

Eureka Remediation Tool: Grade 8

Module 1, Topic B

To become mathematically proficient, students **must** access on-grade-level content. This document aims to help teachers who use the Eureka curriculum to target remediation for students needing extra support before and **during** approaching on-grade-level work, creating opportunities for on-time remediation directly connected to the new learning.

About this Topic

Focus Standards:

8.EE.A.3: Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9 , and determine that the world population is more than 20 times larger.*

8.EE.A.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Topic Overview per the Eureka Curriculum

In Topic B, students' understanding of integer exponents is expanded to include the concept of magnitude as a measurement. Students learn to estimate how big or how small a number is using magnitude. In Lesson 7, students learn that positive powers of 10 are large numbers and negative powers of 10 are very small numbers. In Lesson 8, students express large numbers in the form of a single digit times a positive power of 10 and express how many times as much one of these numbers is compared to another. Students estimate and compare national to household debt and use estimates of the number of stars in the universe to compare with the number of stars an average human can see.

Lessons 9–13 immerse students in scientific notation. Each lesson demonstrates the need for such a notation and then how to compare and compute with numbers in scientific notation. In Lesson 9, students learn how to write numbers in scientific notation and the importance of the exponent with respect to magnitude. The number line is used to illustrate different magnitudes of 10, and students estimate where a particular number, written in scientific notation, belongs on the number line. Also, in this set of lessons, students use what they know about exponential notation, properties of exponents, and scientific notation to interpret results that have been generated by technology.

Continuing with magnitude, Lesson 10 shows students how to operate with numbers in scientific notation by making numbers have the same magnitude. In Lessons 11–13, students reason quantitatively with scientific notation to understand several instances of how the notation is used in science. For example, students compare masses of protons and electrons written in scientific notation and then compute how many times heavier one is than the other by using their knowledge of ratio and properties of exponents. Students use the population of California and their knowledge of proportions to estimate the population of the U.S. assuming population density is the same. Students calculate the average lifetime of subatomic particles and rewrite very small quantities (e.g., 1.6×10^{-27} kg) in a power-of-ten unit of kilograms that supports easier comparisons of the mass.

It is the direct relationship to science in Lesson 12 that provides an opportunity for students to understand why certain units were developed, like the gigaelectronvolt. Given a list of very large numbers, students choose a unit of appropriate size and then rewrite numbers in the new unit to make comparisons easier. In Lesson 13, students combine all the skills of Module 1 as they compare numbers written in scientific notation by rewriting the given numbers as numbers with the same magnitude, using the properties of exponents. By the end of this topic, students are able to compare and perform operations on numbers given in both decimal and scientific notation.

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Overview

Eureka Remediation Tools include:

1. a diagnostic assessment to help teachers determine the misunderstandings or gaps in mathematical knowledge related to a specific Topic in the Eureka curriculum
2. guidance for teachers to analyze student work on the diagnostic assessment
3. suggested materials for targeted remedial instruction

Note: The use of this guidance is not intended to delay students' engagement with on-grade-level learning. On-grade-level learning should be the focus of instructional time and be treated as an opportunity for students to "finish" learning previous skills and deepen conceptual understanding.

Diagnostic Assessment

The diagnostic assessment is designed to be administered to targeted students prior to beginning instruction on the given Topic. When appropriate, it is broken into parts (Part A, Part B, and so on); each part addresses a different prerequisite standard and contains three problems. If a student correctly answers at least 2 out of the 3 problems, it can be assumed that he/she is ready to engage with the new content of the Topic with little to no support needed prior to engaging with the Topic. The diagnostic assessment is designed in this way so that teachers can determine the "entry point" to remedial instruction and/or opportunities for unfinished learning within the context of the new learning. The entry points and opportunities for unfinished learning will vary between students.

Guidance for Remediation

The Remediation Guidance is designed for teacher use. It is also broken into parts (Part A, Part B, and so on) and correlates to the parts on the diagnostic assessment. Each part contains the following:

1. **The focus standard:** The focus standards are strategically chosen to address prerequisite skills and are purposefully arranged in the order that students typically master the skills and knowledge.
2. **Why this is important for current grade level work:** This section describes how the work of the prerequisite standard relates to the standard(s) addressed in the Topic of instruction.
3. **Using the diagnostic assessment to identify gaps:** This section identifies common errors students make on the diagnostic assessment items.
4. **Remediation Resources for Targeted Instruction:** The resources pinpoint specific Eureka lessons and parts of lessons for teachers to use to address gaps in mathematical knowledge. Using Eureka materials to address remediation ensures alignment to the standards, consistency in approach to learning, and similarities in strategies for solving problems.

Diagnostic Assessment: Grade 8 Eureka Module 1, Topic B

Part A: 4.OA.A.2:

1. A grocery store sold 250 pounds of fruit in May. This is 5 times more than it sold in January. How many pounds of fruit did the grocery store sell in January? Show your work and/or explain your answer.
2. Jackie has 120 apps on her phone, which is 6 times as many as her younger sister. How many apps does Jackie's younger sister have? Show your work and/or explain your answer.
3. At a local zoo, Alex saw a bear that was 12 feet tall. Next to the bears, he saw a monkey that was 3 feet tall. How many times shorter was the monkey than the bear? Show your work and/or explain your answer.

Part B: 5.NBT.A.2:

4. Which power of 10 is equivalent to 1000?
5. Fill the blank with the power of 10 that makes the following equation true: $90 \times \underline{\hspace{1cm}} = 9,000$
6. Evaluate: 5.08×10^5

Part C: 7.EE.B.3:

7. Abe was taking his 8-year-old brother to an amusement park. The cost of Abe's ticket was \$32.75, and tickets for children age 12 and under was $\frac{4}{5}$ of that price. How much did Abe have to pay to get himself and his little brother into the park? Show your work and/or explain your answer.

Diagnostic Assessment: Grade 8 Eureka Module 1, Topic B

8. Becca earns \$10.50 per hour working at a restaurant. Last Friday, she spent $1\frac{3}{4}$ hours cleaning, $2\frac{1}{3}$ hours doing paperwork, and $1\frac{5}{12}$ hours serving customers. What were Becca's earnings for that day? Show your work and/or explain your answer.
9. Evie is saving to buy herself a new computer that costs \$549. Evie currently has \$35.60 saved. Evie's dad agrees to give her 10 times the amount of money she currently has as a reward for making good grades. How much money does Evie still need to cover the cost of the bike plus the 10% sales tax? Show your work and/or explain your answer.

Diagnostic Assessment Key: Grade 8 Eureka Module 1, Topic B

Solutions:

1. 50
2. 20
3. 4 times
4. 10^3
5. 10^2
6. 508,000
7. \$58.95
8. \$57.75
9. \$212.30

Remediation Guidance: Grade 8 Eureka Module 1, Topic B

Part A Focus: 4.OA.A.2: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison (Example: 6 times as many vs. 6 more than).

<p>Why this is important for current grade level work: Beginning in Lesson 8, students will use multiplicative comparison to compare quantities of various sizes. Since the term “quantity” requires units, majority of the problems used in the topic will be considered word problems. The problems in this section will help the teacher determine which students are comfortable with multiplicative comparison and using it to solve real-world problems. Students can engage with Lesson 7 without being proficient with this standard, but such students will likely need additional supports prior to and/or during Lesson 8 and beyond.</p>			<p>Remediation Resources for Targeted Instruction: <u>4th Grade, Module 5, Topic G, Lesson 39</u> Use the Concept Development portion of the Lesson and a sampling of problems from the Problem Set.</p>
<p>Using the Diagnostic Assessment to identify gaps:</p>			
<p>Problem 1: Look for students who subtract five instead of dividing by five as this shows a misconception in distinguishing multiplicative comparison from additive comparison.</p>	<p>Problem 2: A student who multiplies to solve the problem instead of dividing can still be considered ready for the target standard as he/she has demonstrated the ability to distinguish multiplicative comparison from additive comparison.</p>	<p>Problem 3: This problem most mirrors the type of work students will see during the target topic as they will be creating their own comparisons between quantities. Look for students who fail to use a multiplicative comparison and instead uses an additive comparison.</p>	

