

Pre 0.7

Fraction Sense 2

Lesson Summary: We have traditionally placed much emphasis on computation with fractions. If we place more emphasis on “what makes sense,” we will help student understanding significantly. The activities below help students gain a sense for the size of fractions, arrive at estimates and explain why the estimates are reasonable. Activities below are adapted from Developing Number Sense in the Middle Grades from NCTM.

Utah Core Indicators: Pre-Algebra Content Standards 1, 3.1 Process Standards 1-5

Broad Understanding: We use fractions a lot in our everyday world. Estimation of fractional values is more valuable in the workaday world than computation. Learning to estimate with fractions also improves understanding of fractions.

Essential Questions:

- How do we use benchmarks to estimate solutions to problems using fractions?
- How roles do numerators and denominators play in the size of fractional values?
- What does “in the ball park” mean when estimating?

Knowledge and Skills:

- Estimating with fractions

Assessment Evidence: Use the activity below

Learning Plan

Materials: Circle Fractions (see directions)

Time: Whenever convenient

Lesson Type: Student Investigation, Have students work in pairs

Directions: Follow the directions on the activities below.

Please access the following sources to give students further meaningful opportunities to understand fractions.

- **ACTIONS WITH FRACTIONS, The AIMS Education Foundation, 1998**
- **PROPORTIONAL REASONING, Representing Proportional Relationships, The Aims Education Foundation, 2000**

Directions for fraction estimation circles:

- Copy the fraction circles below onto light colored construction paper.
- Laminate if desired. Have students cut out the circles and then make a cut in the radius of each.
- Have students put the circles together. Slide the radius of one circle through the radius of the other so that the circles are connected. Rotate the circles so to reveal different fractional pie pieces.
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I. Estimating Fractions using Fraction Circles

1) Rotate your circle to show the fractions below. Then sketch the circle with the fractional part.

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{9}{10}$ less than $\frac{1}{4}$ —name the part

$\frac{2}{3}$ $\frac{7}{8}$ $\frac{3}{5}$ more than $\frac{5}{8}$ —name the part

2) Reverse the circle so you cannot see the printed fractions. Use your circle to estimate the size of the fractions below. Sketch your estimation.

$\frac{3}{8}$ $\frac{7}{10}$ $\frac{5}{6}$ less than $\frac{7}{8}$ —name the part

between $\frac{1}{2}$ and $\frac{3}{4}$ —name the part

between $\frac{3}{8}$ and $\frac{1}{2}$ --name the part

II. Visualizing Fractions Near 0, $\frac{1}{2}$, and 1

1) Mark the strips to estimate each fraction.

$\frac{1}{2}$

2) Record the fraction as near 0, $\frac{1}{2}$ or 1. (see below)

$\frac{1}{3}, \frac{2}{3}$

$\frac{1}{4}, \frac{3}{4}$

$\frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}$

$\frac{1}{6}, \frac{5}{6}$

$\frac{2}{7}, \frac{3}{7}, \frac{4}{7}$

$\frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}$

$\frac{2}{9}, \frac{4}{9}, \frac{5}{9}, \frac{7}{9}$

Fractions near 0

Fractions near $\frac{1}{2}$

Fractions near 1

3) Order the Fractions from smallest to greatest.

III. Find the Fraction

After you do the fraction hunt below, create your own hunt complete with clues. Exchange with another group.

NUMBER Choices: $\frac{1}{2}$, $\frac{3}{4}$, $\frac{2}{5}$, $\frac{12}{11}$, $\frac{3}{5}$, $\frac{5}{8}$, $\frac{7}{10}$

Clues: I am greater than 0.5

Clue: I am not equal to 0.75

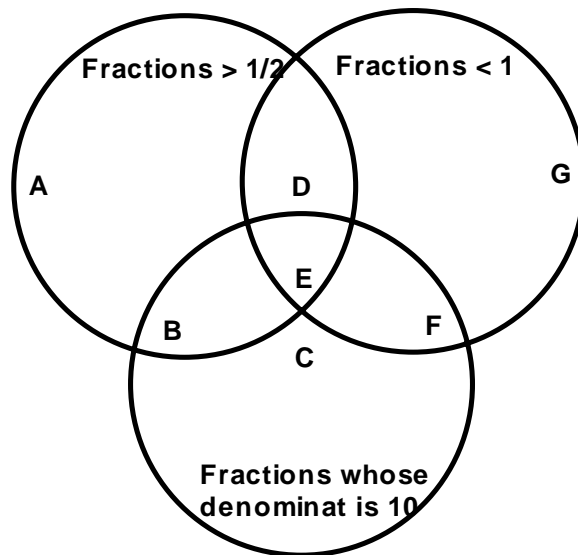
Clue: If you multiply me by 2, you get a number less than 2.

Clue: My denominator is prime

Your Fraction Hunt:

IV. Sorting Fractions

Take turns in your group. Name different fractions and place them in the appropriate region in the Venn diagram below.



Which regions include an infinite number of fractions? _____

Which regions include a finite number of fractions? _____

Are there any regions which are empty sets? If so, which ones? _____

Name some fractions which are outside the diagram below. _____

V. Numerators and Denominators

Suppose a , b , and c are whole numbers (not 0). Also, let's say that $a > b > c$.
What can you say about each of these fractions?

a/b

b/a

b/c

c/b

a/c

c/a

Which is larger? Explain

a/c or b/c

a/b or b/b

a/b or a/c

VI. Are you in the "Ball park?"

To be in the "ball park" means being close to the right answer. Use the number lines below to help you estimate (get in the ball park) the following problems. Place the letter of the problem on the number line to show your estimate answer.

- a) $1/2 + 3/4$ b) $5/8 + 3/5$ c) $1 \text{ and } 3/7 + 2/3$ d) $1 \text{ and } 5/8 + 2 \text{ and } 2/5$



- e) $4 \text{ and } 13/15 - 2 \text{ and } 1/4$
g) $1 \text{ and } 16/17 + 7/8$

- f) $3 \text{ and } 3/8 - 3 \text{ and } 1/4$
h) $5/6 - 7/8$



Write four problems of your own and place the solutions on the number line below.

- a) _____ b) _____ c) _____ d) _____



ESTIMATION PRACTICE

Estimate the following using benchmarks, that is, close to 0, close to $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, etc.

1) $4 \text{ and } \frac{3}{4} + 7 \text{ and } \frac{3}{5}$

2) $1 \text{ and } \frac{16}{17} - \frac{35}{36}$

3) $4 \text{ and } \frac{13}{23} - 4 \text{ and } \frac{5}{36}$

4) $6 \text{ and } \frac{12}{13} + 3 \text{ and } \frac{11}{26}$

5) $5 \text{ and } \frac{1}{3} - 5 \text{ and } \frac{1}{4}$

6) $4 \text{ and } \frac{7}{16} + 8 \text{ and } \frac{7}{27}$