

Eureka Grade 3- Unit 3

Desired Results

Title of Unit

Module 3- Multiplication and Division with units of 0, 1, 6, 7, 8 and 9

Enduring Understandings

- multiplication and division concepts with an emphasis on units of 6 and 8
- multiplication and division concepts with an emphasis on the unit of 7
- analysis of Patterns Using Units of 9, 0, and 1
- multiplication with multiples of 10 and further application of concepts

Essential Objectives

- Organize, count, and represent a collection of objects.
- Count by units of 6 to multiply and divide by using arrays.
- Count by units of 8 to multiply and divide by using arrays.
- Decompose pictorial arrays to create expressions with three factors.
- Use the break apart and distribute strategy to multiply with units of 6 and 8.
- Use the break apart and distribute strategy to divide with units of 6 and 8.
- Count by units of 7 to multiply and divide by using arrays and tape diagrams.
- Use the break apart and distribute strategy to multiply with units of 7.
- Model the associative property as a strategy to multiply.
- Use parentheses in expressions with different operations.
- Use the break apart and distribute strategy to divide with units of 7.
- Solve one-step word problems involving multiplication and division.
- Count by units of 9 to multiply.
- Apply strategies and identify patterns to multiply with units of 9.
- Reason about and explain patterns of multiplication and division with units of 1 and 0.
- Identify patterns by using the multiplication table.
- Identify and complete patterns with input–output tables.
- Create multiplication and division word problems.
- Solve two-step word problems by using the four operations and assess the reasonableness of solutions.
- Multiply by multiples of 10 by using the place value chart.
- Multiply by multiples of 10 by using place value strategies and the associative property.
- Solve two-step word problems involving multiplication of single-digit factors and multiples of 10.
- Identify patterns and apply strategies to multiply with units of 11 and 12. (Optional)

Guiding Questions (Key Questions)

- How does the size of each group help you count?
- How can multiplication be helpful when counting?
- What strategies can be used to multiply and divide by 6?
- How can a letter be used to represent the unknown?
- What strategies can be used to multiply and divide by 8?
- How do you decide which strategy to use to multiply or divide by 8?
- How can two-factor and three-factor expressions describe the same array?
- How can a three-factor expression help us find the product of a two-factor expression?
- What helps you decide how to break apart a factor?
- When does the break apart and distribute strategy help you multiply?
- How can facts you know help you divide?
- How is a number bond helpful when using the break apart and distribute strategy to divide?
- What are some different strategies that can help you find the answer to multiplication and division facts by using units of 7?
- How do you choose your strategy to find the answer to a multiplication or division problem with 7 as a unit?
- How is using the break apart and distribute strategy to break apart the second factor in an expression similar to using the strategy to break apart the first factor? How is it different?
- How do you decide whether to break apart the first factor or the second factor when using the break apart and distribute strategy?
- How can we decompose two factors into three factors to simplify multiplication?
- How does moving the parentheses in a three-factor multiplication expression affect its product?
- Why are the parentheses important in an expression or equation?
- When we choose numbers for division with the break apart and distribute strategy, what do we need to think about?
- When is break apart and distribute a useful division strategy?
- How can the same problem be solved by using different strategies?
- How is using a letter to represent the unknown helpful when we write equations?
- How do we use tens to help us skip-count by nines?
- How do patterns help us multiply with units of 9?
- How do we use 10 to help us multiply with units of 9?
- How can the number of groups in a nines fact help us find the product?
- How can patterns help us multiply and divide with 1?
- How can patterns help us multiply and divide with 0?
- How do the patterns we discovered for odd and even products help you when you multiply?
- How can the multiplication table help us find the product of factors that are larger than the factors in the table?
- How do input–output tables help you see a pattern?
- How can we use patterns to find more numbers in an input–output table?
- How can a picture and an expression help you create a word problem?
- How do you decide what question to ask in a word problem?
- How can representations of word problems help us estimate?
- How can familiar strategies be used to estimate?
- What makes estimating with a two-step problem different from estimating with a one-step problem?
- How does knowing your multiplication facts help you multiply by multiples of 10?
- How does place value help you multiply tens?
- How can grouping factors help us multiply tens?
- How can place value help us simplify problems?
- How do you decide which model to use when solving a two-step word problem?
- How does thinking about the relationship between the numbers help you solve two-step word problems?
- How can multiplication strategies for one-digit numbers be used for two-digit numbers?
- How can multiplication strategies help explain patterns in the multiples of 11 and 12?
- How does knowing the amount in each package help you decide how to count?
- How can multiplication be helpful when counting?
- When might we need to look for additional information to solve a problem?

- What is important to think about when looking for additional information to solve a problem?

Knowledge

Multiplication and Division Concepts with an Emphasis on Units of 6 and 8

Students begin module 3 with a counting collection of pre grouped objects to apply their understanding of multiplication from module 1 and to provide formative data about their counting strategies.

