the beginning of the new century, scientists throughout the United States were at work on a wide variety of agricultural projects.

One of these scientists, Mark Carleton, traveled for the Department of Agriculture to Russia. There he found and exported to his homeland the rust- and drought-resistant winter wheat that now accounts for more than half the U.S. wheat crop. Another scientist, Marion Dorset, conquered the dreaded hog cholera, while still another, George Mohler, helped prevent hoof-and-mouth disease. From North Africa, one researcher brought back Kaffir corn; from Turkestan, another imported the yellow-flowering alfalfa. Luther Burbank in California produced scores of new fruits and vegetables; in Wisconsin, Stephen Babcock devised a test for determining the butterfat content of milk; at Tuskegee Institute in Alabama, the African-American scientist George Washington Carver found hundreds of new uses for the peanut, sweet potato, and soybean.


COMPREHENSION QUESTIONS

1. What is the main idea of this article? What are some of the supporting details?
2. What is the author’s point of view? How is it conveyed?
3. List some examples from the article of the importance of research.
4. What was Cyrus McCormick’s “miracle?” Why was it called a miracle?
5. Identify at least five agricultural careers related to the information in this article
...At the Illinois State University experimental farms, Agriculture Department Chair Rob Rhykerd stands in the livestock barn looking at cattle and sheep. A serious drought this year has hurt farm productivity, but Rhykerd said this year’s reduced crop would be the envy of farmers a generation ago.

“Yields of corn here in central Illinois right after World War II probably looking in the 50 to 80 bushel per acre range and now an average year in McLean County is around 180 bushels per acre, so more than doubled production in the last 50 years,” Rhykerd said....

“We’ve gone from traditional hybrids into genetically modified crops,” he said. “We’ve improved our efficiency using fertilizers. That has been a major advancement. We’ve gotten much better in the last 50 years conserving our resources, soil in particular, but also water.”

Combines have changed a lot over the year. They have ballooned from harvesting two or four rows to sixteen and planters now put in 48 rows of seeds at a pass. Use of GPS and yield monitors to measure productivity is standard.

A decade ago the buzz term was “precision farming.” ISU Agriculture Professor Dick Steffen said that has been slower to develop than originally envisioned. Like all information technology pursuits, it is tough to get each piece of equipment to interface with the others. Steffen said true interactive precision is closer to reality now. Cameras [or sensors] on booms can allow a computer to distinguish weeds from crops.

“So that as it goes along through the field if it spots a weed, it activates the spray nozzle just where the weed is rather than spraying the whole field,” Steffen said.

Steffen said what amounts to robotic farming is coming.

“There are a number of pieces of equipment around the country in research labs and in trials where they have taken operators out of the loop, and the equipment operates basically autonomously,” Steffen said.

“One of the major equipment companies is looking at using drones [unmanned aerial vehicles, or UAVs] flying over fields,” farmer John Reifsteck said....Reifsteck said there may eventually be sensors on those drones to detect weeds, insects, or disease pressure....

Reifsteck said the pace of technology change is not slowing, especially the area of plant genetics....The base genetics of crops are changing to allow higher yields. At the same time, scientists are adding traits for insect protection, weed control, the ability to grow in hot, dry, wet, and cool places....

In a way, the present era is bringing farming full circle from the 19th century. ISU Ag Professor Dick Steffen said when small farmers had a lot of time on horse drawn implements, they knew their land intimately, by the inch. As farm sizes grew, farmers made choices for their entire operation.

“And now with this equipment that allows us to map and allows us to record data about a lot of different points, we are at the point that we can go back to that level of management we saw a century ago,” Steffen said.


COMPREHENSION QUESTIONS
1. What is the main idea of this article? What are the supporting details?
2. Compare agriculture as described in the article “A Revolution in Agriculture” with agriculture as described above.
3. Contrast the author’s point of view with the author’s point of view in “A Revolution in Agriculture.”
4. List five technological advances that are described in the article.
5. Identify five agricultural careers related to the information in the article.
I would like to...

