
Exemplars

Distribution Dilemma

Steve was hired to give out free movie tickets to customers during the grand opening of the new pizza parlor. On Friday, he gave out $\frac{1}{2}$ of his supply; on Saturday, he gave out $\frac{1}{3}$ of what was left; on Sunday, he gave out $\frac{1}{4}$ of the remaining amount; on Monday, he distributed $\frac{1}{3}$ of what was left; on Tuesday, he gave away $\frac{1}{6}$ of what remained and had 60 tickets left.

How many tickets did he have when he began to give them away?

Ten Essential Strategies for Supporting Fraction Sense

1. Provide opportunities for students to work with irregularly partitioned, and unpartitioned, areas, lengths, and number lines.
2. Provide opportunities for students to investigate, assess, and refine mathematical "rules" and generalizations.
3. Provide opportunities for students to recognize equivalent fractions as different ways to name the same quantity.
4. Provide opportunities for students to work with changing units.
5. Provide opportunities for students to develop their understanding of the importance of context in fraction comparison tasks.
6. Provide meaningful opportunities for students to translate between fraction and decimal notation.
7. Provide opportunities for students to translate between different fraction representations.
8. Provide students with multiple strategies for comparing and reasoning about fractions.
9. Provide opportunities for students to engage in mathematical discourse and share and discuss their mathematical ideas, even those that may not be fully formed or completely accurate.
10. Provide opportunities for students to build on their reasoning and sense-making skills about fractions by working with a variety of manipulatives and tools, such as Cuisenaire rods, Pattern Blocks, Fraction Kits, and ordinary items from their lives.



REPRODUCIBLE 1E

Part to Whole and Whole to Part

Date: _____

Name: _____

1. Start with the orange rod.

a. Which rod is $\frac{1}{2}$ of the orange rod? _____
How do you know?

b. Which rod is $\frac{1}{5}$ of the orange rod? _____
How do you know?

c. Which rod is $\frac{1}{10}$ of the orange rod? _____
How do you know?

2. Take out the brown rod.

a. Which rod is $\frac{1}{2}$ of the brown rod? _____
How do you know?

b. Which rod is $\frac{1}{4}$ of the brown rod? _____
How do you know?

c. Which rod is $\frac{1}{8}$ of the brown rod? _____
How do you know?

REPRODUCIBLE 1E (cont'd)

3. Take out the light-green rod.

a. If the light-green rod is $\frac{1}{3}$, which rod is the whole?

How do you know?

b. If the light-green rod is $\frac{1}{3}$, which rod is $\frac{2}{3}$?

How do you know?

4. Take out the white rod.

a. If the white rod is $\frac{1}{5}$, which rod is the whole?

How do you know?

b. If the white rod is $\frac{1}{5}$, which rod is $\frac{2}{5}$? _____

How do you know?

5. Take out the dark-green rod.

a. If the dark-green rod is $\frac{3}{4}$, which rod is the whole?

How do you know?

b. If the dark-green rod is $\frac{2}{3}$, which rod is the whole?

How do you know?

NUMBER LINES (1 – 6) ACTIVITY with Cuisenaire Rods

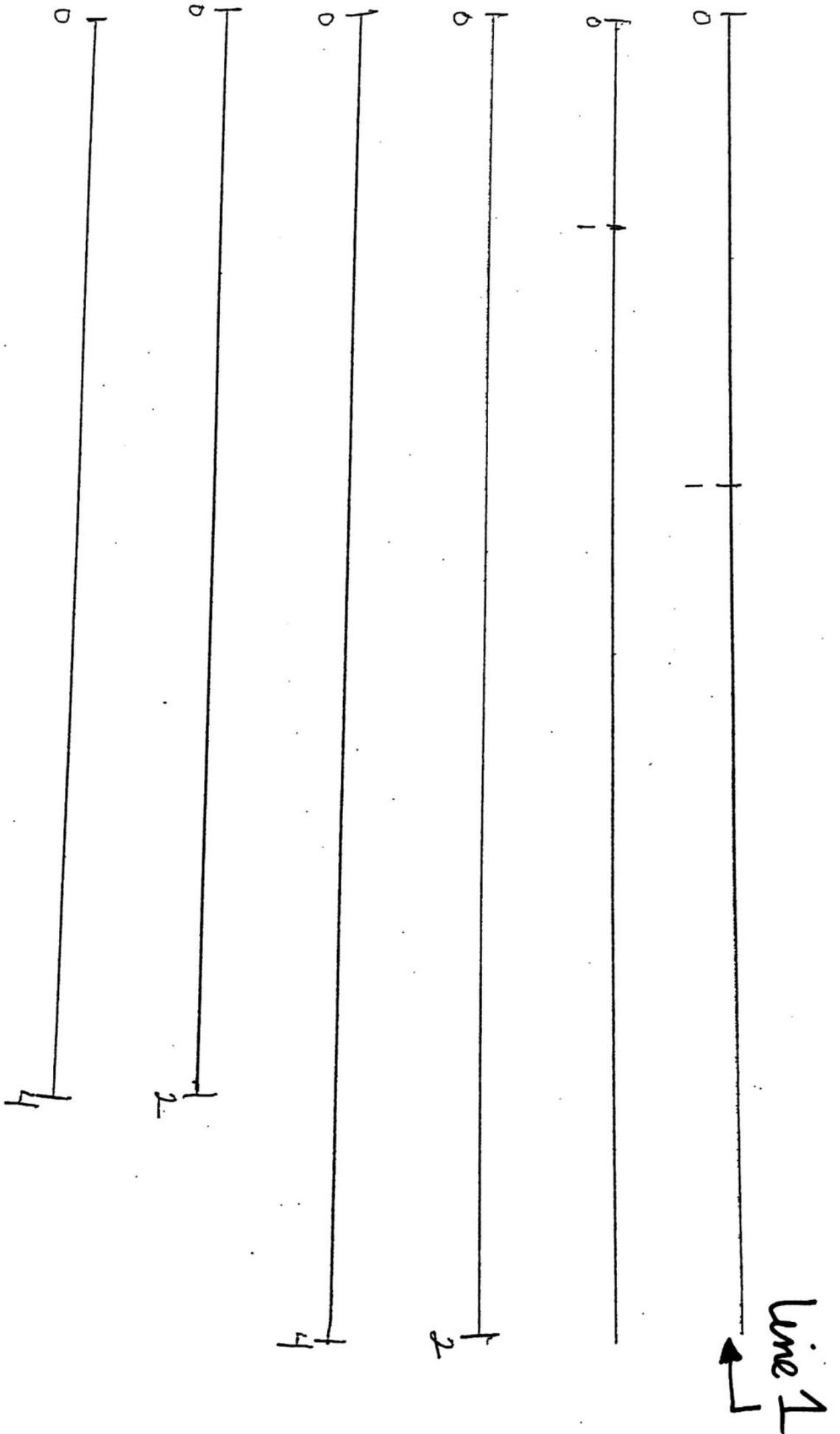
A. Look at Number Line #1. What color rod is the whole?

b) Why?

B. If $\frac{2}{3}$ were to be placed on the number line, the denominator would be represented by which color rod?

C. Use your C-rods to mark $\frac{2}{3}$ on the number line.

D. Mark $\frac{5}{3}$ on your number line



TEACHER NOTES

NUMBER LINES (1 – 6) ACTIVITY with Cuisenaire Rods

A. Look at Number Line #1. What color rod is the whole? **BLUE**

a) Why? **BECAUSE IT IS THE EXACT DISTANCE BETWEEN 0 AND 1.**

B. If $\frac{2}{3}$ were to be placed on the number line, the denominator would be represented by which color rod? **LIGHT GREEN**

a) Why? **BECAUSE 3 EQUAL SIZED PARTS ARE NEEDED TO MAKE THE DISTANCE FROM 0 TO 1**

C. Use your C-rods to mark $\frac{2}{3}$ on the number line.

TEACHER INSTRUCTION:

Have students mark $\frac{1}{3}$ using their light green rods as a reference.

