

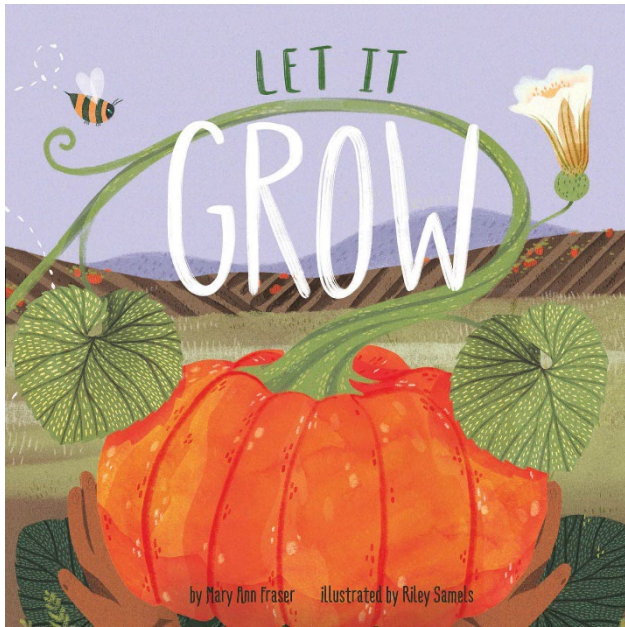


# The Book Planter



## Ag in the Classroom

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**October 2022: *Let It Grow***

**Written by: Mary Ann Fraser**

**Illustrated by: Riley Samels**

A young boy has a pumpkin seed. A very small pumpkin seed. A very small but special pumpkin seed. And what will become of this very small but special seed? He'll only find out if he lets it grow...and grow...and grow! Because sometimes the smallest things can lead to the biggest adventures! In a world full of immediacy and instant gratification, author Mary Ann Fraser plants the seed of patience in her playful picture book about the life cycle of a giant pumpkin and the rewards of letting it grow.

### Did You Know?

- The size of a pumpkin depends on water, temperature, insects, diseases, pollination, fertility, soil type, plant population and weeds.<sup>1</sup>
- Bees and other insects help pollinate pumpkins.<sup>1</sup>
- The first pumpkins grew wild and were only the size of a baseball.<sup>2</sup>
- Pumpkins belong to the same family as squash, watermelons, and cucumbers.<sup>2</sup>
- Some cities host Pumpkin Regattas, where people carve out giant pumpkins and turn them into floats that they race in lakes and rivers.

### Interest Approach – Engagement<sup>1</sup>

1. Ask students to draw a picture of what they think a pumpkin looks like. Hold their pictures up and see how many just think it is an orange round with stem on top. Show samples of different pumpkins and how they come in different shapes, colors, sizes, etc.
2. Use the [Pumpkin Varieties PowerPoint Slides](#) (**Links**) to show pictures of many varieties of pumpkin.
3. After students have observed several different varieties of pumpkin, brainstorm a list of uses for pumpkins on the board.

### Activity 1: The Great Pumpkin Story and Pumpkin Predictions<sup>1</sup>

#### Materials:

- [The Great Pumpkin Story Worksheet](#), 1 per student

- Pumpkins, 1 per group
  - String, rulers, and scale (for weighing pumpkins; a bathroom scale will work)
1. Have students read [The Great Pumpkin Story Worksheet \(Links\)](#) and answer the questions at the end.
  2. Divide the class into groups of four. Provide each group with a pumpkin (do your best to get pumpkins that are quite different from one another).
  3. Ask the groups to estimate the height, diameter, and weight of their pumpkin.
  4. Ask students to guess which group has the largest pumpkin. Which pumpkin weighs the most? Do they think the largest pumpkin will weigh the most? Will the smallest pumpkin weigh the least? Which two pumpkins are the closest in size? Which two pumpkins are the closest in weight?
  5. Next, provide each group with a ruler, some string (for measuring the diameter), and access to a scale (a bathroom scale will work). Ask each group to weigh and measure their pumpkin.
  6. Were their predictions correct?

