

2013

How Do We Measure?

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UNDERSTANDING BY DESIGN

Unit Cover Page

Unit Title: How Do We Measure?

Grade Level: Kindergarten

Subject/Topic Area(s): Math: Measurement

Designed By: Kyla McGlynn

Time Frame: 4 weeks

School District: East Central ISD

School: Pecan Valley Elementary

School Address and Phone: 3966 Southcross, San Antonio, TX 78222, (210) 333-1230

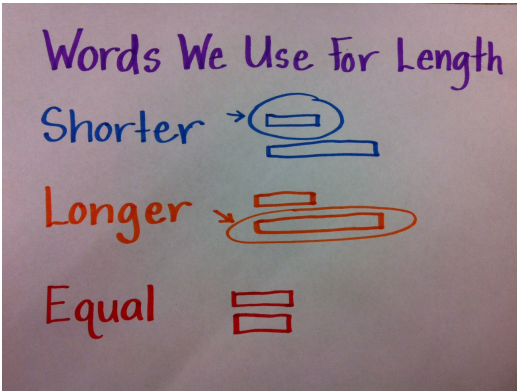
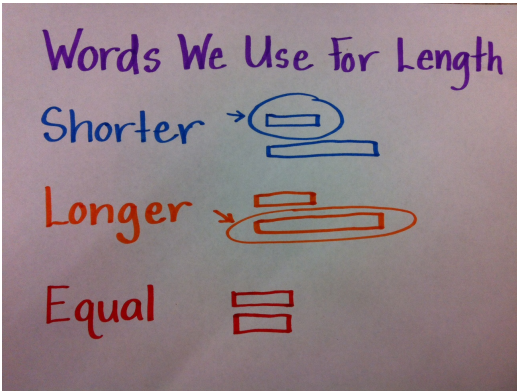
Brief Summary of Unit (Including curricular context and unit goals):

Students directly explore and compare the attributes of length, area, weight, and capacity using a variety of informal measurement instruments correctly and meaningfully. Students describe comparisons of each attribute using proper vocabulary.

How Do We Measure?

Stage 1 – Desired Results		
<p>(K.10) Measurement. The student directly compares the attributes of length, area, weight/mass, capacity, and/or relative temperature. The student uses comparative language to solve problems and answer questions. The student is expected to:</p> <p>(A) compare and order two or three concrete objects according to length (longer/shorter than, or the same);</p> <p>(B) compare the areas of two flat surfaces of two-dimensional figures (covers more, covers less, or covers the same); revised August 2012</p> <p>(C) compare two containers according to capacity (holds more, holds less, or holds the same);</p> <p>(D) compare two objects according to weight/mass (heavier than, lighter than or equal to); and</p>	Transfer	
	<p><i>Students will independently use their learning to...</i></p> <ul style="list-style-type: none"> -find different ways to compare the attributes of length, area, weight, and capacity in a variety of objects. -use different informal units of measurement correctly and meaningfully. 	
	Meaning	
	<p>Understandings <i>Students will understand that...</i></p> <ul style="list-style-type: none"> -measurement involves comparing an attribute of an object with a unit or another object that has the same attribute. - it is important to compare objects in an equal manner. 	<p>Essential Questions</p> <ul style="list-style-type: none"> -How many ways can you measure an object? -What words can we use to describe how we compared two objects? -What happens when we compare two objects?
Acquisition		
<p>Knowledge <i>Students will know...</i></p> <ul style="list-style-type: none"> -how to compare length, area, weight or capacity using informal measurement systems. -how to use the proper vocabulary to compare each attribute of an object. 	<p>Skills <i>Students will...</i></p> <ul style="list-style-type: none"> -determine the attribute to be measured -select an informal unit to measure - directly compare units by filling, covering, or matching the attribute of the object being measured. 	
Stage 2 – Evidence		
CODE	Evaluative	

(M or T)	Criteria (for rubric)	
	<p>Accurately comparing objects for each attribute.</p> <p>Using appropriate vocabulary for comparison of each attribute.</p>	<p>Performance Task(s) <i>Students will demonstrate meaning-making and transfer by...</i></p> <p>You are going on a picnic with the principal! Listen carefully to his instructions; he only wants you to bring certain things on this picnic.</p> <ol style="list-style-type: none"> 1. The principal wants you to take the longest vegetable on the trip. Put the celery, carrots and pepper slice in order from shortest to longest. Choose the longest vegetable and explain your reasoning. (Note proper vocabulary: shorter, longer, same/equal). 2. The principal wants some candy, but not too much, because he is trying to be healthy. Compare the area of the candy bars and put the candy that covers the least in the picnic basket. (Note proper vocabulary: covers more, covers less, covers the same/covers equally). 3. It is getting warm outside and the principal will be really thirsty. Compare the capacity of these cups. Decide which one will be for the principal, which will for you. (Note proper vocabulary: holds more, holds less, holds the same). 4. The principal doesn't want all the picnic items to be too heavy for you to carry. Compare the bags of crackers and decide which weighs less. (Note proper vocabulary: heavier, lighter, the same) <p>(Informal units will be available (colored tiles, beans, toothpicks, unifix cubes. Offer informal units for each attribute and note consistent use of informal units when comparing the same attribute. If students don't offer vocabulary, note and guide students to use proper vocabulary.)</p> <p>----- ----- Other Evidence (e.g., formative) - -</p>
Stage 3 – Learning Plan		
CODE (A, M, T)	<p style="text-align: center;">Pre-Assessment</p> <p style="text-align: center;"><i>How will you check students' prior knowledge, skill levels, and potential misconceptions?</i></p> <p style="text-align: center;">Observe and record statements about what it means to compare. Check understanding with examples and non-examples of accurately comparing two objects.</p>	

	<p>Learning Activities Introduction into Measurement</p> <p><i>What does it mean to compare? Define and discuss. What happens when we compare two things? What kinds of objects can we compare?</i> Record students' answers on chart paper or in personal notebook as pre-assessment.</p> <p>Give examples and non-examples of comparing. Let students give a thumbs up and thumbs down for as another pre-assessment.</p> <p>Length Day 1 :Length Hunt Materials: pencils, math journals, chart paper</p> <p>Ask students to find something that is shorter than their pencil, and longer than their pencil. Observe their current understandings.</p> <p>Tell students that we use certain words when we want to compare objects by length, or how long they are. Create a vocabulary anchor chart titled <i>Words We Use for Length</i> and add, show, and explain the words shorter, longer, and equal/same. Draw a picture to match.</p> 	<p>Observation</p> <p>Thumbs up, thumbs down</p>
A	<p>Ask students to find something that is shorter than their pencil, and longer than their pencil. Observe their current understandings.</p> <p>Tell students that we use certain words when we want to compare objects by length, or how long they are. Create a vocabulary anchor chart titled <i>Words We Use for Length</i> and add, show, and explain the words shorter, longer, and equal/same. Draw a picture to match.</p> 	<p>Observation</p>
M	<p>Students find and record 3 items that are longer than their pencil and 3 items that are shorter than their pencil. They find one item that is equal to their pencil and record in math journal, with labels.</p> <p>Allow students to share findings with partners and class. Ask them to use the words from our anchor chart <i>Words We Use For Length</i>.</p> <p>Day 2: Comparing Names Materials: Chrysanthemum (Kevin Henkes), grid paper for name writing, large construction paper or chart</p>	<p>Observation</p> <p>Discussion and observation</p>