Discuss the distance from 0 to $\frac{1}{3}$ and draw the arc from 0 to $\frac{1}{3}$.

Label $\frac{1}{3}$ above this arc.

Repeat this arc from $\frac{1}{3}$ to $\frac{2}{3}$ (be sure to label this jump of $\frac{1}{3}$ above the arc) and begin to discuss iterations created to get to $\frac{2}{3}$.

Write on board: $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$

Draw the arc from $\frac{2}{3}$ to 1 (be sure to label this jump of $\frac{1}{3}$ above the arc).

Ask students another name for 1. **ANSWER:** $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$ Three one-thirds is equal to one

Discussing “Three one-thirds is equal to one”

$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$ In elementary school, when repeatedly adding the same number, what operation was a quicker way to add the same number? **ANSWER:** multiplication

$3 \times \frac{1}{3} = \frac{3}{3} = 1$ **Three one-thirds is equal to one**

$2 \times \frac{1}{3} = \frac{2}{3}$

$1 \times \frac{1}{3} = \frac{1}{3}$

D. Mark $\frac{5}{3}$ on your number line

TEACHER INSTRUCTION:

How did you know where to place the $5/3$?

ANSWERS: I continued the iteration arcs of $1/3$ and needed two more from the $3/3$ to get to $5/3$.

What equation represents how you arrived at $5/3$?

POSSIBLE ANSWERS:

$$1/3 + 1/3 + 1/3 + \dots = 5/3$$

$$5 \times 1/3 = 5/3$$

$$(3 \times 1/3) + 2/3 = 5/3$$

Given what we've discovered about iterations of $1/3$, between what two whole numbers does $14/3$ lie on the number line?

ANSWER: 4 and 5

Draw this ratio to keep track of student thinking:

$$3/3 = 1$$

$$6/3 = 2$$

$$9/3 = 3$$

$$12/3 = 4$$

$$15/3 = 5$$

$$4 + 2/3 = 14/3 \rightarrow 15/3 - 1/3 = 14/3$$

$$4\frac{2}{3} = \frac{14}{3}$$

Name _____
Partner's name _____

Which is More?

Directions:

There are lots of candy bars, cookies, and pizzas for you and your friends to share. However, you must choose which fraction you want. Work with your partner to investigate which fraction is more. You may not use formulas. When completing your task use manipulatives or drawings. Circle the fraction that is more, and prove your answer with a drawing.

1. $\frac{1}{3}$ or $\frac{1}{4}$

5. $\frac{5}{8}$ or $\frac{5}{7}$

2. $\frac{3}{4}$ or $\frac{3}{8}$

6. $\frac{3}{7}$ or $\frac{5}{7}$

3. $\frac{2}{5}$ or $\frac{1}{5}$

7. $\frac{6}{9}$ or $\frac{6}{13}$

4. $\frac{2}{3}$ or $\frac{1}{4}$

What patterns did you discover?

Can you formulate a "rule" to fit your pattern?

Will your "rule" always work and why?

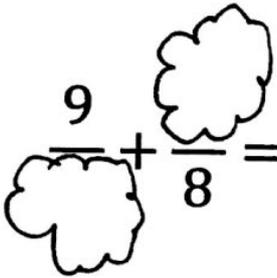
Can you prove it with pictures and words?

Can You Make It True?

One of these is impossible. Can you find it?


$$\frac{\quad}{6} + \frac{\quad}{8} = 1$$


$$\frac{\quad}{5} - \frac{\quad}{3} = 1$$


$$\frac{9}{\quad} + \frac{\quad}{8} = 3$$

$$\frac{6}{a} + \frac{5}{b} = \frac{1}{2}$$

$$\frac{1}{c} - \frac{5}{d} = 2$$

$$\frac{x}{7} - \frac{5}{y} = \frac{1}{2}$$

Algebraic Reasoning

$$\frac{4}{5}x = 16$$

$$\frac{5}{3}x = 10$$