Lesson 5

Objective: Create ruler with 1-inch, 1/2-inch, and 1/4-inch intervals and generate measurement data.

Related Topics: More Lesson Plans for the Common Core Math

Suggested Lesson Structure

■ Fluency Practice	(10 minutes)	
■ Concept Development	(40 minutes)	
■ Student Debrief	(10 minutes)	
Total Time	**(60 minutes)**	

Fluency Practice (10 minutes)

- Group Counting **3.OA.1**　　(6 minutes)
- Factors of 12 **3.MD.4**　　(4 minutes)

Group Counting (6 minutes)

Materials:　(S) Personal white boards

Note: This group counting activity reviews units of 6 and the relationship between multiplication and division.

　T:　Count by sixes to 60. (Write on the board as students count.)
　S:　6, 12, 18, 24, 30, 36, 42, 48, 54, 60.

6	12	18	24	30	36	42	48	54	60
1 six	2 sixes	3 sixes	4 sixes	5 sixes	6 sixes	7 sixes	8 sixes	9 sixes	10 sixes
$6 \div 6$	$12 \div 6$	$18 \div 6$	$24 \div 6$	$30 \div 6$	$36 \div 6$	$42 \div 6$	$48 \div 6$	$54 \div 6$	$60 \div 6$

　T:　(Beneath 6, write 1 six. Point at the 12.) 12 is the same as how many sixes?
　S:　2 sixes.
　T:　(Write 2 sixes beneath 12. Point at the 18.) 18 is the same as how many sixes?
　S:　3 sixes.
　T:　(Write 3 sixes beneath 18. Point at 1 six.) Let's count units of 6. (Write as students count.)
　S:　1 six, 2 sixes, 3 sixes, 4 sixes, 5 sixes, 6 sixes, 7 sixes, 8 sixes, 9 sixes, 10 sixes.
　T:　(Point at 60.) How many sixes are in 60?
　S:　10 sixes.

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6.B.3

T: (Beneath 10 sixes, write 60 ÷ 6 = ___.) What's 60 ÷ 6?

S: 10.

T: (Write 60 ÷ 6 = 10. Beneath 1 six, write 6 ÷ 6 = ___.) On your boards, write the number sentence.

S: (6 ÷ 6 = 1.)

Repeat the process for the rest of the chart.

Factors of 12 (4 minutes)

Note: This fluency activity prepares students for today's lesson.

T: (Write 12 × ___ = 12.) Say the number sentence, completing the unknown factor.

S: 12 × 1 = 12.

Continue with the following possible sequence: 1 × ___ = 12, 6 × ___ = 12, 4 × ___ = 12, 2 × ___ = 12, and 3 × __ = 12.

T: I'll say a factor. You say the factor you need multiply it by to get 12. The first factor is 1.

S: 12.

T: 6?

S: 2.

T: 4?

S: 3.

T: 12?

S: 1.

T: 3?

S: 4.

Concept Development (40 minutes)

Materials: (S) 1″ × 6″ strip of yellow construction paper, colored pencils or markers (black, red, and blue), ruler, lined paper template, 1 pre-cut straws less than 6″ (preferably cut to 1″, 1/2″, and 1/4″ lengths), Problem Set

Problem 1: Partition and measure a paper strip into whole-inch, half-inch, and quarter-inch measurements.
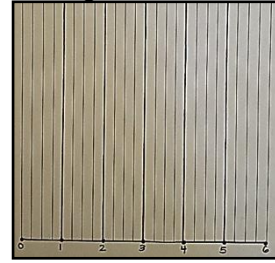
MP.5

T: (Give each student one copy of the lined paper template.) Turn your paper so the margin is horizontal. Draw a number line on top of the margin. Mark 0 on the point where I did. (Model).

T: Use your black marker to plot a point at every 4 spaces. Use the paper's vertical lines to measure the 4 spaces. Then label the number line from 0 to 6, making sure there are 4 spaces for each part. Tell your partner how you know each part is equal.
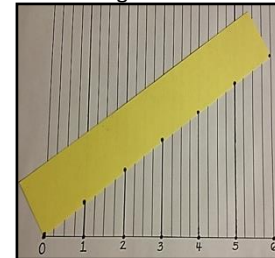
S: (Discuss.)

T: Use a ruler to draw vertical lines up from your number line to the top of the paper at each point. (Pass out 1 yellow strip to each student.) Lay the yellow strip so that the left end touches the 0 endpoint on the original number line, and the right end touches the line at 6.

T: Where the lines touch your strip, plot points on your strip. Extend the points to make them tick marks, then label the strip 0–6. After labeling the numbers on the strip, it will be labeled opposite from your number line.

T: Use your ruler to verify that the intervals on your strip are equal. Measure the full length of the yellow strip in inches. Measure the equal parts.

T: What measurement does each mark represent?

S: 1 inch.

T: We now know every 4 spaces marks 1 inch on our strip. Let's repeat the process, but this time we will mark a point at every 2 spaces. What measurement will each mark represent? Talk to a partner.

MP.5

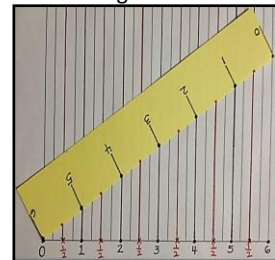S: Two spaces is half. → So that must mean we will mark half inches!

Repeat the process:

- Plot points at every 2 spaces with a red marker to mark half inches. If a point is already marked with a whole inch, plot the new, red point above the black point. Then plot and label every half inch between the whole inches on your strip.

- Plot points at every single interval with a blue marker to mark the quarter inches. If a point is already marked with a whole or half inch, plot the new, blue point above the black or red point. Then plot every quarter inch between the half inches on your strip. Do not have students label every quarter inch on the strip since the spaces are too small.

Place the paper strip under a ruler to verify the accuracy of the paper strip's measurements.

T: What three units of measurement did we partition our paper strip into?

S: Whole inches, half inches, and quarter inches.

T: Point to 2 inches on your paper strip.

S: (Point.)

T: Show your partner 1 half inch less than 2 inches on your ruler.

S: (Show.)

T: What is 1 half inch less than 2 inches?

Creating the number line

Measuring inches

Measuring half-inches

Measuring quarter-inches

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Scaffold student partitioning and measuring of the paper strip with the following options:

- Instruct how to align the zero points of the ruler and the strip step by step.
- Decrease the number of steps by pre-numbering the number line or pre-marking inches.
- Use color. Highlight every fourth line of the grid, or lightly shade every other 4 lines.
- Make the inch lines tactile with glue or Wikki Stix to help students with low vision or perceptual difficulties. Because the surface of the grid will be bumpy, have students label numbers once the strip is off the

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S: $1\frac{1}{2}$ inches.

T: Show $3\frac{1}{4}$ inches.

S: (Show.)

T: Show your partner 1 and a quarter inch more than $3\frac{1}{4}$ inches

S: (Show.)

T: What is 1 and a quarter inch more than $3\frac{1}{4}$ inches?

S: $4\frac{1}{2}$ inches.

Continue the process as needed with $\frac{1}{2}$ inch less than 4 inches, $\frac{1}{4}$ inch more than $1\frac{1}{4}$ inches, $\frac{1}{4}$ inch less than 2 inches, $\frac{3}{4}$ inch more than 3 inches and, $\frac{3}{4}$ inch less than 3 inches.

T: How many half inches are in 1 inch?

S: 2 half inches.

T: How many quarter inches are in 1 inch?

S: 4 quarter inches.

T: How many quarter inches are in a half inch?

S: 2 quarter inches.

T: How many quarter inches in 3 inches?

S: 12 quarter inches.

Problem 2: Generate measurement data.

Pass out the Problem Set and 1 pre-cut straw to each student.

T: On Problem 1 of your Problem Set, use your yellow strip to measure your straw to the nearest inch, half inch, and quarter inch. What do you do if your measurement is not exact?

S: We have to estimate.

T: When you estimate ask yourself, "Is it more than halfway or less than halfway?" After measuring the straw you have, measure six of your classmates' straws and write down their measurements in the chart on your Problem Set.
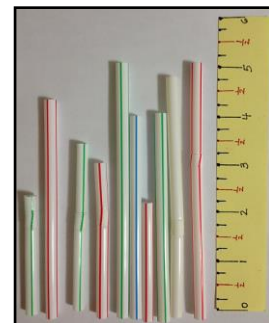
Note: These rulers will also be used in G3—M6—Lessons 6—7.

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6.B.6

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: Create ruler with 1-inch, 1/2-inch, and 1/4-inch intervals and generate measurement data.

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.

- Look at your data for Problem 1. Did you notice a pattern?
- Share your answer for Problem 1(c).
- Have students share their thinking for Problem 2(c). If time permits, have a few students measure an object larger than 6 inches (with their paper strip) using the method they describe.
- Share your answer to Problem 3. What number sentence could you use to find the answer?
- How did using the lined paper help you partition your paper strip accurately?
- Each paper strip measured 6 inches, so our measurements were easy to mark. What if the strips were 8 inches instead? How would you partition the number line?

NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:

Support English language learners as they write their responses on the Problem Set. Allow students to discuss their thoughts in their language of choice before writing. Provide sentence starters and a word bank.

Sentence starters may include:

- One half inch is the same as….
- It's best to use the quarter-inch ruler to measure because….

Possible words for the word bank may include the following:

exact   estimate   accurate

precise   measure

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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.

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6.B.8

Name _____   Date _____

1.   Use the ruler you made to measure different classmates' straws to the nearest inch, $\frac{1}{2}$ inch,

and $\frac{1}{4}$ inch. Record the measurements in the chart below. Draw a star next to measurements that are
exact.

Straw Owner	Measured to the nearest inch	Measured to the nearest $\frac{1}{2}$ inch	Measured to the nearest $\frac{1}{4}$ inch
My straw			

a.   _____'s straw is the shortest straw I measured. It measures _____ inches.

b.   _____'s straw is the longest straw I measured. It measures _____ inches.

c.   Choose the straw from your chart that was most accurately measured with the $\frac{1}{4}$ inch ruler. How do

you know the $\frac{1}{4}$ inch ruler is the most accurate for measuring this straw?

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6.B.10

2.   Jenna marks a 5-inch paper strip into equal parts as shown below.

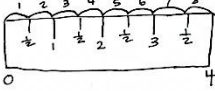a. Label the whole and half inches on the paper strip.

b. Estimate to draw the $\frac{1}{4}$ inch marks on the paper strip. Then fill in the blanks below.

       1 whole inch is equal to _____ half inches.

       1 whole inch is equal to _____ quarter inches.

       $\frac{1}{2}$ inch is equal to _____ quarter inches.

c. Describe how Jenna could use this paper strip to measure an object that is longer than 5 inches.

3.   Sari says her pencil measures 8 half inches. Bart disagrees and says it measures 4 inches. Explain to Bart why the two measurements are the same in the space below. Use words, pictures, or numbers.

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Name _____   Date _____

1.   Davon marks a 4-inch paper strip into equal parts as shown below.

a. Label the whole and quarter inches on the paper strip.

b. Davon tells his teacher that his paper strip measures 4 inches. Sandra says it measures 16 quarter inches. Explain how the two measurements are the same. Use words, pictures, or numbers.

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Name _____   Date _____

1.   Travis measured 5 different color pencils to the nearest inch, $\frac{1}{2}$ inch, and $\frac{1}{4}$ inch. He records the measurements in the chart below. He draws a star next to measurements that are exact.

Color Pencil	Measured to the nearest inch	Measured to the nearest $\frac{1}{2}$ inch	Measured to the nearest $\frac{1}{4}$ inch
Red	7	$6\frac{1}{2}$	$6\frac{3}{4}$
Blue	5	5	$5\frac{1}{4}$
Yellow	6	$5\frac{1}{2}$ ☆	$5\frac{1}{2}$ ☆
Purple	5	$4\frac{1}{2}$	$4\frac{3}{4}$
Green	2	3	$1\frac{3}{4}$

a.   Which color pencil is the longest? _____

   It measures _____ inches.

b.   Look carefully at Travis' data. What color pencil most likely needs to be measured again? Explain how you know.

2.   Evelyn marks a 4-inch paper strip into equal parts as shown below.
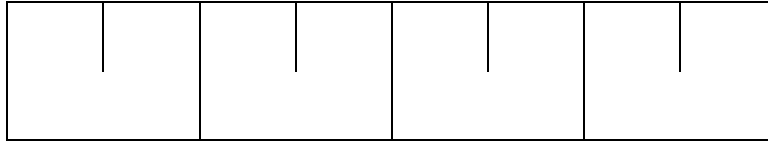
a.   Label the whole and half inches on the paper strip.

b.   Estimate to draw the $\frac{1}{4}$ inch marks on the paper strip. Then fill in the blanks below.

1 whole inch is equal to _____ half inches.

1 whole inch is equal to _____ quarter inches.

$\frac{1}{2}$ inch is equal to _____ quarter inches.

$\frac{2}{4}$ inch is equal to _____half inch.

3.   Travis says his yellow pencil measures $5\frac{1}{2}$ inches. Ralph says that's the same has 11 half inches. Explain how they are both correct.

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6.B.14

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6.B.15

Lesson 5: Create ruler with 1-inch, 1/2-inch, and 1/4-inch intervals and generate measurement data.
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6.B.16