<p>A, M</p> <p>A</p> <p>M</p> <p>T</p>	<p>paper for graph.</p> <p>Read <i>Chrysanthemum</i>. Point out parts in the story where the main characters name is compared to others. Tell students we will compare the lengths of names, just as the characters did in <i>Chrysanthemum</i>. Students write own names on grid paper, graph as a class and compare. Use vocabulary shorter than, longer than, equal to.</p> <p>Discuss: Students share with group or partner a name that is shorter, longer, and equal to their names. How do they know that? <i>How does a graph help us compare length?</i></p> <p>Day 3: Materials: ruler, yardstick, tape measure, unifix cubes, paper clips, blocks, pieces of string</p> <p>Introduce the concept of using informal units to measure by reading the story <i>Twelve Snails to One Lizard</i> (Susan Hightower). Discuss: <i>Can you think of a situation like the one in the book where you need to know how long something is? What we would normally use to measure these things?</i> (Show some examples: ruler, yardstick, tape measure)</p> <p>Explain that we want to measure objects in our classroom, but we aren't allowed to use any "standard" measurement tools (just like in the story).</p> <p>Demonstrate by measuring the length of some easily accessible object (like the overhead projector) using unifix cubes. Place the cubes side by side, have the children help you count them, and record the number.</p> <p>Split children into small groups to measure the length of three different objects. They can use any of the provided units (unifix cubes, blocks, paper clips, shoes, hands, pieces of string, etc.) as long as each unit is the same size.</p> <p>Tell students to record items in math journal and label. Model an example on overhead. Students share with partner or class when finished.</p> <p>Discuss: <i>Why is it a good idea to use small units to measure? What two objects look really close in length?</i></p> <p>Day 4: How Long Is the Teacher? Materials: Laminated footprints, drinking straws, plastic water bottles, pipe cleaners, popsicle stickers,</p>	<p>Discussion, observation, graph</p> <p>Discussion, observation</p> <p>Math journals, discussion</p>
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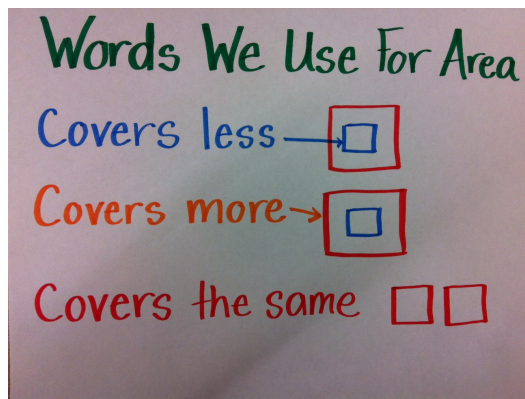
T	<p>markers, chart paper.</p> <p>Pose situation: <i>The principal has just asked me an important question. He needs to know how tall I am.</i></p> <p>Students decide how to measure the teacher and write a note to the principal explain how tall their teacher is and how they decided.</p> <p>Let students discuss how you should be measured and suggest lying down to make the measuring easier. Split students into pairs, and explain that they can pick one unit to measure with from a selection (laminated footprints, drinking straws, plastic water bottles). Record each pairs' measurements on chart paper.</p> <p>Discuss: <i>How did different children measure? Did students who measured with different items get the same number? Did students who did measure with the same items get the same number? Why, why not? What happens when you don't measure in a straight line or you overlap?</i></p> <p>Students dictate letter to principal explaining teacher's height.</p>	<p>Observation</p> <p>Discussion</p>
A	<p>Day 5: Sorting Stations Materials: variety of small objects to measure, unifix cubes, math journals or whiteboards and dry erase markers.</p> <p>In small groups, students participate in comparing length stations. They can record in math journals or on white boards with dry erase markers.</p> <p>Station 1: Sorting objects as longer, shorter or equal to a reference object.</p> <p>Station 2: Ordering a selection of objects from shortest to longest.</p> <p>Station 3: Measuring a selection of objects using unifix cubes.</p>	<p>Observation</p>
M	<p>Area Day 1: Let's Write A Note. Materials: chart paper, three different sized sticky notes, math journals, variety of books from class library.</p> <p>Present problem: Teacher wants to write a note to another teacher. She has a lot to say. Which sticky note should she use? Show students the question and three sticky notes that are easily comparable (fit completely inside each</p>	<p>Observation</p> <p>Discussion</p>
A		

other).

