Cedar Grove School District

Cedar Grove, NJ

2016

Mathematics
Grade 3

Approved by the Cedar Grove Board of Education
November 15, 2016

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Mathematics
Grade 3

In Grade 3, instructional time will focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes.

1. 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; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. 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.

2. Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. 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 noticing equal numerators or denominators.

3. Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

4. Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

This curriculum was written in accordance with the

NEW JERSEY STUDENT LEARNING STANDARDS

for Mathematics

The standards can be viewed at

http://www.state.nj.us/education/cccs/2016/math/standards.pdf

Grade 3 Overview

Operations and Algebraic Thinking

- Represent and solve problems involving multiplication and division.
- Understand properties of multiplication and the relationship between multiplication and division.
- Multiply and divide within 100.
- Solve problems involving the four operations, and identify and explain patterns in arithmetic.

Number and Operations in Base Ten

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

Number and Operations—Fractions

- Develop understanding of fractions as numbers.

Measurement and Data

- Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
- Represent and interpret data.
- Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
- Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

Geometry

- Reason with shapes and their attributes.

Mathematical Practices

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.

Mathematics - Grade 3

Unit 1: Represent and Solve Problems Involving Multiplication and Division

21st Century Themes	
E-Encouraged, T-Taught, or A-Assessed in this unit	
	Creativity and Innovation
	Critical Thinking and Problem Solving
	Communication
	Collaboration

Unit 1 Learning Targets

Students will be able to…

- *Identify multiplication patterns including on a times table*
- *Represent multiplication with objects, diagrams, and arrays*
- *Understand multiplication as repeated addition and joining of equivalent sets*
- *Identify when to use multiplication*
- *Understand multiples (skip counting) and its connection to multiplication*
- *Recall basic facts for all products of two one-digit numbers*
- *Multiply one-digit whole numbers by multiples of 10 (example: 9 × 70)*
- *Use strategies to master basic multiplication facts*
- *Explain division as a set of objects portioned equally into a number of shares*
- *Use models to demonstrate division*
- *Solve division problems without remainders up to 100*
- *Solve division problems using pictures, numbers, and words*
- *Recall basic facts for division using a variety of strategies*
- *Solve unknown factor division problems using multiplication*
- *Determine when to use division in a problem*
- *Determine unknown in a division or multiplication equation relating 3 whole numbers up to 100*
- *Round whole numbers to nearest 10, 100*
- *Fluently add and subtract with regrouping two digit whole numbers within 100*
- *Multiply one digit whole numbers by multiples of 10*

#	Student Learning Objectives	NJSLS	Learning Activity
1	Interpret products of whole numbers as repeated addition or equal groups of objects (up to 100).	**3.OA.1**	• Explain from the lesson to describe how you can use equal groups to find how many in all. • Compare multiplication and addition using compassion words alike, similar, different and dissimilar. • Draw on a number line and demonstrate how to use skip

			count to find how many in all.
2	Explain division as a set of objects partitioned equally into a number of shares (up to 100).	**3.OA.2**	● Use double sided counters make a large group and pull apart to make equal groups
3	Use multiplication within 100 to solve word problems using measurement quantities by creating drawings or arrays.	**3.OA.3**	● Provide an example of how you can use arrays to model multiplication and find factors. ● Explain to a partner how to multiply.
4	Determine the unknown in a division or multiplication equation with an unknown relating 2 whole numbers up to 100 (does not require students to solve from memory).	**3.OA.4**	● Select and describe a strategy that you can use to divide by 8
5	Round whole numbers to the nearest 10 or 100.	**3.NBT.1**	● Model for a partner how can you round numbers ● Explain to one another how to use compatible numbers and rounding to estimate numbers
6	Fluently add and subtract (with regrouping) two 3-digit whole numbers within 100.	**3.NBT.2**	● Use properties to explain patterns on the addition table ● Listen for accuracy as a partner explains how you can add more than two addends ● Present to another team how you can use the break apart strategy to add three digit numbers ● Use the draw a diagram to solve one and two step addition and subtraction problems
7	Multiply one-digit whole numbers by multiples of 10 (10 - 90).	**3.NBT.3**	● Build arrays ● Skip count ● Make equal groups
8	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	**3.MD.6**	● Build structures and measure using different using of measurement

9	Explain the relationship between tiling/multiplying side lengths to find the area of rectangles.	**3.MD.7a,b**	• Discuss and develop s clear reason to explain why you can multiply to find the area of the rectangle.
10	Represent and Interpret data	**3.MD.B.3**	• Explain the strategy make a table to organize data and solve problems • Write a short description telling how to draw a picture graph to show data on a table • Demonstrate, read and interpret a bar graph and a line plot

Represent data

1. **Make sense of problems and persevere in solving them.**
   SLO #7 Use concrete objects or pictures to help conceptualize measures of area.
2. Reason abstractly and quantitatively.
3. **Construct viable arguments and critique the reasoning of others.**
   SLO #7 Analyze measures of area by breaking them into unit squares
4. **Model with mathematics.**
   SLO #7 Use and apply previously learned concepts about unit measurements to solve area measure problems.
5. **Use appropriate tools strategically.**
   SLO #7 Consider available and appropriate tools, such as arrays, models, and drawings, when solving area measure problems.
   SLO #6 Use concrete objects or pictures to help conceptualize measures of area.
6. Attend to precision.
7. **Look for and make use of structure.**
   SLO #4 Fluently multiply and divide within 50, using the relationship between multiplication and division; e.g., if 44 ÷ 2 equals 22, then 22 × 2 must equal 44.
   SLO #8 Compare area measures (rectangles) by tiling and computing the product of the side lengths.
8. Look for and express regularity in repeated reasoning.

