FIDDLIN' WITH FRACTIONS

Special Area: Connections (Fourth and Fifth Grade)
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Length of Unit: (6 Lessons)

I. ABSTRACT

The purpose of this unit, "Fiddlin' with Fractions", is to integrate the Core Knowledge math sequence with hands-on activities. This is an introductory unit on fraction concepts and number sense with a variety of activities which include problem-solving projects. It is designed to meet the different learning styles of students. Students will be engaged in identifying numerators and denominators, renaming, reducing to lowest terms, comparing, and adding and subtracting fractions. This unit could easily be incorporated with textbook work as well. Assessments will be based on both oral and written exercises.

II. OVERVIEW

A. Concept Objectives
   1. The students will develop an understanding of fractions and solve problems concretely, pictorially and symbolically.
   2. The students will apply and demonstrate fractions in practical situations.

B. Content from the *Core Knowledge Sequence*
   1. Identify numerator and denominator
   2. Recognize equivalent fractions
   3. Put fractions into lowest terms
   4. Rename fractions with unlike denominations to fractions with common denominator.
   5. Compare fractions with like and unlike denominator using the signs <,>,=.
   6. Add and subtract mixed numbers and fractions with like and unlike denominators.

C. Skill Objectives
   1. The students will identify numerator and denominator by recognizing a part compared to the whole.
   2. The students will recognize equivalent fractions through construction of a model.
   3. The students will reduce fractions to lowest terms by restating and selecting various fractions that are equivalent (ex. ½ = 3/6).
   4. The students will transform fractions with unlike denominators and convert to like denominator.
   5. The students will compare and contrast fractions by producing a graph.
   6. The students will add and subtract mixed numbers and fractions with like and unlike denominators through preparation of recipes.

III. BACKGROUND KNOWLEDGE

A. For Teachers
   1. Hirsch Jr. E.D. *What Your Fourth Grader Needs to Know, What Your Fifth Grader Needs to Know.* Core Publications, Inc., 1992 0-385-31260-1
   2. *Progress In Mathematics,* Teacher's Edition. New York: Sadlier Oxford, 2000. ISBN: 0-8215-2616-2
   3. Thaler, Mike. *The Teacher from the Black Lagoon.* New York: Scholastic Inc. 1989 ISBN: 0-8215-2615-4

4. Blane, Diane. *The Boxcar Children Cookbook.* Morton Grove: A Whitman and Company, 1991 ISBN: 080750856X

B. For Students
1. Addition
2. Subtraction
3. Multiplication
4. Divisions with and without remainders
5. Sequencing

IV. RESOURCES

A. Any fraction resources can be utilized to supplement this unit.

V. LESSONS

Lesson One: Introduction to Fractions

A. *Daily Objectives*
1. Concept Objective(s)
   a. The students will apply and demonstrate fractions in practical situations.
   b. The students will develop an understanding of fractions and solve problems concretely, pictorially, and symbolically.
2. Lesson Content
   a. Students will identify numerator and denominator by recognizing a part compared to the whole.
3. Skill Objective(s)
   a. Students will explain what the numerator and the denominator in written fraction represent.
   b. Students will model fractions up the twelfths.

B. *Materials*
1. Students as fraction models (ex. Number of blue shirts to all shirts), fraction strips, etc. (anything that will demonstrate fraction parts).

C. *Key Vocabulary*
1. Fraction: A number that names a part of a whole, a region or a set.
2. Numerator: The number above the bar in a fraction.
3. Denominator: The number below the bar in a fraction.
4. Whole Number: Any of the numbers 0, 1, 2, 3, …

D. *Procedures/Activities*
1. The teacher will read aloud *The Teacher from the Black Lagoon* to introduce fractions.
2. Teacher will introduce vocabulary.
3. Teacher will use students for hands on activities to demonstrate fractions as parts of a whole (ex. How many students wear a white shirt versus all other shirts.).

E. *Assessment/Evaluation*
1. Students will practice a shading parts of a whole on a diagram (Diagram provided - see appendix A).

Lesson Two: Equivalent Fractions (3 day lesson)

A. *Daily Objectives*
1. Concept Objective(s)

a. The students will develop an understanding of fractions and solve problems concretely, pictorially, and symbolically.
b. The students will apply and demonstrate fractions in practical situations.

2. Lesson Content
   a. The students will recognize equivalent fractions through construction of a model.
3. Skill Objectives
   a. The students will define the word, "equivalent".
   b. The students will construct and manipulate a fraction model.

