

THINK GLOBAL - AGRICULTURE & OUR WORLD TEACHER LED CLASSROOM EXPERIENCE ANSWER KEY & ADDITIONAL RESOURCES

Section 1: What is Agriculture?

Stop and Discuss

Questions:

1. What is Agriculture?

Agriculture is the business of growing, processing, and distributing safe, healthy food.

2. How are you connected to agriculture?

Everyone needs to eat so we are all consumers of agriculture.

Students may identify other connections as agriculture also provides us with fibre, ingredients for many everyday products, alternate fuels and 1 in 8 jobs in Canada.

3. a) Do you know anyone who works in agriculture?
b) Do they work in:

i. Production?

Are they a farmer or do they provide services or products to farmers?

ii. Processing?

Does that person work in a facility that brings in product from farms and processes them into a finished product for us to buy at the grocery store? What food product?

iii. Distribution?

Does this person transport agriculture or food products? Do they sell food products to consumers?

Extension Activities:

[Agriculture Scavenger Hunt](#)

Sections 2: Global Trade

Stop and Discuss

Questions:

1. What foods would you no longer be able to eat in Canada if we stopped importing all food produced in other countries? Why?

Examples could include:

Lemons	Kiwi	Rice
Cranberries	Coffee	Pineapple
Almonds	Mango	Coconut Oil
Bananas	Dragon fruit	Oranges
Olive Oil	Tuna	Tea

As well as fresh strawberries or grapes etc. in the winter months.

This is because Canada does not have the right climate to grow or produce these foods.

2. If Canada stopped exporting agriculture products, how do you think this would affect:

- a. **Farmers in Canada**
- b. **Agriculture jobs in Canada**
- c. **Canada's economy and balance of trade**
- d. **Other countries in the world?**

Over 50% of the value from the crops and livestock grown in Canada is exported worldwide. Canada's top 5 agricultural exports are wheat, canola seed, soybeans, canola oil and live cattle but we export many other agriculture products.

Website - extension resource:

[Canadian Agri-Food Trade Alliance \(CAFTA\)](#)

- a. [Agri-Food Exports by sector \(9 products highlighted\)](#)
- b. [Trade is my Future \(personal stories\)](#)



Because Canada enjoys favourable conditions for food production that far exceeds the needs of our population, our agri-food sector is primarily export oriented.

Canada is the fifth largest exporter of agricultural and agri-food products in the world after the EU, U.S., Brazil, and China. Canada exported over \$56 billion in 2016 in agriculture and agri-food products and approximately half of everything we produce is exported as either primary commodities or processed food and beverage products.

EXPORT STATISTICS

- We export half of our beef/cattle, 70% of our soybeans, 70% of our pork, 75% of our wheat, 90% of our canola and 95% of our pulses.
- Over 90 percent of Canada's farmers are dependent on exports as well as about 40 percent of our food processing sector.
- 1 in 2 jobs in crop production depend on exports, and 1 in 4 jobs in food manufacturing.
- Export opportunities help us grow: over the last 10 years in Canada, agriculture and agri-food exports have grown by 103%, boosting farm cash receipts by 46% over the same period.
- Agriculture and food processing are key components of the Canadian economy and of Canada's trade portfolio. Agriculture and food account for 11% of Canada's goods GDP and almost 10% of Canada's total merchandise trade. Food processing is by far the largest manufacturing employer in Canada supporting over 250,000 jobs across the country.

Section 3: Population

Stop and Discuss

Questions:

1. Identify the percentage of world population that lives in each continent today.

Africa	17.2%	Europe	9.6%	S. America	5.5%
Asia	59.6%	N. America	7.6%	Oceania	0.5%

2. Why do you think the world population has increased and is predicted to continue increasing?

A few ideas to consider:

- Increased agriculture production and market access
- Better methods of storing, preserving, and trading food which provide better year-round nutrition
- Better healthcare and more cures for diseases
- Better education on health and nutrition
- Better nutrition and health care means more children survive childhood and grow up to have children

It took from the beginning of the human species to the year 1804 for the world population to reach 1 billion people. Since then, the world population has been increasing at a much faster rate.

