Careers in Agriculture

A middle-school cross-curricular unit

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Including both original content and remixed lessons from *Michigan Agriculture in the Classroom*

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We're going to spend the next week investigating careers in one specific career cluster--agriculture. Few students think about careers in agriculture unless they grew up on a farm. But jobs in agriculture are for everyone!

To start our investigation, let's read the following Newsela article - "Students discover high school ag studies are not just for farmers" https://newsela.com/read/ag-education/id/3947/.

Then answer the following questions:

1.   Which of the following sentences BEST summarizes the main idea of the article?

      A. New high school programs are teaching teenagers about agriculture.
      B. The courses are being offered mostly throughout the U.S. Midwest, a region where agriculture has been a tradition.
      C. The courses help the students prepare for future careers in agriculture.
      D. The students are lucky: There are not enough people with degrees in agriculture.

2.   Which of the following would be another good title for the article?

      A.   "Not enough students have degrees in agriculture"
      B. "New high school agriculture classes prepare kids for jobs"
      C. "Future Farmers of America teaches students about farms"
      D. "Beech Grove's Applied Life Sciences Academy gets kids excited about agriculture"

3.   Based on this article, what is the best definition of the word "agriculture"?

      A. how to run and work on a farm
      B.   how to manage cows and other animals
      C. how to grow plants, especially the plants that produce food
      D. how to take care of and grow plants, animals and food

4.   Which word helps you to understand the meaning of "fund" in the sentences below?

The state government helps to fund the Academy. It gives the Academy an allowance for each student in the program.

      A. government
      B. Academy
      C. allowance
      D. student

Lesson 1 - Careers in Agriculture Introduction

Introduction

You don't have to come from a farm to pursue a position in agriculture. There are ag-related jobs everywhere for anyone! In fact, one out of every six jobs in the United States is related to agriculture. With more than 250 career areas available in the field of agriculture, the possibilities are numerous. Plus, there is a demand for qualified people to fill these positions. According to the U.S. Department of Agriculture, more than 57,000 jobs open each year in agriculture.

More than 22 million people have careers in agriculture. Only two million people are traditional farmers, but many people are involved in the process from farm to market. There are agriculture careers in agribusiness, communications, engineering, biotechnology research, government, education, computer science, processing, distribution, marketing and many other areas. Some people have careers connected to agriculture but they do not realize it! For example, sales representatives for food distributors, genetic researchers and elementary teachers who teach topics such as plant and animal systems are all involved in agriculture because their jobs relate to the food and fiber system.

The agricultural industry is made up of six employment areas. These areas are:
- Production Specialist – 7 percent
- Social Service Professionals – 9 percent
- Education and Communication – 11 percent
- Managers and Financial Specialists – 13 percent
- Scientists, Engineers and Related Specialists – 32 percent
- Marketing, Merchandising and Representatives – 28 percent

Agricultural Production Specialist Careers such as aquaculturalist, turf manager, viticulturist, farm manager, grain and/or livestock farmer, wildlife manager, greenhouse manager, fruit and vegetables grower and specialty animal producer.

Social Service Professionals Careers such as youth program counselor, dietitian, regulatory agent, community development specialist, regional planner, park manager, food inspector, and outdoor recreation specialist.

Communication and Education Specialist Careers such as computer systems analyst, illustrator, journalist, information specialist, personnel development specialist, agriculture/horticulture teacher, public relations representative, computer software designer and radio/television broadcaster.

Managers and Financial Specialist Careers such as an accountant, policy analyst, bankers, food service manager, retail manager, consultant, wholesale manager, economist, insurance agency manager and association manager.

Lesson 1 - Careers in Agriculture Introduction

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Scientist, Engineers, and Related Specialists Careers such as agronomist, remote sensing specialist, research technician, environmental scientist, landscape architect, food scientist, animal scientist, agricultural engineer, water quality specialist and plant scientist.

Marketing, Merchandising, and Sales Representative Careers such as grain merchandiser, insurance agent, sales representative, landscape contractor, restaurant manager, market analyst, commodity broker, export sales manager, advertising manager and forest products merchandiser.

From "Count on an Ag Career" from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Lesson 1 - Careers in Agriculture Introduction

Careers in Agriculture Quiz

Careers related to agriculture are found in many different categories. Match each occupation below with the proper category. Can you think of other occupations in each category?

1. Farming and Ranching

2. Science and Research

3. Manufacturing

4. Business

5. Education and Services

6. Communications

a. Agronomist

b. Home economist

c. Meteorologist

d. Food inspector

e. Elevator manager

f. Fruit grower

g. County extension agent

h. Writer

i. Fertilizer packager

j. Loan officer

k. Soil conservationist

l. Artist

m. Seed grower

n. Poultry producer

o. Equipment sales agent

From "Count on an Ag Career" from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Lesson 2 - Using Textual Evidence

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Crop Farming - An Introduction to Corn

The Corn Belt is a group of states producing most of the corn in the United States. Illinois, Iowa, Nebraska and Minnesota produce 50 percent of all the corn grown in the United States. Other major corn-growing states include Indiana, Wisconsin, Michigan, South Dakota, Kansas, Missouri, Kentucky and Ohio. These 12 states make up the Corn Belt.

Corn is the major feed grain grown by farmers in the United States, leading all other crops in value and volume of production. Corn is a major component in foods like cereals, peanut butter and snack foods. An ear of corn has an average of 16 rows with 800 kernels. A pound of corn consists of approximately 1,300 kernels. An acre (about the size of a football field) of corn, yielding 100 bushels, produces approximately 7,280,000 kernels. Most of the weight of a bushel of corn is the starch, oil, protein and fiber, with some natural moisture.

Farmers grow corn on every continent of the world except Antarctica. Hybrid varieties of corn have been developed to adapt to specific growing conditions and locations worldwide. Hybrids are the offspring produced by breeding plants of different varieties.

One hundred years ago, starch was basically the only product resulting from corn refining and the rest of the kernel was thrown away. Today, there are uses for every part of the kernel – even the water in which it is processed. The corn seed (kernel) is composed of four main parts: the endosperm, the pericarp, the germ, and the tip cap. The endosperm is most of the dry weight of the kernel. It is also the source of energy for the seed. The pericarp is the hard, outer coat that protects the kernel both before and after planting. The germ is the living part of the corn kernel. The germ contains genetic information, vitamins and minerals that the kernel needs to grow. The tip cap is where the kernel was attached to the cob.

Corn can be made into fuel, abrasives, solvents, charcoal, animal feed, bedding for animals, insulation, adhesives and more. The kernel is used as oil, bran, starch, glutamates, animal feed and solvents. The silk is combined with other parts of the corn plant to be used as part of animal feed, silage and fuels. Husks are made into dolls and used as filling materials. The stalk is used to make paper, wallboard, silage, syrup and rayon (artificial silk).

Lesson 2 - Using Textual Evidence

Crop Farming - A Brief History of Corn

Since ancient times, corn has played an integral role in human history. Corn is a grass, native to the Americas. The exact origin of the grain remains unknown, but tiny ears of corn have been discovered at ancient village sites and in tombs of early Native Americans. Evidence of corn in central Mexico suggests its presence there as long as 7,000 years ago, where it was domesticated from wild grass. Cultivated corn is known to have existed in the southwestern United States for at least 3,000 years. To the Aztecs and the Incas, corn was a staple of their diet that provided flour and vegetable dishes for their meals. Here in the United States, many of the various Native American tribes have traditionally grown corn – also known as maize – and used it for both food and utilitarian purposes. Corn was so important to some Pueblo tribes of the Southwest that it was considered one of the three sacred foods (along with beans and squash), so sacred that some groups even worshipped it. Indeed, Native American mythology is rich with stories involving corn and important religious events. Many eastern tribes shared their knowledge of corn production with the early European settlers, an act which saved many pioneers from starvation.

Uses of Corn

Along with wheat and rice, corn is one of the world's major grain crops. It is the largest grain crop grown in the United States. Corn has been used as a foodstuff for humans (about 9 percent of each crop), as well as for livestock (about 64 percent of each crop). Corn has found its way into a wide variety of American foods including corn kernels, corn meal and other food products such as: cooking oils, margarine, and corn syrups and sweeteners (fructose). Corn is an excellent source of carbohydrates. Corncobs have been used as a soft-grit abrasive and to provide furfural, a liquid required in the manufacturing of nylon fibers. Corn has been used as a source for producing biodegradable plastics. Additionally, ethanol (a type of renewable fuel made from corn) has shown the possibility of becoming a major"new"fuel for the world's automotive industry. From foods of the past to fuels of the future, this highly diverse crop has played a major role in human civilization.

Corn Development and Growth

As miraculous as the many uses for corn may be, the way corn develops and grows is equally fascinating. A single seed (or kernel) of corn may produce a plant which yields more than 600 kernels of corn per ear. To understand the vast amount of seed produced by corn plants, consider the following example: A single kernel can produce a plant that will contain at least 600 kernels per ear. On one acre of land, anywhere from 22,000 to 35,000 individual plants may be grown. If each plant produces at least one ear of corn, the yield will be 13,000,000 kernels of corn from that single acre. (In general, hybrid corn is developed to produce from one to two ears per plant.) A 400-acre farm would then yield over five-billion

kernels from its production. In addition, U.S. corn yields have increased 125 percent since 1950.

From "Corn: An A-mazing Plant" from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Lesson 2 - Using Textual Evidence

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Crop Farming - Using Articles, Charts, and Maps

Complete the following questions and activities after reading both articles above.

1.   Who used corn in ancient times?

2.   What are some of the ways corn is used today?

3.   Where is corn mostly grown in the United States?

4.   How have the uses of corn changed over time?

5.   What are parts of the corn kernel called, and how are these parts useful?

Using the map of the United States below, color in the 12 states which make up the Corn Belt (see "An Introduction to Corn").

Printable Maps by WaterproofPaper.com

From "Corn: An A-mazing Plant" from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Lesson 2 - Using Textual Evidence

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Crop Farming - Using Articles, Charts, and Maps

Using the USDA charts on the next two pages, answer the following questions about the Corn Belt states and corn production:

1. Complete the chart below by listing the 12 states of the Corn Belt, along with the 2018 area planted, area harvested, yield per acre, and production. The first state is done for you.

    NOTE: Three of the amounts indicated in the USDA chart and the chart below state "(1,000 acres)." That means that the actual number of acres or bushels is x 1,000. So the number of acres planted in Illinois in 2018 was 11 <u>million</u>, not 11 <u>thousand</u>. Illinois' corn production for 2018 was 2 TRILLION, 278 MILLION, 500 THOUSAND bushels of corn!

