Grade: 3

Module: 3

Title: Measure Mania

Date: 1/6/14

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Source: Adapted from Erickson, 2008.

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Waterbury Public Schools
Mathematics Concept-Based Curriculum
Grade 3 -Module 3
2013-2014

Grade Level: 3

Module Title: Measure Mania

Conceptual Lens: Measurement

Operations

- Addition
- Subtraction
- Multiplication
- Division
- Commutative Property
- Associative Property
- Distributive Property
- Word Problems

Unit Title:

Measure Mania

Measurement

- Time
- Length (Distance)
- Mass/Weight
- Volume/Capacity
- Perimeter
- Area
- Units
- Square units
- Liters
- Grams
- Inch
- Half-inch
- Quarter- inch

Geometry

- Triangles
- Quadrilaterals
- Square
- Rectangle
- Rhombus
- Trapezoid
- Parallelograms
- Attributes
- Sides
- Angles
- Circles
- Composite

Data

- Line Plot
- Scaled Bar Graphs

Source: Adapted from Erickson, 2008.

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Module Title: Measure Mania

Conceptual Lens: Measurement

Unit Overview: In this module students will develop understandings of geometric figures by focusing on identification and descriptions of figures based on geometric properties. Students will understand that shapes in different categories may share attributes and those attributes can define a larger category. Rhombi, rectangles, and squares have four sides and are all called quadrilaterals. Students will partition shapes into equal parts of halves, fourths, and eights and recognize the partitioned parts have the same area. Students will recognize area as an attribute of 2-dimensional regions and find the perimeter of polygons using addition. Data will be collected to create bar graphs, pictographs, and line plots. In this module, students will tell and write time to the nearest minute and solve elapsed time. Students will also explore units of mass and volume.

Technology Integration: (What skills do teachers or students need to use this? How much knowledge or familiarity with the use of the Internet and tools are necessary?)

Teachers should be proficient utilizing interactive whiteboard technology and internet resources such as ThinkCentral.com and other websites that provide interactive math tools. Also, teachers should demonstrate knowledge of administering online testing, interpreting data, and selecting computer based activities for students.

Standards addressed in this unit:

New	3.G.2					
	3.MD.2	3.MD.4	3.MD.5	3.MD.6	3.MD.7	3.MD.8
Repeat	3.OA.3	3.OA.7				
	3.MD.1	3.MD.3				

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Generalizations	Guiding Questions *(F = factual; C = conceptual; P = philosophical)*
1. Solving elapsed time problems involves composing and decomposing units of hours, minutes, and seconds.	a. What does it mean to tell time to the nearest minute? (C) b. How many minutes are in an hour? Seconds in a minute? (F) c. What strategies can I use to measure time intervals in minutes? (F) d. How can hours be decomposed to help measure time and solve elapsed time problems? (F) e. How can I number lines to determine how much time has passed between two events? (F) f. When do you regroup in problems involving time? (F) g. What part does elapsed time play in our daily life? (P) h. How can we determine the amount of time that passes between two events? (F) i. Why do we measure time? (P) j. How do you read an analog clock to the nearest minute? (C) k. What do the revolutions of the second and minute hands communicate? (C) l. How are addition and subtraction problems about time similar/different from addition and subtraction problems not involving time? (C)
2. Shapes can be assigned to more than one category based on their attributes.	a. What are attributes? (F) b. What makes shapes different from each other? (F) c. How can you group certain shapes together? Why do they belong together? (F) d. How can a shape be described? (F) e. What attributes are typically used to categorize shapes? (F) f. Why do some shapes belong in more than one category? (C) g. Which shapes have parallel sides? (F) h. Which shapes have right angles? (F) i. How do parallel and perpendicular sides help to classify shapes? (C) j. What is a quadrilateral? (F) k. Which quadrilaterals have multiple names? (F) l. How do you know if a shape is a quadrilateral? (F) m. How can shapes share attributes? (F)
3. Shapes can be partitioned into equal fractional parts. *Focus is on equal areas and naming unit fractions. Fractions will be explored in depth in Module 4.	a. What is partitioning? (F) b. How do you represent an equal part of a shape using a unit fraction? (C) c. How does the area in one section of an equally partitioned shape compare to the areas of the other sections? (C) d. What is a unit fraction? (F) e. How can you partition this shape in ___ equal parts? (F) f. How does partitioning a whole into equal parts result in fractions? (C) g. Why and when do we need to break wholes into parts? (C) h. How does the number of equal parts of a figure relate to the fraction? (C) i. How does the area of the fractional part change when the area of the whole changes? (C)