## Activity 2: Pumpkin Peddlers<sup>1</sup>

### Materials:

- [Pumpkin Peddlers](#) activity sheet
  - Newspaper
  - Knife
  - Plastic cups, 10 per group
  - Resealable bags, 1 per group
  - Large spoons
1. Part of the botanical definition of a fruit is that seeds will be found inside. Ask your students to predict how many seeds they might find inside their pumpkin.
  2. Hand out the [Pumpkin Peddlers Worksheet \(Links\)](#) to each student, and pass out ten cups and one resealable bag to each group.
  3. Using the worksheet, have each group record a reasonable price for the pumpkin and their estimate of how many seeds the pumpkin will contain.
  4. Place newspapers underneath each pumpkin, and cut off the tops of the pumpkins so that students can dig out the seeds. You may want to provide metal spoons for this. Students should take turns digging out the seeds. As the seeds are removed, other students in the group should clean off the fibers, dry the seeds using a paper towel, and then begin to fill the paper cups with groups of ten. When all ten cups are filled, pour the one hundred seeds into a resealable bag, keeping a tally of how many hundreds are emptied into the bag.

5. Were their predictions accurate? Did larger pumpkins have more seeds than smaller pumpkins. Did weight have an influence on the number of seeds? You may want to graph the results of each group's seed count.
6. Discuss how many pumpkins could be grown from one pumpkin. Help students fill in the rest of their worksheet by calculating how much money their pumpkin could generate by multiplying the price they would sell their pumpkins for by how many seeds were in it.

### **Activity 3: Sprouting Pumpkin Seeds<sup>1</sup>**

#### Materials:

- Clear plastic cup (for planting)
  - Paper towels
  - Cotton balls
  - Craft/popsicle stick
1. Provide each student in the group with a clear cup, a paper towel, some cotton balls, a craft stick, and four pumpkin seeds—the ones they cleaned out in **Activity 2** will work just fine. (Try to schedule this activity for a Friday, as the seeds won't sprout over the first two days).
  2. Students should tear or cut a three-inch wide strip from the paper towel. This strip should be placed around the inside of the cup. Student should trim the towel if there is a lot of excess so that there is only one layer around the inside.
  3. Next, have students fill the center of the cup with cotton balls. Tell them to thoroughly dampen the cotton by setting the cup under a dripping faucet. The cotton will moisten the paper towel. No water should drip to the bottom of the cup.
  4. Ask the students to insert the pumpkin seeds between the cup and the paper towel. You can have them place some of the seeds with the pointed end up and some with the pointed end down.
  5. Label each cup with the group's name. Set the cups on a sunny windowsill. Instruct groups to water as necessary and to watch for the seeds to grow. You may want them to draw how the seedlings look on each day once they sprout and begin to grow.

### **Activity 4: Pumpkin Processing<sup>1</sup>**

1. Brainstorm with the class all of the uses for pumpkins. In addition to carving for Halloween, pumpkins are also processed into various food products such as pumpkin pie, pumpkin cheesecake, and more. In fact, the majority of pumpkins grown in the United States are processed into pumpkin puree that is typically canned.



2. Explain to students the difference between a whole, raw food product (like a pumpkin) and a processed food product, such as pumpkin pie or any other food product made from pumpkin. Use the diagram above.
3. Use the instructions found in the attached file [Pumpkin Pie in a Bag](#) to make pumpkin "pies" for your students.

## Links

- *Pumpkin Varieties PowerPoint Slides (Interest Approach – Engagement)*  
[https://cdn.agclassroom.org/media/uploads/2015/02/11/Pumpkin\\_Varieties.pptx](https://cdn.agclassroom.org/media/uploads/2015/02/11/Pumpkin_Varieties.pptx)
- *The Great Pumpkin Story Worksheet (Activity 1)*  
[https://cdn.agclassroom.org/media/uploads/2015/02/11/The\\_Great\\_Pumpkin\\_Story.pdf](https://cdn.agclassroom.org/media/uploads/2015/02/11/The_Great_Pumpkin_Story.pdf)
- *The Great Pumpkin Story Worksheet Answer Key (Activity 1)*  
[https://cdn.agclassroom.org/media/uploads/2020/07/15/The\\_Great\\_Pumpkin\\_Story\\_Answer\\_Key.pdf](https://cdn.agclassroom.org/media/uploads/2020/07/15/The_Great_Pumpkin_Story_Answer_Key.pdf)
- *Pumpkin Peddlers Worksheet (Activity 2)*  
[https://cdn.agclassroom.org/media/uploads/2015/02/11/Pumpkin\\_Peddlers.pdf](https://cdn.agclassroom.org/media/uploads/2015/02/11/Pumpkin_Peddlers.pdf)
- *Pumpkin Pie in a Bag (Activity 4)*  
[https://cdn.agclassroom.org/media/uploads/2016/03/24/Pumpkin\\_Pie\\_In\\_A\\_Bag\\_Matrix\\_1.pdf](https://cdn.agclassroom.org/media/uploads/2016/03/24/Pumpkin_Pie_In_A_Bag_Matrix_1.pdf)