State	2018 Area Planted (1,000 acres)	2018 Area Harvested (1,000 acres)	2018 Yield per Acre (bushels)	2018 Production (1,000 bushels)
Illinois	11,000	10,850	210	2,278,500

Corn Area Planted for All Purposes and Harvested for Grain, Yield, and Production – States and United States: 2016-2018

State	Area planted for all purposes			Area harvested for grain		
	2016	2017	2018	2016	2017	2018
	(1,000 acres)	(1,000 acres)	(1,000 acres)	(1,000 acres)	(1,000 acres)	(1,000 acres)
Alabama	330	250	260	315	235	250
Arizona	95	65	70	50	32	15
Arkansas	760	620	660	745	595	645
California	420	430	430	100	80	65
Colorado	1,340	1,460	1,470	1,170	1,300	1,200
Connecticut [1]	25	24	23	(NA)	(NA)	(NA)
Delaware	170	180	170	164	171	166
Florida	80	75	100	40	37	65
Georgia	410	290	325	340	245	285
Idaho	340	340	360	100	115	135
Illinois	11,600	11,200	11,000	11,450	10,950	10,850
Indiana	5,600	5,350	5,350	5,470	5,200	5,200
Iowa	13,900	13,300	13,200	13,500	12,900	12,800
Kansas	5,100	5,500	5,450	4,920	5,200	5,000
Kentucky	1,500	1,320	1,340	1,400	1,220	1,230
Louisiana	620	500	460	550	490	450
Maine [1]	31	31	31	(NA)	(NA)	(NA)
Maryland	460	480	450	400	420	390
Massachusetts [1]	16	15	14	(NA)	(NA)	(NA)
Michigan	2,400	2,250	2,300	2,040	1,890	1,940
Minnesota	8,450	8,050	7,900	8,000	7,630	7,490
Mississippi	750	520	480	720	500	465
Missouri	3,650	3,400	3,500	3,500	3,250	3,330
Montana	115	115	115	55	65	68
Nebraska	9,850	9,550	9,600	9,550	9,300	9,310
Nevada [1]	11	12	13	(NA)	(NA)	(NA)
New Hampshire [1]	15	14	13	(NA)	(NA)	(NA)
New Jersey	80	77	72	71	70	61
New Mexico	120	125	135	41	43	35
New York	1,100	1,000	1,100	570	485	645
North Carolina	1,000	890	910	940	840	830
North Dakota	3,450	3,420	3,150	3,270	3,230	2,930
Ohio	3,550	3,400	3,500	3,300	3,150	3,300
Oklahoma	400	350	320	350	305	280
Oregon	80	85	80	39	44	45
Pennsylvania	1,400	1,350	1,350	950	920	950
Rhode Island [1]	2	2	2	(NA)	(NA)	(NA)
South Carolina	375	350	340	350	325	310
South Dakota	5,600	5,700	5,300	5,130	5,080	4,860
Tennessee	880	750	740	830	710	690
Texas	2,900	2,450	2,200	2,550	2,240	1,750
Utah	80	80	70	29	20	22
Vermont [1]	90	82	85	(NA)	(NA)	(NA)
Virginia	490	500	485	340	340	325
Washington	170	170	165	85	80	85
West Virginia	49	50	46	35	33	33
Wisconsin	4,050	3,900	3,900	3,220	2,930	3,170
Wyoming	100	95	95	69	63	70
United States	94,004	90,167	89,129	86,748	82,733	81,740

From USDA Crop Production 2018 Summary
(https://www.nass.usda.gov/Publications/Todays_Reports/reports/cropan19.pdf)

Corn Area Planted for All Purposes and Harvested for Grain, Yield, and Production – States and United States: 2016-2018 (continued)