Based on your personal goals and preferences, put a check mark next to all the phrases below that would accurately complete the sentence “I would like to....” Then count the number of check marks in each category and write the number in the space provided for each group on the next page. This is your preferred career area.

GROUP 1
_____ work on a farm
_____ work outdoors
_____ work with animals
_____ manage my own business

TOTAL FOR GROUP 1 _______

GROUP 2
_____ teach others about agriculture, food and the environment
_____ coach young people
_____ teach kids how to take care of animals
_____ teach others to garden and grow crops

TOTAL FOR GROUP 2 _______

GROUP 3
_____ work in a laboratory
_____ develop new food products
_____ develop new biofuels
_____ solve problems

TOTAL FOR GROUP 3 _______

GROUP 4
_____ help people with legal problems
_____ fight forest or range fires
_____ patrol forest lands
_____ help keep our food safe

TOTAL FOR GROUP 4 _______

GROUP 5
_____ work with my hands and tools
_____ build things
_____ work on machinery
_____ design machinery and invent things

TOTAL FOR GROUP 5 _______

GROUP 6
_____ use a computer to create art
_____ make movies
_____ write or broadcast news stories
_____ take pictures

TOTAL FOR GROUP 6 _______

GROUP 7
_____ cook meals
_____ help customers
_____ take care of lawns and landscaping
_____ take care of animals

TOTAL FOR GROUP 7 _______

GROUP 8
_____ work with trees
_____ work outdoors
_____ help the environment
_____ work with wildlife

TOTAL FOR GROUP 8 _______

GROUP 9
_____ sell things
_____ work in an office or a bank
_____ manage a business
_____ work in a store

TOTAL FOR GROUP 9 _______

GROUP 10
_____ work with computers
_____ design computer programs and applications
_____ write code
_____ work with geospatial positioning systems (GPS)

TOTAL FOR GROUP 10 _______
Some Careers in Agriculture

Select one of the careers below from the preferred career area as you selected on the “I would like to...” page. Use online resources to find as much information as possible about the career, including education and training required, most likely employer (public or private), kind of work, salary range, etc.

1. PRODUCTION AGRICULTURE
   - Crop Farmer
   - Dairy Farmer
   - Rancher
   - Farm Laborer

2. AGRICULTURAL EDUCATION
   - High School Agriculture Teacher
   - University Agriculture Teacher
   - County Cooperative Extension Service Educator
   - Environmental Educator

3. AGRICULTURAL RESEARCH
   - Plant or Soil Scientist
   - Animal Scientist
   - Food Scientist and Technologist
   - Laboratory Manager

4. GOVERNMENT/LEGAL
   - Agricultural Grader
   - Food Inspector
   - Patent Attorney
   - Law Enforcement

5. MANUFACTURING/ENGINEERING/CONSTRUCTION/MECHANICS
   - Agricultural Machinery Mechanic
   - Custom Equipment Operator
   - Feed Mill Equipment Operator
   - Mechanical Engineer

6. AGRICULTURAL COMMUNICATION/ART/DESIGN
   - Agricultural Journalist
   - Packaging Designer
   - Marketing Communications Manager
   - Social Media Specialist and Web Designer

7. SOCIAL AND PERSONAL SERVICES
   - Gardener or Groundskeeper
   - Dietitian
   - Veterinarian
   - Cook or Restaurant Manager

8. NATURAL SCIENCE AND RESOURCE MANAGEMENT
   - Entomologist
   - Forester
   - Hydrologist
   - Timber Manager

9. AGRICULTURAL FINANCE, BUSINESS AND MANAGEMENT
   - Agricultural Equipment Salesperson
   - Farm Loan Officer
   - Farm Manager
   - Truck Driver

10. INFORMATION TECHNOLOGY (COMPUTERS)
    - Computer Programmer
    - Computer Software Engineer
    - Computer Hardware Engineer
    - Precision Agriculture Technician (GPS)