World Population Milestones:

1804: 1 billion	1987: 5 billion
1927: 2 billion	1999: 6 billion
1960: 3 billion	2011: 7 billion
1974: 4 billion	

Worksheet - extension resource:

[Journey 2050 World Population worksheet](#)

Website - extension resource:

[World Population History – interactive map](#) (Watch the world population grow from year 1 to 2100.)

3. Which of these phrases best describes how the population in your continent is predicted to change between 2020 and 2050?

- Slowly increase** (North America, South America, Asia)
- Rapidly increase** (Africa, Oceania)
- Slowly decrease** (Europe)

4. Between 1960 - 2020 and beyond, we see a change in the amount of people in the world that live in urban areas rather than rural areas. What has the general trend been?

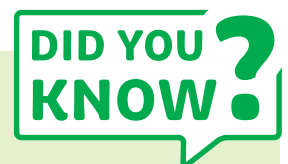
All continents have seen an increase in the percentage of people who live in urban areas, and it is predicted that the percentage of the population that is urban will continue to increase in the coming decades.

World urban populations through the years:

1950 – 751 million urban population
2018 – 4.2 billion urban population

Percentage of world population that was urban:

1973 – 37%
2004 – 49%
2018 – 55%



A decreasing rural population also means a decreasing number of farmers to grow food to feed everyone. In Canada for instance:

- In 1901, our population was 5.4 million and 3.2 million Canadians were farmers. Now our population is 37.7 million and only 0.3 million Canadians are farmers
- In 1901, one farmer fed 10 people while in 2011, one farmer fed over 120 people



(Infographic from p. 2-3 of the 2016 [Real Dirt on Farming](#))

5. a) What has made it possible for farmers to produce enough food to feed the increased world population?

Science, technology, innovation, and higher education have vastly increased the production of food per farmer.

b) Why has this made it possible for more people to move to the cities?

This has made it possible for people to pursue careers other than farming and move off the land to towns and cities where they rely on agriculture and the remaining farmers to provide them with food.

Science like better seeds and livestock genetics, synthetic fertilizers.

Technology like farm machinery, computer-controlled livestock barns, precision ag tools including GPS, mapping software and soil tests.

Innovation like conservation tillage, 4R nutrient management and other best management practices.

Section 4: Land Distribution

Stop and Discuss

Questions:

1. What fraction of the land in your continent can be used for agriculture?

Africa	1/2	Europe	2/5	S. America	1/3
Asia	1/3	N. America	1/4	Oceania	1/2

2. Identify reasons why the rest of the land cannot be used for agriculture.

Reasons can include:

- Climatic
 - Too hot, too cold, too dry (drought), too wet (flooding), too short of a growing season
- Geographic
 - Deserts, mountains, tundra, unfertile soils, marshy areas, areas of high salinity, forested area
 - Urban sprawl, highways
- Environmental
 - Land is polluted
 - Environmental degradation, i.e., top soil eroded, desertification

3. The world population is increasing so more food is needed. The amount of agriculture land is decreasing, and we want to preserve and expand remaining wildlife areas, not convert them to farmland. What suggestions do you have to meet the challenge of producing more food on less land, using less water and fossil fuel energy?

Answers could include:

- Improved seed varieties and livestock genetics, this would include genetic engineering commonly called GMOs, to increase food produced using less land, water, and energy.
- Power farm machinery with fuels other than fossil fuels such as biofuels or hydrogen.
- New production methods such as indoor closed-loop fish farming, vertical farming of greens in warehouses, converting residential lawns, city green spaces and rooftops to food producing gardens.
- Growing food in laboratories i.e. lab cultured “meat” protein.
- Farming insects for protein.

Videos – extension resource

i) [Your Food, Farm to Table](#), 2:40

ii) [How This Robotic Farm Is Reimagining Agriculture](#), 3:11

iii) [H2O2 Series XConcept – Valtra Design Challenge](#), 1:29 (Highlights new hydrogen fuel cell, autonomous tractors of the future.)

