

Fractions Made Visual Unit Plan

Unit Overview
Unit Title
Fractions Made Visual
Unit Summary
Students take on the role of professionals who use fractions on the job. After researching, students create and share multimedia presentations or newsletters that demonstrate the importance of knowing fractions in their chosen professions.
Subject Area
Mathematics
Grade Level
3 - 5
Higher-Order Thinking Skills
Problem Solving, Analysis, Investigation
Approximate Time Needed
20 sessions, 45 minutes per session, plus time for individuals and small groups to work on computers
Unit Foundation
Targeted Content Standards and Benchmarks
California Mathematics Standards for Grade 5 2.0 Students perform calculations and solve problems involving addition, subtraction, and simple multiplication and division of fractions: 2.3 Solve simple problems, including ones arising in concrete situations, involving the addition and subtraction of fractions and mixed numbers (like and unlike denominators of 20 or less), and express answers in the simplest form. 2.4 Understand the concept of multiplication and division of fractions. 2.5 Compute and perform simple multiplication and division of fractions and apply these procedures to solving problems. National Educational Technology Standards Technology productivity tools <ul style="list-style-type: none">• Students use technology tools to enhance learning, increase productivity, and promote creativity.• Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works. Technology communications tools <ul style="list-style-type: none">• Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.• Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. Technology research tools <ul style="list-style-type: none">• Students use technology to locate, evaluate, and collect information from a variety of sources.

Student Objectives/Learning Outcomes	
<p>Students will be able to:</p> <ul style="list-style-type: none"> • Use research skills to become “experts” when delivering interviews and oral presentations • Create multimedia presentations to visually support oral presentations • Analyze how fractions are used with accuracy in a variety of professions • Verbally and visually represent the process of computing with fractions • Use fractions to solve real-world problems • Collaborate with peers to write articles that effectively communicate information and ideas 	
Curriculum-Framing Questions	
Essential Question	Does accuracy really matter that much?
Unit Questions	<ul style="list-style-type: none"> • Are fractions important or would we be better off without them? • How are fractions used on the job and are they needed to get the job done right? • How can understanding fractions make your life easier? • What is a fraction?
Content Questions	<ul style="list-style-type: none"> • How do you add, subtract, multiply, and divide fractions? • What is the difference between a numerator and a denominator? • How do you change a mixed numeral into an improper fraction?
Student Assessment Plan	
Assessment Summary	
<p>To informally assess students, use questioning, journal reviews, and anecdotal notes to monitor progress, provide feedback, and adjust instruction. Schedule student conferences to check student progress periodically and offer feedback as needed. Provide students with the newsletter scoring guide to guide and assess the newsletter article. Use teacher and peer conferences to offer individual feedback on the newsletter article before the final article is placed in the class newsletter. Give students the student checklist and the project rubric to help guide and assess the multimedia presentations. Use the same project rubric to assess the entire unit.</p>	

Assessment Timeline

Before project work begins

- Questioning
- Math Journals

- Anecdotal Notes

Students work on projects and complete tasks

- Questioning
- Newsletter Scoring Guide
- Teacher and Peer Conferences

- Math Journals
- Project Rubric
- Student Checklist

After project work is completed

- Newsletter Scoring Guide
- Project Rubric

- Anecdotal Notes
- Math Journals

Unit Details

Prerequisite Skills

- Experience with electronic presentation and publishing software
- Experience with web browsing
- Exposure to fractions
- Knowledge of basic addition, subtraction, multiplication, and division principles

Instructional Procedures

Introducing the Unit

Begin the unit by posting the Unit Question, *Are fractions important or would we be better off without them?*

Elicit students' initial responses and have them record their thoughts in their math journals. During Week One of the unit, introduce fractions using the fraction basics teacher presentation. To help students understand fractions in a concrete way, involve them in a variety of hands-on experiences working with real-life fractions. Have them decorate cookies as fractional parts, divide paper cookies among friends, examine fractions in everyday life, and create their own fraction models. After each activity, allow students to take pictures of fractional parts for the class digital library, to be used in later projects. Take anecdotal notes while students are experimenting to document skills that may need reviewing before continuing the unit.

Pass out the project rubric and discuss unit requirements. Tell students you will be using this rubric to assess their work and understanding of mathematical concepts learned throughout the unit.

Creating and Publishing a Newsletter

During Week Two, involve students in more hands-on experiences dealing with fractions, notation, and equivalency. At the end of the week, divide students into groups and instruct each group to write about (summarize) one of the activities to publish in a class newsletter. Pass out the newsletter scoring guide to help guide the process. Have students hold peer and teacher conferences to receive feedback on their writing. Instruct students to create an article heading, paste in their edited writing, and add graphics or photos to the class newsletter template using publishing software. Publish the newsletter and then send it home to parents.

Presenting the Project Scenario

To help students understand the importance of fractions and how often fractions are used in life, students learn how various professions use fractions daily on the job.

Post the Unit Questions, *How are fractions used on the job and are they needed to get the job done*

right? and *How can understanding fractions make your life easier?*

Have students write about the questions in their math journals. Collect journals periodically throughout the unit to check for student understanding and redirect teaching as needed with the whole class or individually.

Inform students that they will discover the answers to these questions and the Unit Question presented earlier by taking on the role of a worker in a profession that uses fractions. Their task is to find out just how important fractions are to a profession and how the ability to work with fractions affects job performance. Finally, students must solve real-world fraction problems that relate in some way to their professions and draw conclusions about how the problems translate into their own lives.

Assign or allow students to choose a profession that uses fractions daily on the job. After each student has a profession, pass out the student checklist, and discuss project requirements. Ensure that students understand the assigned tasks.

Researching and Collecting Information in a Variety of Ways

Before you set students to work researching their assigned professions, hold a discussion about effective ways to gather information about a topic. Ask students to brainstorm a list of ways to collect information and techniques for finding answers to questions. If an important research technique, such as conducting firsthand interviews, has not been suggested, make sure it is added to the list. After the list is generated, discuss each technique. Point out how including information from multiple sources and using different research techniques adds validity and interest to a research project.

Provide students with a list of Web sites to use for researching their assigned professions as well as an electronic template or worksheet for collecting and recording information. The worksheet helps students organize their work for the upcoming presentations. In addition, demonstrate interview techniques and discuss the importance of collecting information from experts in the field. Together, generate a list of interview questions that might be important to ask an expert who can help address the project criteria and answer the Unit Questions. Discuss how e-mail can be used as an effective tool to communicate with experts. Remind students about etiquette and the rules they should follow to protect themselves when using the Internet and e-mail, even when conducting research.

Allow several days for students to conduct research and interviews with experts.

Drawing Conclusions and Making Connections Based on Research

After students have had plenty of time to gather and organize information about how fractions are used in their assigned professions, have them begin thinking about how fractions apply to them personally both now and in the future. Remind students that their presentations should answer the following Unit Questions:

- *Are fractions important or would we be better off without them?*
- *How are fractions used on the job and are they needed to get the job done right?*
- *How can understanding fractions make your life easier?*

Presentations should also include an answer to the bigger, Essential Question, *Does accuracy really matter that much?* Guide and assist students as necessary to make associations and draw conclusions. Hold student conferences throughout the research and project process to ensure students stay on track, get questions answered, and receive valuable feedback.

After students have established connections between their assigned professions and themselves, have each student come up with a real-world fraction problem that demonstrates the connection. Inform students that they need to state their real-world problems and show, step by step, how to solve them. As each student explains the process used to solve a problem, the student should address and include the answer to the following Content Questions:

- *What is a fraction?*
- *How do you add, subtract, multiply, and divide fractions?*
- *What is the difference between a numerator and a denominator?*
- *How do you change a mixed numeral into an improper fraction?*

Guide and assist students as needed, as they generate their problems and draw conclusions.

Creating Student Presentations

After students have collected their research information and generated real-world fraction problems associated with them, give students a storyboard form and instruct them to begin the process of creating their multimedia presentations. First, have students visually plan their presentations by completing storyboards. Each storyboard should include slide titles and a bulleted list of key points.

Meet with students individually as storyboards are completed to discuss the presentations and suggest any edits. After a student's storyboard is approved, allow the student to begin creating slides. Guide and assist students as necessary as they create their presentations.

Delivering Oral Presentations

After students complete their presentations, have them break into pairs. Students in the pairs assist each other in delivering their individual oral presentations, with each taking a turn being the interviewer and the other the expert. Give students a period or two to come up with interview questions and practice presentations. The interviewer (student helper) asks the questions, and the expert (student presenter) responds to the questions using slides to support the talking points. Allot several days for students to present their projects. Facilitate a brief discussion following each presentation. Refer to the Essential and Unit Questions again, and ask students to use the information just presented to help respond to the following questions:

- *Does accuracy really matter that much?*
- *Are fractions important or would we be better off without them?*
- *How are fractions used on the job and are they needed to get the job done right?*
- *How can understanding fractions make your life easier?*

Record student responses on a chart.