Unit 1 Essential Questions	Unit 1 Enduring Understandings
• *How are repeated addition and multiplication related?* • *How can I use what I know about repeated subtraction, equal sharing, and forming equal groups to solve division problems?* • *Why is it easier to multiply a basic fact first, and then add zeros?* • *Why do we use symbols to represent missing numbers?*	• *Represent and solve problems involving multiplication and division* • *A multiplication product can be obtained from combining several groups of the same size.* • *The result of division can be obtained from subtracting equal groups from the original amount and / or separating objects into equal, smaller groups.* • *Knowing multiplication facts is an*

• *How do I demonstrate the relationship between numbers, quantities and place value for whole numbers up to 1,000?* • *What models can be used to show multiplication?* • *What are efficient ways to find products?* • *When do I use multiplication to solve problems?*	*important foundation for being able to solve higher level multiplication and division problems.* • *Numbers are able to represent quantity, position, location, and relationships, as symbols may be used to express these relationships.* • *Computation involves taking apart and combining numbers using a variety of approaches.* • *Flexible methods of computation involve grouping numbers in strategic ways.*

Standard Code #	NJ Student Learning Standards
3. OA.1	Interpret products of whole numbers, e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 x 7.*
3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 object each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8*.
3.OA.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 × ? = 48, 5 = □ ÷ 3, 6 × 6 = ?*
3. NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.
3.NBT.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.
3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.
3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units).
3.MD.7a,b	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.

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
- Mid-chapter check point
- End of chapter test
- Performance Assessment Task

Formative Assessment

- Lesson check /spiral review
- Quick Checks
- Digital Personal Trainer

Instructional Materials and Resources

- Go Math Series
- www.ixl.com
- When the Door Bell Rings. By Pat Hutchins
- www.abcya.com
- www.thinkicentral.com
- Manipulatives (dice, double sided counters, base ten blocks, fraction tiles, pattern blocks, flash cards)
- www.learninggamesforkids.com/3rd-grade-math-html
- Dry erase mat

Integration of Technology

- Computers
- SMART Board
- Interactive games

Curriculum Development Resources

- http://www.state.nj.us/education/cccs/2016/math/standards.pdf
- http://www.state.nj.us/education/modelcurriculum/math/2.shtml
- http://www.state.nj.us/education/cccs/standards/9/9.pdf

Mathematics - Grade 3

Unit 2: Properties of Operations

21st Century Themes	
E-Encouraged, T-Taught, or A-Assessed in this unit	
	Creativity and Innovation
	Critical Thinking and Problem Solving
	Communication
	Collaboration

Unit 2 Learning Targets

Students will be able to…

- *Apply properties of operations (commutative, associative, and distributive) to multiply*
- *Use a variety of strategies to solve multiplication problems*
- *Represent relationships of quantities in the form of mathematical expressions, equations, or inequalities (+, –, ×, ÷, , =)*
- *Interpret products of whole numbers as repeated addition and subtraction*
- *Recognize the Commutative, Associative, and Distributive Properties as strategies to add and multiply whole numbers.*
- *Solve division of whole numbers by representing the problem as an unknown factor problem.*
- *Multiply and divide within 40 using strategies such as the relationship between multiplication and division*
- *Interpret operational and relational symbols to solve problems (+, –, ×, ÷, , =)*
- *Multiply and divide within 40 using strategies such as the relationship between multiplication and division*
- *Multiplication within 40 to solve word problems modeled as equal groups or arrays by writing equations to represent equal groups or arrays.*
- *Recognize arithmetic patterns in addition or multiplication tables and explain the pattern using the properties of operations.*
- *Find the area of a rectangular array by counting the number of square units and compare that number with the product of the whole side lengths rectangular array by counting the number of square units and compare that number with the product of the whole side lengths*

#	Student Learning Objectives	NJSLS	Learning Activity
1	Recognize the Commutative, Associative, and Distributive Properties as strategies to add and multiply whole numbers.	**3.OA.5**	• Make a foldable for vocabulary • Students will model properties using counters
2	Solve division of whole numbers by representing the problem as an unknown factor problem.	**3.OA.6**	• Use drawings and equations with a symbol to solve a problem. • Build or draw to represent
3	Multiply and divide using strategies such as the relationship between multiplication and division.	**3.OA.7**	• Identify the numbers in a fact family
4	Use multiplication within 100 to solve word problems modeled as	**3.OA.3**	• Provide an example of how you can use arrays to model

	equal groups or arrays by writing equations to represent equal groups or arrays.		multiplication and find factors ● Draw a number line and demonstrate how you can use it to skip count and find how many in all.
5	Recognize arithmetic patterns in addition or multiplication tables and explain the pattern using the properties of operations.	**3.OA.9**	● Share with a partner how you can use properties to explain patterns on the multiplication.
6	Use the area model (with rectangles) to explain the Distributive Property.	**3.MD.7c**	● Write up a recommendation for using the strategies.
7	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.	**3.MD.7d**	● Demonstrate and describe to a partner how you can break apart a figure to find the area. ● Apply distributive property models to find the area of combined rectangles.

Selected Opportunities for Connection to Mathematical Practices

1. **Make sense of problems and persevere in solving them.**
   SLO #2 In a division problem, analyze given information and the relationship between multiplication and division to solve the problem.
   SLO #7 Use concrete objects or pictures to help conceptualize area models in order to explain the Distributive Property.
   SLO #8 Use concrete objects or pictures to help conceptualize areas of rectilinear figures in order to solve real world area problems.
2. **Reason abstractly and quantitatively.**
   SLO #2 Make sense of quantities and their relationships in division problems that are represented as unknown factor problems.
   SLO #3 Apply both multiplication and division abilities to problems involving quantitative relationships.
   SLO #6 Know and flexibly use different properties of operations to analyze addition or multiplication tables.
3. **Construct viable arguments and critique the reasoning of others.**
   SLO #1 Use previously established definitions to recognize that the Commutative, Associative, and Distributive Properties are strategies to add and multiply whole numbers.
   SLO #6 Use previously established property of operations to establish reasoning about patterns in addition or multiplication tables.
   SLO #6 Justify and be able to explain conclusions made about patterns in addition or multiplication tables.
4. **Model with mathematics.**
   SLO #4 Apply previously learned multiplication skills to solve word problems that involve multiplication, measurement, arrays, & drawings.
   SLO #5 Apply previously learned multiplication and equation writing skills to solve world problems.
   SLO #8 Use and apply previously learned concepts about addition and decomposing

to solve real world area problems.

5. **Use appropriate tools strategically.**
   SLO #4 Use available and appropriate tools such as drawings and arrays, when solving multiplication word problems that require the use of drawings or arrays.
   SLO #7 Consider available and appropriate tools, such as arrays, models, and drawings, when using the area model to explain the Distributive Property.
   SLO #8 Consider available and appropriate tools, such as arrays, models, and drawings, when finding the area of rectilinear figures.
6. **Attend to precision.**
   SLO #6 Precisely communicate arithmetic patterns in addition and multiplication tables.
   SLO #7 Communicate precisely how the area model can illustrate the Distributive Property.
7. **Look for and make use of structure.**
   SLO #6 discern arithmetic patterns in addition or multiplication tables.
8. Look for and express regularity in repeated reasoning.

Unit 2 Essential Questions	Unit 2 Enduring Understandings
● *How might you use multiplication or division to solve problems in the real world?* ● *How are multiplication and division alike?* ● *How can multiplication patterns be used to solve problems?* ● *What strategies aid in mastering multiplication and division facts?*	● *Multiplication and division is the grouping and ungrouping of objects using patterns / properties to solve every day real world problems.* ● *The inverse relationship between multiplication and division can be used to solve unknowns.* ● *Multiplication facts can be deduced from patterns. Patterns are evident when multiplying a number by ten or a multiple of ten.* ● *Multiplication and division are inverses; they undo each other.* ● *Multiplication and division can be modeled with arrays*

Standard Code #	NJ Student Learning Standards
3.OA.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.
3.OA.5	Apply properties of operations as strategies to multiply and divide. Examples: If 6 x 4 = 24 is known, then 4 x 6 = 24 is also known. (Commutative property of multiplication.) 3 x 5 x 2 can be found by 3 x 5 = 15, then 15 x 2 =30, or by 5 x 2= 10, then 3 x 10 = 30. (Associative property of multiplication) Knowing that 8 x 5 = 40 and 8 x 2 = 16, one can find 8 x 7 as 8 x (5 + 2) = (8 x 5) + (8 x 2) = 40 + 16 = 56 (Distributive property). (Students need not use formal terms for these properties)
3.OA.6	Understand division as an unknown factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.
3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40,

	one knows 40 ÷ 5 = 8) or properties of operations.
3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.
3.MD.7c,d	Relate area to the operations of multiplication and addition. **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 × b and a × c. Use area models to represent the distributive property in mathematical reasoning. **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.

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
- Mid-chapter check point
- End of chapter test
- Performance Assessment Task

Formative Assessment

- Lesson check /spiral review
- Quick Checks
- Digital Personal Trainer
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Instructional Materials and Resources

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- www.abcya.com
- www.thinkicentral.com
- Manipulatives (dice, double sided counters, base ten blocks, fraction tiles, pattern blocks, flash cards)
- www.learninggamesforkids.com/3rd-grade-math-html
- Dry erase mat
- Math boards
- Square Tiles
- Addition and multiplication tables

Integration of Technology

- Computers
- SMART Board
- Interactive boards

Curriculum Development Resources

- http://www.state.nj.us/education/cccs/2016/math/standards.pdf
- http://www.state.nj.us/education/modelcurriculum/math/2.shtml

- http://www.state.nj.us/education/cccs/standards/9/9.pdf

Mathematics - Grade 3

Unit 3:
Solve Problems Involving the Four Operations & Understand Fractions as Numbers on the Number Line

21st Century Themes	
E-Encouraged, T-Taught, or A-Assessed in this unit	
	Creativity and Innovation
	Critical Thinking and Problem Solving
	Communication
	Collaboration

Unit 3Learning Targets

Students will be able to…

- *Identify fractions as part of a whole, part of a set, part of an area, and location on a number line*
- *fraction locations on a number line*
- *Represent a fraction on a number line*
- *Use pictures, models, and numbers to identify and record fractions (halves, thirds, fourths, sixths, and eighths*
- *Compare and order fractions with like denominators using models or pictures*
- *Recognize and generate simple equivalent fractions (1/2 = 2/4, 4/6 =2 /3) and explain why the fractions are equivalent using models and pictures*
- *Express whole numbers as fractions (3 = 3/1, 4/4 = 1) and recognize fractions that are equivalent to whole numbers*
- *Compare two fractions with the same numerator or the same size denominator with a visual model or picture Record using , =, and justify with a visual model*
- *Recognize two fractions as equivalent if they are the same size, or the same point on a number line*
- *Tell and write time to the nearest minute to solve word problems with addition and subtraction involving time intervals in minutes*
- *Solve one-step word problems by estimating, measuring, and comparing liquid volumes and masses using appropriate tools and units.*
- *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 parts 1/b e.g., 3 unit fractions of 1/4 add to the quantity 3/4.*

- *Represent the equal parts of shapes as a unit fraction (e.g., a pizza cut into 8 equal slices has 8 slices and each slice has quantity 1/8 of the whole pizza).*
- *Make a drawing of a number line depicting the position of 1/b (with b = 2, 3, 4, 6, or 8).*
- *Make a drawing of a number line depicting a fraction a/b (with a < b and b = 2, 4, 3, 4, 6, 6 or 8).*
- *Find the value of an unknown (expressed as a letter) in an equation that is a representation of a two-step word problem (with any four operations) and assess the reasonableness of the value*

#	Student Learning Objectives	NJSLS	Learning Activity
1	Tell and write time to the nearest minute to solve word problems with addition and subtraction involving time intervals in minutes.	**3.MD.1**	● Demonstrate on an analog clock how you can read time to the nearest minute. ● Complete T chart that list activities associated with a.m. and p.m. and then explain what they mean.
2	Solve one-step word problems by estimating, measuring, and comparing liquid volumes and masses using appropriate tools and units.	**3.MD.2**	● Create a chart to help them figure out how to estimate and measure liquid volume in metric units. ● Use math board to pull apart word problems. ●
3	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*** parts ***1/b;*** e.g., 3 unit fractions of 1/4 add to the quantity 3/4.	**3.NF.1**	● Draw a model and explain to a partner in their own words what equal parts of a whole are. ● Write a fraction and label the numerator and the denominator, and explain to their partner what the top and the bottom of the fraction tells. ● Model and explain how a fraction can tell how many are in part of a group.
4	Represent the equal parts of shapes as a unit fraction (e.g., a pizza cut into 8 equal slices has 8 slices and each slice has quantity 1/8 of the whole pizza).	**3.NF.2**	• Make foldable and paper to manipulate and identify equal parts.
5	Make a drawing of a number line depicting the position of ***1/b*** (with ***b*** = 2, 3, 4, 6, or 8). Represent the	**3.NF.2a**	● Sequence words first, next, then and finally to explain how you can represent and locate

	unit fraction *1/4* on the number line by dividing the number line between 0 & 1 into 4 equal lengths and naming the point at the end of the first length as the position of unit fraction *1/4*; apply the same method for locating the points 1/2, 1/3, 1/5, 1/6, and 1/8 on the number line.		fractions on a number line.
6	Make a drawing of a number line depicting a fraction ***a***/***b*** (with ***a*** < ***b*** and ***b*** = 2, 4, 3, 4, 6, or 8).	**3.NF.2b**	● Sequence words first, next, then and finally to explain how you can represent and locate fractions on a number line. ●
7	Fluently multiply and divide within 50, using the relationship between multiplication and division (e.g., if 44 ÷ 2 equals 22, then 22 × 2 must equal 44).	**3.OA.7**	● Work in teams to design a chart that shows how you can write a set of related multiplication and division facts. ●
8	Find the value of an unknown (expressed as a letter) in an equation that is a representation of a two-step word problem (with any four operations) and assess the reasonableness of the value.	**3.OA.8**	● Work with a partner to explain to another pair how you can solve multiplication problems using the make a table strategy.

Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. **Reason abstractly and quantitatively.**
   SLO #1 Use quantitative reasoning to create a coherent representation of time and time intervals in order to solve problems regarding time.
   SLO #3 Understand and make sense of fraction quantities and their relationship to whole numbers.
   SLO #4 Understand and make sense of fraction quantities in terms of whole shapes.
   SLO #5 Understand and make sense of fraction units as quantities on a number line.
3. **Construct viable arguments and critique the reasoning of others.**
   SLO #1 Use and apply previously stated definitions and assumptions about time to tell, write, and solve word problems involving intervals of minutes on a clock.
   SLO #3 Understand and use stated assumptions and definitions to interpret fractions as parts of wholes.
4. **Model with mathematics.**
   SLO #1 Apply previously learned concepts about time and time intervals to solve word problems involving addition and subtraction of time intervals.
   SLO #2 Apply previously learned concepts about measurement to solve 1-step word problems involving comparing liquid volumes & masses.
   SLO #8 Apply previously learned concepts regarding all four operations to find the unknown value in an equation expressed as a 2-step word problem.

5. **Use appropriate tools strategically.**
   SLO #2 Consider and use available tools, such as drawings, diagrams, and beakers, appropriately when solving word problems comparing liquid volume and mass.
   SLO #5 Consider and use available tools, such as drawings and the number line, when solving problems involving the number line and fraction units.
   SLO #6 Consider and use available tools, such as drawings and the number line, when depicting a fraction.
6. **Attend to precision.**
   SLO #2 Specify units of measurement appropriate to the problem.
7. **Look for and make use of structure.**
   SLO #7 Look for and discern patterns between multiplication and division to fluently solve multiplication and division problems.
8. **Look for and express regularity in repeated reasoning.**
   SLO #8 Evaluate the reasonableness of results from equations derived from two-step word problems.

Unit 3 Essential Questions	Unit 3 Enduring Understandings
● *How can I model and solve problems by representing, adding and subtracting amounts and intervals of time?* ● *How can I measure and estimate volumes and masses using standard units, and how can these be applied to real-life problems?* ● *Where are fractions seen in real life?* ● *Where do we find fractions on a number line?* ● *What does it mean to be close to a whole? What do letters mean in a math problem? How many ways can we use models to represent fractions?*	● *The duration of an event is called elapsed time, and it can be measured and computed using addition and subtraction.* ● *Objects can be measured using standard units.* ● *Everyday objects have a variety of attributes, each of which can be measured in many ways.* ● *Estimation helps us see whether or not our answers are reasonable.* ● *Fractional parts are equal shares of a whole or a whole set.* ● *Fractions are represented between whole numbers on number lines.* ● *When the numerator and denominator are the same number, the fraction equals one whole. The closer the numerator number is to the denominator number, the closer the fraction is to a whole.* ● *Number lines, fraction models (circles, bars, etc.) can be used to compare, order, and demonstrate fraction equivalency.* ● *Numbers are able to represent quantity, position, location, and relationships, and symbols (letters) may be used to express these relationships.*

Standard Code #	NJ Student Learning Standards

3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations.
3.OA.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.
3.NF.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*.
3.NF.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. 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. **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.
3.MD.1	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., by representing the problem on a number line diagram.
3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as beaker with a measurement scale) to represent the problem.
3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
- Mid-chapter check point
- End of chapter test
- Performance Assessment Task

Formative Assessment

- Lesson check /spiral review
- Quick Checks
- Digital Personal Trainer

Instructional Materials and Resources

- Fractions magnets
- Fraction bars
- Go Math Series

- www.ixl.com
- When the Door Bell Rings. By Pat Hutchins
- www.abcya.com
- www.thinkicentral.com
- Manipulatives (dice, double sided counters, base ten blocks, fraction tiles, pattern blocks, flash cards)
- www.learninggamesforkids.com/3rd-grade-math-html
- Dry erase mat
- Math boards
- Square Tiles
- Addition and multiplication tables on games
-

Integration of Technology
• Computers • SMART Board • Interactive boards

Curriculum Development Resources
• http://www.state.nj.us/education/cccs/2016/math/standards.pdf • http://www.state.nj.us/education/modelcurriculum/math/2.shtml • http://www.state.nj.us/education/cccs/standards/9/9.pdf

Mathematics - Grade 3

Unit 4: Build Equivalent Fractions & Compare Fractions and

Apply to Measurement Qualities

21st Century Themes	
E-Encouraged, T-Taught, or A-Assessed in this unit	
	Creativity and Innovation
	Critical Thinking and Problem Solving
	Communication
	Collaboration

Unit 4 Learning Targets

Students will be able to…

- *Locate equivalent (equal) fractions on a number line (with dominators 2, 3, 4, 6, 8).*
- *Generate and explain equivalent fractions using visual fraction models, e.g., interpret 1/4 of a group of 12 pennies as 3 pennies: Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ (see the 4 equal sub-groups as fourths).*
- *Generate and explain whole numbers as fractions, and locate them as fractions on a number line*
- *Compare two fractions with the same numerator or the same denominator using the symbols >, =, <*
- *Create and interpret scaled picture (or bar) graph to represent data in 1- and 2-step word problems*
- *Find the area of a plane figure understanding that unit squares are used to measure area of a rectilinear drawing*
- *Fluently multiply and divide within 50, using the relationship between multiplication and division*

#	Student Learning Objectives	NJSLS	Learning Activity
1	Locate equivalent (equal) fractions on a number line (with dominators 2, 3, 4, 6, 8).	**3.NF.3a**	• Illustrate and write captions showing how you can use models to find equivalent fractions.
2	Generate and explain equivalent fractions using visual fraction models, e.g., interpret 1/4 of a group of 12 pennies as 3 pennies: Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ Ⓟ (see the 4 equal sub-groups as fourths).	**3.NF.3b**	• Find an example in the lesson to show how you can use models to name equivalent fractions.
3	Generate and explain whole numbers as fractions, and locate them as fractions on a number line.	**3.NF.3c**	• List several situations when you might use a fraction greater than 1 or a whole number.
4	Compare two fractions with the same numerator or the same denominator using the symbols >, =, <.	**3.NF.3d**	• Role play the strategy “act it out” to solve comprehension problems.
5	Find the area of a plane figure understanding that unit squares are	**3.MD.5a, b**	• Explore perimeter and area as attributes of polygons.

	used to measure area of a rectilinear drawing.		• Complete a 2 column chart to show how finding the area of a figure differs from the perimeter of a figure
6	Fluently multiply and divide within 50, using the relationship between multiplication and division.	**3.OA.7**	• Work in teams to design a chart that shows how you can write a set related multiplication and division facts. • Use equal groups, factors, or a related multiplication fact to divide.

Selected Opportunities for Connection to Mathematical Practices

1. **Make sense of problems and persevere in solving them.**
   SLO #3 Analyze the relationship between whole numbers and whole numbers as fractions.
   SLO #4 Analyze the relationship among two fractions with the same numerator or denominator in order to compare them.
   SLO #5 Understand and make sense of quantities and their relationship to the area of a plane figure.
2. **Reason abstractly and quantitatively.**
   SLO #2 Understand and make sense of fraction quantities in order to use and interpret visual fraction models.
   SLO #3 Understand and make sense of whole numbers as fractions and the quantities they represent in order to place them on a number line.
   SLO # 4 Understand and make sense of fraction quantities with either the same denominator or numerator in order to compare them.
3. **Construct viable arguments and critique the reasoning of others.**
   SLO #3 Justify and explain conclusions regarding whole numbers as fractions and where they are located on the number line.
4. Model with mathematics.
5. **Use appropriate tools strategically.**
   SLO #1 Consider and use appropriate tools, such as drawings and the number line, when solving problems involving fractions equivalents and the number line.
   SLO #2 Consider and use appropriate tools, such as visual models, diagrams, and drawings, when solving problems involving visual fraction models and equivalent fractions.
   SLO #3 Consider and use appropriate tools, such as drawings and the number line, when generating and locating whole numbers as fraction on the number line.
6. **Attend to precision.**
   SLO #2 Communicate and explain precisely equivalent fractions using visual fraction models.
   SLO #4 State and understand the meaning of the symbols <, >, = symbols when comparing two fractions.
7. **Look for and make use of structure.**
   SLO #6 Look for and discern patterns between multiplication and division.
8. Look for and express regularity in repeated reasoning.

Unit 4 Essential Questions	Unit 4 Enduring Understandings

● *How can two fractions with different numbers equal each other?* ● *How do I use concrete materials and drawings to understand and show understanding of fractions?* ● *How do I explain the meaning of a fraction, and use my understanding to represent and compare fractions?* ● *How do charts, tables, and graphs help you interpret and calculate data?* ● *How do I measure accurately to the nearest half inch and quarter inch*	● *The fraction name (half, third, etc.) indicates the number of equal parts in the whole.* ● *Two halves and three thirds equal the same fraction even though the numbers represented in the fraction are different.* ● *Number lines, fraction models (circles, bars, etc.) can be used to compare, order, and demonstrate fraction equivalency.* ● *Fractional parts are equal shares of a whole or a whole set. The more equal sized pieces that form a whole, the smaller the pieces of the whole become.* ● *When the numerator and denominator are the same number, the fraction equals one whole. When the wholes are the same size, the smaller the denominator, the larger the pieces.* ● *Charts, tables, and graphs can be used to organize and analyze data to help us make valid inferences, decisions and arguments in real world situations.* ● *There are appropriate units of measurement and tools such as rulers) to use in different situations.* ● *Measurement requires repeated measures to ensure accuracy.*

Standard Code #	NJ Student Learning Standards
3.OA.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.
3.NF.3a	Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
3.NF.3b	Recognize and generate simple equivalent fractions, **e.g.**, 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, **e.g.**, by using a visual fraction model.
3.NF.3c	Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.
3.NF.3d	Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons

	with the symbols >, =, <, and justify the conclusions, e.g., by using a visual fraction model.
3.MD.5a	Recognize area as an attribute of plane figures and understand concepts of area measurement. 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.
3.MD.5b	A plane figure can be covered without gaps or overlaps by n squares is said to have an area of n square units.

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
-
-

Formative Assessment

-
-
-

Instructional Materials and Resources

-
-

Integration of Technology

- Computers
- SMART Board
-

Curriculum Development Resources

- http://www.state.nj.us/education/cccs/2016/math/standards.pdf
- http://www.state.nj.us/education/modelcurriculum/math/2.shtml
- http://www.state.nj.us/education/cccs/standards/9/9.pdf

Mathematics - Grade 3

Unit 5: Represent and Solve Problems Involving Multiplication and Division

21st Century Themes

***E**-Encouraged, **T**-Taught, or **A**-Assessed in this unit*

	Creativity and Innovation
	Critical Thinking and Problem Solving
	Communication
	Collaboration

Unit 5 Learning Targets

Students will be able to…

- *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.

- *Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories*
- *Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters*
- *Explain the relationship between tiling/multiplying side lengths to find the area of rectangles.*
- *Use the area model (with rectangles) to explain the Distributive Property.*
- *Recognize area as additive. Find area of rectilinear figures by decomposing them into non-overlapping rectangles and adding the area of non-rectangular parts, apply to solve real world problems*
- *Measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units).*
- *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.*
- *Fluently multiply and divide within 100, using the relationship between multiplication and division*

#	Student Learning Objectives	NJSLS	Learning Activity
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.	**3.G.1**	● Brainstorm and list ways to describe two-dimensional shapes. ● Write instructions for another student on how to use line segments and angles to make polygons.
2	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	**3.MD.8**	● Explore perimeter of polygons by counting units on grid paper. ● Estimate and measure perimeter of polygons using inch and centimeter rulers. ● Develop a concise explanation of how to find the unknown length of side in a plane figure when you know the perimeter.
3	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)	**3.MD.6** **3.MD.7a**	● Estimate and measure area of plane figures by counting unit squares.

	side lengths.		●
4	Create and interpret a scaled picture (or bar) graph to represent data in 1- or 2-stp word problems.	**3.MD.3**	● Illustrate and explain word problem strategies. (act it out, draw a diagram or UPSC)
5	Depict data measured in fourths and halves of an inch with a line plot with scales marked with appropriate units.	**3.MD.4**	● Measure items in the classroom to the nearest inch,1/2 inch and ¼ inch. ●
6	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.NBT.2**	● Count by tens and ones, use a number line, compatible numbers, or use friendly numbers to find sums mentally. ● Explain to a partner the mental math strategy you used to find a sum.
7	Fluently multiply and divide within 100, using the relationship between multiplication and division.	**3.OA.7**	● Work in teams to design a chart that shows how you can write a set related multiplication and division facts. ● Use equal groups, factors, or a related multiplication fact to divide.

Selected Opportunities for Connection to Mathematical Practices

1. **Make sense of problems and persevere in solving them.**
   SLO #1 Use concrete objects or pictures to help conceptualize and understand similar and dissimilar attributes of shapes.
   SLO #4 Interpret graphed data represented in 1- or 2-step word problems.
   SLO #4 Use concrete pictures to help conceptualize data represented by a 1- or 2-step word problem.
   SLO #5 Graph and plot data to depict measurements in fourths and halves of inches.
2. **Reason abstractly and quantitatively.**
   SLO #1 Know and use flexibly the different properties of objects to understand the attributes of shapes.
   SLO #2 Use quantitative reasoning that entails a coherent representation of polygons in order to find the perimeter.
   SLO #2 Know and use flexibly the different properties of operations in order to find the perimeter of polygons.
   SLO #5 Make sense of quantities measured in fractions of an inch and understand the relationship to data on a line plot.
3. **Construct viable arguments and critique the reasoning of others.**
   SLO #1 Understand the assumptions and definitions regarding different attributes and categories of shapes.

4. **Model with mathematics.**
   SLO #2 Use and apply previously learned concepts about the properties of operations to solve perimeter problems.
   SLO #4 Apply previously learned concepts about representing data to create and interpret data represented in word problems.
   SLO #5 Apply previously learned concepts about fractions to depict data measured in fractions and plotted on a line.
5. Use appropriate tools strategically**.**
6. **Attend to precision.**
   SLO #4 Communicate and precisely explain whole numbers as fractions and where they are located on the number line.
   SLO # 5 Specify units of measure on a plotted line and clarify the correspondence of the depicted data with quantities.
7. **Look for and make use of structure.**
   SLO #1 Look for and discern a structure based on different shapes attributes.
   SLO #3 Understand that knowing 8 × 5 = 40, then one also knows that 40 ÷ 5 = 8.
   SLO #5 Look for and discern patterns between multiplication and division.
   SLO #6 Look for and discern a pattern when adding or subtracting within 1000.
   SLO #7 Look for and discern a pattern when multiply or dividing within 100.
8. Look for and express regularity in repeated reasoning.

Unit 5 Essential Questions	Unit 5 Enduring Understandings
● *How can different geometric terms be used to name the same shape?* ● *How is area related to multiplication and addition?* ● *How can two different shapes have the same area but different perimeter?* ● *Why is it important to understand 2 and 3- dimensional figures?*	● *Two and three dimensional objects can be described, classified, and analyzed by their attributes. Different shapes can sometimes be classified into multiple categories.* ● *The attributes of 2 and 3-dimensional figures can help us describe the environment and solve real life problems.* ● *Area is an attribute of 2-dimensional shapes. Using addition, students can count and add the number of same-sized, tiled squares and use these dimensions to multiply the sides to find area.* ● *Different shapes can share the same number of square tiles, but the sides and lengths of the shapes may be different.*

Standard Code #	NJ Student Learning Standards
3.OA.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. Know from memory all products of two 1-digit numbers.

3.NBT.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.
3.MD.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. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*
3.MD.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units -- whole numbers, halves, or quarters.
3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
3.MD.7a	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.
3.MD.8	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
3.G.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.

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
-
-

Formative Assessment

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-
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Instructional Materials and Resources

-
-

Integration of Technology

- Computers
- SMART Board
-

Curriculum Development Resources

- http://www.state.nj.us/education/cccs/2016/math/standards.pdf
- http://www.state.nj.us/education/modelcurriculum/math/2.shtml

- http://www.state.nj.us/education/cccs/standards/9/9.pdf

NJ Student Learning Standards for Mathematics

Grade 3

Operations & Algebraic Thinking

Standards in this domain:

NJSLS.MATH.CONTENT.3.OA.A.1
NJSLS.MATH.CONTENT.3.OA.A.2
NJSLS.MATH.CONTENT.3.OA.A.3

NJSLS.MATH.CONTENT.3.OA.A.4
NJSLS.MATH.CONTENT.3.OA.B.5
NJSLS.MATH.CONTENT.3.OA.B.6
NJSLS.MATH.CONTENT.3.OA.C.7
NJSLS.MATH.CONTENT.3.OA.D.8
NJSLS.MATH.CONTENT.3.OA.D.9

Represent and solve problems involving multiplication and division.

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. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*

3.OA.A.2
Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*

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.[1]

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 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?*

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

3.OA.B.5
Apply properties of operations as strategies to multiply and divide.[2] *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*

3.OA.B.6
Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8*.

Multiply and divide within 100.

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.

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

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.[3]

3.OA.D.9
Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends*.

[1] See Glossary, Table 2.

[2] Students need not use formal terms for these properties.

[3] This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in conventional order when there are no parentheses to specify a particular order (Order of Operations).

Number & Operations in Base Ten

Standards in this domain:

NJSLS.MATH.CONTENT.3.NBT.A.1
NJSLS.MATH.CONTENT.3.NBT.A.2
NJSLS.MATH.CONTENT.3.NBT.A.3

Use place value understanding and properties of operations to perform multi-digit arithmetic.[1]

3.NBT.A.1
Use place value understanding to round whole numbers to the nearest 10 or 100.

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.

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

[1] A range of algorithms may be used.

Number & Operations—Fractions[1]

Standards in this domain:

NJSLS.MATH.CONTENT.3.NF.A.1
NJSLS.MATH.CONTENT.3.NF.A.2
NJSLS.MATH.CONTENT.3.NF.A.3

Develop understanding of fractions as numbers.

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*.

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. 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.
- **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.

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 (equal) if they are the same size, or the same point on a number line.
- **b**. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
- **c**. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram*.
- **d**. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

[1] Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.

Measurement & Data

Standards in this domain:

NJSLS.MATH.CONTENT.3.MD.A.1
NJSLS.MATH.CONTENT.3.MD.A.2
NJSLS.MATH.CONTENT.3.MD.B.3
NJSLS.MATH.CONTENT.3.MD.B.4

NJSLS.MATH.CONTENT.3.MD.C.5
NJSLS.MATH.CONTENT.3.MD.C.6
NJSLS.MATH.CONTENT.3.MD.C.7
NJSLS.MATH.CONTENT.3.MD.D.8

Solve problems involving measurement and estimation.

3.MD.A.1
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., by representing the problem on a number line diagram.

3.MD.A.2
Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[1] Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.[2]

Represent and interpret data.

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. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets*.

3.MD.B.4
Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

3.MD.C.5
Recognize 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.

3.MD.C.6
Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

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 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.
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.

Geometric measurement: recognize perimeter.

3.MD.D.8

Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

[1] Excludes compound units such as cm3 and finding the geometric volume of a container

[2] Excludes multiplicative comparison problems (problems involving notions of "times as much"; see Glossary, Table 2).

Geometry

Standards in this domain:

NJSLS.MATH.CONTENT.3.G.A.1
NJSLS.MATH.CONTENT.3.G.A.2

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 of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

3.G.A.2

Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape*.