Eureka Remediation Tool: Grade 8
Module 4, Topic A

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 Standard:

8.EE.C.7: Solve linear equations in one variable.

    a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

    b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Topic Overview per the Eureka Curriculum

In Lesson 1, students begin by transcribing written statements into symbolic language. Students learn that before they can write a symbolic statement, they must first define the symbols they intend to use. In Lesson 2, students learn the difference between linear expressions in and nonlinear expressions in x, a distinction that is necessary to know whether or not an equation can be solved (at this point). Also, Lesson 2 contains a quick review of terms related to linear equations, such as *constant*, *term*, and *coefficient*. In Lesson 3, students learn that a linear equation in x is a statement of equality between two linear expressions in x. Students also learn that an equation that contains a variable really is a question: Is there a value of that makes the linear equation true? In Lesson 4, students begin using properties of equality to rewrite linear expressions, specifically using the distributive property to "combine like terms." Further, students practice substituting numbers into equations to determine if a true number sentence is produced.

In Lesson 5, students practice the skills of the first few lessons in a geometric context. Students transcribe written statements about angles and triangles into symbolic language and use properties of equality to begin solving equations (**8.EE.C.7b**). More work on solving equations occurs in Lesson 6, where the equations are more complicated and require more steps to solve (**8.EE.C.7b**). In Lesson 6, students learn that not every linear equation has a solution (**8.EE.C.7a**). This leads to Lesson 7, where students learn that linear equations either have a unique solution, no solution, or infinitely many solutions (**8.EE.C.7a**). In Lesson 8, students rewrite equations that are not obviously linear equations and then solve them (**8.EE.C.7b**). Finally, in Lesson 9, students take another look at the Facebook problem from Module 1 in terms of linear equations (**8.EE.C.7a**).

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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.

Part A: 7.EE.A.1

1. Expand the following expression.

$$5\left(x - \frac{1}{2}\right)$$

2. Perform the indicated operations to create an equivalent expression which contains no like terms.

$$\left(\frac{2}{13}a + 7\right) - \left(12 - \frac{6}{13}a\right) + \left[\frac{4}{13}a + (-9)\right]$$

3. Expand the expression and collect like terms to create an equivalent expression which contains no like terms.

$$\frac{3}{2}(-8 - 4w) - (6w - 12) + \frac{7}{5}$$

Part B: 7.EE.B.4a
Solve each equation and show your work.

4. $\frac{2}{3}m - 7 = 3$

5. $\frac{1}{2}(p + 13) = -5$

6. $-3(6 - k) = -15$

Solutions:

1. $5x - \dfrac{5}{2}$
2. $\dfrac{12}{13}a - 14$
3. $-12w + \dfrac{7}{5}$
4. $m = 15$
5. $p = -23$
6. $k = 1$

Part A Focus: 7.EE.A.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients to include multiple grouping symbols (e.g., parentheses, brackets, and braces).

Why this is important for current grade level work:

Some of the equations students are expected to solve in the target topic require the use of the distributive property and the ability to collect like terms. While students have been applying the distributive property to numerical expressions since 3rd Grade, their work with applying the distributive property to algebraic expressions only began in 6th Grade and was further developed in 7th Grade. Also in the previous two years, students began to explore the concept of equivalent algebraic expression, leading to the concept/skill of combining like terms. The most important look-fors here are the accurate use of the distributive property and the ability to perform arithmetic with rational numbers. While both are incredibly important, depending on the severity of the gap, many students will likely be able to engage with the grade-level work even if gaps exist. Exploring these ideas in the context of solving equations may prove beneficial for addressing some of the existing misconceptions/gaps. The problems scaffold in difficulty/complexity.

Using the Diagnostic Assessment to identify gaps:

Problem 1:

Look for students who only distribute to the first term (i.e., $5x - \frac{1}{2}$) as this shows an incomplete understanding of the distributive property as it applies to algebraic expressions. Also, students who leave their answer as $5x - 5\left(\frac{1}{2}\right)$ may be considered ready for the target standard; although, such students may need additional supports in arithmetic with fractions.

Problem 2:

Look for students who think the variable terms combine to make $0a$ as this shows a mishandling of the subtraction of $-\frac{6}{13}a$. Such students may have an incomplete understanding of the distributive property as it applies to algebraic expressions. While unlikely, look for students who change the power of a when combining like terms. Since this topic is after Module 1 where students engaged with 8.EE.A.1, it is possible that the new grade-level work with exponents has created a misconception concerning combining like terms. Using expansion to help students see the difference in operations should help clear up any such misconception.

Problem 3:

Look for students who distribute the 3/2 across both linear expressions (and possibly to 7/5) as this shows an incomplete understanding of the distributive property as it applies to algebraic expressions. Also, look for students who are unable to see the constant terms from the first two expressions combine to make 0 [i.e., -12 – (-12) = 0] as this either points to a gap in arithmetic or the distributive property.

Remediation Resources for Targeted Instruction:

7th Grade, Module 3, Topic A, Lesson(s) 1-6

Use the Classwork portion of each of the Lessons, aligned to the identified gap in understanding/skill, and a sampling of problems from the Problem Set focused on conceptual understanding and/or procedural skill.

Part B Focus: 7.EE.B.4a: Solve word problems leading to equations of the form $p + q = r$ and $p(p + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*

	Remediation Resources for Targeted Instruction:
Why this is important for current grade level work: The target Topic will build directly from students' ability to fluently solve two-step equations. While being fluent in solving two-step equations is not a true prerequisite for beginning the new grade-level work, it will greatly impact students' ability to engage with and master the new learning. If students are still trying to understand the foundation of solving equations, the equations presented in the target Topic will likely prove to be too challenging for students. The most important look-fors here are the accuracy of the students' method and their answer, with the method being a better sign of readiness. The problems scaffold in difficulty.	[7th Grade, Module 2, Topic C, Lesson(s) 17, 22-23](#) Use the Classwork portion from each of the Lessons and a sampling of problems from the Problem Set focused on conceptual understanding and/or procedural skill and fluency.

Using the Diagnostic Assessment to identify gaps:

Problem 4:	**Problem 5:**	**Problem 6:**
Look for students who do not recognize adding 7 to both sides as the most appropriate first step. Also, look for students who incorrectly handle the fractional coefficient. While this does not show a gap in understanding of solving equations, it does show a place where such a student may need additional supports while engaging with the grade-level content.	Look for students who distribute the ½ as opposed to dividing both sides by ½ (or multiplying both sides by its reciprocal, 2) as this shows the student does not fully understand how the equation was built. Such a student likely has only a procedural knowledge for solving equations and may not be fully equipped to engage with the complex equations of the target Topic.	Look for students who leave their answer as $-k = -1$, not realizing that this is not an acceptable answer. Or, worse, look for students who think the answer is -1 simply because they were unsure of how to handle the negative sign in front of the variable. Both show a gap in the students' understanding of solving equations that will require additional supports while engaging with the target Topic.