

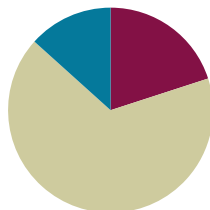
Lesson 30

Objective: Partition various wholes precisely into equal parts using a number line method.

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

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Concept Development	(40 minutes)
■ Student Debrief	(8 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Multiply by 9 **3.OA.4** (8 minutes)
- Compare Fractions with the Same Numerator **3.NF.3d** (4 minutes)

Multiply by 9 (8 minutes)

Materials: (S) Multiplication by 9 Sprint

T: Skip-count by nines. (Write multiples horizontally as students count.)

S: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90.

T: (Write $9 \times 5 =$ to the side of the number line.) Let's skip-count by nines to find the answer. (Count with fingers to 5 as students count.)

S: 9, 18, 27, 36, 45.

T: (Circle 45 and write $9 \times 5 = 45$ above it. Write $9 \times 4 =$ to the side of the number line.) Skip-count by nines. (Count with fingers to 4 as students count.)

S: 9, 18, 27, 36.

T: Let's arrive at the answer by skip-counting down starting at 45. (Hold up 5 fingers as students say 45 and take away 1 finger as students count.)

S: 45, 36.

T: (Write $9 \times 7 =$ to the side of the number line.) Skip-count by nines. (Count with fingers to 7 as students count.)

S: 9, 18, 27, 36, 45, 54, 63.

T: Let's skip-count starting at 45. (Hold up 5 fingers as students say 45 and count up with fingers as students count.)

S: 45, 54, 63.

T: (Write $9 \times 9 =$ to the side of the number line.) Skip-count by nines. (Count with fingers to 9 as

students count.)

S: 9, 18, 27, 36, 45, 54, 63, 72, 81.

T: Let's skip-count down starting at 90. (Hold up 10 fingers as students say 90 and remove 1 finger as students count.)

S: 90, 81.

T: Let's get some practice multiplying by 9. Be sure to work left to right across the page. (Distribute Multiply by 9 Problem Set.)

Compare Fractions with the Same Numerator (4 minutes)

Materials: (S) Personal white boards

T: (Project a figure showing 3 fourths.) Say the fraction of the figure that is shaded.

S: 3 fourths.

T: (Write $\frac{3}{4}$ directly below the figure. To the right of the first figure, project one that is the same size and shape.) Say the fraction of the figure that is shaded.

S: 3 eighths.

T: (Write $\frac{3}{8}$ directly below the second figure.) On your boards, write each fraction. Between the fractions, use the greater than or less than symbol (Write $<$ and $>$.) to show which fraction is larger.

S: (Write $\frac{3}{4} > \frac{3}{8}$.)

Continue process for $\frac{5}{10}$ and $\frac{5}{8}$, $\frac{2}{5}$ and $\frac{2}{3}$, $\frac{4}{5}$ and $\frac{4}{6}$.



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Students below grade level may benefit from naming the unit fraction (e.g., "eighths") before naming the shaded fraction. Solidify understanding of greater than/less than symbols by soliciting a simultaneous oral response, e.g., "3 fourths is greater than 3 eighths."

Provide sentence frames for ELLs, such as "___ is greater than ___."

Concept Development (40 minutes)

Materials: (S) At least 5- 9"x 1" strips of red construction paper per student, 1 copy of the Lined Paper Template or simple notebook paper, 12-inch ruler (Please see the notes about the Exit Ticket.)

T: Think back on our lessons. Talk to your partner about how to partition a number line into thirds.

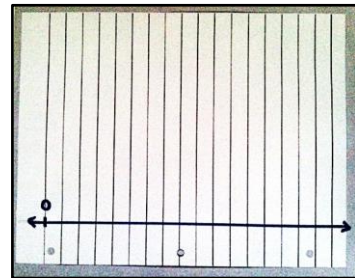
S: Draw the line and then estimate 3 equal parts. → Use your folded fraction strip to measure. → Measure a 3-inch line with a ruler and then mark off each inch. → Or on a 6-inch line, 1 mark would be at each 2 inches. → And don't forget to mark 0. → Yes, you always have to start measuring from 0.

T: What if you want to mark off *any* fractional unit *precisely* without the use of a ruler, just with lined paper? Let's explore a method to do that.

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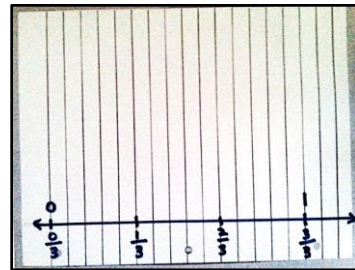
Step 1: Draw a number line and mark the 0 endpoint.

- T: (Give students 1 sheet of lined notebook paper.) Turn your paper so the margin is horizontal. Draw a number line on top of the margin.
- T: Mark 0 on the point where I did (Demonstrate.). How can we equally and precisely partition this number line into thirds? Talk to your partner.
- S: We can use the vertical lines. → Each line can be an equal part. → We can count 2 lines for each third. → Or 3 spaces or 4 to make an equal part, just so long as each part has the same number. → Oh, I see, this is the answer. → But the teacher said any piece of paper. If we make thirds on this paper, it won't help us make thirds on every paper.



Step 2: Measure equal units using the paper's lines.

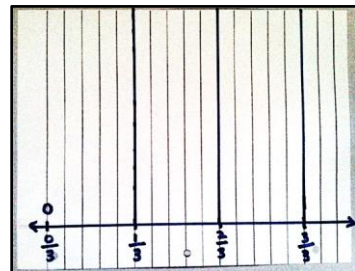
- T: Use the paper's vertical lines to measure. Let's make each part 5 spaces long. Label the number line from 0 to 1 using 5 spaces for each third. Discuss in pairs how you know these are precise thirds.



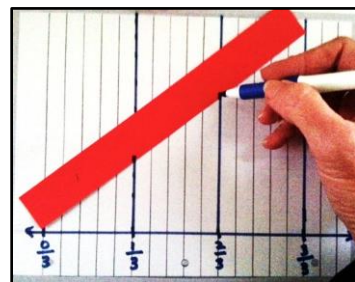
Step 3: Extend the equal parts to the top of the notebook paper with a line.

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- T: Draw vertical lines up from your number line to the top of the paper at each third. (Hold up 1 red strip of paper.) Talk to your partner about how we might use these lines to partition this red strip into thirds.
- T: (Pass out 1 red strip to each student.) The challenge is to partition the red strip precisely into thirds. Let the left end of the strip be 0. The right end of the strip is 1.
- S: The strip is too long. → We can't cut it? → No. The teacher said no. How can we do this? (Circulate and listen but don't give an answer.)

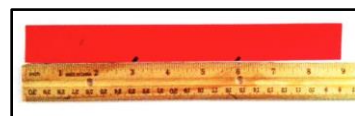


Step 4: Angle the red strip so that the left end touches the 0 endpoint on the original number line. The right end touches the line at 1.



Step 5: Mark off equal units, indicated by the vertical extensions of the points on the original number line.

- T: Do your units look equal?
- T: Verify they are equal with your ruler. Measure the full length of the red strip in inches. Measure the equal parts.
- T: I made this strip 9 inches long just so that you could verify that our method partitions precisely.



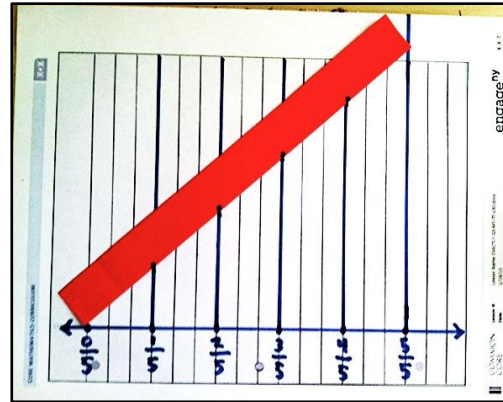
Have the students think about why this method works. Have them review the process step by step.

Problem Set (10 minutes)

Materials: (S) Copies of the Lined Paper Template or simple notebook paper

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.

In cooperative groups, challenge the students to use the same process to precisely mark off other red strips into halves, fourths, etc. It is particularly exciting to partition fifths, sevenths, ninths, and tenths since those are so challenging to fold.



Student Debrief (8 minutes)

Lesson Objective: Partition various wholes precisely into equal parts using a number line method.

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.

- (Present a meter strip.) Could we use this method to partition any length strip? Talk to your partner about how we could partition this longer strip. Model partitioning the meter strip by using the same method. Simply tape additional lined papers above the lined paper with the thirds. This allows you to make a sharper angle with the meter strip.
- This long strip (The meter length.), this shorter strip (The red length.), and this number line (The one at the base of the paper.) were all partitioned during our work. What is the same and different about them?
- Why do you think this method works? Why are the fractional units still equal when we angle the paper? Do you need to measure to check that they are?
- How might having this skill be helpful in your lives or math class?
- Explain to the students that this lesson will be very important in their high school mathematics and that a mathematician invented it in order to prepare them for success later in their math journey.

Exit Ticket (3 minutes)

Since this is an exploratory lesson, rather than giving an Exit Ticket, circulate and take notes on each student's work during the lesson. Is the student able to generalize the method to partition into other fractional units? Make notes about the quality of the new efforts and what mistakes a student made either conceptually (not understanding the angling of the strip) or at a skill level (such as not using the paper's lines properly to partition equal units.) Make notes, too, on the role students take within cooperative groups. Which students articulate directions? Explanations? Which students execute well but silently?

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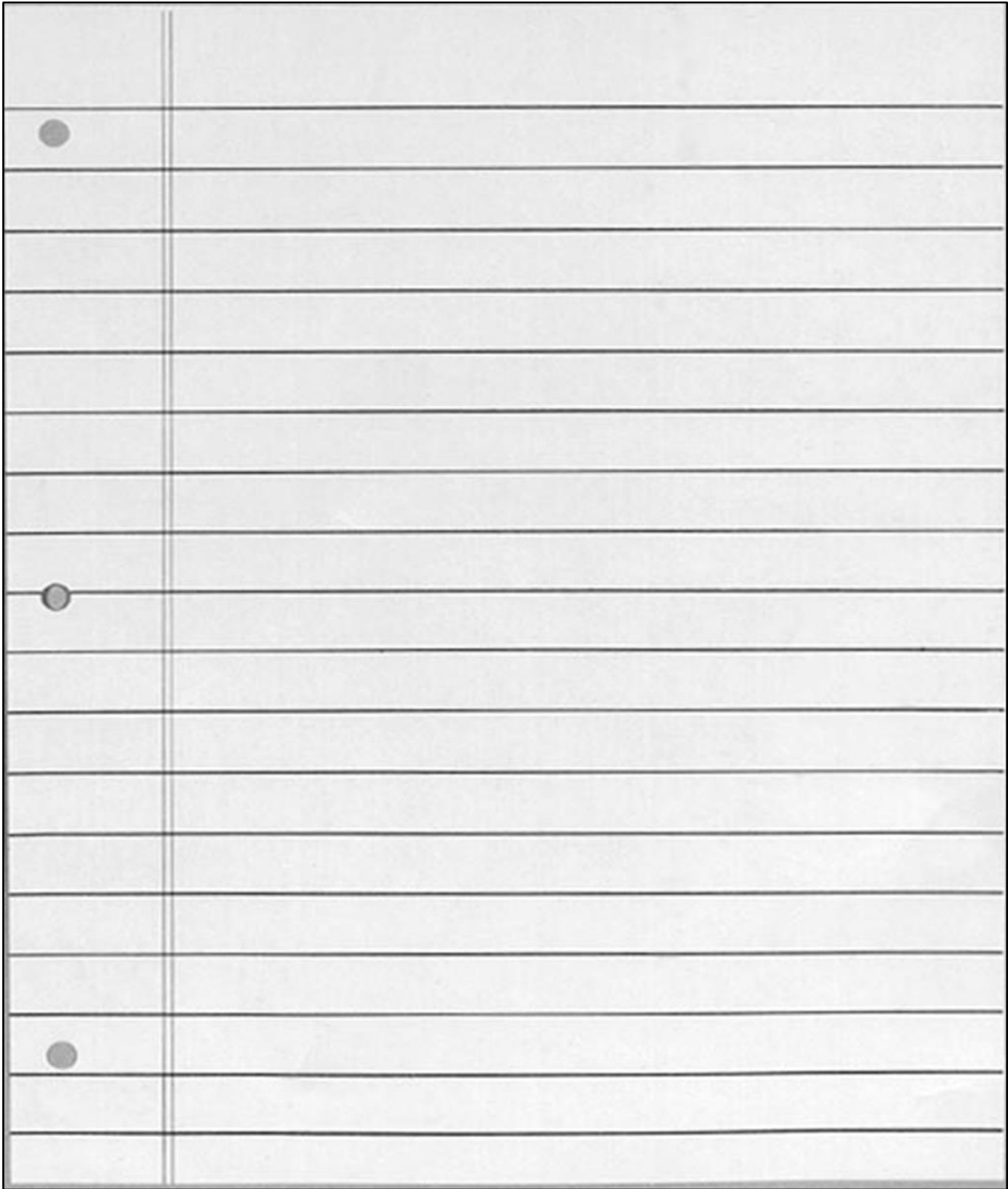
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Name _____

Date _____

Instructions: Write a friendly letter to a friend or family member. Describe step-by-step the experience you had of partitioning a length into equal units simply using a piece of notebook paper and a straight edge. Illustrate the process. Your teacher will give you a lined paper and strip to take home.