## Supplemental Videos

- America's Heartland: Uses for Pumpkins  
<https://www.youtube.com/watch?v=7j17iyI634g>
- LIBBY's 100% Pure Pumpkin from farm to can  
<https://www.youtube.com/watch?v=Hft-zbqxeLM>
- Pumpkin: How Does it Grow?  
<https://www.youtube.com/watch?v=I3cc2QeSfWw>

## Sources

1. <https://agclassroom.org/matrix/lesson/131/>
2. Fraser, M. A. (2021). Let it grow. Capstone Editions. Print.

## K-5 Subject Areas: Reading, Speaking and Listening, Science, Math

### Reading

- **RL.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RL.K.3** With prompting and support, identify characters, settings, and major events in a story.
- **RL.K.9** With prompting and support, compare and contrast the adventures and experiences of characters in familiar stories.
- **RL.1.1** Ask and answer questions about key details in a text.
- **RL.1.2** Retell stories, including key details, and demonstrate understanding of their central message or lesson.
- **RL.1.3** Describe characters, settings, and major events in a story, using key details.
- **RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RI.K.2** With prompting and support, identify the main topic and retell key details of a text.
- **RI.1.2** Identify the main topic and retell key details of a text.

### Speaking and Listening

- **SL.K.1** Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
- **SL.K.4** Speak audibly and express thoughts, feelings, and ideas clearly.
- **SL.K.5** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.1.1** Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- **SL.1.5** Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.
- **SL.2.1** Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
- **SL.3.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.3.3** Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- **SL.4.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

### Science

- **K.P.2.1** Classify objects by observable physical properties (including size, color, shape, texture, weight, and flexibility).
- **K.L.1.2** Compare characteristics of living and nonliving things in terms of their: structure, growth, changes, movement, basic needs.
- **1.L.1.1** Recognize that plants and animals need air, water, light (plants only), space, food and shelter and that these may be found in their environment.
- **1.L.2.1** Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth.
- **2.L.2.1** Identify ways in which many plants and animals closely resemble their parents in observed appearance and ways they are different.
- **3.L.2.1** Remember the function of the following structures as it relates to the survival of plants in their environments: • Roots – absorb nutrients • Stems – provide support • Leaves – synthesize food • Flowers – attract pollinators and produce seeds for reproduction
- **3.L.2.2** Explain how environmental conditions determine how well plants survive and grow.
- **3.L.2.3** Summarize the distinct stages of the life cycle of seed plants.

### Math

- **NC.3.OA.1** For products of whole numbers with two factors up to and including 10: • Interpret the factors as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition, decomposing a factor, and applying the commutative and associative properties.
- **NC.3.OA.2** For whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient: • Interpret the divisor and quotient in a division equation as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition or subtraction, and decomposing a factor
- **NC.3.OA.3** Represent, interpret, and solve one-step problems involving multiplication and division. • Solve multiplication word problems with factors up to and including 10. Represent the problem using arrays, pictures, and/or equations with a symbol for the unknown number to represent the problem. • Solve division word problems with a divisor and quotient up to and including 10. Represent the problem using arrays, pictures, repeated subtraction and/or equations with a symbol for the unknown number to represent the problem.
- **NC.3.OA.6** Solve an unknown-factor problem, by using division strategies and/or changing it to a multiplication problem.
- **NC.3.OA.7** Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10.
- **NC.3.MD.3** Represent and interpret scaled picture and bar graphs: • Collect data by asking a question that yields data in up to four categories. • Make a representation of data and interpret data in a frequency table, scaled picture graph, and/or scaled bar graph with axes provided.
- **NC.4.MD.1** Know relative sizes of measurement units. Solve problems involving metric measurement

- **NC.4.MD.4** Represent and interpret data using whole numbers. • Collect data by asking a question that yields numerical data. • Make a representation of data and interpret data in a frequency table, scaled bar graph, and/or line plot.
- **NC.5.MD.2** Represent and interpret data. • Collect data by asking a question that yields data that changes over time. • Make and interpret a representation of data using a line graph.

