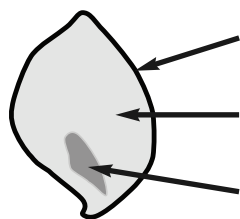




## Chapter 9 Grains

Wheat, rice, corn, oats, barley and rye are all **grains** (plants that belong to a family of cereal grasses). Grains are used to make foods like bread, breakfast cereal, rice and pasta. These products can be made from whole grains or processed grains. Some examples of whole grains are brown rice and whole wheat bread. Whole grains have three parts called the bran, endosperm and germ. The **endosperm** contains carbohydrates. The **bran** and **germ** are full of vitamins, minerals and fiber. Sadly, the bran and germ are removed from processed grains. Processed grains are left with mostly endosperm. Some examples of processed grains are white rice and white bread. Most Americans need to eat more whole grains.

Enjoy learning about Poppin' Grains!



**Bran:** Antioxidants, vitamins and fiber

**Endosperm:** Carbohydrates, protein, and small amounts of vitamins and minerals

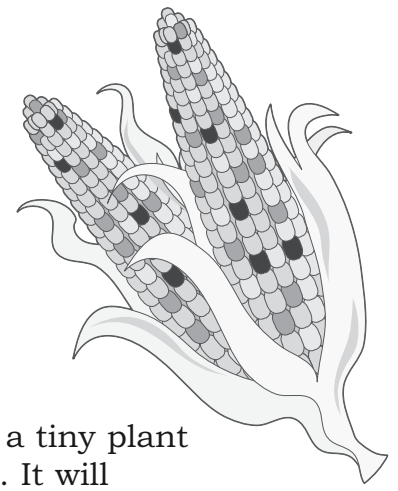
**Germ:** Fat, vitamins, minerals, and some protein

### Hands-On Lessons:

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# A-maizing Corn



## What makes popcorn pop?

A popcorn kernel is actually a seed. Like other seeds, it has a tiny plant **embryo** inside. An embryo is a life form in its earliest phase. It will eventually grow into a plant. The embryo is surrounded by soft, starchy material. This material will give the embryo the energy it needs to grow into a plant. A hard, glossy shell protects the outside of the seed.

The material that surrounds the embryo holds water. When the kernel is heated to about 400°F, the water inside the kernel turns into **steam**. When water is boiled it turns into steam. This steam creates pressure inside the kernel causing it to explode. The soft starch inside the kernel breaks out. This creates the fluffy white area of a popped kernel. If a popcorn kernel is too dry, it will not pop. It should be about 14% water.

Popcorn can be good for you if you don't add much to it in the way of butter or sugary toppings. It is very nutritious providing a good source of carbohydrates, protein, fiber, and vitamins and minerals.

There are five different types of corn: dent, flint, sweet, flour, and popcorn. Each serves a different purpose. For example, livestock usually eat dent corn. On the other hand, people usually eat sweet corn and popcorn.

Popcorn, like other types of corn, grows in rows. The kernels grow on a cob making an **ear** of corn. A medium ear has about  $\frac{3}{4}$  cups of kernels. That will pop into about a 1½ gallons of popcorn. That's a lot of popcorn!

## DOODLE BUGS

In the reading, circle the five types of corn.

Underline the sentence that tells you how many cups of kernels are on 1 ear of corn.

Which is not a part of a kernel? (Circle one.)

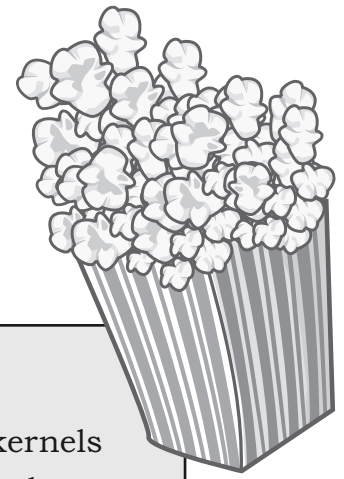
Embryo

Shell

Steam

# MATHEMATICS INVESTIGATIONS:

## Get Poppin'



### You will need:

- 1 pencil
- 1 calculator

### Things to know:

- 1 small ear popcorn =  $\frac{1}{2}$  cup kernels
- $\frac{1}{2}$  cup kernels = 1 gallon popped
- 1 gallon = 16 cups

Imagine you are a farmer. A movie theater has asked you to grow popcorn for them. It is your job to find out how much popcorn you need to grow for the movie theater to sell popcorn for 1 week. Predict how many ears of popcorn you think you will need for the whole week.

**Prediction:** \_\_\_\_\_

### Growing Popcorn

Use the Get Poppin' chart to record your answers after completing each question.

1. Every Monday the movie theater sells 1 gallon of popped popcorn. How many cups of popcorn kernels did they use Monday? *Hint:  $\frac{1}{2}$  cup kernels = 1 gallon of popcorn*
2. Every Tuesday and Wednesday the movie theater sells 2 gallons of popped popcorn per day. How many cups of popcorn kernels did they use Tuesday and Wednesday? *Hint: Once you found out how many kernels are needed for 1 day (2 gallons multiplied by 1 cup of kernels) you need to double that number to find out how many are needed for both days.*
3. Every Thursday, Friday and Sunday the movie theater sells 4 gallons of popped popcorn per day. Record the cups of popcorn kernels they used Thursday, Friday and Sunday. *Hint: Once you found out how many kernels are needed for 1 day (4 gallons multiplied by 1 cup of kernels) you need to triple that number to find out how many are needed for all three days.*
4. Every Saturday the movie theater sells 8 gallons of popcorn. How many cups of popcorn kernels did they use Saturday?
5. Add up the total amount of popcorn kernels used.
6. Divide total cups of kernels by 2 to find out how many ears need to be grown.

MATHEMATICS INVESTIGATIONS:  
**Get Poppin' (continued)**

**Get Poppin' Chart**

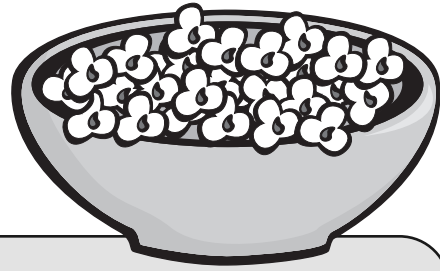
	<b>Popped Popcorn (Gallons)</b>	<b>Kernels (Cups)</b>
<b>Monday</b>		
<b>Tuesday</b>		
<b>Wednesday</b>		
<b>Thursday</b>		
<b>Friday</b>		
<b>Saturday</b>		
<b>Sunday</b>		

1. Total cups of popcorn kernels \_\_\_\_\_ Cups
2. Total ears of popcorn needed for that week at the movie theater \_\_\_\_\_ ears.
3. Was your prediction correct?

**The movie theater has decided that they want you to grow their popcorn for 1 month. There are 4 weeks in this month. Answer the following questions.**

4. How many ears of corn do you need for two weeks?
5. How many ears of corn do you need for three weeks?
6. How many ears of corn do you need for the whole month?

## FUN WITH FOOD: **Popcorn Party**



### **You will need:**

1 burner  
1 large pot with lid  
1 small bowl  
Dry measuring cups  
Measuring spoons

### **PREP TIME: 5 minutes**

Water  
2 tablespoons olive oil  
1 cup popcorn kernels (from a jar)  
Help from an Adult

Observe, taste and record the differences between regular popcorn and popcorn that has been soaked in water. Predict which method (soaking or regular) will produce more popcorn in the end. Remember that popcorn pops because of the steam inside.

**Prediction:** \_\_\_\_\_

### **Popping popcorn!**

1. Pour  $\frac{1}{2}$  cup of the dry kernels into a bowl.
2. Soak the kernels in water for up to 8 hours. You may want to do this overnight.
3. After the kernels have soaked for 8 hours, pour 1 Tbsp of olive oil into the pot and place on medium to high heat.
4. After the oil has heated, pour  $\frac{1}{2}$  cup of regular dry popcorn kernels into the pot and place lid on top of pot. Make sure the lid is tight.
5. Listen as the kernels pop. Once the popping sound slows down, take the pot off the heat and take the lid off. Set to the side to let cool.
6. Clean the pot and follow the same directions to pop the soaked kernels.
7. Taste and see the difference!

### **Fun Fact**

Popcorn is a light snack that is mostly carbohydrate and protein. It actually has more protein than any other grain.

FUN WITH FOOD:  
**Popcorn Party**

**Record and draw your observations**

**Regular dry popcorn kernels**

Appearance \_\_\_\_\_  
\_\_\_\_\_

Taste and Texture \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Number of kernels that popped \_\_\_\_\_



**Soaked popcorn kernels**

Appearance \_\_\_\_\_  
\_\_\_\_\_

Taste and Texture \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Number of kernels that popped \_\_\_\_\_



What were the differences?

\_\_\_\_\_  
\_\_\_\_\_

Which did you like better? Why? \_\_\_\_\_

\_\_\_\_\_

# Proficiency Questions

**Circle the best answer:**

- 1. A kernel is a (n):**
  - a. animal
  - b. seed
  - c. bean
  - d. none of the above
  
- 2. A life form in its earliest stage is a(n):**
  - a. plant
  - b. seed
  - c. embryo
  - d. none of the above
  
- 3. If each planted kernel grows into 3 ears, how many kernels do you need to plant to have 12 ears of corn?**
  - a. 12
  - b. 6
  - c. 24
  - d. 4
  
- 4. If you have 1 cup of kernels, how many cups of popped popcorn do you have? ( $\frac{1}{2}$  cup kernels = 1 gallon popped popcorn, 1 gallon = 16 cups)**
  - a. 16
  - b. 24
  - c. 1
  - d. 32