



# AGRICULTURE

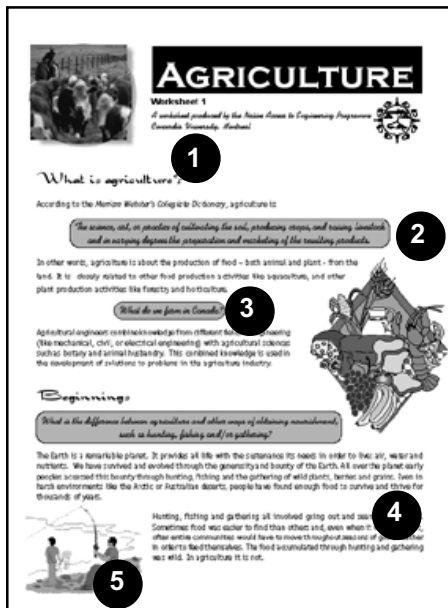
## Worksheet 11

*A worksheet produced by the Native Access to Engineering Programme*



## Teacher's Guide

Here are some suggestions for how can work with Worksheet 11, Agriculture.

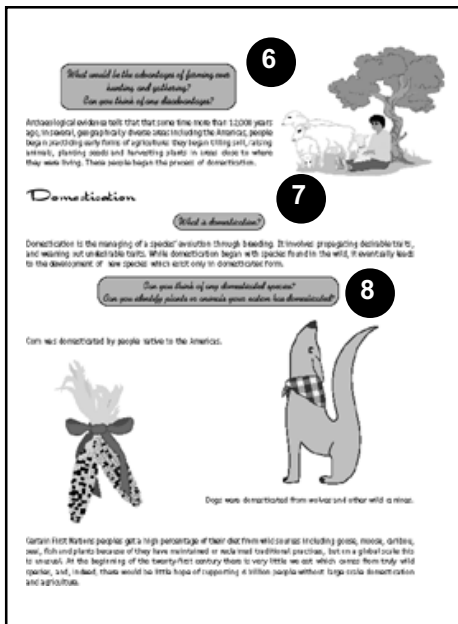


1. Vocabulary  
After reading this worksheet, your students should be able to explain the following terms:

|                  |                           |
|------------------|---------------------------|
| Agriculture      | Forestry                  |
| Animal Husbandry | Genetically modified food |
| Aquaculture      | Horticulture              |
| Biodiversity     | Intercropping             |
| Botany           | Irrigation                |
| Domestication    | Selective breeding        |
| Fertilization    | Three sisters             |

2. Do your students understand the definition? Can they demonstrate their understanding by using the term in a sentence?
3. Aquaculture is the farming of fish and other water based goods such as pearls and mussels.
4. Despite the short growing season and harsh climate, Canada produces a huge variety of produce from the farm. For in-depth information about produce go to the Agriculture Canada web site at [www.agr.ca](http://www.agr.ca) . Here is a brief list of some of the foods our students may come up with:
  - Meat: Beef, chicken, bison, lamb
  - Grains: Rye, wheat, oilseeds (such as canola)
  - Fruits: Apples, pears, peaches, grapes, nectarines, plums, raspberries, strawberries, blackberries, blueberries, cranberries
  - Vegetables: Potatoes, mushrooms, lettuce, tomatoes, peas, carrots, beets, onions, cabbage, corn, beans, squash
  - Other: Eggs, milk and dairy products, maple syrup, honey, flowers, Christmas trees

- Hunting, fishing and gathering all involve going out and looking for food in nature. In agriculture food is farmed nearby and consists of species generally not found in the wild.



- Your students may, of course, come up with other answers:

Advantages of farming:

Food is easily accessible.

Food is generally of a standard quality.

You can have a good idea of how much food you will have for the winter.

You can adjust the amount of food you grow to the number of people in the community.

Disadvantages of farming:

Agriculture requires careful tending of the plants or animals being raised.

Disease or adverse weather may wipe out an entire crop or herd without warning.

Certain farming practices, such as irrigation, fertilization or the grazing of herds, can adversely affect the land.

- The answer to this question is contained in the paragraphs which follow it. It may, however, be interesting to gauge your students' understanding of the term prior to entering into a discussion about domestication.

- Just about any produce purchased at a supermarket comes from plants or animals which have been domesticated from wild stock. Depending on the region in which you live you can compare and contrast domestic species with wild ones your students are familiar with. For instance, what are the differences between wild strawberries (or blueberries) and domesticated ones? Or, what are the differences between wild canines – such as wolves or foxes – and domesticated ones – such as huskies or collies?