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4. Standard units provide people with a common understanding of the quantities involved when measuring mass and volume.	a. What would happen if we did not have standard units of measurement for volume or mass? (P) b. What is a standard unit? (F) c. Why are units important in measurement? (C) d. What does liquid volume/mass of an object tell me? (C) e. What tools are used to measure volume/mass? (F) f. What are some ways I can measure volume/ mass? (F) g. What strategies can I use to help me solve problems involving volume/mass?(C) h. How are benchmarks used to measure volume/mass? (C) i. What estimation strategies are used in measurement? (C) j. How can measuring one object with different size units emphasize the relationship between smaller units to larger units in the same system? (C)
5. Square units represent a form of measurement used to determine the area of a rectangle.	a. What methods can I use to determine area?(F) b. What operations are involved when solving area problems? (F) c. Why is it important to know about area in real life? (C) d. How would decomposing a rectilinear figure into two rectangles be helpful in finding the area? (C) e. How are area and perimeter of a shape related? (C) f. How many different rectangles can you make with an area of ___ units?(F) g. How can an array be used to prove that the area of a rectangle equals length times width? (C) h. How can I use what I know about the relationship between multiplication and division to determine the missing side of a rectangle when given the area and one side? (C)
6. Linear measurement to fractional units results in more precise measurements.	a. What three unit fractions are represented on this ruler? (F) b. How do smaller units on a ruler lead to more precise measurements? (C) c. How are rulers and number lines alike? (C) d. Why do we measure in fractional units? (C) e. What methods can I use to determine perimeter? (C) f. Why is it important to know about perimeter in real life? (C)
7. Pictographs, bar graphs, and line plots represent sets of data used in problem solving.	a. What is data? (F) b. Do data displays simply help us understand information, or can they lead/mislead us to particular conclusions? (C) c. Why do we use graphs to represent data? (C) d. How does interpreting a graph help you learn more about the data collected? (C) e. What can we do with the data we collect and display? (C) f. How can I demonstrate my understanding of the data? (C) g. Why is it sometimes necessary to use skip counting increments on a given scale? (C) h. How do I decide which increments to use for my scale? (F)

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Critical Content What Students Will Know	Key Skills What Students Will Be Able to Do
Operations • Apply all four operations to problem solving in context. • Use the properties to solve word problems • Apply the relationship between multiplication and division to solve area of a rectangle problem Measurement • Time • Linear measurements • Perimeter • Area • Use grams and liters to solve volume and mass problems • Apply the formula for area of a rectangle Geometry • Use attributes to analyze and sort shapes • Partition shapes into fractional parts • Subdivide a rectilinear figure into two rectangles Data • Use line plots to display measurement data • Bar graphs • Pictographs	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.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.* 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).[6] 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. [7] [6] Excludes compound units such as cm^3 and finding the geometric volume of a container. [7] Excludes multiplicative comparison problems (problems involving notions of "times as much"; see Glossary, Table 2). 3.MD.4 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* 3.MD.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.6. Measure areas by counting unit squares (square cm, square m, square in,

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	square ft, and improvised units). 3.MD.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. 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.

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Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)_	Resources
Spiral throughout this module.	**Model the process of solving measurement word problems involving all four operations. Move from single step to multi-step.** • **Problems should involve unknowns in different positions.** • **Measurements should be given in the same units without fractions.** **(Generalizations: 1, 4, 5, 6, 7)** **(3.MD.1 3.MD.2 3.MD.7 3.MD.8)** Introduce and explain George Polya's Problem-Solving Method: 1. Understand the problem. 2. Devise a plan. 3. Carry out the plan. 4. Look back and evaluate the answer. ** ***All learning experiences allow for student discourse.***	Acuity District Pre-Assessment Required Performance Task **Lisa's Playroom** (End of Module) Teacher Observation Teacher Assessments Math Expressions *Formative Assessment:* *Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Unit 8, 9, 11, 13 : refer to *Differentiated Instruction* pages in T.E. or on Think Central • RTI • Challenge Cards Intervention: *RTI Intervention Books* Extension: *Online Destination Math*	Grade 3 Unpacked Standards ThinkCentral LearnZillion Video Lessons: Math Expressions © • Unit 8, 9, 11, 13 Hands-On Standards© Common Core Edition, Grade 3 ETA hand2mind@2012

