Unit Title: Keeping Track

INSTRUCTIONAL UNIT AUTHORS

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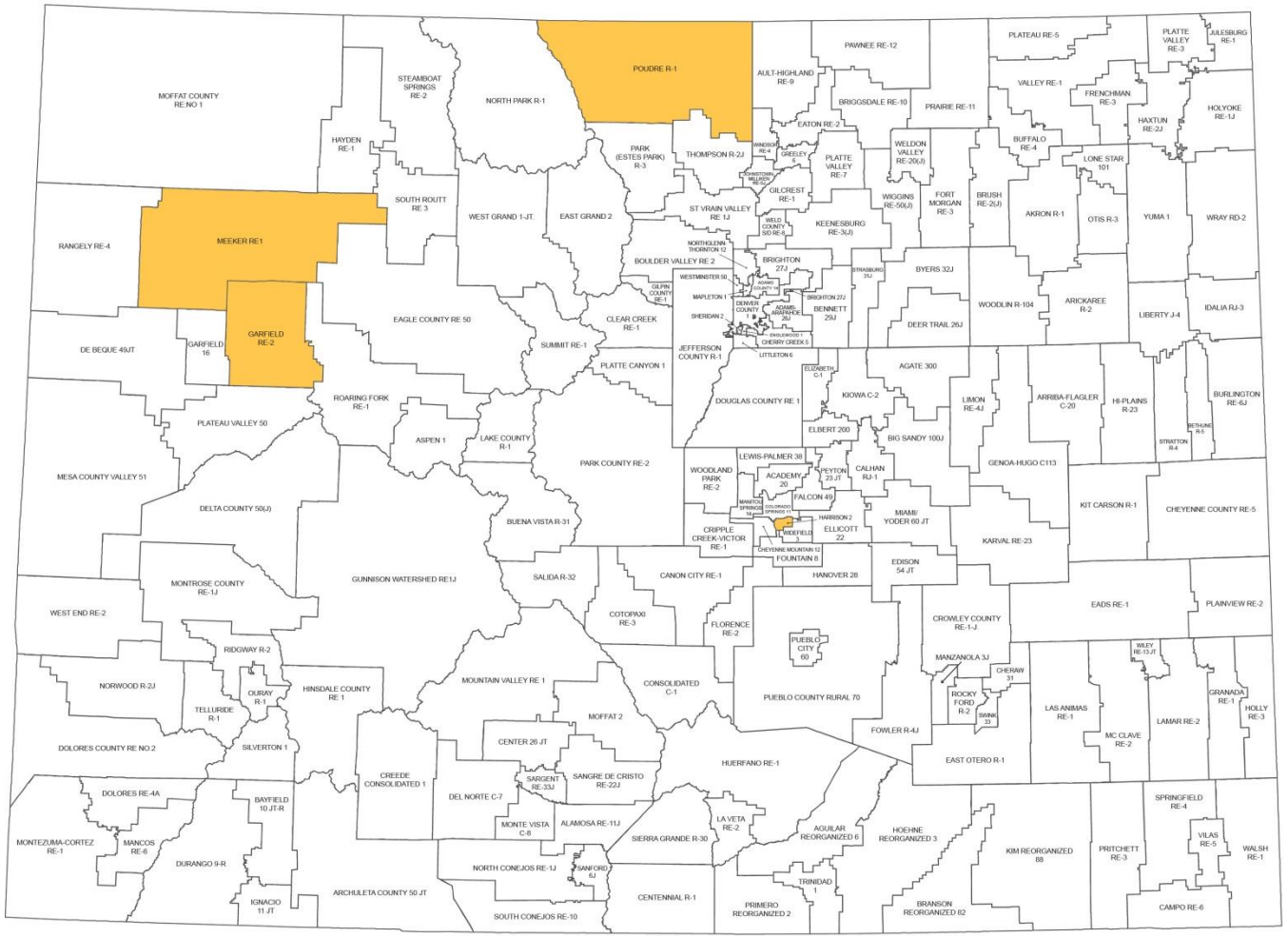

This unit was authored by a team of Colorado educators. The template provided one example of unit design that enabled teacher-authors to organize possible learning experiences, resources, differentiation, and assessments. The unit is intended to support teachers, schools, and districts as they make their own local decisions around the best instructional plans and practices for all students.

