Duration: 55 minutes

MATERIALS

Graph paper
Internet access, LCD projector or SMART Board

RESOURCES

Food and Agriculture Organization of the United Nations Website
http://faostat.fao.org/default.aspx

Web Video: Adapting to Climate Change in Bangladesh, Food and Agriculture Organization of the United Nations Website
www.fao.org/videocatalogue/

United Nations Economic and Social Development Website
http://esa.un.org/unpp/

Blueprint For Life/Work Designs – The Quick Reference Guide

INSTRUCTIONAL METHODS

Group Discussion
Direct Instruction
Individual Learning

LESSON OBJECTIVES

- ✓ Students will understand that professional careers allow individuals to engage in work experiences that satisfy one's needs as well as contribute to society (BP 6.3.10)
- ✓ Students will understand that Agricultural and Bioresource Engineers find new and better ways to improve agricultural production and processing, and the management of natural resources
- ✓ Students will demonstrate the ability to graph ordered pairs in the Cartesian coordinate plane, and to graph real-world relations in the Cartesian coordinate plane (B.3, B.4)
- ✓ Students will demonstrate the ability to identify, graph, and interpret examples of linear functions describing real-world situations (B.6)
- ✓ Students will demonstrate the ability to write the equation of a line when given two points on the line (B.15, B.16)
- ✓ Students will demonstrate the ability to construct scatterplots from real-world data (B.17)

BACKGROUND INFORMATION

Help feed the world. Our world is growing – rapidly. By 2025, the world population is expected to soar to over 8 billion people. A healthy future depends on being able to produce enough food for everyone and protect the environment we live in. That makes Agricultural and Bioresource Engineers absolutely vital.

Agricultural and Bioresource Engineers are involved in the development of more efficient machines to seed, harvest and process crops, work on irrigation projects, find better ways to preserve foods and help increase crop yields. They also find ways to sustain our natural resources by preventing soil erosion and conserving water systems. There are exciting opportunities here at home and in developing countries.

MOTIVATIONAL SET

According to the United Nations, population is expected to increase to 8 billion by the year 2025, and to over 9 billion by 2050. World population would not be a concern, if there were unlimited resources.

Agricultural and Bioresource Engineers apply engineering science and technology to agricultural production and processing, and to the management of natural resources. They design and develop new equipment and technology for use in land-based industries, such as agriculture and horticulture. Their work also involves field testing and evaluation, technical support, and the education of customers and operators. They work in a wide range of areas – all focused on using technology to make agriculture and horticulture more efficient and productive.

PROCEDURE

1. Watch the web video: Adapting to Climate Change in Bangladesh http://www.fao.org/videocatalogue/ (5 minutes).

2. Visit the United Nations website http://esa.un.org/unpp/ and select the variable "Population", region "World", and click "Display". Have the students graph the data and projections for world population from 1950 – 2050 (Medium Variant).

3. Explain that in scientific research, we may gather data and notice that when the data is plotted, there seems to be a linear relationship between the variables. The data may not be exactly linear, but may appear close to lying on a line. Graphs like this are called scatterplots. Our job then becomes one of finding the equation of the line that best describes the relationship between the two variables.

4. Have the students draw a line through the points so that approximately the same number of points lie above the line as below the line. This is called the "line of best fit".

5. Now have the students calculate the equation of the line of best fit by choosing two points on the line and finding the slope (m) of the line.

   Then they should find the y-intercept, by substituting the slope (m) and a point (x, y) into y = mx+b. *Note: For this question, let 1950=0, 1960=10, 1970= 20, etc.*

   Use this equation to answer the question: If population continues to grow at this rate, what will be the population in year 2100?

   (If time allows, repeat 2 – 5 above, for population growth of less developed regions and population growth of more developed regions).

6. Graph the following data regarding world food production and find the equation of the line. *Note: Let x equal the number of years past 2000, so 2003 = 3 and 2004 = 4.*

Year	Production of Cereals (in 1000 tonnes)	Production of Fruit and Vegetables (in 1000 tonnes)
2003	2 085 774	1 345 056
2004	2 270 360	1 383 649

(Source: Food and Agriculture Organization of the United Nations Website)

In order to meet the rising demand for food for the year 2050, by how much will the world food production have to increase?

7. Graph the following data of Canada's food production and find the equation of the line. *Note: Let x equal the number of years past 2000, so 2003 = 3 and 2004 = 4.*

Year	Production of Cereals (in 1000 tonnes)	Production of Fruit and Vegetables (in 1000 tonnes)
2003	50 174	3 132
2004	52 682	3 228

(Source: Food and Agriculture Organization of the United Nations Website)

In order to meet the rising demand for food for the year 2050, by how much will Canada have to increase food production to maintain our contribution to world food production?

DEBRIEF

1. What role do Agricultural and Bioresource Engineers play in food production, and why is their role so important?

2. What role does Canada play in helping to meet the rising demand for world food production?

3. How does climate change affect food production?

4. Can you name other professional careers that contribute positively to society?

5. Why might someone choose a career in engineering or geoscience?

6. What subjects might an Agriculture and Bioresource Engineer need to be good at in order to be successful?

ASSESSMENT / INDICATORS

The indicators that the teacher will be looking for are an understanding by the students of the following items:

1. The students understand that professional careers allow individuals to engage in work experiences that satisfy one's needs as well as contribute to society.

2. The students are able to graph ordered pairs in the Cartesian coordinate plane, and to graph real-world relations in the Cartesian coordinate plane.

3. The students are able to identify, graph, and interpret examples of linear functions describing real-world situations.

4. The students are able to write the equation of a line when given two points on the line.

5. The students are able to construct scatterplots from real-world data.