Next Steps and Instructional Moves

The intended purpose of this document is to provide teachers with a tool to determine student understanding and suggest instructional moves that may help guide a student forward in their learning of a particular concept or standard. This guide is not an exhaustive list of strategies.

Fifth Grade: Cluster 4
Number and Operation Base Ten/
Understanding Place Value in the Context of Metric Measurement

NC.5.NBT.1 Explain the patterns in the place value system from one million to the thousandths place.

- Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- Explain patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100.

NC.5.NBT.3 Read, write, and compare decimals to thousandths.

- Write decimals using base-ten numerals, number names, and expanded form.
- Compare two decimals to thousandths based on the value of the digits in each place, using >, =, and < symbols to record the results of comparisons.

NC.5.MD.2 Represent and interpret data.

- Collect data by asking a question that yields data that changes over time.
- Make and interpret a representation of data using a line graph.
- Determine whether a survey question will yield categorical or numerical data, or data that changes over time.

Not Yet

Students that are consistently scoring "Not Yet" are unable to explain the magnitude of digits in a whole number or decimal. Further students may not be able to write numbers in the various forms required or have a strategy to compare two decimals.

Next Steps:

For students struggling with the magnitude of digits in a number (NC.5.NBT.1) or writing numbers in expanded form (NC.5.NBT.3):

- Begin by providing tasks that require students to write a whole number in expanded form:
  Example: 6,582 can be written in:
  expanded form: 6,000 + 500 + 80 + 2 or as
  expanded notation: 6 x 1,000 + 5 x 100 + 8 x 10 + 2
- Provide students with tasks that focus on the digit and value of numbers. For example: Use the table below. Remove the answers in the value column. Ask students to determine value of each underlined digit and justify the reasoning.

Digit	Value
2<u>2</u>22.22	200
22<u>2</u>2.22	20
222<u>2</u>.22	2
2222.<u>2</u>2	.2 or 2/10
2222.2<u>2</u>	.02 or 2/100

Next Steps and Instructional Moves

- Discuss with students how they can determine the magnitude of a number after writing a number in expanded form or expanded notation. Students in the "Not Yet" category are not ready to start relating the value of the various digits of a number and should work on representing numbers in expanded form and expanded notation.
- Provide opportunities for student to notice and wonder using the table below. Pose probing questions like "What patterns do you see in the table below?"

Expanded Form	Product
5 x 1	5
5 x 10	50
5 x 10 x 10	500
5 x 10 x 10 x 10	5000

For students struggling with explaining patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100 (NC.5.NBT.1):

- Provide students with a calculator. Encourage students to explore patterns in multiplying a number such as 33.33 by 1,000, then 100, then 10. Have students record the results and observe a pattern in the placement of the decimal point for each product. Ask students to justify the pattern they see.
- Encourage students to make meaning of multiplying by 10, 100, and 1000 by providing hands-on experiences. Provide students a kitchen scale. Ask them to weigh one jelly bean, marshmallow or pasta noodle. Ask them to weigh 10 of those objects. Repeat this process several times until students can begin to predict the weight of 10 or 100 of their objects without using the kitchen scale. Prompt them to justify their reasoning with an exit ticket.

1 noodle
2.5 g

10 noodles
25 g

- Have students draw a chart and discuss the relationship between the values of digits. Have them justify the pattern they notice as they move from left to right within the chart. Ask probing questions such as "What happens to the decimal point as your change place values moving from left to right?"

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths
5	5	5	5	5	5
5,000	500	50	5	.5	.05

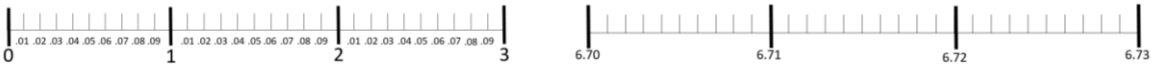
5,000 ÷ 10 | 500 ÷ 10 | 50 ÷ 10 | 5 ÷ 10 | .5 ÷ 10

- Building Powers of Ten lessons will support students in their conceptual understanding.

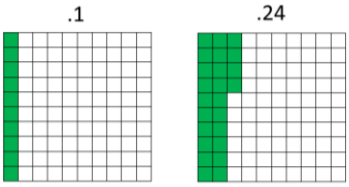
Next Steps and Instructional Moves

For students having trouble representing, writing, and comparing two decimals (NC.5.NBT.3):

- Encourage students to use a number line to represent and compare decimals. This allows the students to visualize the placement of the decimals using a tool they have prior experience with. Special number lines are easy to create. Just make a single row table. Eliminate the top border and you will have a number line that is easy to label for student use.



- Provide students with 10x10 grids where the whole grid equals 1 and have students shade grids to represent decimals. Discuss with students that since the whole grid has 100 equal squares then each square is 0.01 and since the whole grid has 10 rows and 10 columns an entire row or column is 0.1.

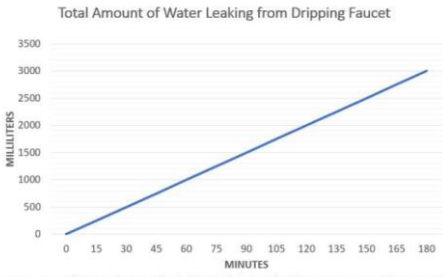


- Decimal Comparison Clues lesson will support students struggling with decimal comparison.

For students having trouble collecting data by asking a question that yields data that changes over time and making and interpreting a representation of data using a line graph (NC.5.MD.2):

- Provide students with measurement data that changes over time in decimal form. Examples include water dripping from a faucet (ml), rain totals (ml), kilometers run in a week, or kilograms of food fed to an elephant daily. In cluster 4, students are revisiting the graphing skills of Cluster 1 and extending their knowledge by graphing with metric measurement.

Kelly's faucet was dripping water. She used a beaker to save and record the amount of water lost every 15 minutes. She recorded the total amount of water lost in the line graph below.



How many more liters of water had dripped from the faucet by 180 minutes than had dripped after 60 minutes?

Next Steps and Instructional Moves

Progressing

Students that are consistently scoring "Progressing" may be unable to explain the pattern in place value but may be able to discern value of digits. Further, students may not be able to write numbers in the various forms required or have a strategy to compare two decimals. They should be able to graph data over time yet need support extending this to metric measurement.

Next Steps:

For students struggling with the magnitude of digits in a number (NC.5.NBT.1) or writing numbers in expanded form (NC.5.NBT.3):

- Begin by providing tasks that require students to write a decimal in expanded form:
  Example: 453.45 can be written in:
  expanded form: 400 + 50 + 3 + .4 + .05 or as
  expanded notation: (4 x 100) + (5 x 10) + (3 x 1) + (4 x 1/10) + (5 x 1/100)
- Provide students with tasks that focus on digit and value of numbers. For example: Use the table below. Remove the answers in the digit or value column. Ask students to determine digit or value and justify the reasoning.

Digit	Value
2222.22	200
2222.22	20
2222.22	2
2222.22	.2 or 2/10
2222.22	.02 or 2/100

- Discuss with students how the magnitude numbers relate to one another. For example: 837.72 is a great number for students to discuss. Pose the question, "What is the place value relationship between the two 7s in the number 837.72?"
- Provide opportunities for student to notice and wonder using the table below. Pose probing questions like "What patterns do you see in the table below?"

Expanded Form	Product
5 x 1	5
5 x 10	50
5 x 10 x 10	500
5 x 10 x 10 x 10	5000

For students struggling with explaining patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100 (NC.5.NBT.1):

- Encourage students to make meaning of multiplying by 10, 100, and 1000 by providing hands-on experiences. Provide students a kitchen scale. Ask them to weigh one jelly bean, marshmallow or pasta noodle. Ask them to weigh 10 of those objects. Repeat this process several times until students can begin to predict the weight of 10 or 100 of their objects without using the kitchen scale. Prompt them to justify their reasoning with an exit ticket.