State	Yield per acre			Production		
	2016	2017	2018	2016	2017	2018
	(bushels)	(bushels)	(bushels)	(1,000 bushels)	(1,000 bushels)	(1,000 bushels)
Alabama	120.0	167.0	156.0	37,800	39,245	39,000
Arizona	215.0	195.0	220.0	10,750	6,240	3,300
Arkansas	171.0	183.0	181.0	127,395	108,885	116,745
California	185.0	167.0	173.0	18,500	13,360	11,245
Colorado	137.0	143.0	130.0	160,290	185,900	156,000
Connecticut [1]	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Delaware	170.0	189.0	145.0	27,880	32,319	24,070
Florida	145.0	161.0	157.0	5,800	5,957	10,205
Georgia	165.0	176.0	176.0	56,100	43,120	50,160
Idaho	188.0	203.0	213.0	18,800	23,345	28,755
Illinois	197.0	201.0	210.0	2,255,650	2,200,950	2,278,500
Indiana	173.0	180.0	189.0	946,310	936,000	982,800
Iowa	203.0	202.0	196.0	2,740,500	2,605,800	2,508,800
Kansas	142.0	132.0	129.0	698,640	686,400	645,000
Kentucky	159.0	178.0	175.0	222,600	217,160	215,250
Louisiana	165.0	184.0	173.0	90,750	90,160	77,850
Maine [1]	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Maryland	152.0	172.0	146.0	60,800	72,240	56,940
Massachusetts [1]	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Michigan	157.0	159.0	153.0	320,280	300,510	296,820
Minnesota	193.0	194.0	182.0	1,544,000	1,480,220	1,363,180
Mississippi	166.0	189.0	185.0	119,520	94,500	86,025
Missouri	163.0	170.0	140.0	570,500	552,500	466,200
Montana	100.0	70.0	85.0	5,500	4,550	5,780
Nebraska	178.0	181.0	192.0	1,699,900	1,683,300	1,787,520
Nevada [1]	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
New Hampshire [1]	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
New Jersey	145.0	167.0	141.0	10,295	11,690	8,601
New Mexico	150.0	134.0	187.0	6,150	5,762	6,545
New York	129.0	161.0	159.0	73,530	78,085	102,555
North Carolina	129.0	142.0	113.0	121,260	119,280	93,790
North Dakota	158.0	139.0	153.0	516,660	448,970	448,290
Ohio	159.0	177.0	187.0	524,700	557,550	617,100
Oklahoma	121.0	126.0	134.0	42,350	38,430	37,520
Oregon	230.0	212.0	195.0	8,970	9,328	8,775
Pennsylvania	129.0	161.0	140.0	122,550	148,120	133,000
Rhode Island [1]	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
South Carolina	127.0	136.0	127.0	44,450	44,200	39,370
South Dakota	161.0	145.0	160.0	825,930	736,600	777,600
Tennessee	151.0	171.0	168.0	125,330	121,410	115,920
Texas	127.0	140.0	108.0	323,850	313,600	189,000
Utah	175.0	176.0	182.0	5,075	3,520	4,004
Vermont [1]	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Virginia	148.0	140.0	146.0	50,320	47,600	47,450
Washington	235.0	225.0	220.0	19,975	18,000	18,700
West Virginia	145.0	152.0	152.0	5,075	5,016	5,016
Wisconsin	178.0	174.0	172.0	573,160	509,820	545,240
Wyoming	147.0	155.0	164.0	10,143	9,765	11,480
United States	174.6	176.6	176.4	15,148,038	14,609,407	14,420,101

From USDA Crop Production 2018 Summary
(https://www.nass.gov/Publications/Todays_Reports/reports/cropan19.pdf)

Lesson 3 - Math in Agriculture

Introduction

Operating a farm is a multi-faceted business. Farmers must purchase supplies and services and sell products. They need a good understanding of agri-business and economics to make a profit. Farmers work with individuals and companies to supply the needs of their farm and sell their products. Farmers must know how to keep an organized budget, compare prices, and make wise financial decisions. Farmers use math in their day-to-day operations. For example, farmers use math to determine the amount of seed they need to plant their crop and how much it will cost. They use math to purchase equipment and make payments. Math is important in determining taxes and insurance and helping farmers keep track of how much their livestock weighs, how much milk their cows produce and their crop yield per acre, etc.

As an example, read the information below on Dairy Farming and then complete the math problems which follow the article with your small group. Discuss how you came up with your answers.

Dairy Farming

Dairy cows have the ability to change grass and grains, the kind people can't eat, into milk -- a nearly perfect food! The dairy cow can do this because she is a ruminant, an animal with four compartments to her stomach. Ruminants do not have any upper front teeth. They eat by wrapping their tongues around their food and pulling it into their mouths.

Dairy cattle were brought to America during early Viking voyages in the 1000s, Columbus' voyages in 1492, and the colonists' settlements in the early 1600s. When pioneers settled the West, they took dairy cattle with them for milk, cheese and butter. When cities began growing rapidly, it was harder to get milk from the farm to the people in the city. This problem was solved when railroads became a form of transportation. Milk was then transported to many places, some as far as 50 miles away.

Milk is now supplied to consumers on a daily basis. Before the late 1600s, milk was only available during the spring, summer, and fall, because cows could feed on pastures during these times of the year. When colonists began saving grain and hay for cattle to eat during the winter, cows started producing milk all year long.

Dairy farming occurs in every state. However, California, Wisconsin, New York, Minnesota, and Pennsylvania are the leading milk-producing states.

On today's dairy farms, cows are milked two or three times a day with special milking machines. Using automated equipment, farmers milk dairy cows and store the fresh milk in a refrigerated tank. The invention of the electric milking machine marked the end of the standard milking stool and the

tiring job of milking by hand. With just two of these portable milking machines, a farmer can milk a dozen cows in a quarter of the time it previously took by hand.

Dairy farmers are careful to keep the milk clean and avoid exposing it to the open air, which might cause contamination. After the milk is taken from the cows, it is pumped through a clear plastic pipe to a refrigeration tank. Special refrigerated tanker trucks then pick the milk up and transport it to the dairy processing plants, where the milk is pasteurized to kill any disease-causing bacteria.

All dairy cows are female and must have a calf before they can produce milk. Heifers are female calves less than one year of age. After cows reach two years of age they usually give birth to their own calves. Dairy cows spend six and a half hours a day eating hay, silage and grain. Silage is fermented corn, wheat or hay with the stalks and leaves. The average cow eats 50 pounds of silage as well as 40 pounds of feed and hay each day – a total of 90 pounds of food. (The average American only eats four pounds of food a day.) Dairy cows also drink 25-50 gallons of water daily. This food and water turns into about 100 glasses of milk a day.

