02. Operations and Algebraic Thinking

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **4 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In this unit, students will build their understanding of palce value to develop methods of working with numbers within addition, subtraction, multiplication and division

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Essential Questions:

- How are multiplication and division related?
- How can one use properties as strategies to solve problems?
- How can one use multiplication to help solve division problems?

Enduring Understandings:

- Multiplication and division are inverse operations.
- Using properties can make problems easier.
- The total number of objects when grouped can be found most efficiently by multiplication.
- When two out of three numbers are known in an equation, there is exactly one number, represented by the unknown, which will make the statement true.

CONTENT AREA STANDARDS

3.OA

A. Represent and solve problems involving multiplication and division

B. Understand properties of multiplication and the relationship between multiplication and division

C. Multiply and divide within 100

D. Solve problems involving the four operations, and identify and explain patterns in arithmetic

3.NBT

A. Use place value understanding and properties of operations to perform multi-digit arithmetic

MA.K-12.2	Reason abstractly and quantitatively.
MA.3.OA.A.1	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each.
MA.3.OA.A.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MA.3.OA.A.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers.
MA.3.OA.B.5	Apply properties of operations as strategies to multiply and divide.
MA.K-12.7	Look for and make use of structure.
MA.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.
MA.3.OA.D.8	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MA.3.OA.D.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.
MA.3.NBT.A.1	Use place value understanding to round whole numbers to the nearest 10 or 100.
MA.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.
MA.3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively.
	Presentation of Knowledge and Ideas
CS.K-12.3	Recognizing and Defining Computational Problems
CS.K-12.5	Creating Computational Artifacts
CS.K-12.6	Testing and Refining Computational Artifacts

TECH.9.4.5.CT	Critical Thinking and Problem-solving
TECH.9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
TECH.9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).

STUDENT LEARNING TARGETS

- I can assess the reasonableness of answers using mental computation and estimation strategies including rounding.*Analysis*
- I can apply properties of operations (Commutative, Associative, and Distributive) as strategies to multiply and divide.*Comprehension*
- I can determine the unknown whole number in a multiplication or division equation relating three whole numbers.*Comprehension*
- I can draw a scaled bar graph to represent a data set with several categories.*Comprehension*
- I can draw a scaled picture graph to represent a data set with several categories.*Comprehensio*
- I can explain arithmetic patterns using properties of operations. *Comprehension*
- I can identify arithmetic patterns (including patterns in the addition table or multiplication table).*Comprehension*
- I can interpret products of whole numbers. *Comprehension*
- I can solve one- and two-step how many more and how many less problems using information presented in scaled bar graphs.*Comprehension*
- I can solve two-step word problems using equations with a letter standing for the unknown quantity.*Comprehension*
- I can solve word problems (using multiplication and division within 100) in situations involving equal groups, arrays, and measurement quantities.*Comprehension*
- I can 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.*Retrieval*
- I can know from memory all products of two one-digit numbers (by the end of third grade).*Retrieval*
- I can multiply and divide within 100 fluently. *Retrieval*
- I can use place value understanding to round whole numbers to the nearest 10 or 100.*Retrieval*

Declarative Knowledge

Students will understand that:

- Apply properties of operations (Commutative, Associative and Distributive) as strategies to multiply and divide
- Determine the unknown whole number in a multiplication or division equation relating three whole numbers
- Explain arithmetic patterns using properties of operations
- Identify arithmetic patterns (including patterns in the addition table or multiplication table)
- Interpret products of whole numbers
- Solve one and two step how many more and how many less problems using information presented in

scaled bar graphs
- Solve two step word problems using equations with a letter standing for the unkiwn quantity
- Solve word problems (using multiplication and division within 100) in situations involving equal groups, arrays, and measurement quantities
- 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
- Know from memory all products of two one-digit numbers (by the end of third grade)
- Multiply and divide within 100 fluently

Procedural Knowledge

Students will be able to:

- Assess the reasonableness of answers using mental computation and estimation strategies including rounding
- Draw a scaled bar graph to represent a data set with several categories
- Use palce value understanding to round whole numbers to the nearest 10 or 100

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments, Summative, and Benchmark Assessments' sections.

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

Summative Assessments

- EDM Unit Assessments

- Projects

Formative Assessments

- Journal Pages
- Math Boxes
- Math Talks
- Open Response Activities
- Stdent Friendly Proficiency Scales
- Exit/Entrance Tickets
- Performance Tasks
- Teacher Observations
- Check Lists

Benchmark Assessments

- IXL Screener / Diagnostic Snapshot BOY
- Interim Assessment 1
- IXL Diagnostic Snapshot MOY
- Interim Assessment 2
- IXL Diagnostic Snapshot EOY

RESOURCES (Instructional, Supplemental, Intervention Materials)

- Core Instructional Materials:
    - Everyday Math Unit 3 Resources
        - Math Masters
        - Student Journal Volume 1
        - ConnectED

  Supplemental Materials:

    - IXL
    - Illustrative Math Tasks
    - EM Games

EM Lessons:

- 3.1
- 3.3
- 3.4
- 3.5
- 3.6
- 3.8
- 3.9
- 3.10
- 3.11
- 3.12
- 3.13

INTERDISCIPLINARY CONNECTIONS

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

- Repeat directions
- Provide scaffolds
- Use graphic organizers
- Use wait time
- Provide manipulatives, grid paper
- Provide additional time

See link to Accommodations & Modifications document in course folder.