Name \_\_\_\_\_

## ***Pumpkin Peddlers***

**Figure out your pumpkin profit! Answer the following questions to calculate how much your group could earn from growing and selling pumpkins.**

1. The price of our pumpkin was \$ \_\_\_\_\_.
2. We estimate that our pumpkin has \_\_\_\_\_ seeds in it.

***Now clean out the pumpkin, and place ten seeds in each cup. When all cups have been filled, empty them into the bag. Continue until all seeds have been counted. If you have to empty seeds into the bag more than once, keep tally of how many hundreds you have.***

3. How many seeds did your group put in the bag? \_\_\_\_\_
4. Our pumpkin had \_\_\_\_\_ seeds in it.
5. We could grow \_\_\_\_\_ pumpkins from this one pumpkin!
6. The price we would charge for one pumpkin is \$ \_\_\_\_\_.

7. How much money would your group make if you sold all of the pumpkins? (Hint, multiply the price you would charge by how many pumpkins you could produce.)  
\_\_\_\_\_







## Materials

### *Pumpkin Pie In A Bag*

- ☐ 1 gallon-size Ziploc bag
- ☐ 2 2/3 cups cold milk
- ☐ 2 packages (4 serving size) instant vanilla pudding mix
- ☐ 1 can (15 ounces) solid pack pumpkin puree
- ☐ 1 teaspoon ground cinnamon
- ☐ 1/2 teaspoon ground ginger
- ☐ Graham cracker crumbs
- ☐ 30 small cups
- ☐ 1 can whipped topping
- ☐ 30 spoons

### *Oven-baked Pumpkin Pie*

- ☐ 3/4 cup granulated sugar
- ☐ 1 teaspoon ground cinnamon
- ☐ 1/2 teaspoon salt
- ☐ 1/2 teaspoon ground ginger
- ☐ 1/4 teaspoon ground cloves
- ☐ 2 large eggs
- ☐ 1 can (15 oz.) pumpkin puree
- ☐ 1 can (12 fl. oz.) evaporated milk
- ☐ 1 unbaked 9-inch (4-cup volume) deep-dish pie shell
- ☐ Whipped cream (optional)

# Pumpkin Pie In A Bag

## *Making Pumpkin Pie in the Classroom*

## Background

Pumpkins, a squash native to North America, are very popular during Halloween and Thanksgiving. Pumpkins are high in vitamin A and most parts of the pumpkin are edible, including the flesh, the seeds, the leaves, and even the flowers. However we most commonly enjoy the pumpkin flesh cooked and pureed, combine with spices, and made into delicious desserts.

## Procedures: No-bake Pumpkin Pie In A Bag

1. In a one-gallon (heavy duty) plastic Ziploc bag, combine the milk and instant pudding mix.
2. Close the bag and knead it with your fingers until the ingredients are completely blended—usually around one minute.
3. Add the pumpkin, cinnamon, and ginger and then reseal the bag.
4. Squeeze and knead the bag with your hands until the mixture is completely blended—usually around two minutes.
5. Place 1/2 tablespoon graham cracker crumbs in the bottom of each of the cups.
6. Cut the corner of the Ziploc bag and squeeze the pie filling into the cups.
7. Garnish with whipped topping and enjoy!

Consider whipping up an oven-baked pumpkin pie using the recipe below and having a taste test between the two types of “pie”.

## Procedures: Oven-baked Pumpkin Pie

1. Preheat oven to 425°F.
2. Mix together sugar, cinnamon, salt, ginger and cloves in small bowl.
3. Beat eggs in large bowl.
4. Stir in pumpkin and sugar-spice mixture.
5. Gradually stir in evaporated milk
6. Pour mixture into pie shell.
7. Bake in preheated oven for 15 minutes.
8. Reduce temperature to 350° F; bake for 40 to 50 minutes or until knife inserted near center comes out clean.
9. Cool on wire rack for 2 hours.
10. Serve immediately or refrigerate. Top with whipped cream before serving.

*Adapted from New Mexico AITC by Utah AITC. Real pumpkin pie recipe from <http://www.verybestbaking.com>.*



# The Great Pumpkin Story

## Pumpkins are not vegetables... they're fruits!

Pumpkins, gourds, and other varieties of squash are all members of the family Cucurbitaceae, which also includes cucumbers, gherkins, and melons.