There are many different breeds of dairy cows and each breed varies in the amount of and richness of milk produced. Some dairy farmers keep several breeds of cows in the herd in order to maintain a consistent milk quality. Holstein-Friesian cows are large black and white cows. They produce the most milk, but the least butterfat. Holsteins are the most popular breed in this country and adapt to all kinds of climates.

From "The Dairy Shoppe" from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Math Discussion Group Questions:

1.   How much time do cows spend eating hay, silage and grain each week?

2.   If a cow eats 90 pounds of food and drinks 50 gallons of water per day, what percentage of a cow's food is turned into glasses of milk each day?

3.   How many pounds of feed and hay will an average cow eat in a year?

Lesson 3 - Math in Agriculture

Math in Agriculture - You are the Farmer

You are a no-till **Farmer** in Wisconsin and usually plant soybeans, as well as corn. This year you make the decision to plant corn on all the ground you farm. Use the following information to complete the activity. You will have to round some answers to the nearest whole dollar, full container or full bag.

- Seed corn costs $117 per acre.
- Fertilizer costs $129 per acre.
- Fuel and oil cost $14 per acre. *(Every time you work on your acreage, this amount needs to be included.)*
- Herbicide costs $82.20 for a 2.5-gallon container that treats 8 acres.
- Insecticide costs $94 for a 50-pound bag. Fifty pounds treats 6.7 acres.
- Your farm property is Wisconsin's average size of 221 acres.

1. You decide to rent 76 acres of your neighbor's farmland for $97 per acre. What is the total rent for this acreage? **Don't forget to include this acreage in the rest of your calculations.**

_____

2. You decide to plant your corn. How much will it cost to plant seed corn on all of your acres?

_____

3. You need to purchase a new tractor and planter. The **Agricultural Loan Officer** from the bank will recommend loaning you the money to buy the equipment, but you are required to make payments of $18,500 every year for seven years. In addition, you have payments on previous purchases of $5,500 per year. What is your total annual equipment cost for one year?

_____

4. You need to put fertilizer on your corn crop. How much will this cost? _____

5. To keep weeds in your corn under control, you need to apply herbicide. How many containers will you need? _____ How much will it cost to apply? _____

6. Most of your no-till corn is planted on last year's soybean ground and does not need any insecticide. Eighty acres of corn will be planted on last year's corn ground, and corn rootworms are a threat to the crop. Your **Agronomist** recommends that you apply an insecticide product. How many 50-pound bags will you need? _____ Calculate the cost of application:

_____

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7. It is time to pay your property taxes and insurance. The cost is $28 per acre on the land that you own. What is your total cost?

_____

8. Your corn crop is great! You harvest 144 bushels per acre. What is the total number of bushels of corn harvested? _____

9. Look back at the chart on Page 12. According to the USDA, did your corn crop yield more or less than the state average of bushels per acre for 2018? _____

10. List the states where your 144 bushels per acre average would be more than the state average for 2018 (ignore those states which say N/A):

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

Challenge Section!

A. Corn production for the state of Wisconsin in 2018 totalled 545,240,000 bushels. What percentage of the state total production was your farm's total production?

_____

B. Look back at the chart you created on Page 10. According to the article "An Introduction to Corn," *"Illinois, Iowa, Nebraska and Minnesota produce 50 percent of all the corn grown in the United States."* In 2018, the entire United States produced 14,420,101,000 bushels of corn. Use the space below to determine whether the states of Illinois, Iowa, Nebraska and Minnesota did produce at least 50% of the corn grown in the United States. **NOTE: Don't forget to multiply the state totals x 1,000 to get the correct answer!**

Lesson 4 - Agriculture Career Research with Xello

Introduction

It is not necessary to come from a farm to pursue a position in agriculture. One out of every six jobs in the United States is related to agriculture. There is a demand for qualified people to fill these positions. According to the U. S. Department of Agriculture, more than 57,000 jobs open each year in agriculture.

Approximately 22 million people now work in agriculture and ag-related fields. Only 10 percent of them are directly involved in production agriculture. The rest work in agribusiness, communications, science, government, education, processing and distribution, marketing and sales, as well as other occupations which serve the farmer or agricultural industry.

As new technologies emerge in agriculture, so will new job opportunities and the need for well-trained and educated people. Today's agriculture offers more than 250 rewarding and challenging careers. Agriculture today is so much more than farming. Agriculturists can work in livestock production or soil conservation, equipment repair or radio broadcasting, or anything from nursery management and genetic engineering to landscaping and law.

From "Picture This Agriculture Career " from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Xello

If you haven't already done so this year, go to https://xello.world/wp-login.php and log in to your Xello account. If you were using Career Cruising in the past, you will notice that Xello has a much different look and feel to it! Follow the steps below to research agriculture careers:

1. Take the Matchmaker quiz to see how your interests align with available careers in agriculture. Click the "Getting Started" button and Launch Matchmaker.

2. Once you are done with the Matchmaker questions, search for the "Farmer" career. You'll see immediately whether Farmer is a good career match for you or not, and you can click on "Find out Why" to see how your Matchmaker answers aligned with the skills for Farmer.

3. Select "Similar Careers" on the right-hand side or "Explore the Agriculture Career Cluster" or search for other agriculture occupations listed on Pages 4-6 in this packet. Spend some time (15 minutes) skimming other agriculture occupations, but in the end, choose ONE agriculture-related career to research more thoroughly (preferably one that is a good match for your interests).

