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## Math Peer Teaching: Developing Fraction Concepts Chapter 15

### *Summary*

Fractions is an important concept where students start dealing with partial numbers rather than whole numbers. It is critical that students understand fractions and the various contexts that they are used so they will be able to apply this knowledge in algebra, advanced math and perhaps in their future profession as a tool for measurement. It is also critical that students understand that fractions, decimals, and percents are the same thing. However, the focus of this chapter is fractions.

Fractions are represented in part-whole relationships, measurement, division, operator, and ratio. *Part-Whole* is a good starting point for teaching the concept of fractions, for example shading parts of a region, part of a group ( $\frac{3}{5}$  of the class), part of a length, or parts of a pie/pizza/circle. *Measurement* uses the unit of length as a measurement piece to distinguish distance. (For  $\frac{5}{8}$ ;  $\frac{1}{8}$  is the unit, and it takes 5 of them to reach  $\frac{5}{8}$ ). *Division* is equal sharing, for example \$10 shared with 4 people. Each person receives  $\frac{1}{4}$  of the money or \$2  $\frac{1}{2}$ . *Operator* is when fractions are used in an operation. For example  $\frac{4}{5}$  square metres or  $\frac{2}{3}$  of students were wearing pink (fraction of a whole number where mental math can be used to find the solution). *Ratios* is where fractions can determine probability ( $\frac{1}{4}$  chance of an event is one in four). Ratios can also be used in part-part (people wearing jackets vs no jackets) or part-whole (people wearing jackets vs the whole group of people).

### Students find fractions difficult for several reasons:

1. Students do not see the numerator and denominator as separate values. Using fractions in measurement can help students see that the fraction is one number and a single value.
2. By thinking of the two numbers separately, students may think that  $\frac{2}{3}$  is any two parts, not two equal sized parts. (p 286 picture of Van de Wall)
3. Students may get confused with rules on fractions (larger denominator = smaller fraction) and may believe that  $\frac{1}{10}$  is greater than  $\frac{1}{5}$  because in whole numbers 10 is greater than 5. Asking students if they prefer to go outside for  $\frac{1}{2}$  hour or  $\frac{1}{4}$  of an hour may help.
4. Students may confuse “rules” for operation of whole numbers with fractions ( $\frac{1}{2} + \frac{1}{2} = \frac{2}{4}$ ). Exploring estimation can help illustrate to students why this is not true.

### Big Ideas in Chapter 15

1. Students must experience fractions across many constructs, including part of a whole, ratios, and division.
2. Three categories of models exist for working with fractions -area ( $\frac{1}{3}$  of a garden) length ( $\frac{3}{4}$  of a metre) or a set or quantity ( $\frac{1}{2}$  of the class)
3. Partitioning and iterating are ways for students to understand the meaning of fractions, especially numerators and denominators
4. Students need many experiences estimating with fractions
5. Understanding equivalent fractions is critical. Two equivalent fractions are two ways of describing the same amount by using different sized fractional parts

## Lesson Plan: Fractions

**Subject: Math**

**Grade: 5**

**Time: (30-60 min depending on student ability and depth of lesson)**

**GCO: Number (N): Develop number sense**

**SCO: N7: Demonstrate an understanding of fractions by using concrete and pictorial representations to:**

- create sets of equivalent fractions
- compare fractions with like and unlike denominators.

Review: numerator and denominator

**Multiple representations: candy, number line, manipulatives (pie pieces/area model)**

**Learning Objectives:** I can show that I grasp the concept of fractions by using the 3 different fraction models using manipulatives to show equivalence across sets (candy, students), length (number line), area (pie pieces, paper folding, pattern blocks) and also writing out the fraction in number form. Manipulatives used will vary on what is available. I understand which part of the fraction is the numerator and the denominator.

### **Materials:**

Smartboard

Lesson plan

Laptop

Candy fraction activity sheet

Smartboard Warm-up Class Fractions electronic lesson

Smartboard Musical Fun with Fractions (electronic)

Graph paper (2 per student)

pencils

rulers

paper for folding

pattern blocks, rectangular regions, pie pieces

Other manipulatives: folded paper, cuisenaire rods, dotted paper

### **Math Warm-up/Explore (10-15 min)**

Class Fractions: Activity 15.3 (Van de Walle text)

Material(s) needed: smart board (if not, a white board could work too).

- 1) Have students count how many students there are in all.
- 2) What fraction (how many) of our friends are wearing green today? (Use different colours or hair, clothes, types of shoes, types of clothes: sweater, t-shirt). If students answer with a whole number like 4, ask them: 4 students out of how many students in the class/total?

Repeat this activity 2 times and then introduce numerator and denominator.

- 1) Have students count how many students there are in all. This will be the denominator (write on the board)
- 2) What fraction of our friends are wearing sweaters today? (Use different colours or hair, clothes, types of shoes, types of clothes: sweater, t-shirt) This is the numerator, (write on the board).

Repeat 2 times. Then include different representations for each answer such as a number line, and area models. Demonstrate it and then ask students to come up to the Smartboard and show the fraction on a number line and an area model.

### **Directions to transition into lesson**

We just did a Fraction game with the students in the class. Now we are going to represent fractions in several different ways, like we started to do in the Explore activity. Everyone must fill out the activity sheet. We will do this activity individually. When you have completed it, you will then discuss your answers with a partner, then in a group. Then you will represent your fractions using a number line and a graph (alone or with a partner but each student must complete their own sheet). At the end we will have a class discussions and address any prevailing questions.

### **Procedure**

Hand out activity sheet and a box of smarties to each student (or approx 20 candies). Having various denominators will make this activity more rich, and involve more discussion and discovery for the students.

-Circulate through the class and provide guidance and probing questions if necessary.

Students will:

- 1) Complete activity sheet (fractions with sets and the number)
- 2) Discuss/compare answers with a partner
- 3) Represent the fractions using an area diagram- folding paper, drawing using graph paper, using dot paper. \*
- 4) Represent the fraction on a number line \*\*
- 5) Complete enrichment activities (optional, see below)
- 6) Participate in a whole-class discussion

Wrap up

1. Today we have learned to show fractions in a few different ways. Turn to a shoulder partner and discuss what ways you used to represent fractions today.
2. Call on students and ask what their partner said and allow for other students to further explain.

3. Review answers. Today we used fractions in sets/part-whole (candy), measurement (number line), and in area (graph paper or rectangular regions).

### **Assessment: Formative**

- 1) Observation during explore activity. The teacher can get a feel for which students should be grouped together for comparing fractions based on prior knowledge.
- 2) Observations/ (write on post-it notes and place in students' folders after class) while circulating/assisting students with activity sheet
- 3) Collect all three sheets to mark and provide feedback to students. What they did well, and a goal to work towards and a strategy of how to attain that goal (Fraction activity sheet and graph paper with number line and area).

### **Differentiation**

Ensure that when students discuss answers in groups that there is one student in each group that understands the concept well.

For Step 2) students with ADHD, or trouble with fine motor coordination may: use rectangular regions manipulatives and take pictures using the class iPad to document their work so the teacher may assess it after class.

For step 3) students with difficulty may use folded paper strips, a ruler, fraction, or cuisenaire rods before putting the number on the number line.

### **Enrichment**

Have students simplify fractions that can be simplified and show how they did it ( $10/20=5/10=1/2$ ). Have students write the equivalent decimal and percent with each fraction that they write. Students who have had musical exposure or who grasp the concept of fractions quickly may go to the smart board and do the Musical Fun with Fractions interactive activity. This activity could also be done the next day in class. (see lesson plan attached)

### **References**

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