The answer to the second part of your question will depend on your region and nation. Perhaps an Elder or person who knows some local history can be brought in talk about how food was traditionally acquired and what role – if any - agriculture traditionally played in community life.

- Corn is a good source of food because it contains a large number of seeds on each cob. Each seed is low in fat and calories while being relatively high in dietary fiber and protein. Corn can be dried and easily stored for winter. The kernels can also be ground into a meal.

- For ancient peoples whose diet and survival depended on acquiring sufficient food, a multi-kerneled corn cob would have provided a good food source that was gathered with relative ease and speed as compared with other foods. In other words corn provided more return for less effort, freeing up time and energy for other activities.






**Other aspects of agriculture**

Some plants are sensitive to frost damage. In fact, there is much more to agriculture than we have seen so far. In fact, there is much more to agriculture than we have seen so far. In fact, there is much more to agriculture than we have seen so far.


**19**



In the Americas, scientists are working to develop a variety of genetically modified crops. In the Americas, scientists are working to develop a variety of genetically modified crops. In the Americas, scientists are working to develop a variety of genetically modified crops.

**20**

Some crops have been genetically modified to be resistant to pests. Some crops have been genetically modified to be resistant to pests. Some crops have been genetically modified to be resistant to pests.



19. Concerns you might have as a farmer:

**Weather:** rain – too much, too little; wind – removes soil; sun - a certain amount is required for ripening; temperature - extremes affect both livestock and plants

**Money:** equipment; supplies - seeds, livestock, equipment; competition - Because of our proximity to the United States, Canadian farmers have to deal with competition from US farmers. Competition covers things such as export tariffs, subsidies etc.

**Animal and plant health:** pesticides; herbicides; medicine, veterinary consultations

20. There are a number of problems related to the overuse of chemical fertilizer in soil. It can kill bugs that are beneficial to soil and plants; or, over the long term render the soil sterile. Water run off from chemically fertilized fields has led to algae blooms in local rivers, streams and lakes.

Algae are an integral part of any aquatic system , but when they reproduce too quickly and produce a bloom – a visible mass - they are dangerous to both plants and animals. An algae bloom is too much of a good thing. The bloom prevents sunlight from reaching aquatic plants beneath it. Without sunlight, the plants cannot photosynthesize, and so they die. The loss of plant life in water means, the oxygen content will go down, and – believe it or not – the fish won't be able to breathe. Algae blooms caused by fertilizers have been known to cause mass fish die-offs in the areas affected.

21. According to Agriculture Canada about 68 million hectares of land are devoted to farming activity in Canada. This represents about 7% of the total land area. The main factor limiting farming activity is climate.

22. Food imported to Canada consists largely of produce which cannot be grown in a northern climate.

**Lesson plans**

If you want to explore agriculture with your students there are a number of good resources available on the web.

**California Foundation for Agriculture in the Classroom:** These lesson plans are free, and complete – worksheets, activities are all included for pdf download. Although they focus on California crops and agriculture many are general enough for use anywhere and could be modified relatively easily for local application.

[www.cfaic.org/Resource\\_Materials/Lesson\\_Plans/lessonplans.html](http://www.cfaic.org/Resource_Materials/Lesson_Plans/lessonplans.html)

**Corn in the Classroom:** From the Ontario Corn Producers Association, this page contains lots of information from which lessons incorporating statistics about corn can be developed.


[www.ontariocorn.org/citc.html](http://www.ontariocorn.org/citc.html)

**Agriculture in Canada**

Canada is one of the world's largest food producers. While we don't produce the skilled labor and the climate, we produce a lot of food. Canada is one of the world's largest food producers. While we don't produce the skilled labor and the climate, we produce a lot of food.

**21**

**22**



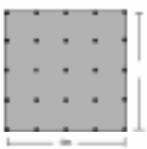

**Resources:**

1. Agriculture Canada
2. Food for Thought
3. Food for Thought
4. Food for Thought
5. Food for Thought
6. Food for Thought
7. Food for Thought

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**Math problem**


1. You have to bring about 4 such trees to the school. If you do not have a plot in your school, then discuss with your friends and make a plan for it. You can use graph paper or geoboard to make the plan. The plot must be square and the trees must be planted at equal intervals. The trees must be planted at equal intervals. The trees must be planted at equal intervals. The trees must be planted at equal intervals.

2. Do you think it is a good idea to plant trees in a school? Why or why not? Write your answer in your notebook.

3. If you have a plot of land, how many trees can you plant in it? Write your answer in your notebook.

4. You can also plant trees in a school. How many trees can you plant in a school? Write your answer in your notebook.



## Solutions

### Problem 1. Area

This problem is an exercise in dividing a fixed area into 4 equal, smaller areas. For solving this problem, students can use either geoboards or graph paper.

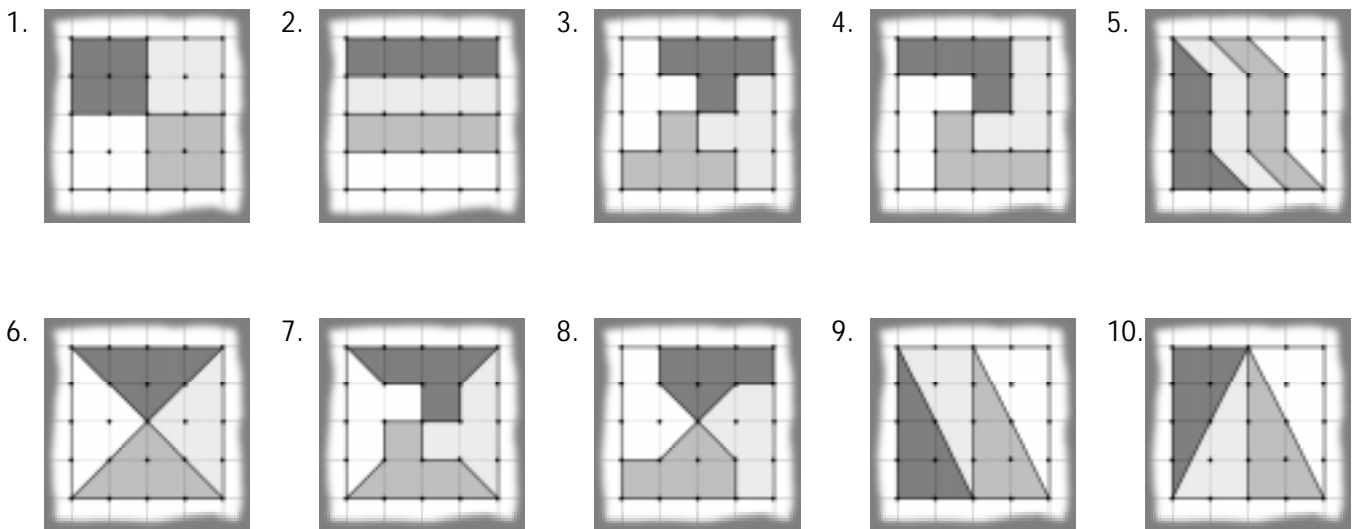
- I. What do we know?
- Plot is 4m x 4m
  - Pegs are 1m apart horizontally and vertically.
  - There are four groups of students.
  - Each group must get a plot of equal area.

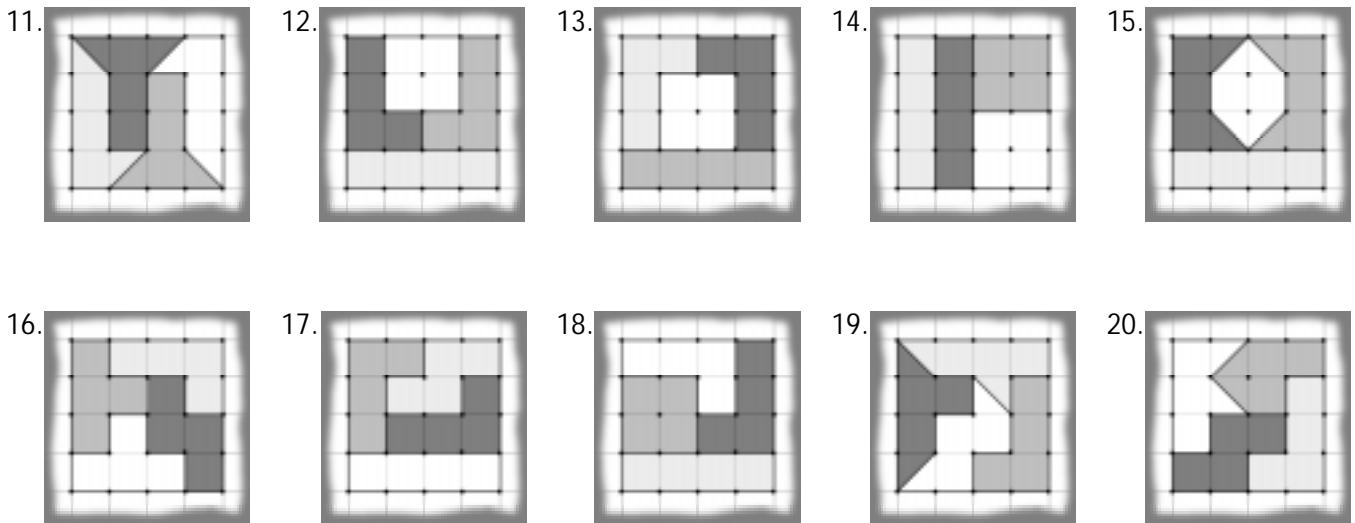
II. Determine how much area each group will get.

$$\begin{aligned}
 \text{Area per group} &= \frac{\text{Total area of plot}}{\text{Number of groups}} \\
 &= \frac{4\text{m} \times 4\text{m}}{4 \text{ groups}} \\
 &= \frac{16\text{m}^2}{4 \text{ groups}} \\
 &= 4\text{m}^2 \text{ per group}
 \end{aligned}$$

III. Divide the 16m<sup>2</sup> plot into (at least) 12 different layouts of four 4m<sup>2</sup> plots.

Working with graph paper or geoboards, students should try to come up with as many different solutions as possible. A number of possibilities follow.

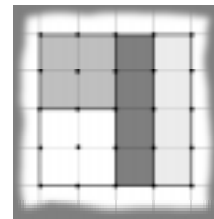
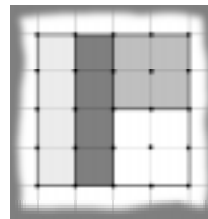
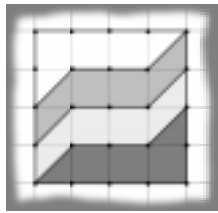
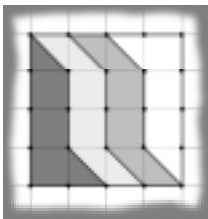




How many can the class find? Will they consider rotated or mirrored designs as “different” plot layouts?

Rotated: Are these the same or different?

Mirrored: Are these the same or different?



**Answer: Each student in the class of twelve should be able to provide a unique layout for the plot.**

**Enrichment:** How many plot layouts can your students find where all the smaller plots are the same shape? Can they find any in which each of the four subplots is a different shape?

**Problem 2: Calculation**

**Problem 2a**

- I. What do we know?
  - Number of trees = 300
  - Sap per tree = 25 l
  - Syrup to sap ratio, 1l of syrup:40l sap

II. Calculate total volume of syrup produced

$$\begin{aligned}\text{Vol. of syrup} &= \text{sap produced per tree} \times \text{syrup:sap ratio} \times \# \text{ trees} \\ &= \frac{25\text{l sap}}{\text{tree}} \times \frac{1\text{l syrup}}{40\text{l sap}} \times 300 \text{ trees} \\ &= 187.5\text{l syrup}\end{aligned}$$

**Answer: 187.5l syrup**

**Problem 2b.**

I. What do we know?

- Volume of tin = 500ml
- 187.5l of syrup (from 2a)

II. Calculate Number of tins.

$$\begin{aligned}\# \text{ tins} &= \frac{1 \text{ tin}}{500\text{ml}} \times \frac{1000\text{ml}}{1\text{l}} \times 187.5\text{l syrup} \\ &= 375 \text{ tins of syrup}\end{aligned}$$

**Answer: 375 tins of syrup**

**Problem 2c.**

I. What do we know?

- Cost of tin: \$0.68
- Selling price per tin: \$2.50
- # tins: 375 (from 2b)

II. Calculate Profit per can

$$\begin{aligned}\text{Profit per tin} &= \$2.50 - \$0.68 \\ &= \$1.82\end{aligned}$$

III. Calculate total profit

$$\begin{aligned}\text{Total profit} &= \text{Profit per tin} \times \# \text{ tins} \\ &= \frac{\$1.82}{\text{tin}} \times 375 \text{ tins} \\ &= \$682.50\end{aligned}$$

**Answer:  
The profit is \$682.50**