Remediation Guidance: Grade 8 Eureka Module 1, Topic B

Part B Focus: 5.NBT.A.2: Explain and apply patterns in the number of zeros of the product when multiplying a number by powers of 10. Explain and apply patterns in the values of the digits in the product or the quotient, when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. *For example, $10^0 = 1$, $10^1 = 10$... and $2.1 \times 10^2 = 210$.*

<p>Why this is important for current grade level work: While the first two lessons in the target topic leverage students' understanding of exponents and powers of 10 to explore various quantities, Lesson 9 provides students' with their first explicit exposure to scientific notation. Mastery of this 5th Grade standard will directly impact students' ability to engage with scientific notation. It is imperative that students have a firm understanding of what happens when you multiply or divide by powers of 10 and also a firm understanding of the language used (i.e., powers of 10). The problems in this section use the correct precise mathematical language that will be necessary for the grade-level work.</p>			<p>Remediation Resources for Targeted Instruction:</p> <p><u>5th Grade, Module 2, Topic A, Lesson 1</u></p> <p>Use the Concept Development portion of the Lesson and a sampling of problems from the Problem Set focused on conceptual understanding.</p>		
<p>Using the Diagnostic Assessment to identify gaps:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top;"> <p>Problem 4: Look for students who cannot engage with the language in this item. Such a gap in language should be filled prior to engaging in the grade-level work.</p> </td> <td style="width: 33%; vertical-align: top;"> <p>Problem 5: A student whose answer is 100 instead of 10^2 may still be considered ready for the target standard as he/she has demonstrated understanding of what happens when you multiply by a power of 10.</p> </td> <td style="width: 33%; vertical-align: top;"> <p>Problem 6: Look for students who simply put five zeros behind the 8 (e.g., 50,800,000) as this shows a misunderstanding of how to multiply by powers of 10, likely due to a trick they learned. Expanding the power of 10 and possibly utilizing a place value chart should prove beneficial in addressing the misconception.</p> </td> </tr> </table>				<p>Problem 4: Look for students who cannot engage with the language in this item. Such a gap in language should be filled prior to engaging in the grade-level work.</p>	<p>Problem 5: A student whose answer is 100 instead of 10^2 may still be considered ready for the target standard as he/she has demonstrated understanding of what happens when you multiply by a power of 10.</p>
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Part C Focus: 7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*

<p>Why this is important for current grade level work: Beginning in Leeson 9 and continuing throughout the remainder of the topic, students will be working with numbers in scientific notation and solving problems involving numbers in various forms. These problems require students to work with numbers in various forms, forcing students to choose with which form they feel most comfortable working. While these problems can be worked in multiple ways, the target topic will require students to solve problems in which both decimal for and scientific notation is used. These problems will help teachers identify which students are comfortable working with numbers in different forms and which students are fluent in converting between various forms.</p>			<p>Remediation Resources for Targeted Instruction: <u>7th Grade, Module 3, Topic B, Lesson(s) 7 - 9</u> Use the Classwork portion of each Lesson and a sampling of problems from the Problem Set focused on application.</p>	
<p>Using the Diagnostic Assessment to identify gaps:</p>				
<p>Problem 7: Look for students who only calculate the cost of the younger brother’s ticket, not finding the total cost. Such students may need additional supports when engaging with multi-step, real-world problems.</p>	<p>Problem 8: While the target topic does not include many problems with fractions, look for students who incorrectly add the given fractions. This is a skill that all students will need to be successful in this topic and beyond.</p>	<p>Problem 9: Look for students who struggle to handle the multiplicative comparison and/or students who misuse the 10% tax, applying it at the wrong point during their solution method. As previously mentioned, students ability to recognize and use multiplicative comparison is the most important piece of the foundational work for success in the target topic.</p>		