Section 5: Food Security

Stop and Discuss

Questions:

1. How food secure is your continent?

Africa	81.2%	Europe	97.5%	S. America	95%
Asia	91.7%	N. America	97.5%	Oceania	94.2%

2. Why is a successful agriculture industry essential to ensuring food security?

Agriculture is the business of growing, processing, and distributing safe, healthy food. Only a successful Agriculture industry can provide the food needed to ensure people are food secure.

3. All these factors help make agriculture successful:

- Infrastructure
- Financial Tools
- Research
- Better Livestock Genetics
- Better Seeds
- Innovation
- Technology
- Education
- Empowering Women
- Government Policies

Give an example of how one of these factors can make agriculture successful in your continent.



New technology can help improve agriculture. But it is important that the technology be appropriate, culturally acceptable, and easy to adopt for the people it is meant to help. An example of a globally useful and welcome technology is cell phones. Although, they have varying uses in different countries, farmers in all countries use them to connect to markets. While technology for some farmers looks like large autonomous farm machinery, for others it can be something much simpler and less expensive like small scale storage bins.

Videos – extension resource:

Videos to illustrate how empowering women, providing education, technology, infrastructure, and better seeds can improve agriculture and food security in developing countries. Videos i) and ii) are embedded in the PowerPoint on slide 28 and 29 for optional viewing:

- i) [Women Need One Thing: A Hand Up, World Food Program USA](#), 0:50, (Highlights how education, technology, and infrastructure can help improve food security in developing countries.)
- ii) [Female Farmers + Food Storage = 98% Less Food Loss, World Food Program USA](#), 0:46, (Highlights how simple storage bins can improve food security.)
- iii) [How to End Global Hunger: Start by Feeding and Empowering Women, World Food Program USA](#), 2:12
- iv) [Simple solutions to hunger -- an Afghan village transformed, Food and Agriculture Organization of the United Nations](#), 3:38, (Highlights how extension/knowledge services, technology, and better seeds can help improve small holder farming.)

4. Between 1990 and 2015, the number of hungry people decreased from 1 billion to 815 million, while the world’s population increased from 5.3 billion to 7.3 billion. But since then, the number of hungry people has been slowly increasing. The UN states that the main reasons for this increase are war and climate change.

a. Explain how you think war affects agriculture and leads to more hungry people.

War displaces populations and disrupts the growing and distributing of food. It can be too dangerous to work in the fields or go to food markets. Roads connecting food producing areas to cities can be destroyed. Armed forces can expropriate all the local food production leaving little for civilians.

b. Explain how climate change affects agriculture and leads to more hungry people.

Climate change alters expected seasonal conditions and weather patterns. It causes farmers to experience for example severe and more frequent droughts and floods, changing seasonal precipitation amounts and times, and increased heat events all of which reduce crop and livestock production.

c. Suggest ways we can overcome these food security obstacles:

i. War

Answers will vary but will involve government efforts and diplomacy. Wars can start because of food insecurity so a successful agriculture industry that can produce and distribute food at affordable prices will help reduce food insecurity. (One factor that caused the uprisings known as the “Arab Spring” which eventually led to the wars in Yemen and Syria was the rapid increase in food prices caused by the 2008 global financial crisis.)

ii. Climate Change

Answers will vary but the agriculture industry is working hard to find innovative solutions to deal with changing weather and growing conditions caused by climate change. Examples include:

- Genetically engineered seeds that can withstand longer periods of drought or flooding.
- Dairy cows that can maintain or increase milk production in high temperatures.
- Using irrigation with smart phone technology to monitor crop water needs and deliver what is needed when it is needed to reduce water usage while dealing with reduced precipitation.
- Making soils more resilient to severe weather by increasing the organic matter and carbon stored in them through the planting of cover crops and perennials and managing the grazing of cattle.

[Reinventing Rice for a World Transformed by Climate Change](#)

[International Potato Center – creating potatoes that can grow on Mars](#)

[Kiwi company launches new heat tolerant dairy genetics](#)