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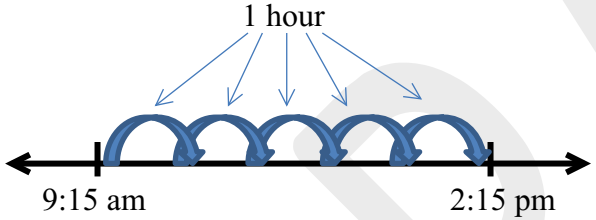
Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)	Resources
Days 1-4 and spiral	**Model telling time to the nearest minute and measuring time elapsed time using clocks, drawings, number lines and word problems (Generalization 1)** **(3.MD.1)** *continued from Module 2 Have students draw analog and write digital times to the nearest minute. Have students use an open number line to measure time intervals and solve elapsed time situations (word problems).  ** ***All learning experiences allow for student discourse.***	Teacher Observation Teacher Created Common Formative Assessments Math Expressions *Formative Assessment: Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. Intervention: *Online Soar to Success* Extension: *Online Destination Math*	Grade 3 Unpacked Standards Math Expressions Unit 10 Hands-On Standards Common Core Gr.3, ETA hand2mind © 2012 eduplace.com Learnzillion Videos www.thinkcentral.com • iTools Primary • Mega Math Module 3 Lessons (see attatched): *Let's Talk About Time* *Time to Get Clean* *Daily Schedule* Engage NY Module 3

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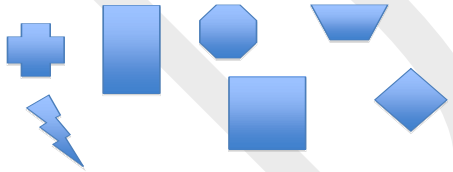
Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)	Resources
Days 5-10	**Analyze two dimensional shapes, using concrete objects and pictorial representations (i.e. attribute blocks, pattern blocks, real-world examples, drawings etc.). (Generalization 2, 7) (3.G.1)** Sort shapes into groups based on specific attributes. Create a pictograph or bar graph of the total number of objects. (G 2 and 7) Provide students with shapes and have students identify defining attributes. Choose two different attribute blocks and draw the shapes. Write about the ways the two shapes are alike and different. Give students a set of quadrilaterals. Sort the shapes into squares, rectangles, trapezoids, parallelograms, and rhombi. Discuss the size and orientations of the various shapes, emphasizing the shapes are not affected by the size and orientation. Create a bar or pictograph to represent the number of shapes in each category. Provide students with a variety of shapes. Have them circle those fitting a particular attribute, i.e. Quadrilaterals.  Have students write riddles about quadrilaterals to use with partners. For example, I have one set of parallel sides. What quadrilateral am I? ***All learning experiences allow for student discourse.**	Teacher Observation Teacher Created Common Formative Assessments Math Expressions *Formative Assessment:* *Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. Intervention: *Online Soar to Success* Extension: *Online Destination Math*	Grade 3 Unpacked Standards Math Expressions Unit 10 Hands-On Standards Common Core Gr.3, ETA hand2mind © 2012 eduplace.com Learnzillion Videos www.thinkcentral.com • iTools Primary • Mega Math Module 3 Lessons (see attatched): *Shape Sorter* *What Makes a Shape?* *Quadrilateral Challenge* Engage NY Module 4

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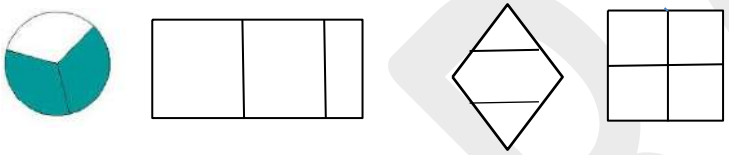
Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)	Resources
Days 11-14	**Partition shapes into two, four, or eight equal shares using concrete objects, (i.e. geoboards, fraction circles, paper cut outs, color tiles, etc…) Then, move to pictorial representations, (i.e. virtual manipulatives, drawings, etc…)** **(Generalization 3) (3.G.2)** *Fraction concepts will be covered in depth in Module 4 Provide students with paper cutouts of circles and rectangles. Ask students to fold into a given number. Have students describe the equal shares relating them to unit fractions and area. Provide students with examples and non- examples of equally partitioned shapes. Ask students to determine which figures are equally partitioned and justify their thinking.  Provide students opportunities to reason about the area of fractional parts . For instance is $\frac{1}{2}$ of a large circle the same area as $\frac{1}{2}$ of a small circle? ** ***All learning experiences allow for student discourse.***	Teacher Observation Teacher Created Common Formative Assessments Math Expressions *Formative Assessment:* *Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Unit 11 : refer to *Differentiated Instruction* pages in T.E. or on Think Central • RTI • Challenge Cards Intervention: *RTI Intervention Books* Extension: *Online Destination Math*	Grade 3 Unpacked Standards ThinkCentral Math Expressions © • Unit 11 Hands-On Standards© Common Core Edition, Grade 3 ETA hand2mind@2012

