Unit 2 - Operations and Algebraic Thinking/Measurement & Fractions

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

Unit Overview

Enduring Understandings

Model multiplication problems with pictures, diagrams, or concrete materials.
Solve multiplication problems presented in context.
Use properties of multiplication patterns to multiply within 100.
Reach fluency with finding products of single-digit numbers.
Derive unknown facts from known facts.
Apply multiplication strategies.
Use the Associative and Distributive properties to multiply within 100.
Reach fluency with finding products of single-digit numbers.
Understand multiplication represents the total number of objects in equal groups.
Understand that division can represent equal sharing or equal groups.
The Understanding that area is multiplying length x width and connected to multiplication.
Represent fractions with models (i.e. area model, number line, or set model).
Understand that fractions name a quantity just like whole numbers.
Develop understanding of fractions as numbers.
Interpret the unit fraction 1/b as the quantity formed by 1 of b equal parts of a whole and the fraction a/b as the quantity formed by a part 1/b; e.g., 3-unit fractions of ¼ add to the quantity of ¾.

Essential Questions

How can you use multiplication to find how many in all?
What strategies can you use to find how many in all?
What are the similarities and differences between multiplication and addition?
How can you solve one- and two-step problems?
How can you use arrays to model multiplication and find factors?
How can you use the Commutative Property of Multiplication to find products?
How can you use the Distributive Property to find products?
How can you use the Associative Property of Multiplication to find products?
How can you use properties to explain patterns on the multiplication table?
How can you solve multiplication problems?
How can you use an array or a multiplication table to find an unknown fact or product?
What strategies can you use to multiply?
How can you find the area of a plane figure?
How can you solve area problems?
How can you break apart a figure to find the area?

How can you use fractions to describe how much or how many?
What are equal parts of a whole?
Why do you need to know how to make equal shares?
What information does a numerator and a denominator tell?
How does a fraction name part of a whole or group?
How can you represent and locate fractions on a number line?
When might you use a fraction greater than one or a whole number?

Learning Objectives

Solve one- and two-step multiplication problems.
Use arrays to model products and factors.
Use different strategies to multiply with the factors 0-9.
Use the Distributive Property to find products by breaking apart arrays.
Use the Commutative or Distributive Property or known facts to multiply
Use the Associative Property of Multiplication to multiply with three factors.
Identify and explain patterns on the multiplication table.
Use a variety of strategies to multiply
Solve multiplication problems by using a variety of strategies
Identify and describe a number pattern shown in a function table.
Use an array or a multiplication table to find an unknown factor.
Use base ten blocks, a number line, or place value to multiply with multiples of ten.
Model and record multiplication with multiples of ten.
Apply the Distributive Property to area models and to find the area of combined rectangles.
Explore and identify equal parts of a whole.
Divide models to make equal shares.
Use a fraction to name one part of a whole that is divided into equal parts.
Read, write, and model fractions that represent more than one part of a whole that is divided into equal parts.
Represent and locate fractions on a number line.
Recognize the Commutative, Associative, and Distributive Properties as strategies to multiply whole numbers.
Use multiplication within 100 to solve word problems modeled as equal groups or arrays by writing equations to describe and or represent equal groups or arrays.
Fluently multiply and divide within 100, using the relationship between multiplication and division.
Recognize the Commutative, Associative, and Distributive Properties as strategies to add and multiply whole numbers.
Recognize arithmetic patterns in multiplication tables and explain the patterns using the properties of operations.
Determine the unknown in a multiplication equation with an unknown relating three whole numbers to 100 (does not require students to solve from memory).
Multiply one-digit whole numbers by multiples of 10 (10-90).
Use equal groups and arrays to represent the relationship between multiplication and division.
Find the area of a rectangular array by counting the number of square units and compare that number with the product of the (whole number) side lengths.
Use the area model (with rectangles) to explain the Distributive Property.
Recognize the area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.
Represent the equal parts of shapes as a unit fraction (e.g., a pizza cut into eight equal slices has eight slices and each slice has quantity 1/8 of the whole pizza).

Standards: Content

MATH.3.OA.B.5	Apply properties of operations as strategies to multiply and divide.
MATH.3.OA.C.7	With accuracy and efficiency, 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.
MATH.3.OA.D.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations.
MATH.3.NF.A.1	Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.
MATH.3.NF.A.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.
MATH.3.NF.A.2.a	Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.
MATH.3.NF.A.2.b	Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
MATH.3.NF.A.3	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
MATH.3.NF.A.3.c	Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
MATH.3.M.B	Geometric measurement: understand concepts of area and relate area to multiplication and to addition
MATH.3.M.B.3	Recognize area as an attribute of plane figures and understand concepts of area measurement.
MATH.3.M.B.3.a	A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.
MATH.3.M.B.3.b	A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
MATH.3.M.B.4	Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).
MATH.3.M.B.5	Relate area to the operations of multiplication and addition.
MATH.3.M.B.5.a	Find the area of a rectangle with whole-number side lengths by tiling it and show that the area is the same as would be found by multiplying the side lengths.
MATH.3.M.B.5.b	Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
MATH.3.M.B.5.c	Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.
MATH.3.M.B.5.d	Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying

	this technique to solve real world problems.
MATH.3.G.A.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.

Standards: Interdisciplinary

PFL.9.1.2.PB.1	Determine various ways to save and places in the local community that help people save and accumulate money over time.
PFL.9.1.2.PB.2	Explain why an individual would choose to save money.
CS.3-5.8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
CS.3-5.8.1.5.DA.5	Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
CS.3-5.8.2.5.ED.2	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
CS.3-5.8.2.5.ED.3	Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
CS.3-5.8.2.5.ED.5	Describe how specifications and limitations impact the engineering design process.
WRK.9.2.5.CAP.6	Compare the characteristics of a successful entrepreneur with the traits of successful employees.
WRK.9.2.5.CAP.7	Identify factors to consider before starting a business.
TECH.9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
TECH.9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
TECH.9.4.2.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
TECH.9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).

Assessment Evidence

Formative	Collaborative Activities, Homework, Daily Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Games, Exit Slips, Questioning, Teacher Made Pages, Learning Centers, Problem of the Day, Reveal Workbooks, Fluency Checks, Curious, Activity Based Exploration, Guided Exploration, On My Own.
Summative	Tests, Mid-Chapter Checkpoint assessments, teacher generated assessments
Alternative & Benchmark	Alternative – Reteaching, One on One Conferencing, Learning Centers, student portfolio of assignments, Homework, Higher Order Thinking Problems, Additional leveled practice, orally administered assessments. Benchmark - LinkIt Benchmark Assessments, Totowa TPA
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, websites and digital interactives/models, Multi-media presentations, video streaming, Brain Pop, Microsoft 365, Primary and Secondary Source Documents, Reveal, Resources, manipulatives, post-it notes, markers, number lines, chart & graph paper, construction paper, glue, scissors, paperclips, crayons, envelopes, dot ink & cards, geo blocks, number cubes/dice.

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

X	Self-Awareness	X	Relationship Skills
X	Responsible Decision-Making	X	Social Awareness
X	Self-Management		

21st Century Skills & Themes

	Global and Cultural Awareness	X	Technology Literacy		Planning and Budgeting
X	Creativity and Innovation		Financial Institutions		Risk Management and Insurance

	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
X	Critical Thinking and Problem Solving		Credit Profile		Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		