B. *Materials*
1. Paper Plates of two colors (enough for each student to have two), scissors, pencil, supplemental worksheets from your classroom textbook.

C. *Key Vocabulary*
1. Equivalent: Equal Value

D. Procedures/ Activities
1. The teacher will write the word, equivalent, on the board and discuss its meaning.
2. Review previous lesson on fractions.
3. The teacher will distribute paper plates of two colors to each student.
4. The students will make one cut on each paper plate from the outside edge to the center.
5. The students will then connect the two paper plates by sliding one slot inside the other until the centers meet.
6. The teacher will demonstrate various fractions using the fraction model.
7. Students will demonstrate equivalent fractions using the fraction model.

E. *Assessments/Evaluations*
1. Students will complete a teacher made worksheet (Appendix A).

Lesson Three: Fractions in lowest terms (Two Day Lesson)

A. *Daily Objectives*
1. Concept Objective(s)
   a. The students will apply and demonstrate fractions in practical situations.
   b. The students will develop an understanding of fractions and solve problems concretely, pictorially, and symbolically.
2. Lesson Content
   a. Students will reduce fractions to lowest terms by restating and selecting various fractions that are equivalent (ex. ½ = 3/6).
3. Skill Objective(s)
   a. Students will learn how to factor using prime and composite numbers.
   b. Students will convert fractions to lowest terms.
   c. Students will recognize and select fractions in lowest terms.

B. *Materials*
1. Bingo game cards and markers, dice (enough for every student)

C. *Key Vocabulary*
1. Factor: Two or more numbers that are multiplied together to produce a product.
2. Prime Number: A number that has only two factors, 1 and the number itself.
3. Composite Number: A number that has more than two factors.
4. Lowest Terms: A fraction is in lowest terms when its numerator and denominator have no common factor other than one.

5. Greatest Common Factor (GCF): The greatest number that is a factor of two or more products.

D. *Procedures/Activities*
1. The teacher and students will discuss the vocabulary words.
2. Teacher will demonstrate how to factor numerators and denominators.
3. Students will identify the greatest common factor that is common to both the numerator and denominator.
4. Once students have determined the GCF they will practice reducing fractions to lowest terms.
5. Students will then play fraction bingo (ex. Teacher displays fraction 3/6 and students must identify and mark the fractions in lowest terms on their answer card, which would be ½). See Appendix B

E. *Assessment/Evaluation*
1. Have students work in pairs. Ask students to roll a number cube twice to get a fraction, then work together to decide if it is in lowest terms. If not, they should rename it as an equivalent fraction in lowest terms.

Lesson Four: Renaming Fractions (Two Day Lesson)

A. *Daily Objectives*
1. Concept Objective(s)
   a. The students will apply and demonstrate fractions in practical situations.
   b. The students will develop an understanding of fractions and solve problems concretely, pictorially, and symbolically.
2. Lesson Content
   a. Students will transform fractions with unlike denominators and convert them to like denominators
3. Skill Objective(s)
   a. Students will find the least common denominator of a set of fractions.
   b. Students will identify common multiples and least common multiples.
   c. Students will convert fractions of unlike denominators to fractions of like denominators.

B. *Materials*
1. toothpicks, Handout Appendix C (one for each student)

C. *Key Vocabulary*
1. Multiples: A number that is the product of a given number and any whole number.
2. Common Multiple: A number that is a multiple of two or more numbers.
3. Least Common Multiple (LCM): The least number other than zero that is a common multiple of two or more numbers.
4. Least Common Denominator (LCD): The least common multiple of the denominators of two or more fractions.

D. *Procedures/Activities*
1. Teacher will divide students into pairs and distribute toothpicks (at least 12) to each group.
2. Using toothpicks, the students will form triangles to complete the table on Appendix C.
3. Students should try to recognize the patterns formed for multiples of three.

4. Using toothpicks, the students will then form squares to complete the table on Appendix C.
5. Students should try to recognize the patterns formed for multiples of four.
6. Teacher will discuss the multiples of three and four and ask students to identify what is common.
7. Using the examples of three and four, the teacher will show students how to find the LCM of a pair of fractions.
8. Students will then compare the relationship between LCM and LCD.
9. Students will practice renaming fractions using knowledge gained from discussion of LCM and LCD.