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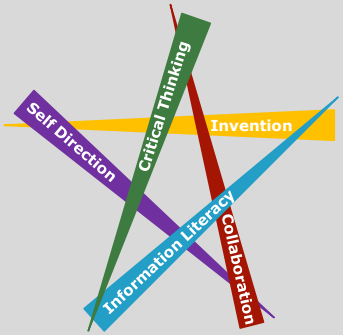
Colorado Teacher-Authored Sample Instructional Unit

Content Area	Mathematics	**Grade Level**	1st Grade
Course Name/Course Code			

Standard	**Grade Level Expectations (GLE)**	**GLE Code**
1. Number Sense, Properties, and Operations	1. The whole number system describes place value relationships within and beyond 100 and forms the foundation for efficient algorithms	MA10-GR.1-S.1-GLE.1
	2. Number relationships can be used to solve addition and subtraction problems	MA10-GR.1-S.1-GLE.2
2. Patterns, Functions, and Algebraic Structures	Expectations for this standard are integrated into the other standards at this grade level.	
3. Data Analysis, Statistics, and Probability	1. Visual displays of information can be used to answer questions	MA10-GR.1-S.3-GLE.1
4. Shape, Dimension, and Geometric Relationships	1. Shapes can be described by defining attributes and created by composing and decomposing	MA10-GR.1-S.4-GLE.1
	2. Measurement is used to compare and order objects and events	MA10-GR.1-S.4-GLE.2

Colorado 21st Century Skills



Critical Thinking and Reasoning: *Thinking Deeply, Thinking Differently*

Information Literacy: *Untangling the Web*

Collaboration: *Working Together, Learning Together*

Self-Direction: *Own Your Learning*

Invention: *Creating Solutions*

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.

Unit Titles	**Length of Unit/Contact Hours**	**Unit Number/Sequence**
Keeping Track	4 weeks	

Unit Title	Keeping Track			**Length of Unit**	4 weeks
Focusing Lens(es)	Comparison/Measurement	**Standards and Grade Level Expectations Addressed in this Unit**	MA10-GR.1-S.4-GLE.2		
Inquiry Questions (Engaging-Debatable):	• Why keep track of time? (MA10-GR.1-S.4-GLE.2-IQ.2) • Why do we measure objects? (MA10-GR.1-S.4-GLE.2-IQ.2) • How are length and time different? How are they the same? (MA10-GR.1-S.4-GLE.2-IQ.3)				
Unit Strands	Measurement and Data, Geometry				
Concepts	Length, units, order, measure, time, hour, half hour, minute, rounding, indirect comparison, analog, digital				

Generalizations **My students will Understand that…**	**Guiding Questions** **Factual**	**Conceptual**
In different ways, both analog and digital clocks display and communicate hours and minutes (MA10-GR.1-S.4-GLE.2-EO.b)	How does a digital clock show a half hour? How does an analog clock show a half hour?	Why are there two hands on an analog clock?
Time telling requires an understanding of the half-hour unit of measure that can be composed into an hour and multiple hour increments (MA10-GR.1-S.4-GLE.2-EO.b.i)	How is a half hour different than an hour?	Why would we measure time in increments smaller than an hour?
When comparing the size of two objects that cannot be placed next to each other, a third object can be used for indirect comparison (MA10-GR.1-S.4-GLE.2-EO.a.i)	What kind of object could you use to indirectly compare the length of your desk and the length of the foursquare court on the playground?	How can you order three objects by length if you are not able to directly compare them? How can you tell when one object is bigger than another (MA10-GR.1-S.4-GLE.2-IQ.1) How can you be sure that two things that appear to be the same size truly are the same size?
Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps (MA10-GR.1-S.4-GLE.2-EO.a.ii)	What errors might occur when measuring?	Why might different measurements occur from measuring the same object with non-standard units?