Discuss and record. *Which sticky note would be best for writing a long note, and why?* Introduce the word area and explain that it is the space inside a region.

Send students to find a book from the class library that has a larger area than their math journals, then one that has a smaller area. Record book title and label. Students share with partners or class.

Create a vocabulary anchor chart titled *Words We Use for Area* and add, show, and explain the words covers more, covers less, covers the same. Draw a picture to match.



A

Day 2: Let's Compare Squares.

Materials: Squares of many sizes (at least one for each student), chart paper, post its of different sizes, coffee filter, cupcake liner, marker box, crayon box

A

Compare cupcake liner and a coffee filter. *When I put the cupcake liner on top of the coffee filter, I can still see some of the coffee filter. But, if I put the coffee filter on top of the cupcake liner, I cannot see any of the cupcake liner. That shows me that the cupcake liner covers less area and the coffee covers more area.*

A

Make chart, students compare more objects (box of crayons vs. box of markers, cupcake liner, coffee filter, post its) and sort into covers more, covers less.

Give each a square and a partner. They compare areas of squares and determine if their squares cover more, less or are equal to their partners. Switch partners a few times to practice comparison.

A

T

Day 3: Cheezy Area

Observation

	<p>Materials: Large box of cheez-its, Cheezy Area worksheet</p> <p>Model how to measure the area of each shape on Cheezy Area worksheet using Cheez-its and record number. Allow students to complete worksheet using their own set of Cheez-its to measure area and record.</p> <p>Discussion: <i>Which shape has the most area or covers the most? Which shape has the least area or covers the least? Do any of the shapes cover the same area?</i></p> <p>Make sure students use proper vocabulary to compare each shape.</p> <p>Day 4: Explore Area</p>	<p>Discussion, observation</p>
M,T	<p>Materials: tiles, cubes, playing, cards, dominoes and sticky notes as informal measuring units; games, books, puzzles, journals, folders as items to measure.</p> <p>Students will choose different objects from around the room and measure their areas with different non-standard units. Model how to estimate or make a good guess, then cover the surface of an object with one of the units available.</p>	
M	<p>Discussion: <i>Which is a better choice to measure when measure this object?—bigger units or smaller units? Why? If you run out of tiles, can you finish measuring with playing cards? Why or why not? If Student A measured his book with cards and Student B measured his book with sticky notes, can you compare the measurements? Why or why not?</i></p>	<p>Discussion, observation</p>
	<p>Day 5: Who Has The Bigger Candy Bar? Materials: Who Has The Bigger Candy Bar worksheet, color tiles</p> <p>Present problem: <i>Two teachers are arguing who has a bigger candy bar. What do you think? How can you know for sure?</i></p> <p>Let students use color tiles to measure the area of each candy bar outline. Observe and check that they are measuring accurately. They will find that both candy bars have the same area.</p>	<p>Who Has the Bigger Candy Bar Graphic Organizer</p>
M	<p>Discuss: <i>Can we always tell by looking at a surface which has a bigger or smaller area? How do we measure when the shapes are different?</i></p>	

Capacity

Day 1: What's the Best Way to Fill My Pool?

Materials: photo of kiddie pool, solo cup, bucket, Dixie cup, plastic 12oz water bottle, chart paper, math journals.

Pose question: *I just got a new pool for the summer and I want to fill it with water. (Show photo or slide of kiddie pool). Which container would I use if I wanted to fill up my pool? (Show small plastic cup and bucket).*

M

Partner Share. Listen to discussions and allow a few students to share and record answers. Conclude that the bucket holds more water, so it would be best for filling up a pool. The process will go more quickly.

Explain that capacity is how much something holds.

Show students some containers, have them place them in order (as a class) from which would hold the least amount of water to the most amount of water (Dixie cup, regular plastic bottle, large bucket). What did they use to decide that? (Eyes, by looking).

Students draw and label something in their math journals that they think can hold more than the water bottle.

Create a vocabulary anchor chart titled *Words We Use for Capacity* and add, show, and explain the words holds more, holds less and holds the same. Draw a picture to match.



A, M

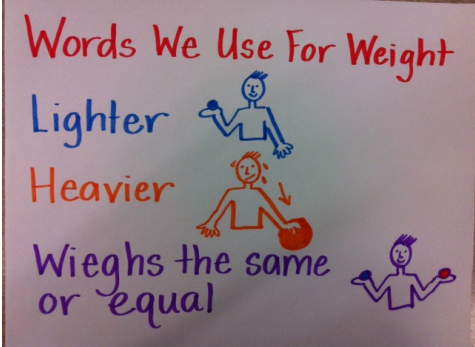
Day 2: The Thirsty Teacher.

Materials: small blue cup, tall red cup, wide green cup, Dixie cups, bucket of water, chart paper for anchor chart.

Math journals

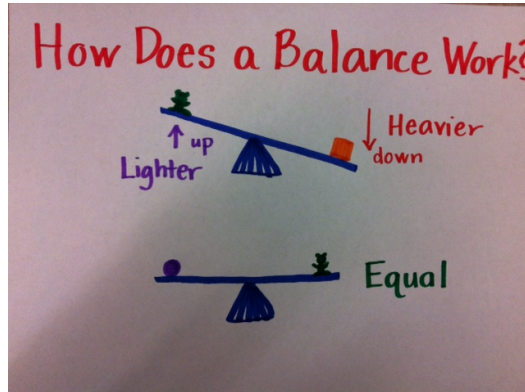
<p>M, T</p>	<p>Pose question with pictures on anchor chart: <i>(Teacher's name) is very thirsty. Which cup should she use?</i> Show students three cups: one is tiny, and obviously holds less, and the other two are different shapes and hold the same amount, or the shorter, wider cup holds more).</p> <p>Partner share, then record a few students answers labeled <i>What we think</i>: on the anchor chart.</p> <p>Have a few sets of students demonstrate how to figure out which cup has the greater capacity. (Provide large container of water, Dixie cups for pouring/measuring). Guide students by asking: <i>Tell me what you're doing? Why did you decide to do that? What does that tell you? What are you going to do next?</i> (If students are completely stuck, demonstrate how to keep track of how many mini cups go in each cup. Record number and determine if tall red cup or wide green cup holds more water).</p> <p>Record answer on chart paper, write an explanation why the teacher should use that cup.</p>	<p>Observation</p>
<p>M</p>	<p>Day 3. Fill the Container. Materials: 10 small, rectangular or square shaped containers/Tupperware, large quantities of unifix cubes, chart paper.</p>	
<p>M</p>	<p>Show small Tupperware container on overhead and have a supply of unifix cubes for measuring handy. <i>I am going to use these unifix cubes to fill my container. I want to see how many cubes my container can hold. First I'm going to make a good guess, or an estimate: I think 20.</i> Record estimate on chart paper. Fill container (describe why it is important to place each cube neatly next to each other) and record actual count (24 cubes). <i>My container holds 24 cubes. The capacity is 24 cubes.</i></p>	<p>Observation</p>
<p>M</p>	<p>Let partners choose a container. <i>How many cubes do you think it will hold? Make a good guess, or an estimate.</i> Record each pair's estimate on chart paper. Allow them to use unifix cubes to carefully fill container. Monitor students to make sure they are filling correctly and are keeping track of how many cubes they are using. Each group announces how many cubes their container holds, and it is recorded on chart paper.</p> <p>Compare containers as holding the least, holding the most, or holding equal amounts. Reinforce proper vocabulary.</p> <p>Day 4: Container Compare.</p>	

M	<p>Materials: enough small cups and containers for each student, Dixie cups for each student, supply of beans for each table or pairs of partners.</p> <p>Model situation on overhead/document camera. Fill a cup/container with beans using a Dixie cup, but fill Dixie cup inconsistently (half way, sometimes only a few beans, sometimes full). See if students notice this mistake. After announcing the incorrect capacity of the cup, ask it is okay not to fill up Dixie cup entirely? Model again, carefully filling Dixie cups to top and announce capacity of cup. Stress that we must measure with the same units each time.</p> <p>Partners each choose a cup and use Dixie cups to fill with beans. Students compare capacity of cups and decide which holds more, which holds less. Observe to make sure students measure consistently.</p> <p>Repeat with different groups of partners and containers.</p>	Observation
M	<p>Discussion: <i>Can one partner measure his cup with unfix cubes, and the other measure with beans and compare? Why or why not?</i> Discuss and model if necessary.</p>	
M	<p>Day 5: Challenge Problem and Capacity Exploration. Materials: small blue cup, tall red cup, Dixie cups for each student or partners, an assortment of cups and small containers to fill, large supply of beans for each table or set of partners.</p> <p>Present problem situation to students: <i>Student A has a blue cup that holds 3 dixie cups of beans. Student B has a red cup that holds 5 dixie cups of beans. If Student A pours all of her beans into Student B's cup, how many more Dixie cups will we need to fill the cup?</i></p> <p>Students draw on whiteboards or in math journals, and discuss with partners. Allow student to share answer and draw on large whiteboard for class. Show students how to determine answer by directly modeling.</p> <p>Allow students to independently explore capacity with various containers, using beans and Dixie cups. Observe and note understanding and any misconceptions students may still have.</p>	Math Journals, Discussion
M	<p>Weight</p> <p>Day 1: Water Bottle Weighing</p> <p>Materials: Filled water bottles for each student or pairs, variety of objects for students to use around the</p>	Math Journals, Sorting Activity

M	<p>classroom.</p> <p>Alone or with partners, students compare a filled water bottle with other objects. They draw and label one object that weighs more than their water bottle, and one that weighs less in math journals. Observe students as formative assessment and see if they understand the terms lighter or heavier.</p> <p>Create a vocabulary anchor chart titled <i>Words We Use for Weight</i> and add, show, and explain the words heavier, lighter and equal. Draw a picture to match.</p>	
A		
M	<p>Explain that we can use our hands to compare the weight of two objects. Students share items they found are lighter and heavier than the water bottle. Record on chart.</p> <p>Day 2: Are All Big Things Heavy? Materials: tennis ball, beach ball, Light or Heavy? picture sort, math journals.</p> <p>Show students a beach ball and a tennis ball. <i>Which is bigger? Have a few students compare weight with arms. Which is heavier? How can that be?</i> Discuss answers and record. Conclude and record on chart paper: <i>weight and size are different; there is more matter or stuff in things that are heavier.</i></p> <p>Students cut, sort and glue pictures of things that are heavy and light in math journals. Observe and monitor for understanding of vocabulary.</p>	Discussion
A,M	<p>Day 3: Balancing Act Materials: balance, eraser for each set of partners, bag of assorted small items for each partner, chart paper.</p> <p>Introduce balance. Explain that we cannot always tell if something is lighter or heavier by using our hands, so we use a balance to do this. Model weighing a few items on the balance. <i>What do you think it means when one side</i></p>	

goes down? What does it tell you about the object when the other side goes up? What does it mean when the balance is straight (not slanted?)

Draw diagram of how the balance works.



A,M

M

Math Journal or Compare the Eraser graphic organizer

In pairs, let students compare weight of eraser with items in a bag using a balance. They record in math journal or on graphic organizer what was heavier than the eraser and what was lighter than the eraser.

Circulate and check students' understandings. Have them describe findings using proper vocabulary.

Day 4: Balancing with Unifix Cubes

Materials: bag of small objects for each pair, set of unifix cubes for each pair.

Tell students that sometimes we want to compare items by weighing them with a certain unit. That way, we can compare by numbers. Model how to weigh a few small objects against unifix cubes.

Students weigh items using unifix cubes and record on How Many Cubes? graphic organizer or in math journal.

Discuss: *Was it harder or easier to compare which objects weighed the most?*

Day 5: Let's Go on a Picnic! (Performance Task)

Materials: Picnic basket, celery stalk, carrot stick, pepper slice, Peppermint Patty, Hershey bar, two cups of different size, packages of different crackers (one heavier, one lighter), colored tiles, beans, unifix cubes, tooth picks, or any other informal measurement unit students might use, rubric per student.

Assess students individually while other students

Math Journal or How Many Cubes? graphic organizer

<p>T</p> <p>M</p>	<p>participate in further measurement exploration and learning stations.</p> <p>Present performance task verbally to students. Have a type of basket available as a picnic basket and an area or box of food. You are going on a picnic with the principal! Listen carefully to his instructions; he only wants you to bring certain things on this picnic.</p> <ol style="list-style-type: none"> 5. The principal wants you to take the longest vegetable on the trip. Put the celery, carrots and pepper slice in order from shortest to longest. Choose the longest vegetable and explain your reasoning. (Note proper vocabulary: shorter, longer, same/equal). 6. The principal wants some candy, but not too much, because he is trying to be healthy. Compare the area of the candy bars and put the candy that covers the least in the picnic basket. (Note proper vocabulary: covers more, covers less, covers the same/covers equally). 7. It is getting warm outside and the principal will be really thirsty. Compare the capacity of these cups. Decide which one will be for the principal, which will for you. (Note proper vocabulary: holds more, holds less, holds the same). 8. The principal doesn't want all the picnic items to be too heavy for you to carry. Compare the bags of crackers and decide which weighs less. (Note proper vocabulary: heavier, lighter, the same) <p>(Informal units will be available (colored tiles, beans, toothpicks, unifix cubes. Offer informal units for each attribute and note consistent use of informal units when comparing the same attribute. If students don't offer vocabulary, note and guide students to use proper vocabulary.)