4. Once you've decided on a career, complete the notetaking guide on Page 19.

5. Exit Slip - Once you are done with the notetaking guide, write a paragraph (at least 5 sentences) about whether or not you think you would enjoy this career and why.

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Agriculture Career Research with Xello - Notetaking Guide

Fill in the notetaking guide with information on your chosen agriculture career.

Chosen Agriculture Career:	
Job Description - List 3 things a person with your career does as part of their job:	1. 2. 3.
Core Tasks - List 3 important tasks performed in this career:	1. 2. 3.
Workplace/Working Conditions: List at least 2 things that you like about the workplace or working conditions for this career:	1. 2.
What are the entry-level earnings in the state of Wisconsin?	
What is the entry-level position and what are the education requirements for this position?	
Click on one of the interviews and list some pros and cons of this career:	Pro: Con:

Lesson 5 - Technology in Agriculture

Introduction

Before voyages of discovery for new land, only a few crops were grown in particular regions. For example, people in Europe did not know what potatoes were until the Spanish brought them to Europe in the 1500s. When European and Spanish explorers and settlers came to America, the Native Americans introduced them to many new crops. Europeans brought with them knowledge of a variety of farming methods, tools, seeds and livestock.

The Agricultural Revolution began in the early 1700s with many discoveries and inventions. Farming was made easier and more productive. Inventions allowed farmers to produce more food and feed more people than before. As a result, people began taking new jobs off the farm.

Farmers do a lot to prepare soil for planting, care for the crop and harvest. In earlier times, farmers did most jobs by hand with very few tools to help them. Farmers used animals to do most of the heavy work. Farmers went from using few hand tools before the 1700s to using different types of equipment in the 1700s and 1800s. Still, many inventions in the 1800s required animals, such as oxen or horses, to pull them through a field or to supply the power for a machine to run. Since then, many advances in farm machinery and farm equipment have been made. Using modern machinery, one farmer can feed more people now than ever before.

One valuable piece of machinery farmer's use today is a tractor. Before tractors, farmers used horses and other animals to pull and work pieces of heavy equipment. The first types of tractors were called traction engines. They ran on steam and were hard to maneuver. Over time, newer, improved versions were made, and by the 1920s a more practical tractor was developed. Today, tractors are used for many different things. They are used to plant, cultivate and pull heavy loads filled with grain, mowers and much more. A tractor can pull these heavy machines and equipment because it has an engine whose power equals that of 200 horses.

Before the 1700s, farmers planted crops by spreading seeds by hand. In the early 1700s, a farmer named Jethro Tull invented a seed drill. The seed drill dug small trenches in the soil and dropped seeds into them. This piece of equipment is now called a planter. Planters put seeds in the soil. They have tanks which hold the seeds and seed meters so the correct amount of seeds are dropped into the soil. A row of wheels on the planters cover the seeds with soil after they are dropped in the field.

Farmers once harvested crops by hand. They could cut stalks, stack them in large piles and store them in a silo. (A silo is a cylindrical structure in which grain is kept.) Next, the farmer separated the grain from the stalk by hand. It took many people to do these two tasks, until Cyrus McCormick invented the reaper, a machine that cuts the stalks. Then a thresher was invented. Threshers separate the grain from the stalks. Farmers used reapers to cut the stalks and threshers to separate the grain from the stalks.

Lesson 5 - Technology in Agriculture

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Since the 1930s, farmers have used machines called combines to pick grain from the fields (which is also called harvesting). A combine does the job of both a reaper and a thresher. A combine separates grain from the stems as it cuts stalks in the field. The combine stores the grain in a big tank inside the machine. The leftover stalks are thrown out the back of the combine. The auger is a long tube on the side of the combine. Inside the auger is a rotating flange (like a screw) that moves the grain from the storage tank and dumps it into a truck or wagon.

In the past, using horses and other farm animals, farmers would cut hay in the fields and rake it into bundles. Then, they would haul it back to the barn for storage. Today, farmers use mechanical hay balers.
These hay balers cut the hay or straw and pack it into square or round bales.

Dairy cows were once milked by hand. Farmers would milk their cows two to three times daily. Today, most farmers use milking machines. Farmers still milk cows two to three times a day, but it is a much easier process. Farmers attach suction cups to the teats of a dairy cow, and this suction system pulls milk
from the cow and pumps it into a storage tank. The storage tank keeps the milk fresh and cool. When farmers milked by hand, it would take two people about two and one-half hours to milk 20 cows. Today, an electric milking machine enables one farmer to milk 20 cows in about 15 minutes!

From "Tracking Technology" from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Lesson 5 - Technology in Agriculture

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Technology in Agriculture - Using Articles and Videos for Research

Complete the following questions and activities after reading the article and watching the video below.

1.   How do farmers plant seeds now? How did they plant seeds in the past?

2.   What two pieces of equipment did farmers use to harvest crops in the past?

3.   What big machine do farmers use today to harvest crops?

4.   What machine do farmers use to pull heavy loads or pieces of equipment?

5.   How did farmers milk cows in the past? How do they milk cows today?

6.   How many times a day does a farmer need to milk the cows?

From "Tracking Technology" from Michigan Agriculture in the Classroom (https://miagclassroom.org/edu/lessons.cfm)

Next, watch "The Future of Farming--A TDC Mini-Documentary" on Youtube:
https://youtu.be/Qmla9NLFBvU

This mini-documentary lists a **huge** number of technological advancements to the agriculture industry:

- Autonomous pickers
- Robotic weed/pest killers
- Micro-sensors
- Robotic soil sampler
- Autonomous farm
- Drone-assisted crop monitoring
- Uber-like aerial crop imaging
- Cubesat whole farm imaging
- Big data analytics
- Data sharing collectives
- Vertical farming
- Optimal growing wavelengths
- Climate replication
- Livestock activity monitors
- Breath analysis

- Automated thermal imaging analysis
- 3-D camera measuring
- Audio health monitoring
- Automated behavior analysis
- Inland saltwater fish farms
- Zero waste fish farming
- Fish food made from bacteria
- Insect flour and protein powder
- Cultured meats
- Genetic modification:
    - CRISPR
    - Drought tolerant corn
    - Nextgen cassava project
    - C4 rice project
    - Livestock disease immunity

Technology in Agriculture - Using Articles and Videos for Research

In this final activity for "Careers in Agriculture," we're going to concentrate on several skills. One is the skill of taking notes from an article. Being a good notetaker is an important soft skill or employability skill, as seen in this infographic from Resume Professional Writers:
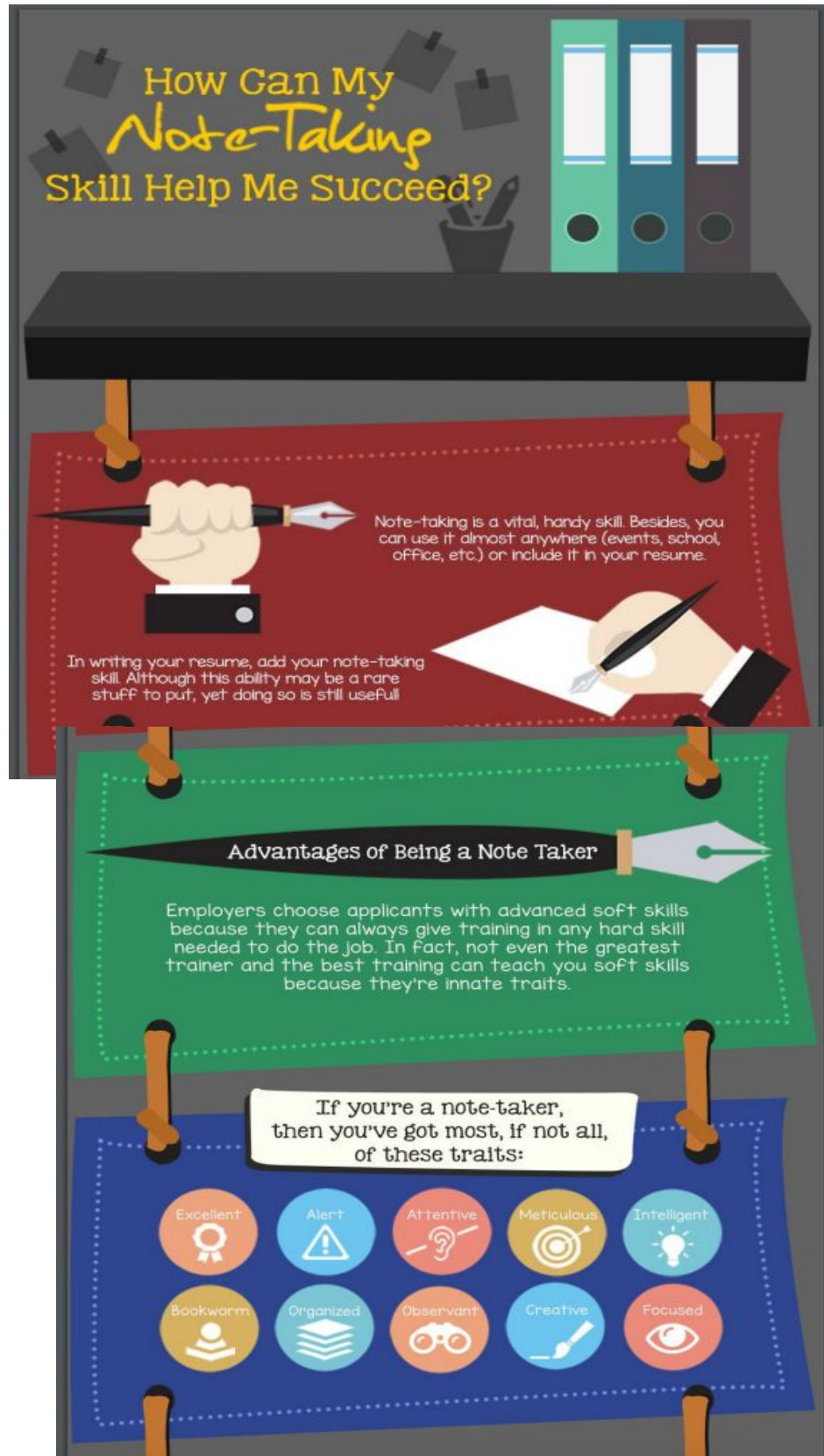
Lesson 5 - Technology in Agriculture

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Technology in Agriculture - Using Articles and Videos for Research

Think about the agriculture career you researched earlier. Then follow these steps to practice your note-taking skills and gather information for final writing assignment:

1. From the list on Page 22, choose one technological advancement in agriculture which would impact a person with the career you chose in Lesson 4.