Key Knowledge and Skills: **My students will…**	*What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.*

- Order three objects by length (MA10-GR.1-S.4-GLE.2-EO.a.i)
- Compare the lengths of two objects indirectly by using a third object (MA10-GR.1-S.4-GLE.2-EO.a.i)
- Measure the length of an object by laying multiple copies of a shorter object end to end without gaps or overlaps and express the length of the object as a whole number of length units of the shorter object (MA10-GR.1-S.4-GLE.2-EO.a.ii)
- Track the number of placed units to produce a measure of units (MA10-GR.1-S.4-GLE.2-EO.a.ii)
- Tell and write time in hours and half-hours using analog and digital clocks (MA10-GR.1-S.4-GLE.2-EO.b)

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline.
EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: *"Mark Twain exposes the hypocrisy of slavery through the use of satire."*

A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	*It is a few minutes before nine o'clock.* *The length of my pencil is longer than my hand and then length of your pencil is shorter than my hand, which means my pencil is longer than your pencil.*
Academic Vocabulary:	Analog clock, digital clock, compare, half-hour, hour, minute, time
Technical Vocabulary:	Unit, indirect comparison, length, rounding

Unit Description:	This unit focuses on measurement in relation to length and time. Across the 4-week unit, students will consider the concepts of unit, zero, conservation and transitivity. Throughout the entire unit learning experiences are designed to ensure students are measuring for a purpose. Students begin by making indirect comparisons about length (transitivity) using non-standard units. The concept of comparison leads to students to discuss the need for standard units, which connects, to the concept of time and the unit of an hour. Students continue their work with units of length by repeating (iterating) a standard unit without gaps or overlaps. All of this work provides a foundation for working with a ruler.
Unit Generalizations	
Key Generalization:	Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps
Supporting Generalizations:	In different ways, both analog and digital clocks display and communicate hours and minutes
	Time telling requires an understanding of the half-hour unit of measure that can be composed into an hour and multiple hour increments
	When comparing the size of two objects that cannot be placed next to each other, a third object can be used for indirect comparison

Performance Assessment: *The capstone/summative assessment for this unit.*	
Claims: (Key generalization(s) to be mastered and demonstrated through the capstone assessment.)	Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps.
Stimulus Material: (Engaging scenario that includes role, audience, goal/outcome and explicitly connects the key generalization)	An educational company has hired you as mathematical designer to create a ruler for other first grade students that can be taped to their desk or table and set of directions for using the ruler. You will be provided with cardstock and two one-inch squares. The one-inch squares can be used to create individual one-inch unit marks on your ruler. Your goal it to create a ruler that will help students measure with accuracy and precision.
Product/Evidence: (Expected product from students)	Students will create a desktop ruler and set of directions for using the ruler. High quality rulers will: • show one-inch lengths iterated with no gaps or overlaps • accurate numbering from zero to the end the ruler High quality directions will: • use words and/or pictures to show how to find the length of an object
Differentiation: (Multiple modes for student expression)	Students can orally describe the directions for using their ruler. Students can include in their directions how to measure the length of an object not aligned to the zero mark of the ruler to demonstrate their understanding of the arbitrariness of zero. Students can partition the one-inch units to indicate half-inches to show an advanced understanding of the measurement concept.

Texts for independent reading or for class read aloud to support the content	
Informational/Non-Fiction	**Fiction**
Length (Math Counts) by Henry Arthur Pluckrose (Lexile level 270+) *Actual Size* by Steve Jenkins (Lexile level 1080)	*How Big Is a Foot?* by Rolf Myller (Lexile level 660) *Inch by Inch* by Leo Lionni (Lexile level 210) *What time is it, Mr. Crocodile?* by Doug Cushman (Lexile level 270+) *How Tall, How Short, How Far Away* by David Adler (Lexile level 750) *Is a Blue Whale the Biggest Thing There Is?* By Robert Wells (Lexile level 580) *Super Sand Castle Saturday* by Stuart Murphy (Lexile level 910) *Measuring Penny* by Loreen Leedy (Lexile level 500) *Millions to Measure* by David Schwartz (Lexile level 470) *How Long or How Wide? A Measuring Guide* by Brian Cleary (270+)

Ongoing Discipline-Specific Learning Experiences				
1.	Description:	Think/work like a mathematician – Expressing mathematical reasoning by constructing viable arguments, critiquing the reasoning of others [Mathematical Practice 3]	Teacher Resources:	http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm (lesson plans contains exemplars that could be replicated for students to critique the reasoning of others)
			Student Resources:	N/A
	Skills:	Present and defend solutions to problems and identify and describe the flaw in reasoning of others [Mathematical Practice 4]	Assessment:	Students analyze and defend their solutions for each major learning experience. Careful attention should be paid to precise use of vocabulary and symbols. Periodically throughout the unit, students should be provided with flawed solutions and asked to identify, describe and correct the flaw.
2.	Description:	Think/work like a mathematician – Engaging in the practice of modeling the solution to real world problems	Teacher Resources:	https://www.sites.google.com/a/cmpso.org/caccss-resources/k-8-modeling-task-force/k-8-modeling-resources (examples of modeling problems and resources for teachers on teaching and scoring them)
			Student Resources:	N/A
	Skills:	Model real world problems mapping relationships with appropriate models, analyze relationships to draw conclusions, interpret results in relation to context, justify and defend the model, and reflect on whether results make sense	Assessment:	Modeling Problems Students utilize visual models for measurement such as number lines to represent and analyze relationships of real world problems to draw conclusions and interpret results in relation to the context of the problem.

3.	Description:	Mathematicians are fluent with addition and subtraction within 10	Teacher Resources:	http://www.mathematicallyminded.com/ (resources for centers or home activities in the free downloads section) http://www.edplus.canterbury.ac.nz/literacy_numeracy/maths/numdocuments/dot_card_and_ten_frame_package2005.pdf (dot cards and ten frame activities)
			Student Resources:	http://www.fisme.science.uu.nl/toepassingen/03373/ (speedy pictures designed to practice fluency)
	Skills:	Add and subtract within 10 includes knowing all the ways to compose and decompose each whole number from 1 to 10	Assessment:	Fluency Problems Students build fluency with combinations within 10 through consistent practice.

Prior Knowledge and Experiences

Student familiarity with the concepts of shorter and longer and ordering items by length will provide a strong foundation for this unit. These concepts are the starting point for instruction. Students unfamiliar will still be able to access the unit but more time should be spent on the beginning activities.

Learning Experience # 1	
The teacher may read a book (e.g., *Measuring Penny* by Loreen Leedy) to begin a discussion about all types of measurement (e.g., length, time, weight) so that students can begin to see measurement used and described in a variety of ways.	
Teacher Notes:	The teacher may want to create a poster of the recollections students share about measurement that can be revisited at the end of the unit to show growth in understanding. Students may converge their thinking about measurement on length only, the book *Measuring Penny* should help to create more divergent thinking. This unit focuses on time and length but the brainstorming should be open to any type of measurement because the key ideas of this unit are true for all types of measurement. The article, *Measurement of Length: How Can We Teach it Better?* by Constance Kamii provides a review of the big ideas in measurement (e.g., units, conservation, transitivity, zero).
Generalization Connection(s):	Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps
Teacher Resources:	*Measurement of Length: How Can We Teach it Better?* by Constance Kamii *Measuring Penny* by Loreen Leedy
Student Resources:	N/A
Assessment:	Students can demonstrate their prior knowledge with measurement by discussing questions such as: What words do you use to describe the length of an object? What words do you use to describe time? Why do we keep track of time? Why do we measure objects? How are length and time different/same?

Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	N/A	Students can discuss measurement with a partner prior to the whole class discussion to practice verbalizing their ideas
Extensions for depth and complexity:	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	http://www.shutterstock.com/cat.mhtml?searchterm=measurement+tool&search_group=&lang=en&search_source=search_form (measurement images)	Students can create a collage representing different types of measurement
Key Knowledge and Skills:	N/A	
Critical Language:	Length, time, height, weight, volume	

Learning Experience # 2		
The teacher may provide string (or some other nonstandard measuring tool) to students and demonstrate how to compare the string to objects in the room so that students can practice using the words longer, shorter or same length. *Enactive*: Students can compare their string to objects in the room *Iconic*: Students can draw pictures of the objects and their string to show if the string was longer, shorter or the same length *Symbolic*: Students can label their pictures with longer, shorter, or same length		
Teacher Notes:	Students may confuse whether the word shorter describes the object or the string. As students line their string up with the item for comparison it is helpful to check if they start at the end of the object and if they pull the sting tight. Some students may also "iterate" or repeat the string and be able to say the item is twice the length of my string, these students already have a concept of the measuring that can be built on later. There is no need to encourage this strategy because it is part of a later learning experience.	
Generalization Connection(s):	When comparing the size of two objects that cannot be placed next to each other, a third object can be used for indirect comparison	
Teacher Resources:	http://www.k-5mathteachingresources.com/1st-grade-measurement-and-data.html (unit on measurement and data for first grade) http://www.nzmaths.co.nz/resource/tallerwiderlonger (five lessons dealing with longer and shorter) http://www.amazon.com/Ladybug-Move-Richard-Fowler/dp/0152004750 (ladybug on the move lesson) http://illuminations.nctm.org/LessonDetail.aspx?ID=L123 (ladybug lessons)	
Student Resources:	N/A	
Assessment:	Students mastering the concept and skills of this lesson should be able to answer questions such as: How can you tell when one object is longer than another? What does it mean for two objects to be the same length? When might you want to know if an object is longer or shorter than another object?	
Differentiation:	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)

(Multiple means for students to access content and multiple modes for student to express understanding.)	The teacher may predetermine the objects for string comparison and provide pictures of the objects	Students can arrange pictures of objects in a table labeled with the words shorter, longer, and same
Extensions for depth and complexity:	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	The teacher may provide curved objects (e.g., banana) to determine if the student curves the string along the object or goes straight across the object	Students can compare curved objects to their string Students can explain whether it is possible to determine which of the objects is the longest without directly comparing the objects
Key Knowledge and Skills:	• Order three objects by length • Compare the lengths of two objects indirectly by using a third object	
Critical Language:	Longer, shorter, same, length, bigger, smaller, distance *My string is shorter than my foot. My string is longer than my pencil.*	

Learning Experience # 3		
The teacher may use the student work from the previous learning experience so that students can create comparison statements by indirectly comparing objects in relation to the string (e.g., The pencil is longer than the crayon because the pencil was longer than the string and the crayon was shorter than the string).		
Generalization Connection(s):	When comparing the size of two objects that cannot be placed next to each other, a third object can be used for indirect comparison	
Teacher Resources:	http://www.internet4classrooms.com/common_core/order_three_objects_length_compare_lengths_measurement_data_first_1st_grade_math_mathematics.htm (variety of resources for comparing objects including worksheets	
Student Resources:	http://www.ixl.com/math/grade-1/compare-objects-length-and-height (practice questions on comparing lengths)	
Assessment:	Students mastering the concept and skills of this lesson should be able to answer questions such as: How can you compare the length of two objects when it is not possible to put them next to each other? When might you need to compare the length of two objects and not be able to line them up next to each other?	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	The teacher may provide sentence frames for making comparisons https://mathsentenceframes.wikispaces.com/ (explanation of sentence frames and examples)	Students can complete sentence frames to compare the pictures of objects
Extensions for depth and complexity:	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	The teacher may create descriptions of criteria for students to find objects (e.g., find an object longer than the stapler but shorter than the door)	Students locate objects based on criteria provided by the teacher

Key Knowledge and Skills:	• Order three objects by length • Compare the lengths of two objects indirectly by using a third object
Critical Language:	Short, shorter, shortest, long, longer, longest, in-between, compare, same, length, bigger, smaller, distance *The pencil is longer than the crayon because the pencil was longer than the string and the crayon was shorter than the string.*

Learning Experience # 4		
The teacher may provide a context, which requires a standard unit of measurement (e.g., needing a fence for a garden) so that students can begin to comprehend the need for standard units of measurement. *Enactive*: Students can measure the length of the item with their own feet and compare to each other and the teacher. *Symbolic*: Students can discuss the need for a standard unit of measurement.		
Teacher Notes:	It may be helpful to create a visual, such as a graph, of the measurements students found when using a non-standard unit. The variety of answers should motivate the need for a consistent answer when measuring, for instance if they are ordering fencing online.	
Generalization Connection(s):	Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps	
Teacher Resources:	http://www.brighthubeducation.com/lesson-plans-grades-1-2/50168-math-measurement-lesson-plan/ (lesson plan for exploring the need for standard measurements)	
Student Resources:	*How Big Is a Foot?* by Rolf Myller	
Assessment:	Students mastering the concept and skills of this lesson should be able to answer questions such as: Why is each person's foot not a good tool when needing an exact measurement? Why do we need standard units when measuring? What are some common standard units we use to measure lengths?	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	The teacher may have students work in pairs	N/A
Extensions for depth and complexity:	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	http://ellerbruch.nmu.edu/cs255/JoniEMi/metricsystem.html (description of the origin of different units of measurements)	Students can present to the class about the origin of units such as the foot
Key Knowledge and Skills:	• Measure the length of an object by laying multiple copies of a shorter object end to end without gaps or overlaps and express the length of the object as a whole number of length units of the shorter object • Track the number of placed units to produce a measure of units	
Critical Language:	Length, distance, unit, measurement	

<table>
<tr><th colspan="3">Learning Experience # 5</th></tr>
<tr><td colspan="3">The teacher may provide a context for measuring an object so that students can begin to understand the need for accuracy when finding the length of an object.
Enactive: One group of students can be given an unlimited number of units (square tiles, unifix cubes, paper clips) to measure the item the second group of students can be given only one unit to measure the item.
Iconic: Students draw a picture of the item and represent how many units it took to measure the item.
Symbolic: Students record the length of the units (e.g., 25 tiles, 25 paper clips)</td></tr>
<tr><td>Teacher Notes:</td><td colspan="2">It is important to discuss the strategies students used to measure the item by both groups of students and the results. It is particularly important to focus on the need for accuracy (i.e., avoid gaps and overlaps when measuring an item) and how it can result in different and incorrect lengths for the same item. After the discussion students can re-measure the item switching groups and using the strategies discussed. Students might bring up the need for a better measuring tool that prevents gaps or overlaps (i.e., ruler) this is a great discussion that can be followed up in the next learning experience.</td></tr>
<tr><td>Generalization Connection(s):</td><td colspan="2">Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps</td></tr>
<tr><td>Teacher Resources:</td><td colspan="2">http://www.k-5mathteachingresources.com/1st-grade-measurement-and-data.html (ideas for measurement lessons, the measuring with sticks lesson relates closely to this lesson)</td></tr>
<tr><td>Student Resources:</td><td colspan="2">N/A</td></tr>
<tr><td>Assessment:</td><td colspan="2">Students mastering the concept and skills of this lesson should be able to answer questions such as:
Why is it important to not have gaps or overlaps when measuring an item?
How can gaps and overlaps be prevented when measuring an item?
What might cause two people to get different measurements when using the same size unit?
Which is easier/more accurate measuring with a few tiles or just one tile? Why?</td></tr>
<tr><td rowspan="2">Differentiation:
(Multiple means for students to access content and multiple modes for student to express understanding.)</td><td>Access (Resources and/or Process)</td><td>Expression (Products and/or Performance)</td></tr>
<tr><td>The teacher may provide unlimited tiles for students who may need extra support to measure an item</td><td>Students can measure the item by collaborating with others and sharing strategies</td></tr>
<tr><td rowspan="2">Extensions for depth and complexity:</td><td>Access (Resources and/or Process)</td><td>Expression (Products and/or Performance)</td></tr>
<tr><td>The teacher may provide students with only one tile to measure item</td><td>Students can measure the item to the nearest ½ unit using only one unit (e.g., only one square tile) to measure the item</td></tr>
<tr><td>Key Knowledge and Skills:</td><td colspan="2">• Measure the length of an object by laying multiple copies of a shorter object end to end without gaps or overlaps and express the length of the object as a whole number of length units of the shorter object
• Track the number of placed units to produce a measure of units</td></tr>
<tr><td>Critical Language:</td><td colspan="2">Gaps, overlaps, unit, ruler, length, label, measurement</td></tr>
</table>

Learning Experience # 6		
The teacher may have students jump along a number line (on the floor with marks (no numbers) at each one-foot increment) so that students can begin thinking of measurement as a distance traveled concept. *Enactive*: Students can start at zero and jump as far as possible. Students can then go back to zero and jump one foot at a time to determine how far they jumped. *Iconic*: Students can complete a number line showing the distance they jumped by showing each jump from zero to the end of their jump. *Symbolic*: Students can compare the length of their jump to their classmates (e.g., I jumped one foot less than Jorge).		
Teacher Notes:	The goal of this learning experience is to transition students from viewing measurement as counting objects towards a distance traveled concept. As students hop one foot at a time it is helpful to reinforce with them that they start at zero and count for each hop, this is to help students understand they are not counting the "tick marks", which can result in counting the zero mark rather than counting the distance traveled.	
Generalization Connection(s):	Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps.	
Teacher Resources:	http://katm.org/wp/wp-content/uploads/flipbooks/1stFLIPpdf2.pdf (Kansas Flip Book – Grade 1)	
Student Resources:	N/A	
Assessment:	Students mastering the concept and skills of this lesson should be able to answer questions such as: When finding the length of your jump do you count the marks on the floor or how many one foot jumps you made? Where is zero feet? Where is one foot? How many one-foot jumps does it take to get from zero to five feet? How many marks are there from zero to five feet? How is a number line similar and different from the one-foot marks on the floor?	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	Teacher may use a different color for each foot for additional clarification for students	Students can hop from the end of their hop to the end of another student's hop to compare the hops
Extensions for depth and complexity:	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	Teacher may create opportunities for students to relate counting from a number other than zero as a pre-cursor to subtraction or missing addend addition http://www.tncurriculumcenter.org/resource/2429/go (game to measure objects not beginning at zero and comparing the lengths of objects)	Students can find the length of their jump when starting at a mark that does not represent zero Students can find the distance they would jump after three jumps by showing it on a number line
Key Knowledge and Skills:	• Measure the length of an object by laying multiple copies of a shorter object end to end without gaps or overlaps and express the length of the object as a whole number of length units of the shorter object • Track the number of placed units to produce a measure of units	
Critical Language:	Measurement, foot, feet, distance, less than, more than, the same as, length, zero, ruler marks, number line, compare, similar, different	

<table>
<tr><th colspan="3">Learning Experience # 7</th></tr>
<tr><td colspan="3">The teacher may use a one handed clock to discuss the position of the hour hand at hour and half hour increments so that students can connect the concept of time to measurement.
Enactive: Students can work together to move the hour hand on their clocks, working together to identify hour and half hour increments.
Iconic: Students can create a strip of paper to wrap around the clock and mark the hour and half hour marks on the strip of paper from 1 to 12, the paper then resembles a ruler/number line when laid flat.
Symbolic: Students can translate hour and half hour from the analog clock to the digital clock.</td></tr>
<tr><td>Generalization Connection(s):</td><td colspan="2">Time telling requires an understanding of the half-hour unit of measure that can be composed into an hour and multiple hour increments
In different ways, both analog and digital clocks display and communicate hours and minutes</td></tr>
<tr><td>Teacher Resources:</td><td colspan="2">http://katm.org/wp/wp-content/uploads/flipbooks/1stFLIPpdf2.pdf (Kansas Flip Book - Grade 1 shows instructional strategies and common misconceptions for the measurement standard related to time)
http://www.illustrativemathematics.org/illustrations/992 (Illustrative Mathematics provides an assessment task where students make a clock)
http://www.fi.edu/time/Journey/JustInTime/lesson1.html (Just in Time lesson plan for telling time to the hour)</td></tr>
<tr><td>Student Resources:</td><td colspan="2">http://jmathpage.com/JIMSMeasurementclocks.html (Johnnie's Math Page half-hour math games)
www.abcya.com/telling_time.htm (game for telling time to the hour)</td></tr>
<tr><td>Assessment:</td><td colspan="2">Students mastering the concept and skills of this lesson should be able to answer questions such as:
How do digital clocks show a half-hour?
How do analog clocks show a half-hour?
Why are there two hands on analog clocks?
How is measuring time similar to measuring the length of an object?
Why is it important for an hour to be the same for everyone?
Was there a zero on your clock and/or your clock number line? Why or why not?</td></tr>
<tr><td rowspan="2">Differentiation:
(Multiple means for students to access content and multiple modes for student to express understanding.)</td><td>Access (Resources and/or Process)</td><td>Expression (Products and/or Performance)</td></tr>
<tr><td>Teacher may provide students with times at the hour or half hour</td><td>The students can show times on a clock by physically moving the hour hand on the clock</td></tr>
<tr><td rowspan="2">Extensions for depth and complexity:</td><td>Access (Resources and/or Process)</td><td>Expression (Products and/or Performance)</td></tr>
<tr><td>Teacher may provide a clock for students with both a minute and hour hand</td><td>Students can mark time in quarter hours
Students can explain how 60 minutes relates to a half and quarter hour by creating their own number line from 1-60 on a strip of paper and folding to find half-way and quarter points</td></tr>
<tr><td>Key Knowledge and Skills:</td><td colspan="2">• Tell and write time in hours and half-hours using analog and digital clocks</td></tr>
<tr><td>Critical Language:</td><td colspan="2">Clock, hour, half, half-hour, half past, digital clock, analog clock, minute hand, hour hand, length, number line, ruler, measurement, zero</td></tr>
</table>