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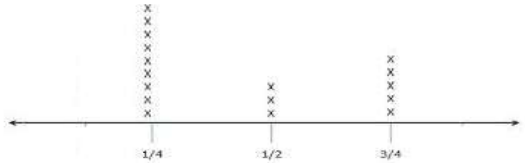
Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)_	Resources
Days 15-20	**Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Display the data by constructing a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, quarters (Generalization 6) (3.MD.4)**  ** ***All learning experiences allow for student discourse***	Teacher Observation Teacher Assessments Math Expressions *Formative Assessment: Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Unit 13, : refer to *Differentiated Instruction* pages in T.E. or on Think Central • RTI • Challenge Cards Intervention: *RTI Intervention Books* Extension: *Online Destination Math*	Grade 3 Unpacked Standards Math Expressions Unit13 Hands-On Standards Common Core Gr.3, ETA hand2mind © 2012 eduplace.com Learnzillion Videos www.thinkcentral.com • iTools Primary • Mega Math Engage NY Module 4

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<table>
<tr><th>Suggested Timeline</th><th>Learning Experiences</th><th>Assessments</th><th>Differentiation (For Support and Extension)_</th><th>Resources</th></tr>
<tr>
<td>Days 21-25</td>
<td>
Calculate perimeter using concrete objects, pictorial representations, and word problems (Generalization 6) (3.MD.8)

Relate perimeter to addition.

Relate perimeter to subtraction by solving for a missing side given the perimeter.

Develop understanding of the formula for the perimeter of a rectangle. P = (2 x length + 2 x width) Have students work with a partner. Draw 6-10 rectangles of different sizes on cm grid paper. Collect data on the base, height, and perimeter of each rectangle and record this information on a table.

<table>
<tr><th>Rectangle</th><th>Length of Base</th><th>Height</th><th>Perimeter</th></tr>
<tr><td>A</td><td></td><td></td><td></td></tr>
<tr><td>B</td><td></td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td><td></td></tr>
</table>
*Be sure to discuss the patterns noticed in the chart

Given a perimeter and a base or height, students find the missing length or width. Have students justify and communicate their solutions using words, diagrams, pictures, and numbers.

** All learning experiences allow for student discourse.
</td>
<td>
Teacher Observation

Teacher Created Common Formative Assessments

Math Expressions
Formative Assessment: Check Understanding
Quick Quiz
Unit Tests
</td>
<td>
Math Expressions

Unit 8, 9 : refer to Differentiated Instruction pages in T.E. or on Think Central

• RTI
• Challenge Cards
Intervention: RTI Intervention Books

Extension: Online Destination Math
</td>
<td>
Grade 3 Unpacked Standards

ThinkCentral
Perimeter Videos

LearnZillion Video Lessons:

Math Expressions ©
Unit 8, 9
Hands-On Standards©
•
Common Core Edition, Grade 3
ETA hand2mind@2012

Module 3 Lessons (See Attached)
Rectangles Rule
</td>
</tr>
</table>

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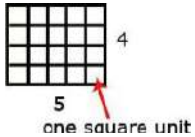
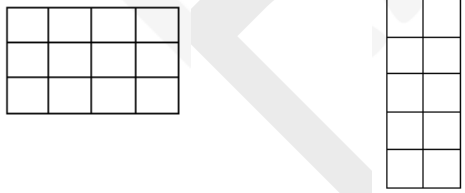
Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)	Resources
Days 26-32	**Measure area in square units using concrete objects, (i.e. fraction circles, paper cut outs, color tiles, etc…) Then, move to pictorial representations, (i.e. virtual manipulatives, drawings, etc…) (Generalization 5) (3.MD.5 ,3.MD.6)** Using a geoboard, have students make a one-by-one square. Explain that this square has an area of one square unit. Next, have students make a shape that has an area of 2 square units. Move on to shapes with larger areas.  Have students use color tiles to measure the area of a given rectangle. Record findings using pictures, numbers and words. Give students a bag of square colored tiles. Have students build a given area. Note that different side lengths may have the same area.  Using graph paper, have students draw a shape with an area of ___ square units. ** ***All learning experiences allow for student discourse.***	Teacher Observation Teacher Created Common Formative Assessments Math Expressions *Formative Assessment: Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Unit 8: refer to *Differentiated Instruction* pages in T.E. or on Think Central • RTI • Challenge Cards Intervention: *RTI Intervention Books* Extension: *Online Destination Math*	Grade 3 Unpacked Standards ThinkCentral LearnZillion Video Lessons: Area Videos Area Videos 2 Math Expressions © • Unit 8 Hands-On Standards© Common Core Edition, Grade 3 ETA hand2mind@2012 Module 3 Lessons (See Attached) *Oops! I'm decomposing!* *Multiplication With Base-Ten Blocks* *How Big is a Desk?*