Pumpkins have been grown in America for over 5,000 years. They are indigenous to the western hemisphere and were completely unknown in Europe before the time of Columbus.

There was probably some kind of pumpkin served at the first Thanksgiving Day feast. Pumpkins and other forms of squash were an important component of the Native American diet along with maize and beans. Pumpkins plants have long, sprawling vines that cover the ground. Pumpkin seeds are planted sometime between the last week of May and the middle of June. After seeds are planted, they will sprout (germinate) in seven to ten days, depending on the variety. During this time, seeds need moisture and warmth. Once seeds have germinated, they will send up their first leaves, called seed leaves (or cotyledons).

Next, the true leaves will appear. Yellow flowers begin to appear after the first three weeks of growth.

Male flowers, which produce pollen, are seen first.

About a week later, the female flowers bloom. Female flowers are easy to spot because each will have a tiny pumpkin at its base. Flowers bloom for less than a day and will not open in cold, rainy weather, but each plant will produce many flowers. When both male and female flowers bloom, bees transfer the pollen from the males to the females—this is called pollination.

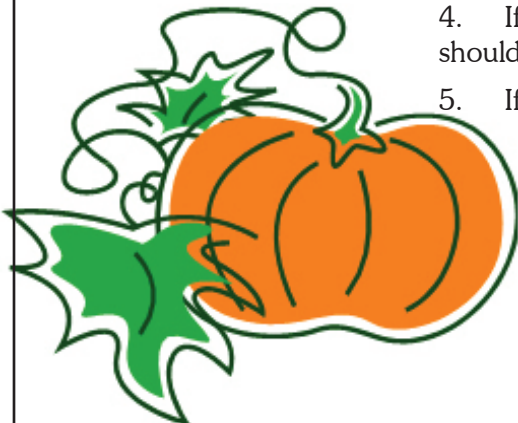
Once pollinated, the fruit at the base of the female flower develops into a full-sized pumpkin. During this time, the plant continues to flower, and many pumpkins will form on a single plant. The pumpkin contains seeds that can be saved to grow new pumpkins the following year. While growing, pumpkins require a lot of moisture and sunlight. It takes about 90–120 days after planting for a pumpkin to reach its full size. Pumpkins are picked in October when they turn bright orange.

Pumpkins are a good source of nutrition. They are high in fiber and low in calories, fat, and sodium. They are loaded with vitamins A and B and potassium. The seeds are very high in protein and are an excellent source of B vitamins.

## Pumpkin Patch Problems

The kids at Discovery Elementary have been given one acre (an acre is about the size of a football field, including the end zones) to plant a pumpkin patch. The pumpkins are going to be sold as part of a fund raiser for PE equipment. The pumpkin seeds have been donated, but there are still plenty of questions...

1. If the field is 280 feet long, and each pumpkin seed is 4 feet apart, how many pumpkin seeds will be planted per row? \_\_\_\_\_
2. If the field is 156 feet wide and each row is 6 feet apart, how many rows of pumpkins can be planted? \_\_\_\_\_
3. How many total seeds will be planted? \_\_\_\_\_
4. If each pumpkin plant produces (yields) six pumpkins, how many pumpkins should they have for sale? \_\_\_\_\_
5. If the pumpkins can be sold for 25¢ per pound, how much money will they raise for new PE equipment? \_\_\_\_\_



What would happen if someone forgets to water the patch?  
What could increase the number of pumpkins per plant?  
What could lower the number of pumpkins per plant?  
What happens if there is an early frost?

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1. If the field is 280 feet long, and each pumpkin seed is 4 feet apart, how many pumpkin seeds will be planted per row?  $280 \div 4 = 70$
2. If the field is 156 feet wide and each row is 6 feet apart, how many rows of pumpkins can be planted?  $156 \div 6 = 26$
3. How many total seeds will be planted?  $70 \times 26 = 1,820$
4. If each pumpkin plant produces (yields) six pumpkins, how many pumpkins should they have for sale?  $1,820 \times 6 = 10,920$
5. If the pumpkins weigh 12 pounds each and can be sold for 25¢ per pound,  
how much money will they raise for new PE equipment?  
 $12 \times .25 = \$3.00$   
 $10,920 \times 3.00 = \$32,760.00$



What would happen if someone forgets to water the patch?  
What could increase the number of pumpkins per plant?  
What could lower the number of pumpkins per plant?  
What happens if there is an early frost?