Eureka Acceleration Tool: Grade 4
Module 3, Topic C

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

About this Topic

Focus Standards:
4.NBT.B.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Note to Louisiana Teachers: The **Grade 4** **Louisiana Guides to Implementing Eureka** encourage 4th grade teachers to only teach the lessons regarding the standard algorithm of multiplication as enrichment as time allows. The Louisiana Student Standards for Mathematics do not require that students be introduced to the standard algorithm for multiplication until 5th grade. Therefore, most students entering 4th grade will not have been exposed to the standard algorithm and are not expected to have mastered the standard algorithm by the end of Grade 4.

Topic Overview per the Eureka Curriculum

Building on their work in Topic B, students begin in Topic C decomposing numbers into base ten units in order to find products of single-digit by multi-digit numbers. Students practice multiplying by using models before being introduced to the standard algorithm. Throughout the topic, students practice multiplication in the context of word problems, including multiplicative comparison problems.

In Lessons 7 and 8, students use place value disks to represent the multiplication of two-, three-, and four-digit numbers by a one-digit whole number.

Lessons 9 and 10 move students to the abstract level as they multiply three- and four-digit numbers by one-digit numbers using the standard algorithm.

Finally, in Lesson 11, partial products, the standard algorithm, and the area model are compared and connected via the distributive property (**4.NBT.5**).

Overview

Eureka Acceleration 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 Acceleration

The Acceleration 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. **Acceleration 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 acceleration ensures alignment to the standards, consistency in approach to learning, and similarities in strategies for solving problems.

Diagnostic Assessment: Grade 4
Eureka Module 3, Topic C

Part A: 3.NBT.A.2

1. Find the sum of 400, 80, and 4. Show your work and/or explain your thinking.

2. Find the sum of 900, 630, and 45. Show your work and/or explain your thinking.

3. Find the sum of 14000, 2100, 280, and 35. Show your work and/or explain your thinking.

Part B: 3.NBT.A.3

4. 3 x 60 = ? Show your work and/or explain your thinking.

5. 5 x 80 = ? Show your work and/or explain your thinking.

6. 8 x 20 = ? Show your work and/or explain your thinking

Part C: 3.OA.B.5

7. Is 6 x 5 equal to 5 x 6? Why or why not? Show your work and/or explain your thinking.

8. Is 3 x (5 x 2) equal to (3 x 5) x 2? Why or why not? Show your work and/or explain your thinking.

9. Is 7 x 8 equal to (7 x 3) + (7 x 5)? Why or why not? Show your work and/or explain your thinking.

Part D: 3.OA.C.7

10. Administer Sprint from 3rd Grade Module 3, Lesson 1. Be sure to follow the administration guidance provided by Eureka.

Solutions:

1. 484
2. 1,575
3. 16,415
4. 180
5. 400
6. 160
7. Yes. Explanations will vary.
8. Yes. Explanations will vary.
9. Yes. Explanations will vary.
10. See 3rd Grade Module 3, Lesson 1 Sprint

Part A Focus: 3.NBT.A.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Why this is important for current grade level work: In the target Topic, students will be expected to multiply up to four-digit numbers by one-digit whole numbers. Most, if not all, of the multiplication problems in this Topic will require students to add two, three, or four individual products to find the product of the two given numbers. Being able to add fluently will allow students to focus more on the multiplication, the target operation. The problems were all generated from multiplying a number with up to four digits by a one-digit number to ensure alignment to the expected grade-level work. The most important look-fors here are the accuracy of the answer and the efficiency of the strategy. The problems scaffold in difficulty.	**Acceleration Resources for Targeted Instruction:** <u>3rd Grade, Module 2, Topic D, Lesson(s) 15 – 16</u> Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding and procedural skill and fluency.
Using the Diagnostic Assessment to identify gaps: **Problems 1-3:** Look for students who fail to add according to place value, i.e., add ones to ones and tens to tens. Also, students may struggle adding three or four addends, not knowing where to start. Encourage them to work with a single place value at a time, beginning with the ones and moving towards the thousands. A place value chart may prove beneficial for such students.	

Part B Focus: 3.NBT.A.3 Multiply one-digit whole numbers by multiples of 10 in the range 10 – 90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Why this is important for current grade level work: Before multiplying three and four digit numbers by single-digit numbers, students must be able to multiply 2 digit numbers by single-digit numbers, e.g., 26 x 5. Students must understand that 26 x 5 is the same as (6 x 5) + (20 x 5); therefore, students must be able to multiply one-digit whole numbers by multiples of 10 fluently. The most important look-fors here are the accuracy of the answer and the efficiency of the strategy.	**Acceleration Resources for Targeted Instruction:** <u>3rd Grade, Module 3, Topic F, Lesson(s) 19 – 20</u> Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding and procedural skill and fluency.
Using the Diagnostic Assessment to identify gaps: **Problems 4 – 6:** Students may use repeated addition to solve these problem (e.g., 3 groups of 60 or 60 + 60 + 60) and still be considered ready for the target standard. However, it is important that students become fluent with multiplication within 100, knowing from memory all products of two one-digit numbers (see 3.OA.C.7). This fluency should extend to this standard as well, leading students to be able to compute these products mentally.	

Part C Focus: 3.OA.B.5. Apply properties of operations as strategies to multiply and divide. (Students need not use formal terms for these properties.)
Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property of multiplication.)

Why this is important for current grade level work:
While this standard does not focus on learning the formal vocabulary and definitions of properties of operation, it is important for students to understand the various properties of multiplication. Understanding the properties of multiplication and being able to apply them will aid students in their pursuit of fluency with multiplication. While some students may see these problems as an exercise in arithmetic, the most important look-for here is the student's explanation/thinking.

Using the Diagnostic Assessment to identify gaps:

Problem 7:	**Problem 8:**	**Problem 9:**
Look for students defend their stance by simply saying 30 = 30 and push them to articulate how/why the two products are equal even though they represent different situations (i.e., 5 groups of 6 compared to 6 groups of 5).	Look for students that understand that "grouping" does not affect the outcome when multiplying. Remember that we do not require the mention of the formal terms (i.e., the associative property) but rather understanding the property.	Students may be able to answer correctly that the two expressions are the equal, but look for students who cannot explain see the "breaking apart" of the 8 into 3 and 5.

Acceleration Resources for Targeted Instruction:

3rd Grade, Module 3, Topic A, Lesson(s) 1 – 2

Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding.

Part D Focus: 3.OA.C.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Why this is important for current grade level work: Fluency is equally as important as conceptual understanding; therefore, students should know all products of two one-digit numbers to aid in fluency of more complex multiplication and division problems. Knowing these products from memory frees up students to focus on the new learning of the grade-level work.	**Acceleration Resources for Targeted Instruction:** <u>3rd Grade, Module(s) 1 and 3</u> Use the Concept Development portion rom a selection of Lessons and a sampling of problems from the Problem Set focused on procedural skill and fluency. Choose Lessons based on the factors with which students struggled.
Using the Diagnostic Assessment to identify gaps: **Problem 10:** The Sprint should be administered as directed by Eureka, ensuring a low-pressure setting. Look for students who work efficiently with a high level of accuracy, and look for students who may not "know from memory" these facts and rely on strategies that are not efficient, such as counting on fingers or drawing pictures.	