

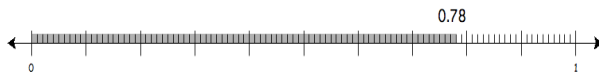
# Rational Number Project

<b>Fraction Operations and Initial Decimal Ideas</b> <b>Lesson 15: Overview</b>	<b>Materials</b>
Students learn to show fractions on a number line by making a translation from paper folding to the number line.	<ul style="list-style-type: none"> <li>• Paper strips for folding</li> <li>• Students Pages A, B, and C</li> <li>• Transparency of final problem</li> </ul>

## Teaching Actions

### Warm Up

Salma was measuring the width of her desk. This is what she found:

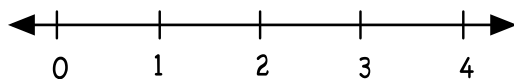


If you were to estimate the fraction of the meter that is shaded, which would it be?

- a.  $\frac{1}{2}$    b.  $\frac{3}{4}$    c.  $\frac{9}{10}$    d.  $\frac{1}{3}$

### Large Group Introduction

1. Ask students to use paper strips to show the fraction  $\frac{3}{4}$ . Ask them to explain their steps (fold in half and half again; shade 3 of 4 equal parts).
2. Display a large number line on the board as noted below (students should follow along using Student Page A).



## Comments

Before asking students to add and subtract fractions on a number line students need practice identifying fractions on this model.

The greatest problem students have is identifying the unit on the number line.

For example, when you ask students to show  $\frac{3}{4}$  on the number line don't be surprised if many students circle 3. If the whole number line is the unit then 3 is  $\frac{3}{4}$  of 4. But with a number line the unit is a distance between 0 and 1. This unit is then iterated to show multiple units. This is unique to this model for fractions.

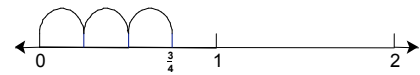
## Teaching Actions

- Have students describe the number line to you.  
Ask: What is the unit?
- State: Let's repeat the steps you just went through to show  $\frac{3}{4}$  with paper strips on the number line.
  - What did you do first with the paper strips? (Partition into 4 equal parts)
  - How can we do that on the number line? Where would numbers less than 1 but greater than 0 be on the number line?
  - How did you show 3 of 4 equal parts on the paper strips? How might we show 3 of 4 equal parts on the number line?
  - If you wanted to show  $2\frac{3}{4}$  with paper strips what would you need? (3 paper strips)  
Where would  $2\frac{3}{4}$  be on the number line? (Between 2 and 3).
- Have someone describe to the class how to locate  $1\frac{4}{5}$  would be on the first number line. Have everyone partition the first number line on Student Page A and mark where  $1\frac{4}{5}$  would be on the line. [Students should partition the unit between 1 and 2 into fifths].
- Have students identify where  $\frac{2}{4}$  would be on the same line? Ask: Can you name  $\frac{2}{4}$  in another way? ( $\frac{1}{2}$ ). Ask: To do this what lines must you ignore?
- Explain: We know that  $\frac{2}{4}$  also equals  $\frac{4}{8}$ . How can you change the number line from 0 to 1 to show that?

## Comments

Students need Student Page A for this large group development. Students use these number lines to follow along with what you show on the large number line on the board.

Possible ways to show  $\frac{3}{4}$ :



## Teaching Actions

8. Ask: how many 8ths equals  $\frac{3}{4}$ ?
9. On the second number line on Student Page A, ask students to find  $1\frac{3}{8}$ . Have a discussion as to how to do this as the line is partitioned only into halves.
10. On the third number line ask students to show  $2\frac{2}{3}$ . Discuss how to do this given that the line is partitioned into 6ths.

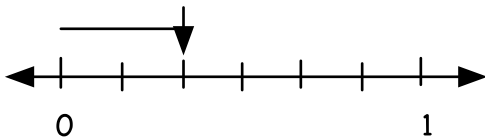
## Small Group/Partner Work

11. With partners, work through Student pages B and C. Select students to share their strategies at the overhead once the majority of students are done

## Wrap Up

12. After sharing responses to the group work, end class with this problem.

What is this point is called. Is it  $\frac{2}{6}$ ,  $\frac{2}{7}$ , 2, or  $\frac{2}{4}$ ?



### Translations:

- Manipulative to Picture to Verbal
- Symbol to Picture
- Symbol to Picture to Verbal

## Comments

Make overheads of Student Pages B and C so students can show during the wrap up how they solved each problem. We found that students do like to present their solutions to the whole group. See additional notes for the teacher for sample student work.

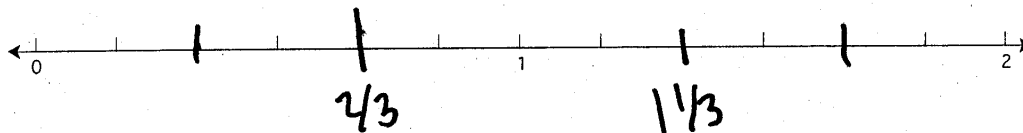
- Students might say the arrow is pointed to  $\frac{2}{7}$  if they count the number of partitions by the number of slash marks and not the number of equal parts between 0 and 1.
- Students might say the arrow is pointed to 2 if they count the slash marks as 0, 1, 2, 3...
- Students may say that the arrow is pointed to  $\frac{2}{4}$  if they identify the point under the arrow as 2 and compares that amount to the 4 partitions from that point to 1.

## Additional Notes to the Teacher

### Lesson 15

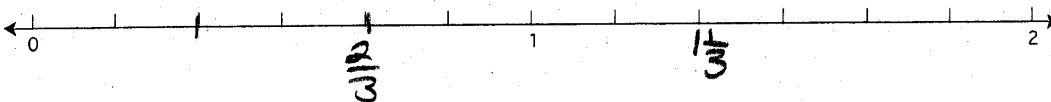
Students approached locating a fractional amount on a number line in different ways. Consider these three examples from students' work.

Problem 7: : Locate  $\frac{2}{3}$  and  $1\frac{1}{3}$  on this number line. What is another name for both fractions?

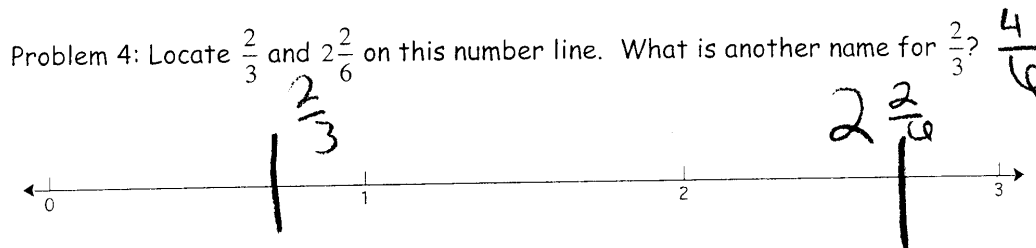


Notice that the student re-partitioned the number line into thirds first and then labeled the location for  $\frac{2}{3}$  and  $1\frac{1}{3}$ .

Problem 7: : Locate  $\frac{2}{3}$  and  $1\frac{1}{3}$  on this number line. What is another name for both fractions?  $\frac{4}{6} \rightarrow \frac{4}{3}$



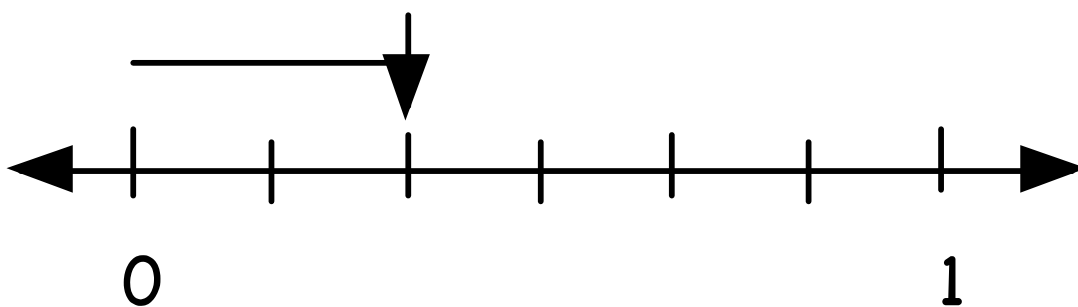
In this example the student found equivalent fraction for  $\frac{2}{3}$  first. Then partitioned the number line to show thirds.



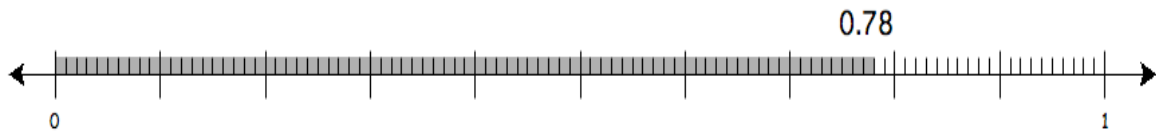
The student only estimated the location of the two fractions. She needs to show the partitions.

What is this point called?

Is it  $2/6$ ,  $2/7$ ,  $2$ , or  $2/4$ ?



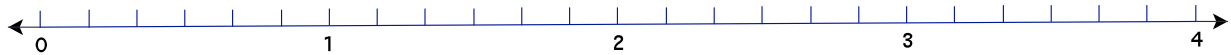
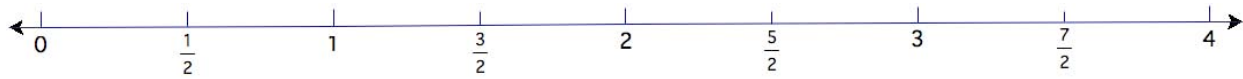
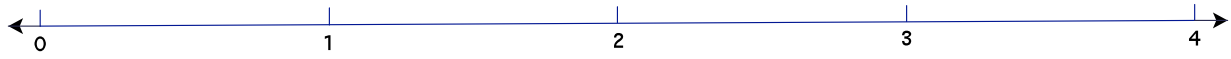
Salma was measuring the width of her desk. This is what she found:



If you were to estimate the fraction of the meter that is shaded, which would it be?

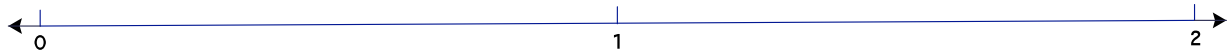
- a.  $\frac{1}{2}$     b.  $\frac{3}{4}$     c.  $\frac{9}{10}$     d.  $\frac{1}{3}$

## Fractions and the Number Line



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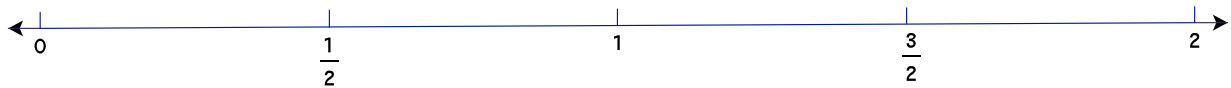
Problem 1: Locate  $1\frac{1}{2}$  and  $\frac{3}{4}$  on this number line.



Problem 2: Locate  $\frac{3}{8}$  and  $1\frac{6}{8}$  on this number line. What is another name for  $1\frac{6}{8}$ ?



Problem 3: Locate  $\frac{1}{6}$  and  $1\frac{2}{6}$  on this number line. What is another name for  $1\frac{2}{6}$ ?



Problem 4: Locate  $\frac{2}{3}$  and  $2\frac{2}{6}$  on this number line. What is another name for  $\frac{2}{3}$ ?

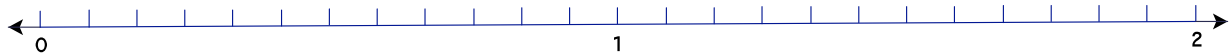


Problem 5: Locate  $\frac{6}{8}$  and  $2\frac{2}{8}$  on this number line. What is another name for both fractions?



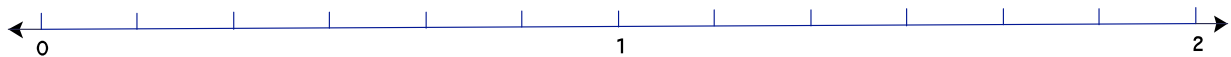
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Problem 6: Locate  $\frac{3}{4}$  and  $1\frac{1}{2}$  on this number line. What is another name for both fractions?



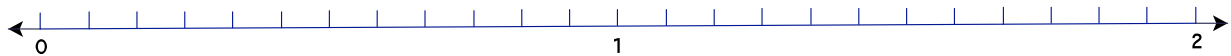
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Problem 7: Locate  $\frac{2}{3}$  and  $1\frac{1}{3}$  on this number line. What is another name for both fractions?



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Problem 8: Locate  $\frac{5}{6}$  and  $1\frac{2}{4}$  on this number line. What is another name for both fractions?



## Post Lesson Reflection

Lesson \_\_\_\_\_

1) Number of class periods allocated to this lesson: \_\_\_\_\_

2) Student Pages used: \_\_\_\_\_

3) Adaptations made to lesson: (For example: added extra examples, eliminated certain problems, changed fractions used)

4) Adaptations made on Student Pages:

5) To improve the lesson I suggest: