Corn Field Math

<u>Skills:</u> Math

<u>Objective:</u> Students use number sense, measurement, and data analysis to construct drawings and compute multi-step problems dealing with whole numbers, fractions, and percents.

<u>Background</u>

Corn is a grass, native to the Americas. The exact origin is unknown, but tiny ears of corn have been discovered at ancient village sites and in tombs of early Americans. Evidence of corn in central Mexico suggests it was used there as long as 7000 years ago, where it was domesticated from wild grass. Cultivated corn is known to have existed in what is now the southwestern US for at least 3000 years. 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. Eastern tribes shared their knowledge of corn production with early European settlers, an act which saved many from starvation.

Early American colonists dried corn and ground it as meal for flour. They used the ground corn in porridge, cake and bread. Fresh, or sweet corn, the kind we like to eat as corn on the cob, was not developed until the 1700s. Before then corn was only used in its dried form.

Along with wheat and rice, corn is one of the world's major grain crops. It is the largest grain crop grown in the US. About 9 percent of all the corn grown is used to produce food for humans. These foods include corn meal and other food products such as cooking oils, margarine, and corn syrups and sweeteners (fructose). Sixty four percent of all corn grown is used as feed for livestock.

Corncobs have been used in the manufacturing of nylon fibers and as a source for producing degradable plastics. Ethanol, a renewable fuel made from corn, has shown the possibility of becoming a major renewable fuel for the world's automotive industry.

Corn can be produced in much of Oklahoma, but primary production is in the Panhandle area. In Oklahoma, corn is harvested for either grain or silage with most of the grain going to dairies, animal feeding operations, and poultry operations. In an average year, around 25 million bushels are grown for grain in Oklahoma, with a yield of 130 bushels per acre. One bushel of corn is equal to 56 pounds.

Corn is pollinated by wind and is typically planted in 30-inch rows A single seed (or kernel) of corn may produce a plant which yields more than 600 kernels of corn per ear. On one acre of land, anywhere from 22,000 to 35,000 individual plants may be grown.

Hybrid corn is developed to produce from one to two ears per plant. Ears

per plant are often determined by moisture availability. Through better soil conservation practices, fertilizer use, better seed quality, and water availability, corn yields have increased 125 percent since 1950.

Activities

1. Read and discuss the background information and vocabulary.
2. Hand out the worksheet for students to complete.
   —Students will work in pairs or groups to solve the math problems.
   —Students will check answers after completing the first two before continuing.
   —In a class discussion, students will agree or disagree with the reasoning of other classmates and explain their positions.

Extra Reading

Bial, Raymond, *Corn Belt Harvest*, Houghton-Mifflin, 1991.

Fussell, Betty, *Story of Corn*, University of New Mexico, 2004.

Hunger, Sally M., and Joe Allen, *Four Seasons of Corn: A Winnebago Tradition (We Are Still Here)*, Lerner, 1996.

Johnson, Sylvia, *Tomatoes, Potatoes, Corn, and Beans: How the Foods of the Americas Changed Eating Around the World*, Atheneum, 1997.

Landau, Elaine, *Corn (True Books—Food and Nutrition)*, Children's 2000.

Nielsen, Michelle L., *The Biography of Corn (How Did That Get Here?)*, Crabtree, 2007.

Rhoads, Dorothy, *The Corn Grows Ripe,* Puffin, 1993.

Vocabulary

cultivate—to prepare land for the raising of crop

domesticated—adapted to living with human beings and serving their purpose.

ethanol—a colorless, volatile, pungent liquid made from corn which can be burned as a fuel.

hybrid—an offspring of parents with different genes especially when of different races, breeds, species, or genera

maize—Native American name for corn. Also called Indian corn.

pollinated—pollen placed on the stigma of a plant for the purpose of creating seeds, flowers, fruit.

porridge—a soft cereal or meal boiled in water or milk until thick.

silage—the entire above-ground portion of the corn plant (including ear) that is harvested by cutting and chopping the plant before it reaches maturity. It is stored in silos or packed into above-ground pits and used for feed.

soil conservation—a protection from loss, waste, etc. of soil through efficient farming methods.

utilitarian—the quality or property of being useful.

Name _____

Corn Field Math

Use your calculator and other mathematical tools to solve the following problems. Compare your methods with a partner.

1. a)An acre of land is 43,560 sq. ft. How long is one side of a square acre?

    b)If the rows are 2.5 ft. apart, how many rows are there?

    c)How many corn plants will be in each row if there are 22,000 plants in a square acre?

2. Each corn plant produces one ear of corn. There are 600 kernels per ear. How many kernels are produced on 1 acre of land?

WAIT: CHECK YOUR ANSWERS TO THE FIRST TWO PROBLEMS BEFORE CONTINUING.

3. There are 135 bushels of corn produced per acre. How many kernels of corn are in a bushel?

4. A farmer has 640 acres planted in corn. How many bushels of corn will this yield if each plant produces two ears?

5. Corn is selling for $2.40 a bushel. Farmer A's plants produce two ears per plant, while Farmer B's plants produce one. Compare their earnings per acre.

6. The yield has increased by 125% or by a factor of 2.25 since 1950. It is 135 bushels today. What was it in 1950? Explain in writing how you completed your answer.

7. The farmer decided to plant his 320 acres in three different varieties of corn. Use graph paper to construct a model of the farmer's land. Label each section, and complete the calculations. Show your work. Discuss your work on this question with a partner or in a cooperative group.

    a)Variety A produces one ear per plant. The farmer planted 1/3 of his 320 acres in Variety A. How many bushels of corn can he expect from Variety A?

    b)Variety B produces two ears per plant. The farmer planted half of his 320 acres in Variety B. How many bushels of corn can he expect from Variety B?

    c)Variety C produces 1.5 ears per plant. The farmer planted the rest of his acreage in Variety C. How many bushels of corn can he expect from Variety C?

     d)What is the total yield the farmer can expect for the entire 320 acres?

    e)How much would the farmer receive from the sale of his corn at $2.40 a bushel?

Corn Field Math (answers)

1. a)An acre of land is 43,560 sq. ft. How long is one side of a square acre?
    $\sqrt{43{,}460}$ = 208.71 ft per side.
    b)If the rows are 2.5 ft. apart, how many rows are there?
    208.71 ÷ 2.5 = 83.48
    c)How many corn plants will be in each row if there are 22,000 plants in a square acre?
    22,000 ÷ 83.48 = 263.54

2. Each corn plant produces one ear of corn. There are 600 kernels per ear. How many kernels are produced on 1 acre of land?
    22,000 x 600 = 13,200,000

3. There are 135 bushels of corn produced per acre. How many kernels of corn are in a bushel?
    13,200,000 ÷ 135 = 97,777.77

4. A farmer has 640 acres planted in corn. How many bushels of corn will this yield if each plant produces two ears?
    640 x 135 = 86,400 x 2 = 172,800 (2 ears per plant)

5. Corn is selling for $2.40 a bushel. Farmer A's plants produce two ears per plant, while Farmer B's plants produce one. Compare their earnings per acre.
    Farmer A: $2.40 x   270 = $648; Farmer B: $2.40 x 135 = $324

6. The yield has increased by 125%, or by a factor of 2.25, since 1950. It is 135 bushels today. What was it in 1950? Explain in writing how you completed your answer.
    x + (125%)x = 135; 2.25x = 135; 135 ÷ 2.25 = 60; x = 60

7. The farmer decided to plant his 320 acres in three different varieties of corn. Use graph paper to construct a model of the farmer's land. Label each section, and complete the calculations. Show your work. Discuss your work on this question with a partner or in a cooperative group.

    a)Variety A produces 1 ear per plant. The farmer planted 1/3 of his 320 acres in Variety A. How many bushels of corn can he expect from Variety A?
    1/3 x 320 = 106.66 acres x 135 bushels = 14,399.1 bushels
    b)Variety B produces 2 ears per plant. The farmer planted half of his 320 acres in Variety B. How many bushels of corn can he expect from Variety B?
    1/2 x 320 = 160 acres x 270 bushels =   43,200 bushels
    c)Variety C produces 1.5 ears per plant. The farmer planted the rest of his acreage in Variety C. How many bushels of corn can he expect from Variety C?
    1/6 x 320 = 53.33 acres x (135 x 1.5) = 10,799.325 bushels
     d)What is the total yield the farmer can expect for the entire 320 acres?
    14,399.1 + 43,200 + 10,799.325 = 68,398.425 bushels
    e)How much would the farmer receive from the sale of his corn at $2.40 a bushel?
    68,398.425 x $2.40 = $164,156.22