2. Find some additional information on your technological advancement. Two suggestions for quality resources include Badgerlink or Newsela for more information. Unlike doing a Google search, using published articles insures that the information has been fact checked and edited before being published (no fake news!) If you use Newsela, here are some articles which may be of interest:

   - "High-tech indoor farming is shaking up the agriculture community"
     https://newsela.com/read/future-farming-technology/id/47363/
   - "Companies hope consumers take a bite out of cell-cultured meat"
     https://newsela.com/read/cell-cultured-meat/id/51776/
   - "Do you want fake fries with that?" https://newsela.com/read/meatless-meat/id/1805/
   - "High tech down on the farm: Helping growers cope with climate change"
     https://newsela.com/read/farms-data/id/2056/
   - "California farmers welcome the iPad and 'ag-tech'"
     https://newsela.com/read/agtech-food/id/6416/
   - "Farmer grows crops in water fertilized by fish"
     https://newsela.com/read/aquaponics-farm/id/2465/

   Search Newsela or Badgerlink for more articles on technology advancements in agriculture.

3. Take notes on the article you've selected with the note-taking guide on Page 25.

Lesson 5 - Technology in Agriculture

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Technology in Agriculture - Notetaking Guide

Fill in the notetaking guide with information on your chosen agricultural technologies.

Chosen agricultural technology:	
Bibliographic Information:	Author _____ Article Title "_____" Magazine/Journal Title _____ Date _____ URL _____
Key terms, topics, ideas:	At least three important ideas related to the key terms and topics:
How does this technology relate to my chosen agricultural career?	

Careers in Agriculture - "A Day in the Life" Final Writing Assignment
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Pretend you are an adult with the agricultural career that you researched. Using your notes from Pages 19 and 25, write a story about a typical work day for you. Include the following information:

- Where you work (this can be a real place or a fictional place--you decide!)
- Things you do in a typical day
- Tasks you perform
- How your job connects to the agricultural advancement you researched
- What you like most about your job
- What is challenging about your job

Your story should be written in the first person point of view and be approximately 1 page (typed double spaced). Use the rubric at the end of the packet as your guide.

Need an example? Here's the beginning of "A Day in the Life" of a Video Game Developer:

My name is Terri, and I'm a videogame developer at Rockstar Games. You might think my job is fun and exciting because you enjoy playing the videogames that I create. However, the tasks that I complete each day are not all "fun and games" (haha!) For example, the first thing I have to do when I get to work is meet with our creative team. This includes writers, artists, designers and programmers. Each person brings their ideas for the game we are designing together. This meeting can be really interesting, but sometimes we argue about whose idea is best!

Once this meeting is done, I usually have another meeting on a second game which is already in development. Here we look for bugs in the program or talk about fixing graphics or problems with the storyline. We might have to pull other people into this meeting if they can help us find problems with the game. These two meetings generally take all morning, and then we take a lunch break.

Things to notice:
- The story is written in first person point of view (I, we).
- The story included an introduction to my character (Terri) and job (videogame designer).
- The story included the place I work (Rockstar Games).
- The story included some tasks I have to complete every day.
- The story included both positives and negatives about the career.

- This is NOT a full page--it's just an example to get started 😊

Careers in Agriculture - "A Day in the Life" Final Writing Assignment

Grading Rubric

Student Name: _____

Category	4	3	2	1
Focus on Topic (Content); includes information about: *Where you work *Things you do in a typical day *Tasks you perform *Technology impacts this job *Pros about this job *Cons about this job	This is definitely "A Day in the Life" of this career! All of the required information is included.	A good summary of "A Day in the Life" of this career. Most of the required information is included.	You have a start at "A Day in the Life" of this career. Some of the required information is included.	Some work needs to be done on "A Day in the Life" of this career. Missing many required pieces of information.
Adding Personality (Voice)	You seem like you actually have experience with this career. Great use of first person point of view to really create a character with this career.	You use information from your research, and you use first person point of view, but the writing doesn't always sound like a real person.	You use some of your knowledge or experience about this career, but you are struggling with first person point of view.	This is not written in first person point of view. This sounds like it is copied from your research, not like a real person.
Introduction (Organization)	Your introduction is inviting and draws the reader into a snapshot of this career. It is clear this will cover "A Day in the Life."	You introduce your "Day in the Life," but it is lacking enthusiasm.	It's clear this is about a career, but not clear that this will follow "A Day in the Life."	There is no clear introduction. It's difficult to see that this will be "A Day in the Life."
Conclusion (Organization)	The conclusion is strong and leaves the reader with a feeling that they understand what "A Day in the Life" of this career is all about.	The conclusion is recognizable and gives the reader good insight into "A Day in the Life" of this career.	The conclusion is recognizable, but is missing some important aspects of "A Day in the Life" of this career.	There is no clear conclusion, the paper just ends.
Grammar & Spelling (Conventions)	Writer makes 0-2 errors in grammar or spelling that distract the reader from the content.	Writer makes 3-5 errors in grammar or spelling that distract the reader from the content.	Writer makes 6-10 errors in grammar or spelling that distract the reader from the content.	Writer makes more than 10 errors in grammar or spelling that distract the reader from the content.

Total/Grade:

Comments: