

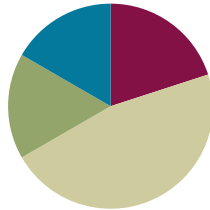
Lesson 19

Objective: Understand distance and position on the number line as strategies for comparing fractions. (Optional)

Related Topics: [More Lesson Plans for the Common Core Math](#)

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Application Problem	(10 minutes)
■ Concept Development	(28 minutes)
■ Student Debrief	(10 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Express Fractions as Whole Numbers Sprint **3.NF.3c** (9 minutes)
- Place Fractions on the Number Line **3.NF.2b** (3 minutes)

Express Fractions as Whole Numbers Sprint (9 minutes)

Materials: (S) Express Fractions as Whole Numbers Sprint

Place Fractions on the Number Line (3 minutes)

Materials: (S) Personal white boards

T: (Draw a number line marked at 0, 1, 2, and 3.) Draw my number line on your board.

S: (Draw.)

T: Estimate to show and label 1 third on the interval 0 to 1.

S: Students estimate the point between 0 and 1 and write $\frac{1}{3}$.

T: Estimate to show 3 thirds.

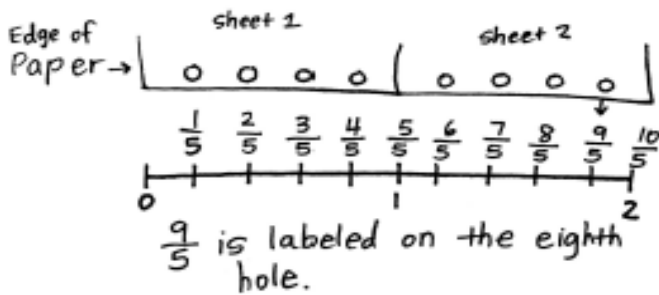
S: (Write $\frac{3}{3}$ above the 1 on the number line.)

Continue with possible sequence: $\frac{6}{3}, \frac{9}{3}, \frac{4}{3}, \frac{7}{3}, \frac{2}{3}, \frac{8}{3}, \frac{1}{2}, \frac{2}{2}, \frac{4}{2}, \frac{3}{2}, \frac{5}{2}, \frac{6}{2}$.

Application Problem (10 minutes)

Thomas has 2 sheets of paper. He wants to punch 4 equally spaced holes along the edge of each sheet.

Draw Thomas' 2 sheets of paper next to each other so the ends meet. Label a number line from 0 at the start of his first paper to 2 at the end of his second paper. Show Thomas where to hole-punch his papers and label the unit fractions. What unit fraction is labeled on the eighth hole?



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

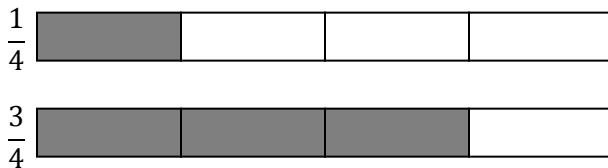
Students below grade level may benefit from acting out the Application Problem, lining up 2 sheets of paper to make a concrete example.

Note that this problem is different from the problem with the rope in Lesson 16 and the nails in Lesson 17. The first hole is not marking zero. Zero is the edge of the paper. Students below grade level may not pick up on this. For all students, it is important when measuring to be clear about the location of zero.

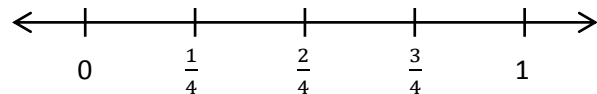
Concept Development (28 minutes)

Materials: (S) Personal white boards

- T: Draw 2 same-sized rectangles on your board and partition both into 4 equal parts. Shade your top rectangle to show 1 fourth and shade the bottom to show 3 copies of 1 fourth.



- T: Compare the models. Which shaded fraction is larger? Tell your partner how you know.
- S: I know 3 fourths is larger because 3 parts is greater than just 1 part of the same size.
- T: Use your rectangles to measure and draw a number line from 0 to 1. Partition it into 4 equal size segments. Label all parts of your number line.



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

For ELLs, model the directions or use gestures to clarify English language. E.g., extend your arms to demonstrate "long."

Give ELLs a little more time to discuss with a partner their math thinking in English.

- T: Talk with your partner to compare $\frac{1}{4}$ to $\frac{3}{4}$ using the number line. How do you know which is the larger fraction?
- S: $\frac{1}{4}$ is less distance from 0, so it is the smaller fraction. $\frac{3}{4}$ is a greater distance away from 0, so it is the larger fraction.
- T: Many of you are comparing the fractions by seeing their distance from 0. You're right, 1 unit is a smaller distance from 0 than 3 units. If we know where 0 is on the number line, how can it help us to find the smaller or larger fraction?
- S: The smaller fraction will always be to the left of the larger fraction.
- T: How do you know?
- S: Because the further you go to the right on the number line, the further the distance from 0. → That means the fraction to the left is always smaller. It's closer to 0.
- T: Think back to our application problem. What were we trying to find? The length of the page from the edge to each hole? Or were we simply finding the location of each hole?
- S: The location of each hole.
- T: Remember the pepper problem from yesterday? What were we comparing? The length of the peppers or the location of the peppers?
- S: We were looking for the length of each pepper.
- T: Talk with your partner. What is the same and what is different about the way we solved these problems?
- S: In both we placed fractions on the number line. → To do that we actually had to find the distance of each from 0, too. → Yes, but in Thomas' we were more worried about the position of each fraction so he'd put the holes in the right places. → And in the pepper problem the distance from 0 to the fraction told us the length of each pepper, and then we compared that.
- T: How do distance and position relate to each other when we compare fractions on the number line?
- S: You use the distance from 0 to find the fraction's placement. → Or you use the placement to find the distance. → So they're both part of comparing. The part you focus on just depends on what you're trying to find out.
- T: Relate that to your work on the pepper and hole-punch problems.
- S: Sometimes you focus more on the distance like in the pepper problem, and sometimes you focus more on the position like in Thomas' problem. It depends on what the problem is asking.
- T: Try and use both ways of thinking about comparing as you work through the problems on today's Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Understand distance and position the number line as strategies for comparing fractions.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- Invite students to share their work on the final 3 problems. Students should have slightly different explanations for Problems 4 and 5. Invite a variety of responses so that both explanations are heard.
- Extend the lesson by having students work together (or guide them) to create word problems with real world contexts that emphasize different types of comparisons:
- Create word problems with a context that emphasizes placement of the fraction on a number line (like the hole-punch problem).
- Create word problems with a context that emphasizes the distance of the fraction from 0 (like the pepper problem).
- Have students solve the problems together and discuss how the context of the problem affects the way in which the solution is delivered.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name Gina Date 3/20

1. Divide each number line into unit fractions as indicated. Then place the fractions. Write each whole as a fraction.

a. halves $\frac{3}{2}$ $\frac{5}{2}$ $\frac{4}{2}$

b. fourths $\frac{4}{4}$ $\frac{11}{4}$ $\frac{6}{4}$

c. eighths $\frac{24}{8}$ $\frac{19}{8}$ $\frac{16}{8}$

2. Use the number lines above to compare the following fractions using $>$, $<$, or $=$.

$\frac{6}{4} < \frac{9}{4}$ $\frac{3}{2} < \frac{5}{2}$ $\frac{19}{8} > \frac{16}{8}$

$\frac{16}{8} > \frac{3}{2}$ $\frac{9}{4} < \frac{19}{8}$ $\frac{4}{2} = \frac{16}{8}$

$\frac{6}{4} < \frac{16}{8}$ $\frac{5}{2} > \frac{9}{4}$ $\frac{24}{8} > \frac{11}{4}$

3. Choose a greater than comparison you made in problem 2. Use pictures, numbers and words to explain how you made that comparison.

$\frac{5}{2} > \frac{9}{4}$

$\frac{5}{2}$ is greater than $\frac{9}{4}$ because $\frac{9}{4}$ is to the left of $\frac{5}{2}$, which also means it is closer to zero.

4. Choose a less than comparison you made in problem 2. Use pictures, numbers and words to explain a different way of thinking about the comparison then what you wrote in problem 3.

$\frac{3}{2} < \frac{5}{2}$

$\frac{3}{2}$ is less than $\frac{5}{2}$ because $\frac{3}{2}$ is to the left of $\frac{5}{2}$ and $\frac{3}{2}$ is closer to zero. Also it's the same unit, so 3 parts is less than 5 parts.

5. Choose an equal to comparison you made in problem 2. Use pictures, numbers and words to explain 2 ways that you can prove your comparison is true.

$\frac{4}{2} = \frac{16}{8}$

They are equal! They are on the same spot on the number line. Both are the same distance away from zero.

A

Correct _____

Write each fraction as a whole number.

1	$\frac{2}{1} =$		23	$\frac{6}{3} =$	
2	$\frac{2}{2} =$		24	$\frac{3}{3} =$	
3	$\frac{4}{2} =$		25	$\frac{3}{1} =$	
4	$\frac{6}{2} =$		26	$\frac{9}{3} =$	
5	$\frac{10}{2} =$		27	$\frac{16}{4} =$	
6	$\frac{8}{2} =$		28	$\frac{20}{4} =$	
7	$\frac{5}{1} =$		29	$\frac{12}{3} =$	
8	$\frac{5}{5} =$		30	$\frac{15}{3} =$	
9	$\frac{10}{5} =$		31	$\frac{70}{10} =$	
10	$\frac{15}{5} =$		32	$\frac{12}{2} =$	
11	$\frac{25}{5} =$		33	$\frac{14}{2} =$	
12	$\frac{20}{5} =$		34	$\frac{90}{10} =$	
13	$\frac{10}{10} =$		35	$\frac{30}{5} =$	
14	$\frac{50}{10} =$		36	$\frac{35}{5} =$	
15	$\frac{30}{10} =$		37	$\frac{60}{10} =$	
16	$\frac{10}{1} =$		38	$\frac{18}{2} =$	
17	$\frac{20}{10} =$		39	$\frac{40}{5} =$	
18	$\frac{40}{10} =$		40	$\frac{80}{10} =$	
19	$\frac{8}{4} =$		41	$\frac{16}{2} =$	
20	$\frac{4}{4} =$		42	$\frac{45}{5} =$	
21	$\frac{4}{1} =$		43	$\frac{27}{3} =$	
22	$\frac{12}{4} =$		44	$\frac{32}{4} =$	

B Improvement _____ # Correct _____

Write each fraction as a whole number.

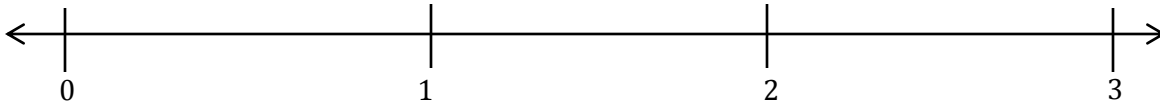
1	$\frac{5}{1} =$		23	$\frac{8}{4} =$	
2	$\frac{5}{5} =$		24	$\frac{4}{4} =$	
3	$\frac{10}{5} =$		25	$\frac{4}{1} =$	
4	$\frac{15}{5} =$		26	$\frac{12}{4} =$	
5	$\frac{25}{5} =$		27	$\frac{12}{3} =$	
6	$\frac{20}{5} =$		28	$\frac{15}{3} =$	
7	$\frac{2}{1} =$		29	$\frac{16}{4} =$	
8	$\frac{2}{2} =$		30	$\frac{20}{4} =$	
9	$\frac{4}{2} =$		31	$\frac{90}{10} =$	
10	$\frac{6}{2} =$		32	$\frac{30}{5} =$	
11	$\frac{10}{2} =$		33	$\frac{35}{5} =$	
12	$\frac{8}{2} =$		34	$\frac{70}{10} =$	
13	$\frac{10}{1} =$		35	$\frac{12}{2} =$	
14	$\frac{10}{10} =$		36	$\frac{14}{2} =$	
15	$\frac{50}{10} =$		37	$\frac{80}{10} =$	
16	$\frac{30}{10} =$		38	$\frac{45}{5} =$	
17	$\frac{20}{10} =$		39	$\frac{16}{2} =$	
18	$\frac{40}{10} =$		40	$\frac{60}{10} =$	
19	$\frac{6}{3} =$		41	$\frac{18}{2} =$	
20	$\frac{3}{3} =$		42	$\frac{40}{5} =$	
21	$\frac{3}{1} =$		43	$\frac{36}{4} =$	
22	$\frac{9}{3} =$		44	$\frac{24}{3} =$	

Name _____

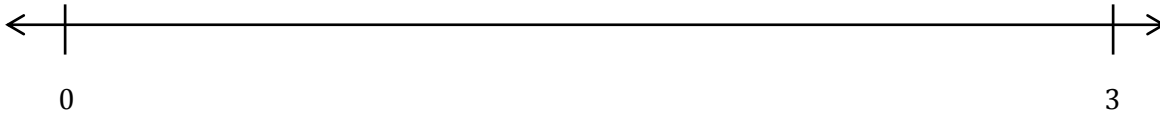
Date _____

1. Divide each number line into unit fractions as indicated. Then place the fractions. Write each whole as a fraction.

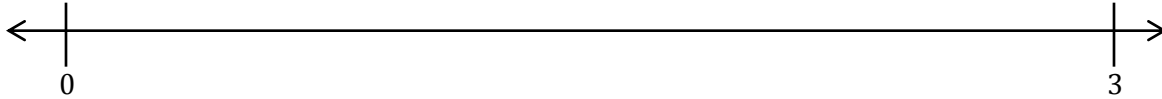
a. halves $\frac{3}{2}$ $\frac{5}{2}$ $\frac{4}{2}$



b. fourths $\frac{9}{4}$ $\frac{11}{4}$ $\frac{6}{4}$



c. eighths $\frac{24}{8}$ $\frac{19}{8}$ $\frac{16}{8}$



2. Use the number lines above to compare the following fractions using $>$, $<$, or $=$.

$$\frac{6}{4} \bigcirc \frac{9}{4}$$

$$\frac{3}{2} \bigcirc \frac{5}{2}$$

$$\frac{19}{8} \bigcirc \frac{16}{8}$$

$$\frac{16}{8} \bigcirc \frac{3}{2}$$

$$\frac{9}{4} \bigcirc \frac{19}{8}$$

$$\frac{4}{2} \bigcirc \frac{16}{8}$$

$$\frac{6}{4} \bigcirc \frac{16}{8}$$

$$\frac{5}{2} \bigcirc \frac{9}{4}$$

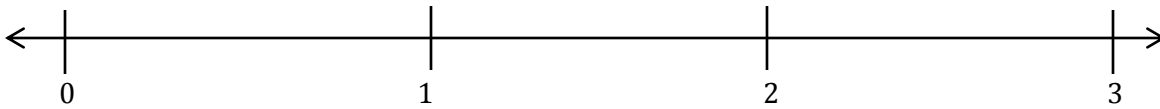
$$\frac{24}{8} \bigcirc \frac{11}{4}$$

Name _____

Date _____

1. Divide each number line into unit fractions as indicated. Then place the fractions. Write each whole as a fraction.

a. fourths $\frac{2}{4}$ $\frac{10}{4}$ $\frac{7}{4}$



2. Use the number line above to compare the following fractions using $>$, $<$, or $=$.

$$\frac{3}{4} \bigcirc \frac{5}{4}$$

$$\frac{7}{4} \bigcirc \frac{4}{4}$$

$$3 \bigcirc \frac{6}{4}$$

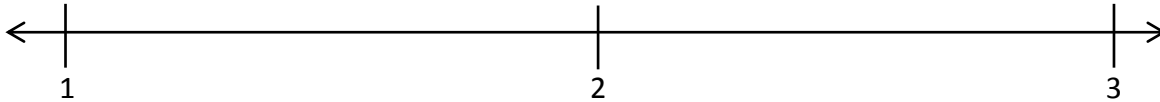
3. Use the number line from Problem 1. Which is larger, 2 wholes or $\frac{9}{4}$? Use words, pictures, and numbers to explain your answer.

Name _____

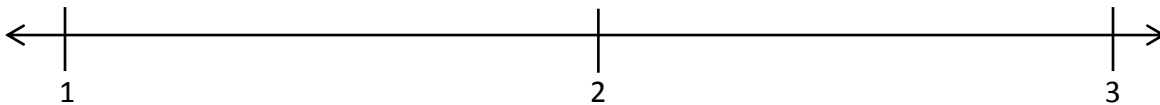
Date _____

1. Divide each number line into the given unit fractions. Then place the fractions. Write each whole as a fraction.

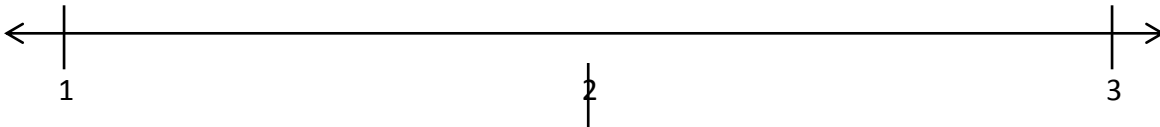
a. thirds $\frac{6}{3}$ $\frac{5}{3}$ $\frac{8}{3}$



b. sixths $\frac{10}{6}$ $\frac{18}{6}$ $\frac{15}{6}$



c. fifths $\frac{14}{5}$ $\frac{7}{5}$ $\frac{11}{5}$



2. Use the number lines above to compare the following fractions using $>$, $<$, or $=$.

$$\frac{17}{6} \bigcirc \frac{15}{6}$$

$$\frac{7}{3} \bigcirc \frac{9}{3}$$

$$\frac{11}{5} \bigcirc \frac{8}{5}$$

$$\frac{4}{3} \bigcirc \frac{8}{6}$$

$$\frac{13}{6} \bigcirc \frac{8}{3}$$

$$\frac{11}{6} \bigcirc \frac{5}{3}$$

$$\frac{10}{6} \bigcirc \frac{3}{3}$$

$$\frac{6}{3} \bigcirc \frac{12}{6}$$

$$\frac{15}{5} \bigcirc \frac{5}{3}$$

3. Use fractions from the number lines in Problem 1. Complete the sentence. Use a words, pictures, or numbers to explain how you made that comparison.

_____ is greater than _____.

4. Use fractions from the number lines in Problem 1. Complete the sentence. Use a words, pictures, or numbers to explain how you made that comparison.

_____ is less than _____.

5. Use fractions from the number lines in Problem 1. Complete the sentence. Use a words, pictures, or numbers to explain how you made that comparison.

_____ is equal to _____.