1 noodle
2.5 g

10 noodles
25 g

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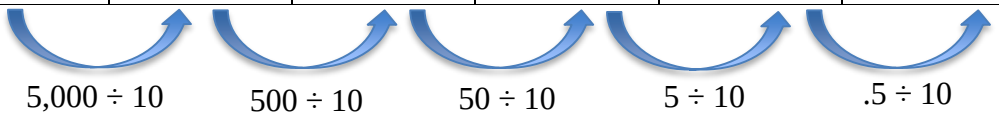
- Have students draw a chart and discuss the relationship between the values of digits. Have them justify the pattern they notice as they move from left to right in the chart. Ask probing questions such as "What happens to the decimal point as your change place values moving from left to right?"

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths
5	5	5	5	5	5
5,000	500	50	5	.5	.05



- Building Powers of Ten I and II lessons will support students in their conceptual understanding.

For students having trouble representing, writing, and comparing two decimals (NC.5.NBT.3):

- Encourage students to use a number line to represent and compare decimals. This allows the students to visualize the placement of the decimals using a tool they have prior experience with. Special number lines are easy to create. Just make a single row table. Eliminate the top border and you will have a number line that is easy to label for student use.

- Pose questions and play games that encourage students to compare decimals. For example: Which decimal is larger? 2,543.56 or 2,563.56 Justify your thinking.
- Activity: Ask students to roll 5 dice at once. Students will partner and create a decimal value. Students will then compare their decimals to determine which student created the largest or smallest number. The strategy involved in this game allows students to think critically about placement of numbers and the decimal.
- Decimal Comparison Clues lesson will support students struggling with decimal comparison.

For students having trouble collecting data by asking a question that yields data that changes over time and making and interpreting a representation of data using a line graph (NC.5.MD.2):

- Provide students with measurement data that changes over time in decimal form. Examples include water dripping from a faucet (ml), rain totals (ml), kilometers run in a week, or kilograms of food fed to an elephant daily. In cluster 4, students are revisiting the graphing skills of Cluster 1 and extending their knowledge by graphing with metric measurement.

Next Steps and Instructional Moves

Meets Expectation	**Students that are consistently scoring "Meets Expectation" have a good understanding of the patterns in the place value system from one million to the thousandths place. They have a strong understanding of patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100. They can read, write, and compare decimals to thousandths. They are able to collect data by asking a question that yields data that changes over time and make and interpret a representation of data using a line graph.**

Next Steps:

For students showing mastery with the magnitude of digits in a number (NC.5.NBT.1) or writing numbers in expanded form (NC.5.NBT.3):

- Veronica's Statement is a great formative assessment task that encourages students to justify the pattern of zeroes and decimal placement when multiplying or dividing by 10.

For students who demonstrate understanding with explaining patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100 (NC.5.NBT.1):

- We recommend for students who have met this standard to maintain related skills during the year and spend time on other standards

For students showing mastery of representing, writing, and comparing two decimals (NC.5.NBT.3):

- Maintain this standard using Check for Understanding tasks from the NCDPI unpacking.

The table below shows the results of the Men's 100 Meter Freestyle Final at the London 2012 Olympics.

Country	Time (in seconds)
Australia	45.53
Brazil	47.92
Canada	47.8
Cuba	48.04
France	47.84
Netherlands	47.88
Russia	48.44
United States	47.52

Mackenzie said that if Michael Phelps had swum this race with a time of 48.5 seconds, he would have gotten the gold medal. What misconception does Mackenzie have? Explain.

Using the times above, write 5 expressions comparing the various times. Use symbols for greater than or less than in your expressions. Write a sentence to go with each expression.

For students demonstrating mastery of collecting data by asking a question that yields data that changes over time and making and interpreting a representation of data using a line graph (NC.5.MD.2):

- Provide students with measurement data that changes over time in decimal form. Examples include water dripping from a faucet (ml), rain totals (ml), kilometers run in a week, or kilograms of food fed to an elephant daily. In cluster 4, students are revisiting the graphing skills of Cluster 1 and extending their knowledge by graphing with metric measurement.