Learning Experience # 8		
The teacher may create numberless rulers so that students can begin to understand how rulers facilitate accurate measurement (i.e., eliminates gaps and overlaps). *Iconic*: Students can measure items using their ruler. *Symbolic*: Students can record the lengths of items they measure.		
Teacher Notes:	The teacher may want to watch how students line up their rulers when measuring an object, (i.e., do they line the end of the ruler up to the end of the object). It is not necessary to line the end of the ruler up to the end of the object. Students can line up to any part of the ruler and find the length. This is one of the reasons to not number the ruler for students because it prompts students to think about the movement from one end of the object to the other end of the object on the ruler and to see zero as arbitrary. Any hash mark can be used as a zero. If students put numbers on their ruler watch for the misconception of numbering the spaces rather than hashmarks and check to see if they write a zero.	
Generalization Connection(s):	Accurate length measurement of an object requires precise iteration of same-size length units that span the object without gaps or overlaps	
Teacher Resources:	http://www.vendian.org/mncharity/dir3/paper_rulers/UnstableURL/squares_cm_in.pdf (link to pdf of rulers with alternating colors) http://www.lcps.org/cms/lib4/VA01000195/Centricity/domain/116/atsquared/Creating%20Customized%20Graph%20Paper%20in%20MS%20Word%202007%20and%202010.pdf (direction on how to create rulers with alternating colors using Microsoft word)	
Student Resources:	http://www.pbs.org/parents/education/math/games/first-second-grade/time-to-move/ (web-based game for measurement with rulers)	
Assessment:	Students mastering the concept and skills of this lesson should be able to answer questions such as: How can you use a ruler to find the length of an object? How does a ruler avoid issues with gaps and overlaps when measuring? How can you be sure that two things that appear to be the same size truly are the same size? Does the length of an item change if I don't start at zero on the ruler? Where is the zero on the ruler and what does it mean?	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	The teacher may provide students with square tiles the same unit size as the ruler to reinforce how to find the length of the object by iterating a unit	Students can find the measure of an object by lining a ruler up along an object and then placing square tiles on top of the ruler along the object
Extensions for depth and complexity:	**Access** (Resources and/or Process)	**Expression** (Products and/or Performance)
	Teacher may provide discussion opportunities for measuring fractional parts of whole units (ie, "What do I do with five units and a little bit more?") http://pbskids.org/cyberchase/math-games/sleuths-on-the-loose/ (web-game for students to compare length)	Students can modify their rulers to show halves and/or quarters of a unit

Key Knowledge and Skills:	• Measure the length of an object by laying multiple copies of a shorter object end to end without gaps or overlaps and express the length of the object as a whole number of length units of the shorter object • Track the number of placed units to produce a measure of units
Critical Language:	Unit, equal, zero, measurement, distance, less than, more than, the same as, length, zero, ruler marks, number line, compare, similar, different