Garden Plot Math

Grade Level: 4th, 5th

Materials Needed:

- Curriculum resources (Envision Math)
- Book(s) related to farming (see below for suggestions)
- M&Ms
- Computers with Scratch or Scratch app

Concepts:

- Fractions
- Using Variables
- Abstraction
- Computer science
- Culturally sustaining

Learning Objectives:

Students will be able to...
- Demonstrate proficiency in identifying fractions and equivalent fractions
- Build knowledge of block coding through Scratch programming
- Demonstrate understanding of variables in a computer science context

What do students need to know prior to this lesson...

- Students should have had a formal introduction to fractions including adding and subtracting fractions
- Students should understand what simplest form means

Introduction:

Make the content relevant to students
1. Review students' prior learning connected and supporting the CCSSs
2. Discuss where students think their food comes from
3. Read books related to farming and food

Please note these are some suggested books to elicit students' prior knowledge. You may choose to select other books or articles for your students.

Click on each image to view a read aloud version of each book.
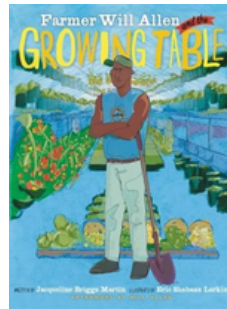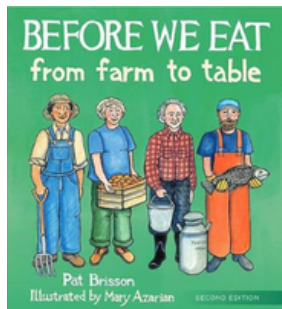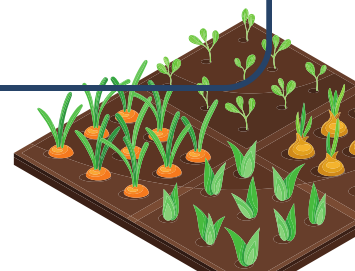
Introduction (continued):

4. What connections can your students make to these stories?

5. Other activity of your choice based on your classroom's needs.

Engagement Activity:

Hands on M&M activity to introduce variables.

Relevant Background Activities:

Math

- For 4th grade, introduce lessons on fractions
- For 5th grade, revisit relevant lesson(s) on fractions

Computer Science

Explore CS First to acquaint students with Scratch. Try these lessons:

- Welcome to CS First (familiarize yourself with the platform)
- Game Design - Lesson 6: Launcher Game (variables)

Performance Task:

Math Curriculum: Envision Math, fourth grade Topic 11 Fraction Equivalence and Ordering, performance task, page 284

The Garden Club recently planted their garden. Each student has a small plot. The layout of the garden is shown below. Each part shows the name of the gardener and the vegetable planted in the plot.

Pedro Carrots	Christina Peas	David Squash	Greg Carrots	Hillary Peas	Kim Corn
Rosa Carrots	Daisy Potatoes	Lauren Carrots	Juan Corn	Sheri Corn	Fatima Carrots

List each item in the garden. Then Write the fractional part of the garden that is taken up by each vegetable. Write each fraction in simplest form.

Scratch Activity:

1. Garden Fraction Scratch Activity (see: https://scratch.mit.edu/projects/1046427808/)

Extensions:

Students "remix" activity to change the program in Scratch and apply their learning of fractions to a new context. <u>There are 3 options</u>:

- Remix the program so the fractions are in simplest form
- Remix the program to change the types of vegetables that will be grown. Maybe you want to do a fruit garden 🫐🍓 OR you're thinking of a farm and what kind of animals 🐷🐮you would like to have?
- Remix the program and consider the effect of climate change on your plots. Provide an explanation on how your program changed from the original due to climate change.
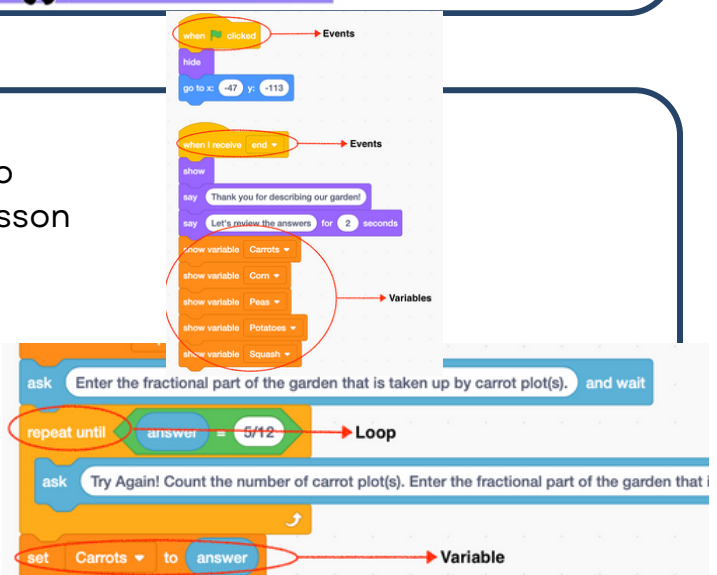

Computer Science Concepts:

An explicit call out of a few select computer science concepts is important for students to realize that they are engaging in CS. In this lesson you can explicitly call out:

- variables
- loops
- events

It's recommended that only 1-2 concepts are introduced at a time. This allows students to grasp the concepts in a manageable way.

Assessment:

- Teacher observation of student work in Scratch activity (formative assessment of conceptual understanding - got it/didn't get it)
- Students choose one of the following Scratch Activities to Demonstrate Understanding. This is a great opportunity for students to participate in pair programming and work together to solve the problem.
- When the activity is complete, have students complete this reflection.
- Formative assessment from your own curriculum

Career Connections

Did you know…

That there are many careers in agriculture that use *fractions and ratios* in their everyday workday, let's take a look at some of those careers:

- **Agricultural engineers** design and plan agricultural plans to address agricultural problems that deal with power, structures, soil and water.
- **Soil scientists** work with different types of soil and analyze them to see how they compare under different circumstances. Depending on weather you want to make sure you have the right kind of soil for the area you are in.

Standards

Common Core Math Standards	
4.NBT.3.	Use place value understanding to round multi-digit whole numbers to any place.
4.NBT.5.	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.OA.3.	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
5.NBT.6.	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
5.NBT.7.	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
5.NF.5.a.	Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

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Computer Science Student Standards

CA CS 3-5.AP.11.	Create programs that use variables to store and modify data.
CA CS 3-5.AP.12.	Create programs that include events, loops, and conditionals.
CA CS 3-5.AP.14.	Create programs by incorporating smaller portions of existing programs, to develop something new or add more advanced features.
CSTA 1B.AP.09.	Create programs that use variables to store and modify data.
CSTA 1B.AP.10.	Create programs that include sequences, events, loops, and conditionals.
CSTA 1B.AP.12.	Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.

CSTA Teacher Standards

1a.	Apply CS practices
2c.	Represent diverse perspectives
2e.	Use accessible instructional materials
4c.	Design inclusive learning experiences