After all of the presentations have been delivered, refer to the completed chart, and draw conclusions about the importance of fractions.

Creating a Wiki (Optional)

Throughout the unit, post daily riddles for students to solve using their fraction kits (or other manipulatives). If time allows, have students create their own riddles for others to solve. Divide students into small groups and ask them to create their own riddles. After a group creates a riddle, have the group build a [wiki](#) that includes the riddle, a response form where visitors to the site can send in their answers, and finally an answer key that explains the solution to the riddle. Posting the riddles on a wiki allows students to publish their work and get feedback from other classrooms, parents, ePALS, and others, extending learning beyond the walls of the classroom.

Wrapping Up

Hold a class discussion around the Essential Question, *Does accuracy really matter that much?* Have students conduct a Pair and Share to discuss their answers and opinions to the Essential Question using examples from their research and project work. Do a partner swap and give students time to share with another peer. Take anecdotal notes as discussions take place, documenting students' understanding of the concepts learned throughout the unit. Have students record their ideas and opinions in their math journals.

Accommodations for Differentiated Instruction

Special Needs Student	Provide additional templates, manipulatives, and scaffolds
Nonnative Speaker	<ul style="list-style-type: none">• Write simplified explanations of the student's real-world fraction problem• Add math pictures and explanations to the student's card file of vocabulary words

**Gifted/Talented
Student**

- Have the student create a board game that involves math-related terminology and problem solving
- Have the student create a test or quiz for the class that is related to fractions

Materials and Resources Required For Unit

Technology – Hardware (Click boxes of all equipment needed)

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> Camera | <input type="checkbox"/> Laser Disk | <input type="checkbox"/> VCR |
| <input checked="" type="checkbox"/> Computer(s) | <input checked="" type="checkbox"/> Printer | <input type="checkbox"/> Video Camera |
| <input type="checkbox"/> Digital Camera | <input checked="" type="checkbox"/> Projection System | <input type="checkbox"/> Video Conferencing Equip. |
| <input type="checkbox"/> DVD Player | <input type="checkbox"/> Scanner | <input type="checkbox"/> Other |
| <input checked="" type="checkbox"/> Internet Connection | <input type="checkbox"/> Television | |

Technology – Software (Click boxes of all software needed.)

- | | | |
|---|--|---|
| <input type="checkbox"/> Database/Spreadsheet | <input type="checkbox"/> Image Processing | <input type="checkbox"/> Web Page Development |
| <input type="checkbox"/> Desktop Publishing | <input checked="" type="checkbox"/> Internet Web Browser | <input checked="" type="checkbox"/> Word Processing |
| <input checked="" type="checkbox"/> E-mail Software | <input checked="" type="checkbox"/> Multimedia | <input type="checkbox"/> Other |
| <input type="checkbox"/> Encyclopedia on CD-ROM | | |

Printed Materials

Supplies

- Hands-on fraction materials, including fraction kits, spinners, dice, tangrams, and pattern blocks to complete activities and investigations
- Partner grab, spinner, or other method to facilitate cooperative groupings

<p>Internet Resources</p>	<ul style="list-style-type: none"> • Cynthia Lanius: Lessons: Fraction Shapes http://math.rice.edu/~lanus/Patterns* Fun Mathematics Lessons: Pattern Block Fractions • Math Challenge Lesson Plan: Fractions www.libraryvideo.com/guides/K6448.pdf* (PDF; 2 pages) Series that reinforces important skills taught in grades 4–6 through the use of animated characters and an engaging storyline • National Library of Virtual Manipulatives for Interactive Mathematics: Numbers and Operators Grades 3–5 http://matti.usu.edu/nlvm/nav/category_g_2_t_1.html* Interactive manipulatives for visualizing fractions • Visual Fractions www.visualfractions.com* Tutorial that models fractions with number lines or circles • Webmath.com: Solve Your Math Problem www.webmath.com/k8if.html* Visual representation of a fraction • Webmath.com: Solve Your Math Problem www.webmath.com/k8cf.html* Compare two fractions • GetTech: Careers www.gettech.org/category2.asp?cat=5* Site to explore careers • The Math Forum http://mathforum.com* A K–12 math information site • Figure This! Math Challenges for Families www.figurethis.org/index40.htm* Math challenges for families with a teacher’s corner and other resources • The Math Forum: Ask Dr. Math™ http://forum.swarthmore.edu/dr.math* Question and answer service for math students and their teachers
<p>Other Resources</p>	

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