

The Garden Club: Operations with Fractions

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Math Objective

Using real-world objects and working toward a goal, children learn about operations with fractions. They use diagrams and models to show fractions. And they use multiplication to rewrite fractions as equivalent fractions before adding or subtracting. Children learn how to add and subtract mixed fractions. They also multiply and divide fractions.

iMath Discover Activity

In this activity, children draw a map of a garden to scale. Children divide the garden plot into equal sections, choose the vegetables that will grow there, and write fractions to show each section.

► Objectives

Children will:

- use graph paper and measuring tools.
- create a scaled drawing with a unit measure.
- draw a map scale.
- design and divide a plan.
- write fractions to represent real-world problems.

Materials

- pencil
- ruler
- string
- tape measure in customary units of length

Lesson Plan

Before Reading

Investigation

Ask children to look at the picture on pp. 4–5. Read the text. Ask: *What will this story be about?* Record children’s answers on the board.

Ask: *Have you had a garden or helped plant one? What did you grow? Did you use math in the garden design? Did you count the plants? Did you use math when you bought the potting soil, plants, or fertilizer? How?* Record children’s answers on the board.

Math Concepts

Connecting to what they know helps children engage in the topic.

Accessing prior knowledge gets children to think about and engage with the topic.

A middle school joins with the community to build and run a community garden. Children learn how fractions can be useful in designing and engineering a garden.

During Reading

Investigation

pp. 6–9: Ask: *What do fractions show? What is an equivalent fraction?* Record children’s answers on the board. Invite a volunteer to read p. 6 aloud. Have another volunteer draw the diagrams on p. 6 on the board. Talk students through the text using the diagrams. Then, read p. 7 aloud. Have children rewrite fractions and work the problem at the top of p. 7 using pencil and paper. Ask: *What is a mixed fraction?* Check children’s understanding. Have children rewrite the mixed fraction and work the problem on the bottom of p. 7. Read p. 8 aloud. Give students another like problem to solve to test their understanding. Read p. 9 aloud. Pass out sticky notes. Let children build the tape diagram on p. 8 using these. Then, have them count and divide the sticky notes.

Math Concepts

Children use equivalent fractions as a strategy to add and subtract fractions. They apply and extend understandings of multiplication and division to fractions and mixed numbers. They rewrite improper and mixed fractions. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. They use diagrams and models to help them understand that fractions represent a part of a whole.

During Reading (continued)

Investigation

pp. 12–13: Read p. 12 aloud. Distribute graph paper. Have children show the assigned space and the leftover space with a unit block representing one foot. Then, have children rewrite the fraction on that page as a mixed fraction. Ask: *What operation do we use to make the fraction into a mixed fraction?* (division)
Read p. 13 aloud and have children work the problem. Ask: *What operations will you use to work this problem?* (division and multiplication)

pp. 14–15: Invite a volunteer read pp. 14–15 aloud. Have children refer back to the top of p. 7 if necessary. Ask: *What do we need to do before we can add or subtract these fractions?* (Rewrite them as equivalent fractions.)

pp. 16–17: Read p. 16 aloud. Brainstorm ideas with children about how to solve this problem. Distribute paper with hundred grids on it. Have children draw the trays as a diagram. Read p. 17 aloud. Ask: *How do we rewrite these fractions so we can add them?* Have children work this problem using paper and pencil. Walk around and check their work.

pp. 18–19: Read p. 18 aloud. Write the problem on the board. Ask: *What will we need to do to find how tall the plant is at the end of the second week? How could we rewrite this mixed fraction as an improper fraction? Then what will our next step be?* Read p. 19 aloud. Have children work this multiplication problem on their own with paper and pencil. Invite a volunteer to work the problem on the board.

Math Concepts

Children understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. They rewrite fractions as mixed numbers. Children fluently multiply and divide fractions.

Children use equivalent fractions as a strategy to add and subtract fractions. They understand that fractions represent the parts of a whole. Children determine the most appropriate operation to use to solve a problem.

Children determine the most appropriate operation to use to solve a problem. They use diagrams to represent mixed numbers. Children rewrite fractions and multiply and add.

Children rewrite mixed fractions and multiply.

During Reading (continued)

Investigation

Math Concepts

pp. 20–21: Have children read pp. 20–21 silently. Distribute drawing paper and colored pencils. Have children design a box design for the package of midges and ladybird beetles. Have them work the problem and put the insect amounts on their package design. Have children work the problem on page 21.

Children rewrite fractions and divide and multiply. Children understand how to write a ratio. Children use design skills and incorporate their answers.

pp. 22–24: Read pp. 22–23 aloud. Distribute graph paper. Have children draw the compost bins and label them and work each problem beside their drawings. Read p. 24 aloud and discuss the science content.

Children manipulate graph paper to help them solve a real-world problem. They add and multiply fractions and rewrite them.

pp. 25–27: Children may read pp. 25–26 silently. Have children pair up to work the problems on these three pages. Ask: *What else could the students use the gourds for?* Invite children to work together to answer the question. Have the pairs create a drawing to show their ideas.

Children rewrite, add, and divide fractions. Children think creatively to design a new use for a material.

pp. 28–29: Invite a volunteer to read these pages aloud. Ask: *What is an equinox? What math words have the Latin root word equi- in them?* (equivalent, equals) Write this information on the board. Invite children to ask questions about the content on these pages.

Children apply their knowledge of a word's meaning to find the meaning of other words. Children understand that the changing seasons are related to the Earth's orbit around the sun. The seasons have a direct impact on the kinds of plants that can be grown at a certain time of year.

pp. 30–33: Read pp. 30–32 together. Divide the class into three groups. Assign one page to each group. Have students work together to solve the problem on their page. Then, have each group present their problem and solution to the class, demonstrating it on the board. Read p. 33 aloud. Ask: *What is your favorite root or leaf vegetable? What is your favorite fruit?*

Children rewrite, subtract, and divide fractions. Children work independently and help each other understand the content.

During Reading (continued)

Investigation

Math Concepts

pp. 34–36: Read these pages together. Keep children in groups. Let them work together to solve the problems on these pages and check each other's work. Ask: *Would you like to raise chickens? How would you build your chicken coop? What special features would you engineer into it?*

Children apply and extend understandings of addition, subtraction, multiplication, and division to fractions and mixed numbers to solve real-world problems.

pp. 37–39: Read these pages together. Keep children in small groups. Have them work the problems on pp. 38–39 together. Ask: *Why does it take so many hours to have a successful garden? List the jobs that people do in a garden to make it work.* Record children's answers on the board.

Children subtract and divide fractions, rewriting them as necessary.

pp. 40–41: Have children remain in groups. Invite them to read p. 40 and solve the problem. Then, distribute drawing paper and art materials. Have children work together to solve and draw the answer to the problem on p. 41.

Children multiply and divide fractions, rewriting them as necessary. They illustrate the parts of the whole.

pp. 42–44: Keep children in groups. Let them read these pages silently. Have children discuss various strategies for each set of problems and find answers. Have children refer back to pp. 6–9 for ideas.

Children review the usefulness of different strategies for rewriting or showing fractions.

p. 45: Read p. 45 aloud together. Provide children with Internet and library time to work on their project.

Children research and understand the necessary parts of a design and make it their own.

After Reading

Ask children to restate the key ideas in the book.

Investigation

Children plan a garden design and choose plants for their garden. They draw and label their plan. Children show in fractions how much of each vegetable or fruit they will grow.

Children design and illustrate a seed packet for a new variety of vegetable of their own creation. Label will show how many seeds are in the packet and tell about the plant and what it needs to grow.

Understanding Math

Children use a real-world situation to learn the necessity of understanding and using fractions.

Children plan, design, illustrate, and describe their own vegetable.