ESTIMATING GRAIN GAME

Overview

Storing grain is an important part of the harvesting process. In this lesson, students will gain knowledge in transporting and storing grain safely. They will learn to estimate different commodities in multiple units of measurement.

Suggested Grade Level:
4th-6th

Time:
25 minutes

Subjects:
Math

Objectives

1. Students will learn to estimate kernels in ounces and cups.
2. Students will learn the differences in weight and space of different commodities.
3. Students will learn how grain is properly stored and transported.

Background Information

The grain elevator has an essential part in getting crops from the farm to the processor to be made into consumable products. The grain elevator provides three vital services including buying grains and oilseeds from farmers, storing them until needed, and reselling to processors.

The farmer's local grain elevator dries, stores and conditions the grains and oilseeds. Then it usually sells the grains and oilseeds to a terminal elevator, flour miller or domestic processor. Terminal elevators, massive grain-handling facilities located at major transportation intersections, also store and condition the grains and oilseeds before selling and shipping them to an export elevator or processor. The export elevators, located on ports or rivers, ship the grains and oilseeds to overseas customers.

Elevators - Past and Present

These large storage facilities are named for the moving belts used inside to move, or "elevate" the grain. It is stored in a temperature and humidity-controlled environment to prevent spoilage and insect growth.

The first grain elevators were all made of wood, which proved to be dangerously combustible since grain dust is a highly explosive substance. Therefore elevators were modified over the years and are now made of cement. The first elevator had a capacity of 55,000 bushels. Three years later, this was doubled. Today, the largest grain elevator in Kansas can store 32,000,000 bushels of grains and oilseeds.

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Background Information Continued

How Much is a Bushel?

Whether farms are buying seed or selling their crop, measuring the portion to be sold is essential. Products are priced by weight, volume and piece.

Farmers sell wheat, corn and soybeans by the bushel. Grain sorghum and sunflowers are sold by hundredweight or by the pound. Some fruits and vegetables are sold by the piece. The price for each measurement unit depends on the current market value.

Materials

- Center of toilet paper roll or any cylinder shaped object, one for each group.
- Clear plastic wrap or paper cupcake holder
- Rubber Bands
- Bags of wheat, grain sorghum, sunflower, corn and soybean seeds
- Containers ranging from 1-8 oz.
- Scales or balance
- Measuring cups

Procedures

1. Discuss the requirements for grain storage.
2. Instruct the students to cover one end of the tube with plastic wrap or paper cupcake holder and fasten with a rubber band so that the container will hold the grains and oilseeds.
3. Demonstrate varying amounts of seed in containers ranging from 1-8 oz to give the students perspective on amount of seed in different size containers.
4. Using scales or balance, compare the weights of the different seeds in 1/4 cup.
5. Have students estimate the number of kernels of each seed to fill a 1 cup measuring cup. Have students record their estimates on worksheet A. Then, supply them with the following information for their “Actual Number of Kernels in 1 Cup” column.
   - Corn - approximately 634 kernels per cup
   - Wheat - approximately 5,625 kernels per cup
   - Grain Sorghum - approximately 6,125 kernels per cup
   - Sunflower Seeds - approximately 1,266 kernels per cup
   - Soybeans - approximately 1,172 kernels per cup
6. Based on their knowledge of the number of kernels in one cup, ask students to estimate the amount that the cylinder will hold. Estimates should be done in ounces and cups. Students should record their estimates on worksheet A.
7. They should measure their estimate and pour it into their grain bin. If the bin overflows, they must begin again. If not, they must continue to estimate and add seeds until their bin is full.
8. Students should measure the amount of grain it takes to fill their grain bin in both ounces and cups and record it on their worksheet.
9. Have students repeat the experiment with each seed type and keep records.

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Vocabulary

Grain Elevator: A tall building used to store grain and containing equipment for conveying grain to the top of a storage bin or bins.

Terminal Elevator: A large grain elevator that receives grain on or after official inspection and weighing that does the cleaning and treating of the grain. These elevators have the capacity to transfer grain to rail cars, barges, or ships for transport to domestic or foreign markets.

Export Elevator: A terminal elevator that loads grain primarily onto ships for export.

Ports: A town or city with a harbor where ships load or unload, especially one where customs officers are stationed.

Storage Bins: Bins that hold large quantities of grain, sorted by type of grain and grade.

Bushels: A unit of measure of capacity equal to 64 US pints, used for dry goods.

Market Value: The amount for which something can be sold on a given market.

Hundredweight: A unit of weight equal to 100 pounds.

Volume: The amount of space that a substance or object occupies, or that is enclosed within a container.

Mass: A body of coherent matter, usually of indefinite shape and often considerable size.

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Student Handout A

Name:_____

1. Which seed is heaviest?

2. Which seed is the lightest?

3. What changes could be made to increase the amount of grains and oilseeds that can be held?

4. What will happen if the grains and oilseeds are not clean when they are sorted?

Crop	Number of pounds per bushel	Number of seeds per pound
Wheat	60	12,000
Gran Sorghum	56	14,000
Sunflower, oilseed	27	6,000
Corn	56	1,450
Soybean	60	2,500

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Student Handout A - Answers

1. Which seed is heaviest?
Corn

2. Which seed is the lightest?
Grain sorghum

3. What changes could be made to increase the amount of grains and oilseeds that can be held?
Increase height of diameter of the bin.

4. What will happen if the grains and oilseeds are not clean when they are sorted?
The grains or oilseeds may become damaged by insects, develop pockets of mold or lower the quality of other grain in the same bin.

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Commodity by the Pound

Commodity or Produce	Pounds (lbs.) Weight per bushel
Corn, shelled	56
Cotton	32
Sorghum, grain	56
Soybeans	60
Sunflower (oil type)	24-32
Wheat	60
Apples	48
Peaches	50
Tomato's	53
Sweet potatoes (Dry)	50

Look at a bushel basket and notice the amount of volume it can hold. Now look at the difference in density and mass or weight the grain and fruit products have when measured by the same volume of a bushel basket.

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Student Handout - Capacity of a Grain Elevator

Name:_____

	Estimate Number of Kernels in 1 cup	Actual Number of Kernels in 1 cup	Estimates in Ounces and Cups	Actual Ounces and Cups
Wheat			oz. cups:	oz.: cups:
Grain Sorghum			oz.: cups:	oz.: cups:
Sunflowers			oz.: cups:	oz.: cups:
Corn			oz.: cups:	oz.: cups:
Soybeans			oz.: cups:	oz.: cups: