GRADE 3 UNIT 2 – PROPERTIES OF OPERATIONS

Established Goals:
Standards

Operations and Algebraic Thinking

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

3.3.OA.5: Apply properties of operations as strategies to multiply and divide

3.3.OA.6: Understand division as an unknown-factor problem

3.3.OA.7: Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations.

3.3.OA.9: Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.

Measurement and Data

3.MD.7c: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.

3.MD.7d: 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.

Transfer

Students will be able to:

How can we determine which of the four operations of arithmetic will help us to solve real world problems?

How can we find the area of over lapping and non-overlapping rectangles?

Meaning

ENDURING UNDERSTANDING	ESSENTIAL QUESTIONS
• Multiplication and Division are related • Various strategies can be used to solve multiplication and division within 100 • Multiplication and or other strategies can be used to solve real world measurement problems involving area	Can you explain and/or demonstrate the relationship between Multiplication and Division? •What strategies can you use to multiply and divide within 100 with accuracy and proficiency? •Evaluate how many different ways can we use multiplication and division help us to solve measurement problems in real life situations

Acquisition

KNOWLEDGE	SKILLS
Students will know how to…	*Students will be skilled at…*
• Strategies for solving Multiplication & Division (Arrays, Equal Groups, • Repeated Addition, Number Patterns, Pictures, Fact Families, Arrays) • Multiplication/Division Fact Families within 40 • Variable N = Unknown • How to Connect Area Models to Multiplication • Variable A = Area • Organize Equal Groups for discovering • Division concepts • How to Use Square Units in Area Models • Length/Width • Rows/Columns • Side • Area Formula = L X W or Counting Square Units	• Solve Multiplication and Division Equations • Fluently Multiply within 40 • Solve real world problems involving multiplication and division within 40 • Explain in how to use arrays to solve multiplication equations • Explain how shared groups help to divide numbers equally • Connect Area Models to Multiplication and Arrays • Find Area of Rectangular Models using Area Formula or Count Square Units within 40 • Use the Commutative, Distributive or Associative Property of Multiplication to solve problems • Use 100 Chart to find patterns in addition and multiplication

	• The Commutative, Associative and Distributive Properties of Multiplication • Rectilinear figures can be decomposed into non-overlapping rectangles	• Decompose rectilinear figures into non-over lapping rectangles to find their area

Vocabulary	Instruction and Pacing (suggested order to teach)	
Multiples Multiplication Factor Quotient Division Dividend Divide Fact Families Factor Multiple Variable Multiplication Product Perimeter Area Length Width Measure Side Square Units Row Column Arrays Pattern Equation Column Rectilinear Figure Decompose Non-Overlapping Rectangle Square Centimeter Square Inches Square Foot Distributive /Commutative & Associative Properties of Multiplication	**Multiplication within 100**	**2 Weeks**
	Division within 100	**2 Weeks**
	Solving for Area using Models	**2 Weeks**
	Fluency (Multiplying/Divide within 50)	**Entire Unit**
	Review and Benchmark Testing	**1 Weeks**
	***One week reteaching in area of need**	**1 week**

Resources

Common Core Standards, New Jersey Model Curriculum

Envisions Math Program Suggested Lessons

Topic 4 & 7 (Continue)

Topic 5 & 6 Multiplication

Topic 8 Division Facts

Topic 14 Area

http://illuminations.nctm.org, https://www.illustrativemathematics.org

http://pearsonrealize.com http://prodigygame.com

Supplemental Resources for Area

Area Units

http://www.njctl.org/courses/math/3rd-grade-math/shapes-and-perimeter/

Area and Perimeter interactive games

http://www.ixl.com/math/grade-3/area-of-figures-made-of-unit-squares

http://www.bgfl.org/custom/resources_ftp/client_ftp/ks2/maths/perimeter_and_area/index.html

http://www.mathplayground.com/area_perimeter.html

Area worksheets http://www.commoncoresheets.com/Area.php

Math games http://www2.learningtoday.com/corporate/math-curriculum.asp

Fact Fluency http://xtramath.org/signin/student

http://www.multiplication.com/

http://njs-main.appspot.com/games-puzzles.html

http://www.coolmath4kids.com/

NCTM Math Illuminations http://illuminations.nctm.org

Illustrative Math https://www.illustrativemathematics.org

Additional Resource for ELL Learners

Problem Solving worksheet

http://media.pearsoncmg.com/curriculum/math/envision2012/pdf/cc4_tt_1.pdf

Multiplication Unitshttp://www.njctl.org/courses/math/3rd-grade-math/multiplication/

Division Unitshttp://www.njctl.org/courses/math/3rd-grade-math/division/

Differentiation and Accommodations

(options)

Provide graphic organizers
Provide additional examples and opportunities for additional problems for repetition
Provide tutoring opportunities
Provide retesting opportunities after remediation (up to teacher and district discretion)
Teach for mastery not test
Teaching concepts in different modalities
Adjust pace and homework assignments

ELL Modifications

- Explain orally and in writing and drawing how to multiply and divide whole numbers, how to find area using L1 and/or gestures, examples and selected technical words
- Use anchor charts for area multiplying and dividing numbers
- Illustrated word wall
- Use sentence frames with multiplication and division word problems
- Use manipulatives- unfix cubes & blocks for area and to show multiplication & division problems
- Act out word problems
- Total physical response- students physically represent area or multiplication & division problems
- Teach Mnemonic/jingles
- ELL scaffolding for Unit 2 3rd http://www.state.nj.us/education/modelcurriculum/math/ellscaffolding/revised/3u2.pdf

21st Century Skills	Critical Thinking, Creative Thinking, Collaborating, Communicating, and Technology Literacy
Instructional Strategies	Fairfield Township School recognizes the importance of the varying methodologies that may be successfully employed by teachers within the classroom and, as a result, identifies a wide variety of possible instructional strategies that may be used effectively to support student achievement. These may include, but not be limited to, strategies that fall into categories identified by the Framework for Teaching by Charlotte Danielson: • Communicating with students • Using questioning and discussion techniques • Engaging students in learning • Using assessment in instruction • Demonstrating Flexibility and Responsiveness
Interdisciplinary	ELA, Science, and Technology

Connections	

Common Misconceptions	Proper Conceptions
Students confuse rows and columns in arrays	Columns are up and down. Rows go across
Students incorrectly draw arrays for the given groups	Arrays are equal groups of rows and columns. Graph paper can help us to organize rows and columns.
Students reverse the numbers when recording the number of rows and columns	The # of rows is the first number in the equations the # in **each** row is the second
Students number the groups rather than the number in each group	Continually checking totals in groups help us to multiply using arrays or pictures
When relating addition to multiplication with repeated addition, students incorrectly record the multiplication sentence	The first number in the equation is how many groups, the second is how many are in each group
For division as sharing students still see the array as a multiplication model	Multiplication and Division are inverse operations. Different models, pictures or groups of objects can be used to show equal groups
Students have difficulty relating division and multiplication	Counters and pictures help to see the connection between multiplication and division
Students confuse Area and Perimeter	Perimeter and Area measure two different measurements of a figure and tell us two completely different pieces of information
Students have difficulty finding area of irregular figures	Breaking models apart or dividing them into smaller parts helps us to find area of larger or irregular figures
Number Sentences and Equations should only have numbers not letters	Letters represent numbers in equations

Performance Task (optional)

Bake Sale

You and your friends are making baked goods for a school bake sale to sell during lunch periods. The baking trays hold different amounts of baked items. You have the following trays to choose from for baking:

Baked Item	# of Trays	# In Each Tray
Blueberry Muffins	**4**	**6**
Strawberry Tarts	**6**	**5**
Granola Bars	**8**	**4**

1 .Choose one baked item that you would like to bake for the bake sale and solve for the following.

- **How many total baked items will you be baking**
- **Draw and label an array to show the total number of baked items in all.**
- **Write a multiplication equation for your array you drew above**
- **Write the related repeated addition equation for your array**

2. The bake sale will be held during two lunch periods 12:00pm and 12:30 pm. You need to have an equal amount for each lunch period. Explain how you would divide the baked items into two equal groups for each lunch period you may redraw your array above or show it on your original array.

Rubric

3 -Student calculates the correct total of baked items, then draws the correct array and writes the multiplication and the related addition equation. Student correctly divides the original array into 2 equal groups or redraws the original array and splits the whole group of baked items into 2 equal groups and writes the correct division equation.

2 –Student draws the correct array and the related multiplication and multiplication equation with the correct total. Student divides the array into 2 equal groups correctly, but does not write the division equation.

1 - Student draws the correct array and writes either a multiplication or addition sentence.

0 - Student does not show evidence of an array or any arrangement of equal groups.

ASSESSMENTS

Suggested Formative Assessment (options)

Problem of the Day

Lesson Quizzes

Exit Ticket

Anecdotal Records (Topic Observation Checklist)

Suggested Summative Assessment (optional)- Grade Level developed Unit/Envisions Topic Tests/ Ed Connect Tests/ State Unit Benchmark/Performance Task