</p> <p>Final Day: Post Assessment <i>What does it mean to compare? Discuss . What happens when we compare two things? What kinds of objects can we compare? Record students' answers on chart paper or in personal notebook as post assessment. Show or tell students answers they gave before.</i></p> <p>Give examples and non-examples of comparing. Let students give a thumbs up and thumbs down for as another post-assessment.</p> <p>Resources:</p>	
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	<p>Hutchenson, Ginny. "Kindergarten Measurement." (2009): 1-3. Web. 20 Jun 2013. <http://vhutcheson.wmwikis.net/file/view/Measurement (Grade K).pdf>.</p> <p>Lovin, Lou Ann, and John Van de Walle. <i>Teaching Student-Centered Mathematics Grades K-3</i>. 1st ed. 1. Boston: Pearson, 2006. 223-250. Print.</p> <p>"Measurement." <i>Kindergarten Kindergarten</i>. N.p., 29 Jul 2012. Web. 20 Jun. 2013. <kindergartenkindergarten.com>.</p>	
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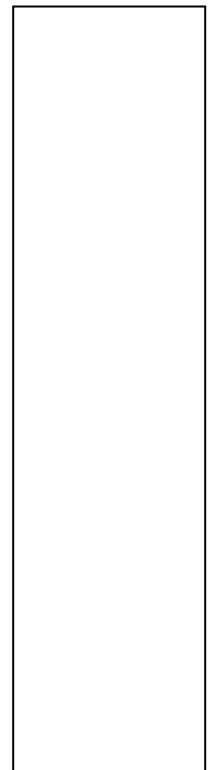
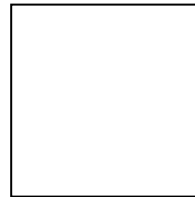
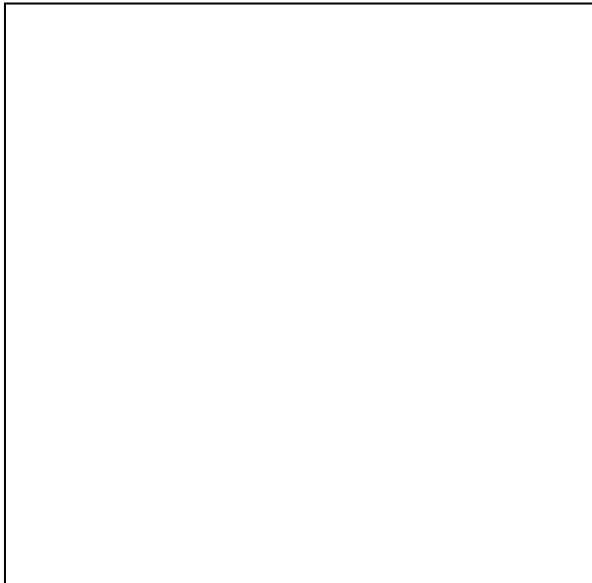
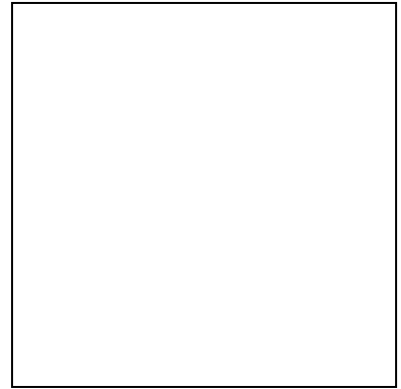
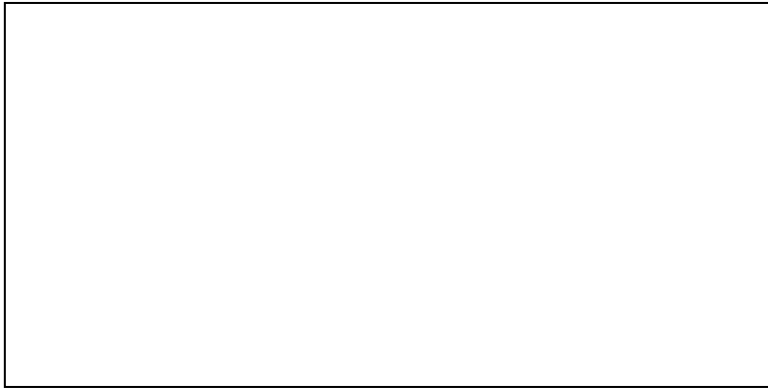
How Do We Measure? Rubric

	Exceeding	Meeting	Approaching
Accurately measures objects for each attribute.	Student compares and measures objects using informal units consistently for all four attributes .	Student compares and measures objects using informal units consistently for three attributes or needs limited prompting and guidance to complete all four comparisons.	Students needs much prompting or guidance to complete all four comparisons of attributes, or accurately measures 2 sets of objects or fewer.
Uses appropriate vocabulary for each attribute (Length: shortest, longest, same; Area: covers more, covers less, covers the same; Capacity: holds the most, holds the least, holds the same;	Student uses proper vocabulary to describe comparisons for all four attributes with no prompting.	Student uses proper vocabulary to describe comparisons for all four attributes with some prompting or uses proper vocabulary for three attributes with no prompting.	Student uses proper vocabulary only with a lot of prompting or for 2 or less attributes.

Name:

Cheezy Area

Use Cheez-it crackers to find the area of each shape. Record area in Cheez-its in each shape.



Who has a bigger candy
bar?

How can you be sure?

Teacher A's candy bar

Teacher B's
candy bar

Light or Heavy?

Name:

Compare the Eraser

Heavier

Lighter

Equal