E. *Assessment/Evaluation*
   1. Students will complete a teacher made worksheet. See Appendix D.

Lesson Five: Comparing Fractions (Three Day Lesson)

A. *Daily Objectives*
   1. Concept Objective(s)
      a. The students will apply and demonstrate fractions in practical situations.
      b. The students will develop an understanding of fractions and solve problems concretely, pictorially, and symbolically.
   2. Lesson Content
      a. Students will compare and contrast fractions by producing a graph.
   3. Skill Objective(s)
      a. Students will find the least common denominator to rename fractions with like denominators.
      b. Students will use >, <, and = symbols to compare fractions.

B. *Materials*
   1. Overhead projector, pencil, paper, poster board, colored pencils

C. *Key Vocabulary*
   1. Least Common Denominator (LCD): The least common multiple of the denominators of two or more fractions.

D. *Procedures/Activities*
   1. Teacher will review the least common multiple and least common denominator.
   2. Teacher will review the symbols >, <, and =.
   3. Using fractions with like denominators teacher will model how to compare on the overhead projector.
   4. Students will demonstrate knowledge of fraction comparison using paper and pencil.
   5. Teacher will illustrate how to compare fractions with unlike denominators.
   6. Students will practice finding LCM for pairs of numbers.
   7. Students will then compare fractions with unlike denominators by finding the LCM.

E. *Assessment/Evaluation*
   1. Using poster board and colored pencils, students will make a circle graph that represents the fraction of time they spend doing various activities in a 24-hour period.

Lesson Six: Adding and Subtraction Fractions and Mixed Numbers

A. *Daily Objectives*

1. Concept Objective(s)
    a. The students will develop an understanding of fractions and solve problems concretely, pictorially, and symbolically.
    b. The students will apply and demonstrate fractions in practical situations.
2. Lesson Content
    a. The students will add and subtract mixed numbers and fractions with like and unlike denominators through preparation of recipes.
3. Skills Objectives
    a. The students will rename fractions with unlike denominators to fractions with like denominators using LCM and LCD.
    b. The students will add and subtract fractions with like denominators.
    c. The students will add and subtract fractions with unlike denominators.
    d. The students will add and subtract mixed numbers.

B. *Materials*
1. Chalkboard, paper, pencils, recipes, ingredients, Boxcar Children Cookbook

C. *Key Vocabulary*
1. Mixed Number: A number that is made up of a whole number and a fraction
2. Improper Fraction: A fraction with its numerator equal to or greater than its denominator

D. *Procedures/Activities*
1. Teacher will explain and show students how to add and subtract fractions with like denominators, reminding students that the denominator remains the same.
2. Students will apply their knowledge by adding and subtraction fractions with like denominators as a whole class activity.
3. The teacher will review the term LCD and how to find.
4. Teacher will put five sets of fractions with unlike denominators on the board and ask students to find the LCD for each set.
5. Teacher will then model how to add fractions with unlike denominators.
6. Students will practice adding fractions with unlike denominators using problems from textbook and other resources.
7. Teacher will model how to subtract fractions with unlike denominators.
8. Students will practice subtractions fractions with unlike denominators using problems from textbook and other resources.
9. Teacher will introduce the vocabulary terms improper fractions and mixed numbers.
10. The teacher will show students how to convert an improper fraction to a mixed number.
11. Students will practice converting improper fractions to mixed numbers.
12. Teacher will demonstrate how to add mixed numbers.
13. Students will practice adding mixed numbers.
14. Teacher will demonstrate how to subtract mixed numbers.
15. Students will practice subtraction mixed numbers.

E. *Assessment/Evaluation*
1. The students will select a recipe from *The Boxcar Children Cookbook* or a resource of choice. Students will apply knowledge of fractions by preparing and measuring. Cook and enjoy!

VI. CULMINATING ACTIVITY

A. Student Independent Project.

1. Students will summarize completed circle graph form lesson five.
2. Fraction cents family project: Students will be given an enlarged replica of a one-dollar bill. With parents/guardian students will research family expenses. Each dollar bill represents the whole amount of the family income. Using fractions, break down the dollar bill into parts of a whole. Each fraction piece will represent the part of a whole spent on family needs and activities. Students will draw in the fraction parts on the dollar bill. The number of sections may vary depending upon family expenses.