Source: Adapted from Erickson, 2008.

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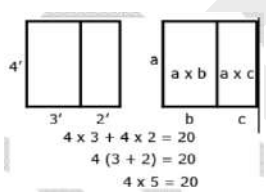
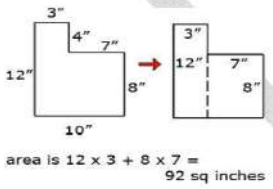
Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)_	Resources
Days 33- 38	**Relate area to multiplication and addition using concrete objects, pictorial representations, and finally the formula for rectangles (Generalization 5) (3.MD.7)** Have students work with a partner. Draw 6-10 rectangles of different sizes on cm grid paper. Collect data on the base, height, and area of each rectangle and record this information on a table. *Be sure to discuss the patterns noticed in the chart (i.e. multiplication) Have students measure side lengths of classroom items (books, desk, etc.) to the nearest whole number and multiply find the area. Model how to partition shapes in to rectangles to find the total area of the shape.   	Teacher Observation Teacher Created Common Formative Assessments Math Expressions *Formative Assessment: Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Unit 8, 9 : refer to *Differentiated Instruction* pages in T.E. or on Think Central • RTI • Challenge Cards Intervention: *RTI Intervention Books* Extension: *Online Destination Math*	Grade 3 Unpacked Standards ThinkCentral LearnZillion Video Lessons: Area Videos Math Expressions © • Unit 8, 9 Hands-On Standards© Common Core Edition, Grade 3 ETA hand2mind@2012

Rectangle	Length of Base	Height	Area
A			
B			
C			

Source: Adapted from Erickson, 2008.

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	Model solving area problems using the formula- length *x* width (base *x* height) ** ***All learning experiences allow for student discourse.***			

Suggested Timeline	Learning Experiences	Assessments	Differentiation (For Support and Extension)	Resources
Days 39-43	**Solve problems involving liquid volume and mass using measurement tools and pictorial representations** **(Generalization 4) (3.MD.2)** Model the concept of liter and milliliter using liquid in a soda bottle. Give students a variety of objects that weigh different amounts. Have them first compare objects and make a "human balance" (e.g., Which is heavier?), and then give them a balance scale. • Display the following amounts of water; 1 mililiter,1 liter. Explain to students what a kiloliter would look like (a dunk tank, 1000 L bottles, etc.) • Ask the students to identify containers that would hold 1 mL, L, kL Provide a pictorial representation of several containers. Have students tell how much is in each. Ask – If contents of container 1 are poured into 3, how much will be in container 3? ** ***All learning experiences allow for student discourse.***	Acuity District Post-Assessment Teacher Observation Teacher Created Common Formative Assessments Math Expressions *Formative Assessment: Check Understanding* *Quick Quiz* *Unit Tests*	Math Expressions Unit 13, : refer to *Differentiated Instruction* pages in T.E. or on Think Central • RTI • Challenge Cards Intervention: *RTI Intervention Books* Extension: *Online Destination Math*	Grade 3 Unpacked Standards ThinkCentral LearnZillion Video Lessons: Volume and Mass Videos Math Expressions © • Unit 13 Hands-On Standards© Common Core Edition, Grade 3 ETA hand2mind@2012 Module 3 Lessons (See Attached) *Fill It Up* *Worth the Weight*

Source: Adapted from Erickson, 2008.

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Waterbury Public Schools
Mathematics Concept-Based Curriculum
Grade 3 -Module 3
2013-2014

Culminating Unit Assessment

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Section Break-Supplemental Lessons

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