Glendale Elementary School District

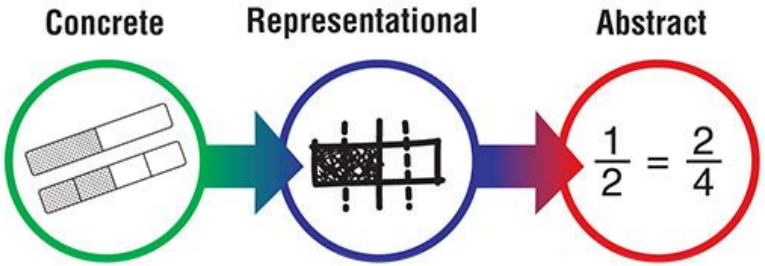
Mathematics Pacing Guide

2020-2021

3rd Grade

By the end of third grade, students will be able to...

- **Extend understanding of place value of multi-digit numbers to 1000 and fluently add and subtract multi-digit numbers to 1000.**
  - Students generalize their understanding of place value through 1000 and the relative size of numbers in each place. They use their understanding of properties of operations to perform multi-digit addition and subtraction with multi-digit whole numbers less than or equal to 1000 . They round multi-digit numbers to 10 or 100. **Develop competency in multiplication and division and strategies for multiplication and division within 100 and develop understanding of the structure of rectangular arrays and of area.**
  - Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models as described in Table 2. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By working with arrays, students connect area to multiplication and justify using multiplication to determine the area. By the end of 3rd grade, students are fluent in multiplication and division within 100.
- **Develop understanding of fractions as numbers, especially unit fractions.**
  - Students develop an understanding of fractions as numbers, beginning with unit fractions. Students understand that the size of a fractional part is relative to the size of the whole. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on recognizing equal numerators or denominators.
- **Fluently add and subtract within 1000.**
- **Fluently multiply and divide within 100. By the end of 3rd grade, know from memory all multiplication products through 10 x 10 and division quotients when both the quotient and divisor are less than or equal to 10.**



The GESD Pacing Guides were created by a panel of Teachers and Achievement Advisors with the additional input and guidance from Principals and Assistant Principals. The GESD Pacing Guides are revised yearly through feedback and committee work. Thank you for all input and support.

Arizona Mathematics Standards (adopted December 2016)

What the Arizona Mathematics Standards Are

The Arizona Mathematics Standards define the knowledge, understanding, and skills that need to be taught and learned so all students are ready to succeed in credit-bearing, college-entry courses and/or in the workplace. The Arizona Mathematics Standards are the foundation to guide the construction and evaluation of mathematics programs in Arizona K-12 schools and the broader Arizona community.

- Focused in coherent progressions across grades K-12
- Aligned with college and workforce expectations
- Inclusive of rigorous content and applications of knowledge through higher-order thinking
- Research- and evidence-based

Understanding in Mathematics

When a student understands a mathematical concept, they move fluidly between the concrete and abstract. There is evidence they are able to make sense of and justify mathematical connections. Evidence of understanding includes connections among:

- Verbal or written reasoning
- Pictorial representations
- Real-world application
- Procedures/Computation

Grade 3 AzM2 Math Blueprint 2016 Standards		
Reporting Category	**Min.**	**Max.**
Operations & Algebraic Thinking and Numbers & Operations in Base Ten	49%	53%
Operations and Algebraic Thinking	*38%*	*42%*
Numbers in Base Ten	*9%*	*13%*
Numbers & Operations - Fractions	18%	22%
Measurement & Data and Geometry	26%	30%
Measurement and Data	*26%*	*28%*
Geometry	*1%*	*4%*

Within a test, approximately 70% of the assessment will be on major content within that grade or course.

Percentage of Points by Depth of Knowledge Level	
DOK 1	10% - 20%
DOK 2	60% - 70%
DOK 3	12% - 30%

Table 1: Common Addition and Subtraction Problem Types/Situations.[1]

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3
	Total Unknown	**Addend Unknown**	**Both Addends Unknown[2]**
Put Together / Take Apart[3]	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare	(“How many more?” version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? (“How many fewer?” version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with “more”): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with “more”): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

[1]Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).

[2]These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean ***makes*** or ***results*** in but always does mean ***is the same quantity as***.

[3]Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.

Table 2: Common Multiplication and Division Problem Types/Situations.[1]

	Unknown Product	**Group Size Unknown** ("How many in each group?" Division)	**Number of Groups Unknown** ("How many groups?" Division)
	3 x 6 = ?	**3 x ? = 18 and 18 ÷ 3 = ?**	**? x 6 = 18 and 18 ÷ 6 = ?**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? ***Measurement example*.** You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? ***Measurement example*.** You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? ***Measurement example*.** You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[2] Area[3]	There are 3 rows of apples with 6 apples in each row. How many apples are there? ***Area example*.** What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? ***Area example*.** A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? ***Area example*.** A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A straw hat costs $6. A baseball hat costs 3 times as much as the straw hat. How much does the baseball hat cost? ***Measurement example***. A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A baseball hat costs $18 and that is 3 times as much as a straw hat costs. How much does a blue straw cost? ***Measurement example*.** A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A baseball hat costs $18 and a straw hat costs $6. How many times as much does the baseball hat cost as the straw hat? ***Measurement example*.** A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[1]The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

[2]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

[3]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

Comprehensive Mathematics Block (90 minutes)

Students are developing fluency in representation, connections, reasoning & proof, problem solving, and communication of mathematics.
Math Attitude is developed and reinforced in every lesson, ensuring that students make sense of mathematics and persevere.

		Teacher Actions	Student Actions	Resources Utilized
FLUENCY (15 minutes) *Purpose: Students increase flexibility, efficiency, and accuracy in computation and procedures. Conceptual understanding and strategies are the foundations on which fluency is built.*		• Model mental math strategies • Think aloud math strategies • Question using a variety of DOK levels • Explicitly teach appropriate mathematical strategies and formulas • Provide feedback on progress	• Utilize mental math strategies • Write out strategies to show procedural knowledge • Answer a variety of DOK 1-4 questions • Share mathematical strategies and thinking • Use feedback to set goals for improvement	• Number Talks • Go Math (K-5) • Socratic Seminar • Turnaround Problem (answer given, students come up with question)
WHOLE GROUP INSTRUCTION (25 minutes)	**Conceptual Understanding** *Purpose: Students develop mathematical understanding (Instructional Continuum).*	• Explicitly teach academic vocabulary • Explicitly model the thinking and strategy used • Guide students through practicing the use of the strategy and offer specific feedback • Guide students through independent practice with appropriate tools • Ask a variety of DOK 1-4 questions throughout instruction	• Use strategies to learn the academic vocabulary and use it in discussions • Utilize the appropriate strategy to solve the problem • Use feedback to redirect actions as needed • Practice the strategies and skills using the appropriate tools • Answer a variety of DOK 1-4 questions • Utilize strategies to check for reasonableness of solution (i.e. UPS-Check)	• Go Math! (K-5) • Holt Math (6-8) • Mathematical Practice standards (as appropriate for lesson)
	Problem Solving *Purpose: Students utilize mathematical knowledge to solve real-life problems and investigate mathematics.*	• Pose problem/situation • Scaffold independent practice with think-alouds • Label strategies used	• Read and understand the problem/situation • Utilize knowledge of appropriate strategies and skills to determine next steps • Label strategies used • Utilize strategies to check for reasonableness of solution (i.e. UPS-Check)	• Go Math! (K-5) • Holt Math (6-8) • Van de Walle
SMALL GROUP INSTRUCTION (40 minutes) *Purpose: Students practice mathematical skills, concepts and/or strategies with strategic support or with enrichment.*		• Identify skill gaps of students using ongoing assessments • Prompt and reinforce mathematical behaviors • Model math strategies and the flexibility to choose between strategies • Create groups by Skill, Concept, or Strategy	• Practice foundational math skills • Monitor comprehension and select strategies to increase understanding • Extend grade level understanding and link to upcoming standards	• Go Math! supplements • Holt Math supplements • Van de Walle • Do the Math • Do the Math Now
COGNITIVE CLOSURE (10 minutes) *Purpose: Students cognitively process learning in order to focus on what was learned, whether it made sense, and if it had meaning.*		• Summarize and synthesize the learning process and skills obtained • Connect the concepts, skills, or strategies to a real world application • Connect the concepts, skills, or strategies to other learning through transfer • Give an End-of-Lesson Assessment (i.e. Exit Ticket, Journal-Writing, etc.)	• Summarize and synthesize the learning process and skills obtained • Reflect on the learning process and connect the learning to a real world application • Complete an End-of-Lesson Assessment	• Exit tickets • Math Journals • Common Formative Assessments

Year-Long Standards Overview

Mathematical Practices – To be embedded into every lesson

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Key:
➡ **Grade-Level Guaranteed Standards**
Essential Standards
Supporting Standards
Previously Presented Materials

Yearlong Fluency Standards – To be taught and revisited continually throughout the year

3.NBT.A.2 Students 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.
3.OA.C.7 Students fluently multiply and divide within 100. By the end of grade 3, they know all products of two one-digit numbers from memory. (assess "know all products" using CFAs in Quarter 4)

Multiplication and Division Concepts
➡**3.OA.A.1**
3.OA.A.3
➡**3.OA.A.2**
3.OA.B.6
3.OA.A.4
3.OA.B.5
3.NBT.A.3

Addition and Subtraction
➡**3.NBT.A.2** (embed 3.NBT.A.1)
3.OA.D.8 (addition and subtraction, embed 3.MD.B.3)

Multiplication and Division
3.OA.B.5
3.NBT.A.3

Addition and Subtraction
(Subtraction, embed 3.NBT.A.1)
3.NBT.A.1
➡**3.NBT.A.2**

Fraction Concepts
3.NF.A.1 (embed 3.G.A.2)
3.NF.A.2
3.NF.A.3 a, b, and c
➡**3.NF.A.3d**
3.OA.D.8 (multiplication or division with addition or subtraction)

Measurement, Geometry, and Problem Solving
3.MD.A.1a
3.MD.B.4
3.G.A.2

Addition and Subtraction
(Subtraction, embed 3.NBT.A.1)
➡**3.NBT.A.2**
3.MD.A.1b

Multiplication and Division
(multiplication and division, embed 3.MD.A.2)
3.OA.A.3
➡**3.OA.C.7**

Area and Multiplication Relationships
3.MD.C.5
3.MD.C.6
➡**3.MD.C.7**
3.MD.C.8

Geometry
3.G.A.1

Fraction
➡**3.NF.A.3d**
3.NF.A.3 a, b, and c

Applications
➡**3.OA.C.7**
3.OA.D.9
3.OA.D.10
3.OA.D.8 (all operations, embed ➡**3.MD.C.7**, 3.MD.C.8)

Use any remaining time in the year to reteach standards to which students did not reach mastery and to pre-teach 4th grade concepts through project-based learning activities.

Quarter 1			
Arizona State Standards	**GESD Suggested Learning Targets (○) AzM2 Sample Task Demands (★)**	**Curricular Resource Mathematical Practices**	**Key Vocabulary**
Multiplication and Division Concepts By the end of this unit of study, students will be able to multiply and divide within 100 involving groups, arrays, and measurement quantities and determine the unknown numbers.			
➡**3.OA.A.1** **Interpret products of whole numbers as the total number of objects in equal groups (e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each).**	★ Represent multiplication equations using multiple representations (pictures, arrays, repeated addition) ★ Interpret products of whole numbers as a total number of objects in a number of groups ★ Find the product of multiple groups of objects ★ Interpret and/or describe what factor pairs represent in a given arrangement ★ Create a multiplication problem that describes a given arrangement ★ Create multiple pairs of factors to create a given arrangement	Go Math! 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 11.6 Mathematical Practices: 1, 4, 7 Flipbook: Pg. 4 *Supplement with* *Teaching Arithmetic Lessons for Introducing Multiplication Marilyn Burns Pgs. 88-98*	Product, Factor, Multiply, Equal groups, Array, Area model, Column, Row, Expression, Multiple, Skip count
3.OA.A.3 **Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.** ***See Table 2*.**	★ Represent a word problem using a picture and an equation with a symbol for the unknown number, or in other ways ★ Solve word problems in situations involving equal groups, arrays, and measurement quantities ★ Multiply within 100 ★ Solve a simple word problem involving multiplication or division ★ Create an equation to model a simple situation with multiplication or division ★ Model multiplication and division equations by sorting objects into equal groups ★ Create an equation to model a complex situation with multiplication or division ★ Create a model using a multiplication or division equation that represents a complex situation	Go Math! 5.3, 4.10 Mathematical Practices: 1, 4, 7 Flipbook: Pg. 7 *Supplement with* *Teaching Arithmetic Lessons for Introducing Multiplication Marilyn Burns Pgs. 35-47, Pgs. 66-76 Pgs. 131-132, Pgs. 139-141*	Array, Equal groups, Product, Factor, Repeated addition, Expression, Quotient, Divisor, Dividend
➡**3.OA.A.2** **Interpret whole number quotients of whole numbers (e.g., interpret 56 ÷ 8 as the number of objects in each group when 56 objects are partitioned equally into 8 groups, or as a number of groups when 56 objects are partitioned into equal groups of 8 objects each).**	★ Explain what division means and how it relates to equal shares ★ Explain what the numbers in a division problem represent ★ Interpret quotients as the number of shares or the number of groups when a set of objects is divided equally	Go Math! 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.8, 6.9, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9 Mathematical Practices: 1, 4, 7 Flipbook: Pg. 6 *Supplement with*	Array, Equal groups, Dividend, Division, Divisor, Quotient, Divide, Factor, Inverse operations, Related facts, Partitive division, Expression, Repeated subtraction

See Table 2.	★ Identify the quotient for a given problem ★ Find a number to answer a question based on the interpretation of a quotient within a context	*Teaching Arithmetic Lessons for Introducing Division Marilyn Burns Pgs. 8-19, Pgs. 48-109, Pgs. 117-141*	
3.OA.B.6 Understand division as an unknown-factor problem (e.g., find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8).	o Explain that multiplication and division are related operations and explain how they are related o Identify the unknown factor in the related multiplication problem o Identify the multiplication problem as related to the division problem o Use multiplication to solve division problems ★ Write division problems as equivalent multiplication problems	Go Math! 5.2, 6.7, 6.8 Mathematical Practices: 1, 7 Flipbook: Pg. 16	Quotient, Dividend, Divisor, Factor, Product, Inverse operations
3.OA.A.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations: 8 x ☐ = 48, 5 =☐ ÷ 3, 6 x 6 =☐. See Table 2.*	★ Multiply and divide within 100 ★ Determine which operation (multiplication or division) is needed to determine the unknown whole number ★ Find the unknown number in a given multiplication or division equation	Go Math! 5.2, 6.7 Mathematical Practices: 1, 2, 6, 7 Flipbook: Pg. 10 *Supplement with* *Teaching Arithmetic Lessons for Introducing Division Marilyn Burns Pgs. 1-7, Pgs. 20-36, Pgs. 37-47*	Equation, Unknown, Equal, Expression, Fact family
Addition and Subtraction **By the end of this unit of study, students will begin working towards fluently adding and subtracting within 1000 using place value, properties of operations using two-step word problems and represent and interpret data.**			
➡**3.NBT.A.2** (embed 3.NBT.A.1) **Fluently add and subtract within 1000 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.** *Note: Students do not learn the standard algorithm for addition or subtraction until 4th Grade.*	★ Use strategies for adding and subtracting within 1000 ★ Fluently add and subtract within 1000 ★ Calculate the sum or difference of two or more numbers	Go Math! 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12 Mathematical Practices: 2, 7, 8 Flipbook: Pg. 28	Digit, Add, Sum, Difference, Minuend, Subtrahend, Addend, Algorithm, Base ten numerals, Compatible numbers, Compose, Expanded form, Place value, Subtract, Standard form
3.OA.D.8 (embed within 3.MD.B.3) **Solve two-step word problems using ~~the four operations~~ *addition and subtraction*. Represent these problems using equations with a letter standing for the unknown quantity. Utilize understanding of the Order of Operations when there are no parentheses.**	★ Explain the order of operations ★ Use strategies for estimating ★ Construct an equation with a letter standing for the unknown quantity ★ Solve two-step word problems using ~~the four operations~~ *addition and subtraction* ★ Justify answers to problems using various estimation strategies	Go Math! 1.12, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 Mathematical Practices: 1, 2, 4, 5 Flipbook: Pg. 19 *Supplement with*	Estimate, Equation, Unknown, Sum, Difference, Reasonableness, Justify, Pictograph/Picture graph, Bar graph, Scale, Key, Horizontal bar graph, Vertical bar graph, Frequency table, Data, Chart, Order of Operations,

	★ Determine a solution to a 2-step word problem ★ Determine whether an answer is reasonable based on estimation or rounding ★ Construct an equation that models a multi-step word problem	*Teaching Arithmetic Lessons for Introducing Division Marilyn Burns Pgs. 110-116*	Bar model/Tape diagram Parenthesis/ Parentheses, Regroup Note: teachers may introduce the term Variable
3.MD.B.3 (embed within **3.OA.D.8**) Create 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. *See Table 1.*	★ Identify the scale of a graph with a scale greater than one ★ Explain the scale of a graph with a scale greater than one ★ Analyze a graph with a scale greater than one ★ Interpret a bar/picture graph to solve one- or two-step problems asking "how many more" and "how many less" ★ Choose a proper scale for a bar graph or picture graph ★ Compare two or more data values from a given graph to solve one- and two-step word problems ★ Construct a scaled bar or picture graph based on given data ★ Create a scale for given data and construct a graph ★ Construct a scaled bar or picture graph based on parameters	Go Math! 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 Mathematical Practices: 1, 4, 6, 7 Flipbook: Pg. 42	Estimate, Equation, Unknown, Sum, Difference, Reasonableness, Justify, Pictograph/Picture graph, Bar graph, Scale, Key, Horizontal bar graph, Vertical bar graph, Frequency table, Data, Chart, Order of Operations Bar model/Tape diagram, Parenthesis/ Parentheses, Regroup
Multiplication and Division **By the end of this unit of study, students will be able to use place value understanding and properties of operations to perform multi-digit arithmetic.**			
3.OA.B.5 Apply properties of operations as strategies to multiply and divide. Properties include Commutative and Associative Properties of Multiplication and the Distributive Property. (Students do not need to use the formal terms for these properties, but teachers should use these terms consistently.)	o Explain how the properties of operations work o Multiply within 100 o Divide within 100 o Apply properties of operations as strategies to multiply and divide ★ Create an equivalent expression and/or equation based on applying a particular property (i.e., Commutative, Associative, Distributive)	Go Math! 4.4, 4.5, 4.6, 4.8, 4.9, 5.3 Mathematical Practices: 1, 4, 7, 8 Flipbook: Pg. 12	Commutative Property of Addition, Commutative Property of Multiplication, Associative Property of Addition, Associative Property of Multiplication, Distributive Property, Additive Identity Property of 0, Multiplicative Identity Property of 1, Zero Property of Multiplication

3.NBT.A.3 Multiply one-digit whole numbers by multiples of 10 in the range 10 to 90 using strategies based on place value and the properties of operations (e.g., 9 x 80, 5 x 60).	o Apply knowledge of place value to multiply one-digit whole numbers by multiples of 10 in the range 10-90 ★ Calculate the product of a one-digit number by a multiple of 10 without context ★ Calculate the product of a one-digit number by a multiple of 10 within the context of a word problem	Go Math! 5.4, 5.5 Mathematical Practices: 2, 7, 8 Flipbook: Pg. 30 *Supplement with <u>Teaching Arithmetic Lessons for Extending Place Value</u> Marilyn Burns Pgs. 80-94, Pgs. 140-155, Pgs. 156-171*	Factor, Product, Multiple
Quarter 2			
Arizona State Standards	**GESD Suggested Learning Targets (○) AzM2 Sample Task Demands (★)**	**Curricular Resource Mathematical Practices**	**Key Vocabulary**
Addition and Subtraction **By the end of this unit of study, students will be able to use place value understanding and properties of operations to perform multi-digit arithmetic fluently.**			
3.NBT.A.1 (embed within **3.NBT.A.2** to estimate sum/difference) Use place value understanding to round whole numbers to the nearest 10 or 100.	★ Define round or rounding in relation to place value ★ Round a whole number to the nearest 10 ★ Round a whole number to the nearest 100 ★ Identify the value of a given number rounded to the nearest 10 or 100 ★ Identify the numbers that round to a given value ★ Plot points (on a number line) to represent values that round to a given value ★ Interpret and distinguish between different rounding procedures (used in rounding to a number) in order to create a number that fits certain parameters	Go Math! 1.2, 1.3, 1.6, 1.7, 1.8, 1.10, 1.11 Mathematical Practices: 5, 7, 8 Flipbook: Pg. 26	Round, Estimate
➡**3.NBT.A.2** (embed 3.NBT.A.1 to estimate sum/difference) **Fluently add and subtract within 1000 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.** *Note: Students do not learn the standard algorithm for addition or subtraction until 4th Grade.*	★ Use strategies for adding and subtracting within 1000 ★ Fluently add and subtract within 1000 ★ Calculate the sum or difference of two or more numbers	Mathematical Practices: 2, 7, 8 Flipbook: Pg. 28 *Supplement with <u>Teaching Arithmetic Lessons for Extending Place Value</u> Marilyn Burns Pg. 157, Pg. 164, Pgs. 10-27, Pgs. 127-139*	Digit, Add, Sum, Difference, Minuend, Subtrahend, Addend, Algorithm, Base ten numeral form, Base ten numerals, Compatible numbers, Compose, Expanded form, Place value, Regroup, Subtract, Standard form
Fraction Concepts **By the end of this unit of study, students will develop understanding of fractions as numbers to the point of being able to compare two fractions and solve two-step word problems with multiplication or division with addition or subtraction.**			

3.NF.A.1 (embed 3.G.A.2) **Understand a fraction (1/*b*) as the quantity formed by one 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*.**	o Explain why a unit fraction such as 1/4 is the quantity formed when the whole is partitioned into 4 equal parts o Identify a fraction such as 2/3 and explain that the quantity formed is 2 equal parts of the whole partitioned into 3 equal parts (1/3 and 1/3 of the whole 3/3) o Express a fraction as the number of unit fractions o Use accumulated unit fractions to represent numbers equal to, less than, and greater than one (1/3 and 1/3 is 2/3; 1/3, 1/3, 1/3, and 1/3 is 4/3) ★ Identify a model given a fraction ★ Identify a fraction given a model ★ Partition a whole into equal parts and identify that each part is a unit fraction	Go Math! 8.1, 8.2, 8.3, 8.4, 8.7, 8.8, 12.9 Mathematical Practices: 1, 4, 7 Flipbook: Pg. 32 *Supplement with* *Teaching Arithmetic Lessons for Introducing Fractions Marilyn Burns Pgs. 1-9, Pgs. 46-53, Pgs. 82-96*	Numerator, Denominator, Unit fraction, Whole, Set, Partition, Equal parts, Fraction, Halves, Thirds, Fourths, Sixths, Eighths, Shares, Fraction bar
3.G.A.2 (embed within **3.NF.A.1**) Partition shapes into *b* parts with equal areas. Express the area of each part as a unit fraction 1/*b* of the whole (Grade 3 expectations are limited to fractions with denominators *b* = 2, 3, 4, 6, 8).	o Explain how shapes can be partitioned into equal area o Describe the area of each part as a fractional part of the whole o Relate fractions to geometry by expressing the area of part of a shape as a unit fraction of the whole ★ Recognize the fraction that an area of a shape represents ★ Identify the shapes that are divided into equal parts ★ Partition a shape into equal areas ★ Shade a fraction of a shape ★ Match given partitions with the fraction each represents ★ Construct a complete shape given only one of the partitioned areas of the whole shape	Go Math! 12.9 Mathematical Practices: 2, 4, 5 Flipbook: Pg. 55 *Supplement with* *Teaching Arithmetic: Lessons for Introducing Fractions Marilyn Burns Pgs. 75-81* *Teaching Arithmetic: Lessons for Extending Fractions Marilyn Burns Pgs. 1-13*	Numerator, Denominator, Unit fraction, Whole, Set, Partition, Equal parts, Fraction, Halves, Thirds, Fourths, Sixths, Eighths, Shares, Fraction bar
3.NF.A.2 **Understand a fraction as a number on the number line; represent fractions on a number line diagram.** **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. Understand that each part has size 1/*b* and that the end point of the part based**	★ Define the interval from 0 to 1 on a number line as a whole ★ Divide a whole on a number line into equal parts ★ Explain why equal parts between 0 and 1 have a fractional representation ★ Explain that the end of each equal part is represented by a fraction (1/the number of equal parts) ★ Explain that the endpoint of each equal part represents the total number of equal parts	Go Math! 8.5, 8.9 Mathematical Practices: 1, 4, 7 Flipbook: Pg. 35 Substandard c is a new standard not in the Flipbook. *Supplement with* *Teaching Student-Centered Mathematics Van de Walle Pgs. 229-238; 12.5, 12.6,*	Number line, Whole, Numerator, Denominator

at 0 locates the number 1/*b* on the number line. **b. Represent a fraction *a/b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Understand that the resulting interval has size *a/b* and that its endpoint locates the number *a/b* on the number line including values greater than 1.** **c. Understand a fraction 1/*b* as a special type of fraction that can be referred to as a unit fraction (e.g. 1/2, 1/4).**	★ Explain unit fraction, 1/*b*, as a special piece of fractions, *a*/*b* ★ Represent fractions on a number line that are greater than 1 whole (using mixed numbers and improper fractions) ★ Identify and represent unit fractions of 1/*b* on a number line ★ Identify and represent fractions of size *a*/*b* as "a" lengths 1/*b* from 0 on a number line) ★ Identify and interpret fractional values on number lines ★ Reason, compare and draw conclusions about partitioning wholes and constructing fractional models and number line representations to justify	*12.7, 12.9*	
3.NF.A.3a Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent if they have the same relative size compared to 1 whole.	o Describe equivalent fractions (less than and greater than 1) o Explain what the numerator in a fraction represents and its location on a number line o Explain what the denominator in a fraction represents and its location on a number line o Use number lines, size, visual fraction models, etc. to find equivalent fractions less than and greater than 1 o Explain how a fraction is equivalent to a whole number o Justify conclusions about the equivalence of fractions	Go Math! 9.6 Mathematical Practices: 2, 3, 4, 6, 8 Flipbook: Pg. 36 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pg. 224; 12.2* *Teaching Arithmetic Lessons for Introducing Fractions Marilyn Burns Pg. 62-67, Pg. 105-115, Pg. 116-121*	Equivalent, Equivalent fractions, Number line
3.NF.A.3b Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. b. Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent.	o Use number lines, size, visual fraction models, etc. to find equivalent fractions (less than and greater than 1) o Use simple equivalent fractions (less than and greater than 1) o Justify conclusions about the equivalence of fractions ★ Represent equivalent fractions ★ Represent and explain equivalent fractions by creating fraction models	Go Math! 9.7 Mathematical Practices: 1, 2, 3, 4, 6, 7, 8 Flipbook: Pg. 36 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pgs.225, Pgs. 241; 12.3, 12.13*	Equivalent, Equivalent fractions, Number line

3.NF.A.3c Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.	o Use whole numbers written in fractional parts on a number line (less than and greater than 1) o Explain the difference between a whole number and a fraction o Explain equivalences between fractions and whole numbers o Explain whether or not different fractions refer to the same whole ★ Express whole numbers as fractions (over 1) and recognize equivalent fraction forms of whole numbers (*n*p/0p)	Go Math! 8.6 Mathematical Practices: 1, 2, 3, 4, 6, 7, 8 Flipbook: Pg. 36 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pg. 242; 12.14, 12.15*	Equivalent, Equivalent fractions, Number line
➡3.NF.A.3d **Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.** **d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Understand that comparisons are valid only when the two fractions refer to the same whole. Record results of comparisons with the symbols >, =, or <, and justify conclusions.**	o Determine if comparisons of fractions can be made (if they refer to the same whole) o Record the results of comparisons using the inequality symbols: >, =, or < o Compare fractions by reasoning about their size to determine equivalence (less than and greater than 1) ★ Compare fractions with the same denominator (less than and greater than 1) ★ Compare fractions with the same numerator and unlike denominators (less than and greater than 1)	Go Math! 9.1, 9.2, 9.3, 9.4, 9.5 Mathematical Practices: 1, 2, 3, 4, 6, 7, 8 Flipbook: Pg. 36 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pg. 238-240; 12.10, 12.11, 12.12*	Numerator, Denominator, Compare, Greater than, Less than
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. Utilize understanding of the Order of Operations when there are no parentheses.**	★ Explain the order of operations ★ Use strategies for estimating ★ Construct an equation with a letter standing for the unknown quantity ★ Solve two-step word problems using the four operations ★ Justify answers to problems using estimation strategies ★ Determine a solution to a two-step word problem ★ Determine whether an answer is reasonable based on estimation and/or rounding ★ Construct an equation that models a multi-step word problem	Go Math! 3.4, 7.10 Mathematical Practices: 1, 2, 4, 5 Flipbook: Pg. 19 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pg. 323; 15.11*	Estimate, Equation, Unknown, Product, Sum, Difference, Quotient, Reasonable, Justify, Bar model/Tape diagram, Order of Operations, Estimation Note: teachers may introduce the term Variable
Measurement, Geometry and Problem Solving **By the end of this unit of study, students will understand concepts of area and relate area to multiplication and to addition.**			

3.MD.A.1a Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes (e.g., representing the problem on a number line diagram).	o Identify minute marks on an analog clock face and minute position on a digital clock face o Write time to the minute o Compare an analog clock face with a number line diagram o Use a number line diagram to add and subtract time intervals in minutes o Solve word problems involving addition and subtraction of time intervals in minutes ★ Recognize and identify a time shown to a single-minute increment on a clock ★ Calculate a change of time ★ Show change of time on a number line or clock ★ Construct a schedule by adding and subtracting time intervals ★ Determine the sum and/or difference of values using symbols $, “.”, ¢.	Go Math! 10.1, 10.2, 10.3, 10.4, 10.5 Mathematical Practices: 1, 4, 6 Flipbook: Pg. 39	a.m., Elapsed time, Midnight, Minute, Noon, p.m., Analog clock, Digital clock, Half hour, Quarter hour, Hour
3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch to the nearest quarter-inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	★ Define horizontal axis ★ Identify each plot on the line as data or a number of objects ★ Determine appropriate unit of measurement ★ Determine appropriate scale for a line plot ★ Analyze data from a line plot ★ Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch ★ Create a line plot where the horizontal scale is marked off in appropriate units - whole numbers, halves, or quarters ★ Measure the length of a given object ★ Classify and/or sort objects based on their measure ★ Construct a line plot for given data	Go Math! 2.7, 10.6 Mathematical Practices: 1, 4, 6 Flipbook: Pg. 44	Horizontal Axis, Length, Line plot, Scale, Inch, Centimeter, Foot, Halves, Fourth, Meter, Metric system, Customary system, Interval
3.G.A.2 Partition shapes into *b* parts with equal areas. Express the area of each part as a unit fraction 1/*b* of the whole (Grade 3 expectations are limited to fractions with denominators *b* = 2, 3, 4, 6, 8).	o Explain how shapes can be partitioned into equal area o Describe the area of each part as a fractional part of the whole o Relate fractions to geometry by expressing the area of part of a shape as a unit fraction of the whole ★ Recognize the fraction that an area of a shape represents	Go Math! 12.9 Mathematical Practices: 2, 4, 5 Flipbook: Pg. 55 *Supplement with* *Teaching Arithmetic: Lessons for Introducing Fractions Marilyn Burns* *Pgs. 75-81*	Numerator, Denominator, Unit fraction, Whole, Set, Partition, Equal parts, Fraction, Halves, Thirds, Fourths, Sixths, Eighths, Shares, Fraction bar

	★ Identify the shapes that are divided into equal parts ★ Partition a shape into equal areas ★ Shade a fraction of a shape ★ Match given partitions with the fraction each represents ★ Construct a complete shape given only one of the partitioned areas of the whole shape	*Teaching Arithmetic: Lessons for Extending Fractions Marilyn Burns Pgs. 1-13*	
Quarter 3			
Arizona State Standards	**GESD Suggested Learning Targets (○) AzM2 Sample Task Demands (★)**	**Curricular Resource Mathematical Practices**	**Key Vocabulary**
Addition and Subtraction **By the end of this unit of study, students will be able to use place value understanding and properties of operations to perform multi-digit arithmetic using two-step word problems and use place value understanding and properties of operations to work with money.**			
➡**3.NBT.A.2** (embed within **3.OA.D.8**) **Fluently add and subtract within 1000 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.**	★ Use strategies for adding and subtracting within 1000 ★ Fluently add and subtract within 1000 ★ Calculate the sum or difference of two or more numbers	Go Math! 1.12 Mathematical Practices: 2, 7, 8 Flipbook: Pg.28 *Standards Practice Book Pg. 25, Pg. 41* *Enrich Book Pg. 11*	Digit, Add, Sum, Difference, Minuend, Subtrahend, Addend, Algorithm, Base ten numeral form, Base ten numerals, Compatible numbers, Compose, Expanded form, Place value, Subtract, Standard form
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. Utilize understanding of the Order of Operations when there are no parentheses.**	★ Explain the order of operations ★ Use strategies for estimating ★ Construct an equation with a letter standing for the unknown quantity ★ Solve two-step word problems using the four operations – include two-step word problems with multiplication and division ★ Justify answers to problems using estimation strategies ★ Determine a solution to a two-step word problem ★ Determine whether an answer is reasonable based on estimation and/or rounding ★ Construct an equation that models a multi-step word problem	Go Math! 7.11 Mathematical Practices: 1, 2, 4, 5, 7 Flipbook: Pg. 19	Estimate, Equation, Unknown, Sum, Difference, Reasonable, Justify, Bar model/Tape diagram Note: teachers may introduce the term Variable
3.MD.A.1b Solve word problems involving money through $20.00, using symbols $, ".", ¢.	★ Know money related symbols ($, ".", ¢) ★ Add and subtract money within $20.00	Mathematical Practices: 2, 4, 7 *Supplement with Teaching Student-Centered Mathematics Van de Walle (PK-2nd*	Money, Add, Subtract, Sum, Difference, Dollar, Cent, Coins (quarter, dime, penny, dime)

		Grade book) Pgs. 351-354; 15.17, 15.18, 15.19, 15.20	
Multiplication and Division **By the end of this unit of study, students will be able to understand properties of multiplication and the relationship between multiplication and division, multiply and divide within 100, represent and solve problems involving multiplication and division, solve problems involving the four operations, and identify and explain patterns in arithmetic, and use place value understanding and properties of operations to perform multi-digit arithmetic.**			
➡**3.OA.C.7** (embed within all OA standards) **Fluently multiply and divide within 100. ~~By the end of Grade 3, know from memory all multiplication products through 10 x 10 and division quotients when both the quotient and divisor are less than or equal to 10.~~**	o Analyze a multiplication or division problem in order to choose an appropriate strategy to fluently multiply or divide within 100 o Fluently multiply and divide within 100 o ~~Recite from memory all products of two one-digit numbers~~ ★ Find the product or dividend	Mathematical Practices: 2, 7, 8 Flipbook: Pg. 17 *Supplement with* *Teaching Arithmetic Lessons for Introducing Multiplication Marilyn Burns Pgs. 150-153*	Quotient, Dividend, Divisor, Factor, Product, Inverse operations
3.OA.A.3 (embed 3.MD.A.2) **Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.** ***See Table 2*.**	★ Represent a word problem using a picture and an equation with a symbol for the unknown number, or in other ways ★ Solve word problems in situations involving equal groups, arrays, and measurement quantities ★ Multiply within 100 ★ Divide within 100 ★ Solve a simple word problem involving multiplication or division ★ Create an equation to model a simple situation with multiplication or division ★ Model multiplication and division equations by sorting objects into equal groups ★ Create an equation to model a complex situation with multiplication or division ★ Create a model using a multiplication or division equation that represents a complex situation	Go Math! 3.4, 4.10 Mathematical Practices: 1, 4, 7 Flipbook: Pg. 7 *Supplement with* *Teaching Arithmetic Lessons for Introducing Multiplication Marilyn Burns Pg. 35-37, Pg. 66-76, Pg. 139-141* *Teaching Arithmetic Lessons for Introducing Division Marilyn Burns Pgs. 142-160*	Array, Equal groups, Product, Factor, Repeated addition, Quotient, Divisor, Dividend
3.MD.A.2 (embed within **3.OA.A.3**) Measure and estimate liquid volumes and masses of objects using metric units. (Excludes compound units such as cm^3 and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units. Excludes multiplicative comparison problems (problems involving notions of "times as much"). *See Table 2.*	★ Explain how to measure liquid volume in liters ★ Explain how to measure mass in grams and kilograms ★ Measure liquid volumes using standard units of liters ★ Measure mass of objects using standard units of grams (g) and kilograms (kg) ★ Add, subtract, multiply, and divide units of liters, grams, and kilograms o Use various strategies to represent a word problem involving liquid volume or mass o Solve one-step word problems involving masses given in the same units	Go Math! 10.7, 10.8, 10.9 Mathematical Practices: 1, 2, 4, 5, 6 Flipbook: Pg. 41	Gram (g), Kilogram (kg), Volume (liquid), Liter (L), Mass, Metric system, Customary system

	o Solve one-step word problems involving liquid volume given in the same unit ★ Identify a given measured amount ★ Estimate an unknown quantity by comparing it with a given measurement ★ Interpret and calculate a one-step word problem involving measurement		
Area and Multiplication Relationships **By the end of this unit of study, students will be able to understand concepts of area and relate area to multiplication and to addition.**			
3.MD.C.5 Understand area as an attribute of plane figures and understand concepts of area measurement. 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. 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	o Define unit square and square unit o Define area o Relate the number (n) of unit squares to the area of a plane figure o Cover the area of a plane figure with unit squares without gaps or overlaps ★ Identify what the area of a figure means and represents ★ Recognize a square with side length 1 unit as a unit square	Go Math! 11.4 Mathematical Practices: 2, 4, 6 Flipbook: Pg. 45	Area, Square unit (sq. un.), Unit square, Perimeter, Combine, Width
3.MD.C.6 Measure areas by counting unit squares (e.g., square cm, square m, square in, square ft, and improvised square units).	o Use unit squares of cm, m, in, ft, and other sizes of unit squares to measure area ★ Find the area of a rectilinear figure by counting squares	Go Math! 11.5 Mathematical Practices: 2, 4, 5, 6 Flipbook: Pg. 47 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pgs. 352-354; 16.8, 16.9, 16.10*	Area, Square unit (sq. un.), Unit square
➡3.MD.C.7 **Relate area to the operations of multiplication and addition.** **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.** **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.** **c. Use tiling to show that the area of a rectangle with whole-number side lengths**	o Use rectangular arrays to represent whole-number products in multiplication problems o Multiply using an area model (array) o Compare the area found by tiling a rectangle to the area found by multiplying the side lengths o Add areas of rectangles o Relate area of a rectangle to multiplication and addition by modeling the Distributive Property o Explain how areas of each rectangle in a rectilinear (straight line) figure can be added together to find the area of the figure o Use the technique of decomposing rectilinear figures to find the area of each rectangle to solve real world problems	Go Math! 11.6, 11.7, 11.8 Mathematical Practices: 1, 2, 4, 5, 6 Flipbook: Pg. 48 *Supplement with Investigations "Flips, Turns, and Area" Investigation 2*	Area, Square unit, (sq. un.), Unit square, Factor, Product, Array, Tiling, Side, Length, Decompose, Sum, Distributive Property

***a* and *b* + *c* is the sum of *a* × *b* and *a* × *c*. Use area models to represent the Distributive Property in mathematical reasoning.** **d. Understand that rectilinear figures can be decomposed into non-overlapping rectangles and that the sum of the areas of these rectangles is identical to the area of the original rectilinear figure. Apply this technique to solve problems in real-world contexts.**	o Solve real world and mathematical area problems by multiplying side lengths of rectangles o Find the side lengths of a rectangle in units ★ Find the area of a rectangle using various strategies, such as multiplying side lengths and using tiling to demonstrate the distributive property as it relates to area ★ Find the area of rectilinear figures by decomposing them into non-overlapping rectangles ★ Draw conclusions about unknown side lengths in order to calculate the area of a rectilinear figure		
3.MD.C.8 (embed within **3.OA.D.8**) Solve real-world and mathematical problems involving perimeters of plane figures and areas of rectangles, including finding the perimeter given the side lengths, finding an unknown side length. Represent rectangles with the same perimeter and different areas or with the same area and different perimeters.	★ Define a polygon ★ Define perimeter ★ Find the perimeter when there is an unknown side length ★ Exhibit (design, create, draw, model, etc.) rectangles with the same perimeter and different areas ★ Exhibit rectangles with the same area and different perimeters ★ Construct a polygon with a given perimeter or area ★ Find the perimeter of a polygon given the side lengths ★ Find an unknown side length of a polygon given the perimeter ★ Construct a rectangle with a given perimeter based on area (or a given area based on perimeter)	Go Math! 11.1, 11.2, 11.3, 11.9, 11.10 Mathematical Practices: 1, 2, 3, 4, 7 Flipbook: Pg. 50 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pg. 355; 16.11* *http://www.illustrativemathematics.org/standards/k8*	Polygon, Perimeter, Area
Quarter 4			
Arizona State Standards	**GESD Suggested Learning Targets (○) AzM2 Sample Task Demands (★)**	**Curricular Resource Mathematical Practices**	**Key Vocabulary**
Geometry **By the end of this unit of study, students will be able to reason with shapes and their attributes.**			
3.G.A.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples	o Identify and define rhombi, rectangles, and squares as examples of quadrilaterals based on their attributes o Describe, analyze, and compare properties of two-dimensional shapes o Group shapes with shared attributes to define a larger category (e.g., quadrilaterals)	Go Math! 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8 Mathematical Practices: 5, 6, 7 Flipbook: Pg. 53	Closed shape, Open shape, Attribute, Endpoint, Line, Line segment, Plane shape, Point, Ray, Two-Dimensional shape, Angle, Right angle, Vertex/Vertices, Decagon, Hexagon, Octagon, Pentagon,

of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	o Draw examples of quadrilaterals that do and do not belong to any of the subcategories ★ Select attributes that are shared by a set of shapes ★ Select shapes that belong to the same sub-categories ★ Use a set of attributes to name a shape ★ Classify shapes based on attributes ★ Explain why a shape is classified in a given way, given a set of shapes in two groups		Circle, Polygon, Quadrilateral, Side, Triangle, Parallelogram, Intersecting lines, Parallel lines, Perpendicular lines, Rectangle, Rhombus, Square, Trapezoid, Venn diagram
Fractions **By the end of this unit of study, students will be able to explain the relationships between fractions and their size.**			
3.NF.A.3a Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent if they have the same relative size compared to 1 whole.	o Describe equivalent fractions (less than and greater than 1) o Explain what the numerator in a fraction represents and its location on a number line o Explain what the denominator in a fraction represents and its location on a number line o Use number lines, size, visual fraction models, etc. to find equivalent fractions less than and greater than 1 o Explain how a fraction is equivalent to a whole number o Justify conclusions about the equivalence of fractions	Go Math! 9.6 Mathematical Practices: 2, 3, 4, 6, 8 Flipbook: Pg. 36 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pg. 224; 12.2* *Teaching Arithmetic Lessons for Introducing Fractions Marilyn Burns Pg. 62-67, Pg. 105-115 Pg. 116-121*	Equivalent, Equivalent fractions, Number line
3.NF.A.3b Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. b. Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent.	o Use number lines, size, visual fraction models, etc. to find equivalent fractions (less than and greater than 1) o Use simple equivalent fractions (less than and greater than 1) o Justify conclusions about the equivalence of fractions ★ Represent equivalent fractions ★ Represent and explain equivalent fractions by creating fraction models	Go Math! 9.7 Mathematical Practices: 1, 2, 3, 4, 6, 7, 8 Flipbook: Pg. 36 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pgs.225, 241; 12.3, 12.13*	Equivalent, Equivalent fractions, Number line
3.NF.A.3c Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.	o Use whole numbers written in fractional parts on a number line (less than and greater than 1) o Explain the difference between a whole number and a fraction o Explain how a fraction can be equivalent to a whole number o Explain whether or not different fractions refer to the same whole	Go Math! 8.6 Mathematical Practices: 1, 2, 3, 4, 6, 7, 8 Flipbook: Pg. 36 *Supplement with Teaching Student-Centered Mathematics*	Equivalent, Equivalent fractions, Number line

	★ Express whole numbers as fractions (over 1) and recognize equivalent fraction forms of whole numbers	*Van de Walle Pg. 242; 12.14, 12.15*	
➡**3.NF.A.3d** Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. **d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Understand that comparisons are valid only when the two fractions refer to the same whole. Record results of comparisons with the symbols >, =, or <, and justify conclusions.**	o Determine if comparisons of fractions can be made (if they refer to the same whole) o Record the results of comparisons using the inequality symbols: >, =, or < o Compare fractions by reasoning about their size to determine equivalence (less than and greater than 1) ★ Compare fractions with the same denominator (less than and greater than 1) ★ Compare fractions with the same numerator and unlike denominators (less than and greater than 1)	Go Math! 9.1, 9.2, 9.3, 9.4, 9.5 Mathematical Practices: 1, 2, 3, 4, 6, 7, 8 Flipbook: Pg. 36 *Supplement with <u>Teaching Student-Centered Mathematics</u> Van de Walle Pg. 238-240; 12.10, 12.11, 12.12*	Numerator, Denominator, Compare, Greater than, Less than
Applications **By the end of this unit of study, students will use real life projects to apply, multiply, and divide within 100, sSolve problems involving the four operations, and identify and explain patterns in arithmetic.**			
➡**3.OA.C.7** **Fluently multiply and divide within 100. By the end of Grade 3, know from memory all multiplication products through 10 x 10 and division quotients when both the quotient and divisor are less than or equal to 10.**	o Analyze a multiplication or division problem in order to choose an appropriate strategy to fluently multiply or divide within 100 o Fluently multiply and divide within 100 (factors up to 10 such as 9×6, but not 20×5, etc.) o Recite from memory all products of two one-digit numbers ★ Find the product or dividend	Go Math! 4.1, 4.2, 4.3, 5.4, 5.5, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9 Mathematical Practices: 2, 7, 8 Flipbook: Pg. 17 *<u>Standards Practice Book</u> Pg. 269, Pg. 271, Pg. 273, Pg. 275*	Quotient, Dividend, Divisor, Factor, Product, Inverse operations
3.OA.D.9 Identify patterns in the addition table and the multiplication table and explain them using properties of operations (e.g. observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends).	o Identify arithmetic patterns such as even and odd numbers, patterns in an addition table, patterns in a multiplication table, and patterns regarding multiples and sums o Explain relationships between the numbers in a pattern o Explain rules for a pattern using properties of operations ★ Identify numbers in a well-known pattern, such as an addition or multiplication table ★ Identify unknown numbers in a pattern ★ Identify the pattern in a sequence of numbers ★ Determine characteristics or trends across numerical situations such as sum, doubles, and/or multiples	Go Math! 1.1, 4.7, 4.10, 5.1, 11.7 Mathematical Practices: 1, 2, 3, 6, 7 Flipbook: Pg. 22 *Supplement with <u>Teaching Arithmetic Lessons for Introducing Multiplication</u> Marilyn Burns Pgs. 99-113, Pgs. 135-138 <u>Teaching Arithmetic Lessons for Extending Place Value</u> Marilyn Burns Pgs. 127-139, Pgs. 10-27*	Pattern, Table, Decompose, Arithmetic patterns

3.OA.D.10 When solving problems, assess the reasonableness of answers using mental computation and estimation strategies including rounding.	o Understand reasonableness o Justify reasonableness o Apply different strategies including mental math and estimation ★ Determine the best estimation strategy given the context of a situation ★ Determine whether an answer is appropriate in a given context ★ Recognize when an estimation strategy is or is not appropriate ★ Use Estimation strategies to solve a problem	Go Math! 1.12, 3.4, 4.10 Mathematical Practices: 1, 3, 8	Reasonable, Computation, Estimate, Rounding, Justify
3.OA.D.8 (embed **3.NBT.A.2**, **3.MD.C.7**, and 3.MD.C.8) **Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Utilize understanding of the Order of Operations when there are no parentheses.**	★ Explain the order of operations ★ Use strategies for estimating ★ Construct an equation with a letter standing for the unknown quantity ★ Solve two-step word problems using the four operations ★ Justify answers to problems using various estimation strategies ★ Determine a solution to a two-step word problem ★ Determine whether an answer is reasonable based on estimation and/or rounding ★ Construct an equation that models a multi-step word problem	Go Math! 1.11, 2.6 Mathematical Practices: 1, 2, 4, 5 Flipbook: Pg. 19 *Standards Practice Book Pg. 25, Pg. 41, Pg. 55, Pgs. 145-147* *Enrich Book Pg. 11, Pg. 37, Pg. 60, Pg. 61, Pg. 92, Pg. 93, Pg. 96*	Estimate, Equation, Unknown, Sum, Difference, Reasonable, Justify, Bar model / Tape Diagram Note: teachers may introduce the term Variable
➡**3.MD.C.7** (embed within **3.OA.D.8**) **Relate area to the operations of multiplication and addition.** **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.** **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.** **c. Use tiling to show that the area of a rectangle with whole-number side lengths *a* and *b + c* is the sum of *a × b* and *a × c*. Use**	o Use rectangular arrays to represent whole-number products in multiplication problems o Multiply using an area model (array) o Compare the area found by tiling a rectangle to the area found by multiplying the side lengths o Add areas of rectangles o Relate area of a rectangle to multiplication and addition by modeling the distributive property o Explain how areas of each rectangle in a rectilinear (straight line) figure can be added together to find the area of the figure o Use the technique of decomposing rectilinear figures to find the area of each rectangle to solve real world problems o Solve real world and mathematical area problems by multiplying side lengths of rectangles o Find the side lengths of a rectangle in units	Go Math! 11.3, 11.7, 11.8, 11.9, 11.10 Mathematical Practices: 1, 2, 4, 5, 6 Flipbook: Pg. 48 *Enrich Book Pg. 92, Pg. 93*	Area, Square unit (sq. un.), Unit square, Factor, Product, Array, Tiling, Side, Length, Decompose, Sum, Distributive Property

area models to represent the Distributive Property in mathematical reasoning. **d. Understand that rectilinear figures can be decomposed into non-overlapping rectangles and that the sum of the areas of these rectangles is identical to the area of the original rectilinear figure. Apply this technique to solve problems in real-world contexts.**	★ Find the area of a rectangle using various strategies, such as multiplying side lengths and using tiling to demonstrate the Distributive Property as it relates to area ★ Find the area of rectilinear figures by decomposing them into non-overlapping rectangles ★ Draw conclusions about unknown side lengths in order to calculate the area of a rectilinear figure		
3.MD.C.8 (embed within **3.OA.D.8**) Solve real-world and mathematical problems involving perimeters of plane figures and areas of rectangles, including finding the perimeter given the side lengths, finding an unknown side length. Represent rectangles with the same perimeter and different areas or with the same area and different perimeters.	★ Define a polygon ★ Define perimeter ★ Find the perimeter when there is an unknown side length ★ Exhibit (design, create, draw, model, etc.) rectangles with the same perimeter and different areas ★ Exhibit rectangles with the same area and different perimeters ★ Construct a polygon with a given perimeter or area ★ Find the perimeter of a polygon given the side lengths ★ Find an unknown side length of a polygon given the perimeter ★ Construct a rectangle with a given perimeter based on area (or a given area based on perimeter)	Go Math! 11.1, 11.2, 11.3, 11.9, 11.10 Mathematical Practices: 1, 2, 3, 4, 7 Flipbook: Pg. 50 *Supplement with Teaching Student-Centered Mathematics Van de Walle Pg. 355; 6.11* *http://www.illustrativemathematics.org/standards/k8*	Polygon, Perimeter, Area

Quarter Taught				**Essential Standards (➡Grade Level Guaranteed Standards)**
1	2	3	4	Operations and Algebraic Thinking (OA):
X				➡**3.OA.A.1** – Interpret products of whole numbers as the total number of objects in equal groups (e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each).
X				➡**3.OA.A.2** – Interpret whole number quotients of whole numbers (e.g., interpret 56 ÷ 8 as the number of objects in each group when 56 objects are partitioned equally into 8 groups, or as a number of groups when 56 objects are partitioned into equal groups of 8 objects each). *See Table 2.*
X		X		**3.OA.A.3** – Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. *See Table 2*.
		X	X	➡**3.OA.C.7** – Fluently multiply and divide within 100. By the end of Grade 3, know from memory all multiplication products through 10 x 10 and division quotients when both the quotient and divisor are less than or equal to 10.
X	X	X	X	**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. Utilize understanding of the Order of Operations when there are no parentheses.
X	X	X	X	➡3.NBT.A.2 – Fluently add and subtract within 1000 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
				Number and Operations – Fractions (NF):
	X			**3.NF.A.1** – Understand a fraction (1/*b*) as the quantity formed by one 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*.
	X			➡**3.NF.A.2** – Understand a fraction as a number on the number line; represent fractions on a number line diagram. 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. Understand that each part has size 1/*b* and that the end point of the part based at 0 locates the number 1/*b* on the number line. b. Represent a fraction *a*/*b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Understand that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line including values greater than 1. c. Understand a fraction 1/*b* as a special type of fraction that can be referred to as a unit fraction (e.g. 1/2, 1/4).
	X		X	➡**3.NF.A.3d** – Compare two fractions with the same numerator or the same denominator by reasoning about their size. Understand that comparisons are valid only when the two fractions refer to the same whole. Record results of comparisons with the symbols >, =, or <, and justify conclusions.
				Measurement and Data (MD):
		X	X	➡**3.MD.C.7** – Relate area to the operations of multiplication and addition. 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. 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. c. Use tiling to show that the area of a rectangle with whole-number side lengths *a* and *b* + *c* is the sum of *a* × *b* and *a* × *c*. Use area models to represent the Distributive Property in mathematical reasoning. d. Understand that rectilinear figures can be decomposed into non-overlapping rectangles and that the sum of the areas of these rectangles is identical to the area of the original rectilinear figure. Apply this technique to solve problems in real-world contexts.

Quarter Taught				**Supporting Standards**
1	2	3	4	Operations and Algebraic Thinking (OA):
X				3.OA.A.4 – Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *See Table 2*.
X				3.OA.B.5 – Apply properties of operations as strategies to multiply and divide. Properties include Commutative and Associative Properties of Multiplication and the Distributive Property.
X				3.OA.B.6 – Understand division as an unknown-factor problem (e.g., find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8).

			X	3.OA.D.9 – Identify patterns in the addition table and the multiplication table and explain them using properties of operations (e.g. observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends).
			X	3.OA.D.10 – When solving problems, assess the reasonableness of answers using mental computation and estimation strategies including rounding.
				Number and Operations in Base Ten (NBT):
	X	X		3.NBT.A.1 – Use place value understanding to round whole numbers to the nearest 10 or 100.
X				3.NBT.A.3 – Multiply one-digit whole numbers by multiples of 10 in the range 10 to 90 using strategies based on place value and the properties of operations (e.g., 9 x 80, 5 x 60).
				Number and Operations – Fractions (NF):
	X		X	3.NF.A.3 – Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent if they have the same relative size compared to 1 whole. b. Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. d. *THIS SUB-STANDARD IS LISTED WITH THE ESSENTIAL STANDARDS ABOVE.*
				Measurement and Data (MD):
		X		3.MD.A.1 – Solve problems involving measurement. a. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes (e.g., representing the problem on a number line diagram). b. Solve word problems involving money through $20.00, using symbols $, ".", ¢.
		X		3.MD.A.2 – Measure and estimate liquid volumes and masses of objects using metric units. (Excludes compound units such as cm^3 and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units. Excludes multiplicative comparison problems (problems involving notions of "times as much"). *See Table 2.*
X				3.MD.B.3 – Create 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. *See Table 1*.
	X			3.MD.B.4 – Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch to the nearest quarter-inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
		X		3.MD.C.5 – Understand area as an attribute of plane figures and understand concepts of area measurement. 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. 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.
		X		3.MD.C.6 – Measure areas by counting unit squares (e.g., square cm, square m, square in, square ft, and improvised units).
		X	X	3.MD.C.8 – Solve real-world and mathematical problems involving perimeters of plane figures and areas of rectangles, including finding the perimeter given the side lengths, finding an unknown side length. Represent rectangles with the same perimeter and different areas or with the same area and different perimeters.
				Geometry (G):
			X	3.G.A.1 – Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
	X			3.G.A.2 – Partition shapes into *b* parts with equal areas. Express the area of each part as a unit fraction 1/*b* of the whole (Grade 3 expectations are limited to fractions with denominators *b* = 2, 3, 4, 6, 8).