VII. HANDOUTS/WORKSHEETS

A. Appendices A - E

VIII. BIBLIOGRAPHY

A. Hirsch Jr., E.D. *What Your Fourth and Fifth Grader Needs to Know*. Core Publications, Inc., 1992. ISBN 0385-31260-1

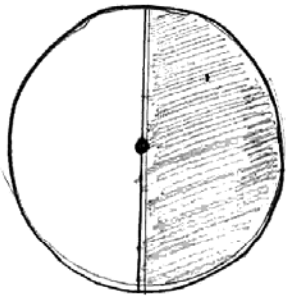
B. *Progress in Mathematics, Teacher's Edition*. New York: Sadlier Oxford, 2000. ISBN 0-8215-2615-4

C. Thaler, Mike. *The Teacher from the Black Lagoon*. New York: Scholastic INC., 1989 ISBN: 0-590-41962-5

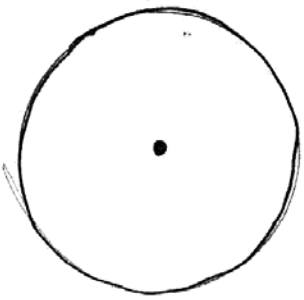
D. Blain, Diane. *The Boxcar Children Cookbook*. Morton Grove: A. Whitman and Co. . 1991. ISBN: 08750856X

APPENDIX A

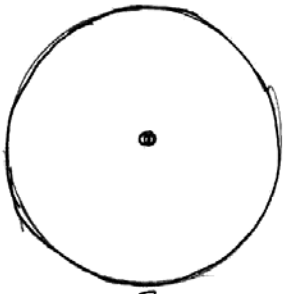
Shade the part of the circle that denotes the fraction.



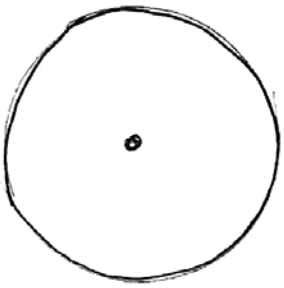
$\frac{1}{2}$



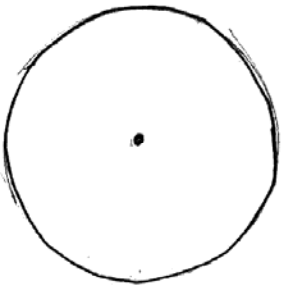
$\frac{1}{4}$



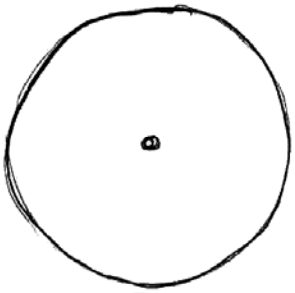
$\frac{3}{8}$



$\frac{11}{12}$



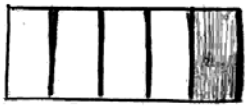
$\frac{7}{9}$



$\frac{2}{3}$

Write the fraction that tells what part of the circle is shaded.

Shade the part of the bar that denotes the fraction.



Appendix B
Fraction Bingo Tables

B	I	N	G	O
$\frac{1}{4}$	$\frac{2}{3}$	$\frac{3}{7}$	$\frac{4}{9}$	$\frac{1}{8}$
$\frac{1}{2}$	$\frac{2}{7}$	$\frac{3}{10}$	$\frac{4}{7}$	$\frac{1}{7}$
$\frac{1}{5}$	$\frac{2}{5}$	**Free Space**	$\frac{4}{11}$	$\frac{1}{1}$
$\frac{1}{6}$	$\frac{2}{11}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{9}$
$\frac{1}{10}$	$\frac{2}{9}$	$\frac{3}{4}$	$\frac{4}{13}$	$\frac{1}{3}$

B	I	N	G	O
$\frac{1}{1}$	$\frac{2}{5}$	$\frac{3}{7}$	$\frac{4}{11}$	$\frac{1}{2}$
$\frac{1}{9}$	$\frac{2}{9}$	$\frac{3}{5}$	$\frac{4}{9}$	$\frac{1}{5}$
$\frac{1}{3}$	$\frac{2}{3}$	**Free Space**	$\frac{4}{7}$	$\frac{1}{4}$
$\frac{1}{7}$	$\frac{2}{7}$	$\frac{3}{4}$	$\frac{4}{13}$	$\frac{1}{6}$
$\frac{1}{8}$	$\frac{2}{11}$	$\frac{3}{10}$	$\frac{4}{5}$	$\frac{1}{10}$

Appendix C

Toothpick Activity

Number Of △	1	2	3	4	5	6	7	8
Number Of Sides								

Number Of □	1	2	3	4	5	6	7	8
Number Of Sides								

Comparing Fractions

Part A: Find the Least Common Multiple (LCM) for each pair of numbers.

1. 3, 7
2. 2, 3
3. 7, 21
4. 3, 9
5. 12, 4
6. 7, 2
7. 3, 15
8. 7, 56
9. 8, 40
10. 12, 48
11. 16, 32
12. 11, 5

Part B: Find the Least Common Denominator (LCD) for each set of fractions.