Throughout the topic, students apply multiplication and division concepts, representations, and strategies from module 1 to the units of 6 and 8. Students see sixes as 2 threes and eights as 2 fours. They use the commutative, distributive, and associative properties to help them multiply and divide. Students advance their representations to more abstract arrays and tape diagrams and begin to use a letter to represent an unknown quantity.

Multiplication and Division Concepts with an Emphasis on the Unit of 7

With a focus on 7 as a factor, students extend their work with the properties of operations and use different strategies to multiply efficiently. They create expressions with known facts to find products and quotients of unfamiliar facts by flexibly applying the distributive property and regrouping factors by using the associative property. Students apply their learning as they solve one-step word problems.

Analysis of Patterns Using Units of 9, 0, and 1

Students explore patterns to identify and apply strategies for multiplying and dividing with 9, 0, and 1. They look for and generalize patterns in the multiplication table and in input–output tables to solve problems. They synthesize their understanding of multiplication with one-digit factors to write their own one-step word problems and assess the reasonableness of solutions to two-step word problems.

Multiplication with Multiples of 10 and Further Application of Concepts

To culminate the module, students use place value models, the properties of operations, and familiar facts to multiply multiples of 10 by one-digit numbers. They apply their learning to solve two-step word problems and share solution strategies. Students revisit the counting collection from topic A, this time applying their new understandings from module 3. Opportunities to extend learning are available with an optional lesson on multiplying and dividing by 11 and 12 and an optional lesson on solving word problems in a multi-part task.

Skills

- 3.Mod1.AD1 Represent a multiplication situation with a model and convert between several representations of multiplication.
- 3.Mod3.AD1 Represent a model with a multiplication situation.
- 3.Mod1.AD2 Represent a division situation with a model and convert between several representations of division.
- 3.Mod3.AD2 Represent a model with a division situation.
- 3.Mod3.AD3 Solve one-step word problems involving multiplication and division within 100, using a letter for the unknown number.
- 3.Mod3.AD4 Determine the unknown number in a multiplication or division equation.
- 3.Mod3.AD5 Apply the distributive property to multiply
- 3.Mod3.AD6 Apply the distributive property to divide.
- 3.Mod3.AD7 Apply the associative property of multiplication.
- 3.Mod1.AD7 Represent and explain division as an unknown factor problem.
- 3.Mod3.AD8 Multiply and divide within 100 fluently, recalling from memory all products of two one-digit numbers.
- 3.Mod3.AD9 Solve two-step word problems. Represent these problems using equations with a letter standing for the unknown. Assess the reasonableness of solutions.
- 3.Mod3.AD10 Identify and extend arithmetic patterns and explain them using properties of operations.
- 3.Mod3.AD11 Multiply one-digit whole numbers by multiples of 10 in the range 10–90 using place value strategies and properties of operations.

Standards -New York Next Generation Standards

MA.NY-3.OA.1 Interpret products of whole numbers.

e.g., Interpret 5×7 as the total number of objects in 5 groups of 7 objects each. Describe a context in which a total number of objects can be expressed as 5×7 .

MA.NY-3.OA.2 Interpret whole-number quotients of whole numbers.

e.g., Interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. Describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.

MA.NY-3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.

e.g., using drawings and equations with a symbol for the unknown number to represent the problem

MA.NY-3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

e.g., Determine the unknown number that makes the equation true in each of the equations: $8 \times ? = 48$, $5 = \underline{\quad} \div 3$, $6 \times 6 = ?$

MA.NY-3.OA.5 Apply properties of operations as strategies to multiply and divide.

Note: Students need not use formal terms for these properties.

MA.NY-3.OA.6 Understand division as an unknown-factor problem.

e.g., Find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.

MA.NY-3.OA.7a Fluently solve single-digit multiplication and related divisions, using strategies such as the relationship between multiplication and division or properties of operations.

e.g., Knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$.

MA.NY-3.OA.7b Know from memory all products of two one-digit numbers.

MA.NY-3.OA.8 Solve two-step word problems posed with whole numbers and having whole-number answers using the four operations.

Note: Two-step problems need not be represented by a single expression or equation.

- **MA.NY-3.OA.8.a** Represent these problems using equations or expressions with a letter standing for the unknown quantity.
- **MA.NY-3.OA.8.b** Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

MA.NY-3.OA.9 Identify and extend arithmetic patterns (including patterns in the addition table or multiplication table).

MA.NY-3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10–90 using strategies based on place value and properties of operations.

e.g., 9×80 , 5×60

Assessment Evidence

ADs and their proficiency indicators support teachers with interpreting student work on

- informal classroom observations,
- data from other lesson-embedded formative assessment,
- Exit Tickets,
- Topic Quizzes, and
- Module Assessments.

Learning Plan

Learning Activities

This section includes activities, experiences, or mini-lessons that students may engage in. Some of them may scaffold learning and others may foster interdisciplinary connections. These should be tied to the standards. Opportunities for intervention or differentiation should be notated here.

Resources

Materials, both printed and electronic from Eureka Math 2 New York