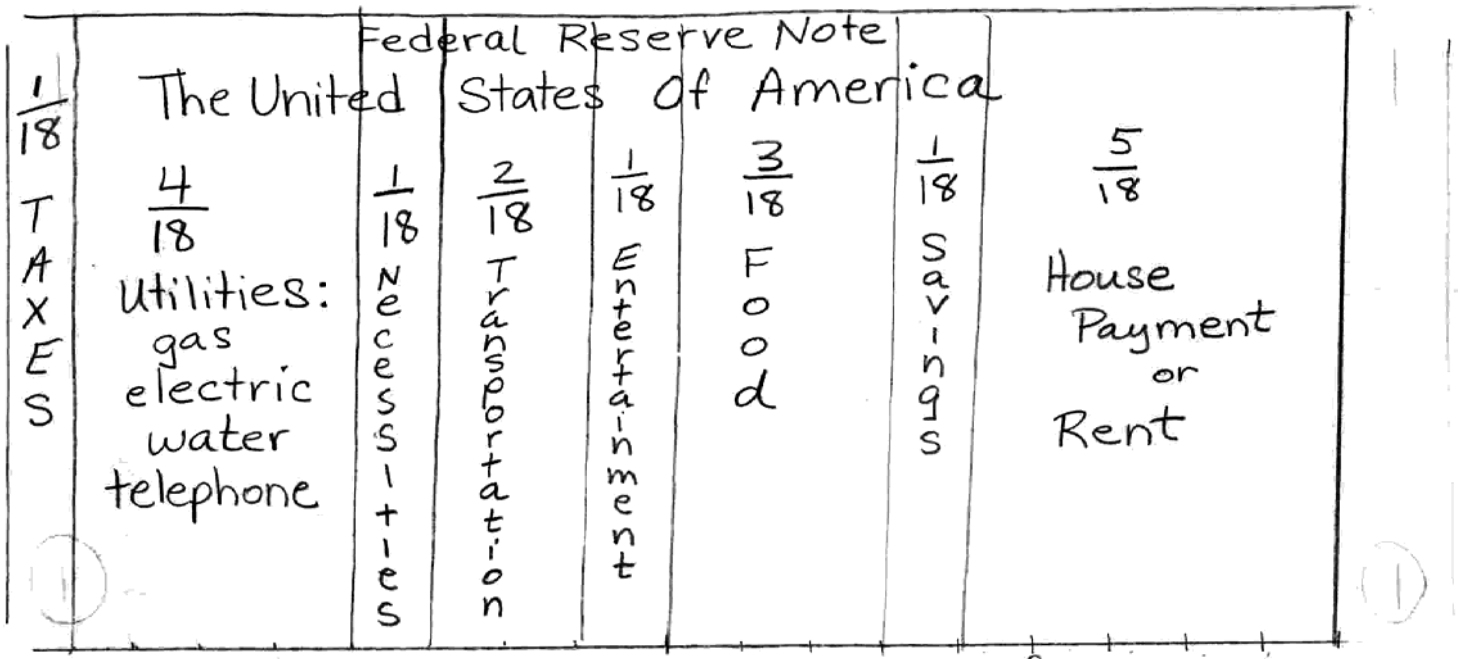
1. $\frac{5}{6}, \frac{4}{5}$
2. $\frac{3}{4}, \frac{1}{10}$
3. $\frac{7}{8}, \frac{5}{6}$
4. $\frac{1}{2}, \frac{3}{6}$
5. $\frac{1}{12}, \frac{3}{24}$
6. $\frac{1}{3}, \frac{4}{9}$

Part C: Compare these fractions using < = >.

1. $\frac{1}{4} \_\_ \frac{7}{16}$
2. $\frac{7}{10} \_\_ \frac{3}{5}$
3. $\frac{4}{21} \_\_ \frac{1}{7}$
4. $\frac{6}{14} \_\_ \frac{2}{7}$
5. $\frac{3}{5} \_\_ \frac{5}{8}$
6. $\frac{4}{7} \_\_ \frac{6}{9}$
7. $\frac{7}{12} \_\_ \frac{9}{15}$
8. $\frac{10}{25} \_\_ \frac{7}{10}$

Apperdix D

APPENDIX E
(Example)
Fraction Cents



This will be an enlarged replica of a one dollar bill.

- Students may have more or less than 18 fraction parts. Number of sections vary depending on family expenses.