

Measurement K-8:

CONTENT STANDARD #4 – FLUENCY WITH MEASUREMENT
Understand attributes, units, and systems of units in measurement: and develop and use techniques, tools, and formulas for measuring

Topic: Length, Area, Surface Area, Volume Attributes and Units
Topic: Measurement Tools and Techniques
Topic: Measurement Formulas

<p>Understanding(s): <i>Students will understand that...</i></p> <ul style="list-style-type: none"> • Measurements may be taken directly, or derived from other measurements. • Accuracy and precision of measurement depends on its purpose. • Known measurements can be used to determine other proportional measurements. 	<p>Essential Question(s):</p> <ul style="list-style-type: none"> • What determines which measurement attributes, units, and systems of units are to be used? • What conditions determine the degree of accuracy and precision needed?
<p>Knowledge: <i>Students will know...</i></p> <ul style="list-style-type: none"> • Rate of change. • Surface area. • Volume. • Area. • Perimeter. • Weight. • Capacity. • Linear units (length). • Square units (area). • Cubic units (volume). 	<ul style="list-style-type: none"> • Length/width. • Scaling. • Circumference. • Ratio. • Proportion. • Radius/diameter of a circle. • Formulas. <i>Note: Derived from a variety of experiences.</i> • Solids. <p>Skill(s): <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Calculate volume and surface area of solids. • Calculate area and perimeter of plane figures. • Calculate area and circumference of circles. • Measure lengths in different units. • Convert units within a system of measurement. • Use ratios and proportions to scale figures. • Express rate of change as a ratio of two different measures. • Use map scales to measure distances between two points. • Make scale drawings. • Compare and order objects by their attributes.

Grade	Reference	Benchmark
Grade 8	MA.8.4.1	Select and use appropriate units to measure the surface area and volume of solids
	MA.8.4.2	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems
	MA.8.4.3	Use ratios and proportions to solve measurement problems
	MA.8.4.4	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids
Grade 7	MA.7.4.1	Determine how measurements, such as perimeter and area, of common shapes (e.g., squares, rectangles, parallelograms, triangles, circles) are affected when one of the attributes is changed in some way
	MA.7.4.2	Uses ratios and proportions to relate a scale drawing to the actual object
	MA.7.4.3	Use known measurements (e.g., radius) to calculate desired measurements (e.g., circumference and area) of circles
Grade 6	MA.6.4.1	Estimate the circumference and area of a circle (with no reference to a formula)
	MA.6.4.3	Apply strategies and formulas to solve area and perimeter problems involving polygons (e.g., regular hexagons) and complex shapes (i.e., shapes composed of two or more common shapes)
Grade 5	MA.5.4.1	Convert simple units within a system of measurement (e.g., millimeters to centimeters, feet to yard, quarts to gallons, gram to kilogram, minutes to hours, days to weeks)
	MA.5.4.3	Use map scales to measure the distance between locations and make simple scale drawings

Grade	Reference	Benchmark
	MA.5.4.5	Use known measurements (e.g., base and height) to calculate desired measurements (e.g., area) of triangles, parallelograms, and trapezoids
	MA.5.4.6	Use known measurements (e.g. length, width, and height) to calculate desired measurements (e.g., surface area and volume) of rectangular solids
Grade 4	MA.4.4.1	Explain the need to use standard units for measuring
	MA.4.4.2	Select and apply appropriate customary and metric units and tools to measure length, perimeter, and area for the degree of accuracy needed
	MA.4.4.4	Estimate and measure surface area and volume using U.S. customary units and metric units
	MA.4.4.5	Use known measurements to calculate desired measurements of squares and rectangles (e.g., use the length of the square to calculate its area and perimeter)
Grade 3	MA.3.4.1	Describe the concept of area and volume and the appropriate units for each
	MA.3.4.2	Measure area and volume using standard and non-standard units (e.g., tiles, index cards, grids, cubes)
	MA.3.4.3	Measure length, capacity, and weight in U.S. customary and metric units (e.g., pound, kilogram)
	MA.3.4.5	Select appropriate tools for measuring length, capacity, and weight
	MA.3.4.6	Estimate and measure perimeter and area of common shapes and irregular (e.g., a house-shaped pentagon) shapes
Grade 2	MA.2.4.1	Measure length using inches, feet, and centimeters
	MA.2.4.2	Identify appropriate units for measuring length, area, capacity, and weight
	MA.2.4.6	Identify objects or visual benchmarks that could be used in place of standard units when estimating
Grade 1	MA.1.4.1	Measure with multiple copies of standard (e.g., inch tiles, foot-long lengths of string) or non-standard (e.g., paper clips, pencils) units of the same size
	MA.1.4.4	Identify measurement tools that could be used to measure length, capacity, and weight
Grade K	MA.K.4.1	Compare and order objects according to length, weight, capacity, area, and volume

LEVELS OF PROGRESSION BELOW THE BENCHMARK			AT THE BENCHMARK	BENCHMARK	ADVANCED	
Foundational Benchmark	Approaching the					
Students will	Students will	Students will	Students will		Students will	
Gr. 8		<ul style="list-style-type: none"> Estimate and measure surface area and volume using U.S. customary units and metric units. <i>Note : See 4.4.4</i> 	<ul style="list-style-type: none"> Select an appropriate unit of measurement for a situation involving surface area and volume and know why that unit is appropriate, e.g., student would use larger units for bigger areas and volumes; the volume of a classroom would be measured in terms of cubic feet or cubic yards rather than cubic inches. 	<ul style="list-style-type: none"> Select and use appropriate unit of measurement to solve problems involving surface area and volume and know why that unit is appropriate. 	<p>MA.8.4.1 Select and use appropriate units to measure the surface area and volume of solids</p>	
			<ul style="list-style-type: none"> Express two different measures as a ratio, e.g., a car traveled 200 miles on 5 gallons of gas, so the ratio is 200 miles / 5 gallons, but has difficulty simplifying it to get a unit ratio. 	<ul style="list-style-type: none"> Express two different measures as a unit ratio, e.g., a car traveled 200 miles on 5 gallons of gas, so the ratio 200 miles / 5 gallons simplifies to the unit ratio 40 miles per gallon. Use the rate to solve a problem, e.g., how many miles can be traveled on a full tank of gas if the tank can hold 12 gallons? 	<p>MA.8.4.2 Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems</p>	
		<ul style="list-style-type: none"> Identify ratios from a problem situation. 	<ul style="list-style-type: none"> Identify related quantities that can be set up as an appropriate proportion. 	<ul style="list-style-type: none"> Determine unknown measurements by: Using a known ratio (or rate) and applying it, e.g., a car typically uses 40 miles per gallon of gas. How many miles can be traveled on a full tank of gas if the tank holds 12 gallons? Solution: 40 mpg x 12 gallons = 480 	<p>MA.8.4.3 Use ratios and proportions to solve measurement problems</p>	

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Foundational Benchmark	Approaching the				
Students will	Students will	Students will	Students will		Students will
			miles. <ul style="list-style-type: none"> Identifying related quantities that can be set up as a proportion, e.g., my height is 54 inches and I am casting a 24-inch shadow. How tall is the building next to me that is casting a 20-foot shadow? Proportion: 54 inches / 24 inches = h / 20 feet). 		
<ul style="list-style-type: none"> Identify the dimensions of selected prisms, cylinders, and pyramids. Identify the base of a prism, cylinder, or pyramid if the orientation has been changed, i.e., the solid is not on its "base." 	<ul style="list-style-type: none"> Identify the formula to determine the surface area and volume of selected prisms, cylinders, and pyramids. 	<ul style="list-style-type: none"> Identify the variables in the formulas for surface area and volume of prisms, cylinders, and pyramids and explain what they represent. 	<ul style="list-style-type: none"> Match parts of the formula to parts of the geometric figure, e.g., $2\pi r^2$ in the formula for the surface area of a cylinder represents the area of the two circular bases. Calculate the surface area of any prism by determining the total area of each face. Calculate the volume of prisms by applying the formula, $V = Bh$ (B = area of the base, h = height of the prism). Calculate the surface area of a cylinder by applying the formula: $SA = 2\pi r^2 + 2\pi rh$ (r = radius of the base, h = height of the cylinder). Calculate the volume of a cylinder by applying the formula: $V = \pi r^2 h$. Calculate the surface area of a pyramid by determining the total 	<p>MA.8.4.4 Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids</p>	<ul style="list-style-type: none"> Revise and use the formula for given situations, e.g., surface area of an open cylinder is $\pi r^2 + 2\pi rh$.


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Foundational Benchmark	Approaching the					
Students will	Students will	Students will	Students will		Students will	
				area of each face. • Calculate the volume of a pyramid by applying the formula: $V = \frac{1}{3} Bh$ (B = area of the base, h = height of the pyramid).		
Gr. 7	<ul style="list-style-type: none"> Explain and give an example of how doubling (or tripling, etc.) the length and width of a square or rectangle affects the perimeter. 	<ul style="list-style-type: none"> Explain and give an example of how doubling (or tripling, etc.) the length and width of a square or rectangle affects the perimeter and area. 	<ul style="list-style-type: none"> Explain and give an example of how doubling (or tripling, etc.) the radius of a circle affects the circumference and area. 	<ul style="list-style-type: none"> Explain and give an example of how doubling (or tripling or quadrupling, etc.) one dimension of a triangle or parallelogram (either the base OR the height) affects the area of that shape. <i>Note: The change in perimeter is harder to quantify because the resultant figure may not be similar to the original shape.</i> Explain and give an example of how doubling (or tripling, etc.) the base AND height of a triangle or parallelogram affects the area. <i>Note: The change in perimeter is harder to quantify because the resultant figure may not be similar to the original shape.</i> 	MA.7.4.1 Determine how measurements, such as perimeter and area, of common shapes (e.g., squares, rectangles, parallelograms, triangles, circles) are affected when one of the attributes is changed in some way	
		<ul style="list-style-type: none"> Explain what the “scale” on the drawing means in terms of a ratio. 	<ul style="list-style-type: none"> Identify the corresponding sides between a scale drawing and the actual object. 	<ul style="list-style-type: none"> Apply ratios and/or proportions to determine unknown measurements, e.g., side lengths, area, perimeter between a 		MA.7.4.2 Uses ratios and proportions to relate a scale drawing to the actual object

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Students will	Students will	Students will	Students will		Students will	
		<ul style="list-style-type: none"> State the formulas for the circumference of a circle as $C = 2\pi r$ or $C = \pi d$ and the area of a circle as $A = \pi r^2$. 	<ul style="list-style-type: none"> Calculate the circumference OR area of a circle when the radius or diameter is known. 	<ul style="list-style-type: none"> scale drawing and the actual object. Calculate the circumference AND area of a circle when the radius or diameter is known. Calculate the radius or diameter of a circle given the circumference. 	<p>MA.7.4.3 Use known measurements (e.g., radius) to calculate desired measurements (e.g., circumference and area) of circles</p>	<ul style="list-style-type: none"> Calculate the radius or diameter of a circle given the area.
Gr. 6	<ul style="list-style-type: none"> Define circumference as the distance around (perimeter of) a circle. Estimate the circumference of a circle (without referring to a formula) by using a measurement technique such as: <ul style="list-style-type: none"> wrapping a string around the circumference and measuring the length of the string. counting the number of units it takes to work your way around the circumference. Estimate the area of a circle (without referring to a formula) by using a measurement technique such as: <ul style="list-style-type: none"> drawing the circle on grid paper and counting the numbers of square units and partial square units inside the circle inscribing a square 	<ul style="list-style-type: none"> Demonstrate the diameter is twice the radius of a circle or the radius is half the diameter. Demonstrate the area of a circle (without referring to a formula) by using a measurement technique such as: <ul style="list-style-type: none"> creating a square whose side is the radius of the circle and showing that three of these squares and a little more will fill the circle. 	<ul style="list-style-type: none"> Estimate the circumference of a circle (without referring to a formula) by using the understanding that it is a little more than three times the diameter. Estimate the area of a circle (without referring to a formula) by using the understanding that it is a little more than three times the radius squared. 	<p>MA.6.4.1 Estimate the circumference and area of a circle (with no reference to a formula)</p>		

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Students will	Students will	Students will	Students will		Students will
	<i>inside or</i> circumscribing a square outside the circle to get low or high end estimates.				
	<ul style="list-style-type: none"> Decompose complex shapes into two or more common shapes. 	<ul style="list-style-type: none"> Identify the formula that can be used to determine the area OR perimeter of a shape, and then apply the formula. 	<ul style="list-style-type: none"> Identify the formula that can be used to determine the area AND perimeter of a polygon, and then apply the formula. Decompose complex shapes into two or more common shapes, and then apply the appropriate formulas to determine the area and perimeter of the original shapes. Use understanding of perimeter and area to determine other measurements, e.g., possible side lengths given the area/perimeter; largest perimeter given the area. 	<p>MA.6.4.3 Apply strategies and formulas to solve area and perimeter problems involving polygons (e.g., regular hexagons) and complex shapes (i.e., shapes composed of two or more common shapes)</p>	
Gr. 5	<ul style="list-style-type: none"> Describe various systems of measurement from its smallest unit to its largest unit, e.g., 8 ounces in a cup, 2 cups in a pint, 2 pints in a quart, 4 quarts in a gallon. 	<ul style="list-style-type: none"> Convert from one unit to the immediate unit above or below within the same system of measurement, e.g., able to convert ounces to cups, but unable to convert ounces to gallons. 	<ul style="list-style-type: none"> Convert from a larger unit of measure to a smaller unit of measure within the same system of measurement, e.g., convert 3 feet to inches ($3 \times 12 = 36$). 	<ul style="list-style-type: none"> Convert from one unit of measurement to another, both small to large, and large to small (within the same system of measurement). 	<p>MA.5.4.1 Convert simple units within a system of measurement (e.g., millimeters to centimeters, feet to yard, quarts to gallons, gram to kilogram, minutes to hours, days to weeks)</p>

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Students will	Students will	Students will	Students will		Students will
	<ul style="list-style-type: none"> Match the scale drawing of a simple object, e.g., making an object bigger or smaller to its original. Draw simple objects, e.g., eight Hawaiian Islands, but not to scale. 	<ul style="list-style-type: none"> Determine the actual distance between two points by applying the map scale. 	<ul style="list-style-type: none"> Determine the actual distance between two points by applying the map scale. Make a scale drawing of a simple object, e.g., a rectangular two- or three-dimensional object or scene, e.g., a map showing the distance between three desks in class. 	MA.5.4.3 Use map scales to measure the distance between locations and make simple scale drawings	
		<ul style="list-style-type: none"> Match the strategy that uses the known measurement to find the unknown measurement, e.g., match the formula for finding the area of a triangle. 	<ul style="list-style-type: none"> Use known measurements, e.g., base and height of triangles, parallelograms, and trapezoids, to calculate other unknown measurements, e.g., area, side lengths of those shapes. 	MA.5.4.5 Use known measurements (e.g., base and height) to calculate desired measurements (e.g., area) of triangles, parallelograms, and trapezoids	
		<ul style="list-style-type: none"> Calculate the surface area OR volume of a rectangular solid when given its length, width, and height. 	<ul style="list-style-type: none"> Calculate the surface area AND volume of a rectangular solid when given its length, width, and height. 	MA.5.4.6 Use known measurements (e.g. length, width, and height) to calculate desired measurements (e.g., surface area and volume) of rectangular solids	<ul style="list-style-type: none"> Calculate the length (or width, or height) of a rectangular solid when its volume and two of the other dimensions are known. Determine possible lengths, width, and/or heights of a rectangular solid when given its surface area (or volume).

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Foundational Benchmark	Approaching the					
Students will	Students will	Students will	Students will	Students will	Students will	Students will
	<ul style="list-style-type: none"> Identify standard units of measure, e.g., square units, cubic units. 	<ul style="list-style-type: none"> Define standard units of measure. 	<ul style="list-style-type: none"> Explain the need to use standard units for measuring. 	MA.4.4.1 Explain the need to use standard units for measuring		
	<ul style="list-style-type: none"> Identify customary and metric tools to measure length, perimeter OR area for the degree of accuracy needed, e.g., 12-inch rulers, yard sticks, meter sticks. 	<ul style="list-style-type: none"> Use customary and metric tools to measure length, perimeter OR area for the degree of accuracy needed. 	<ul style="list-style-type: none"> Select and apply appropriate customary and metric units and tools to measure length, perimeter, AND area for the degree of accuracy needed. 	MA.4.4.2 Select and apply appropriate customary and metric units and tools to measure length, perimeter, and area for the degree of accuracy needed		
Gr. 4	<ul style="list-style-type: none"> Identify surface area and volume. 	<ul style="list-style-type: none"> Using a benchmark estimate surface area and volume using U.S. customary units and metric units, e.g., given a jar partially filled with ten one-inch cubes, estimate how many cubes would fill the entire jar. 	<ul style="list-style-type: none"> Measure surface area and volume using U.S. customary units and metric units. 	<ul style="list-style-type: none"> Estimate and measure surface area and volume using U.S. customary units and metric units. 	MA.4.4.4 Estimate and measure surface area and volume using U.S. customary units and metric units	
			<ul style="list-style-type: none"> Use known measurements to calculate desired measurements of squares and rectangles, e.g., use the length of the square to calculate its area OR perimeter. 	<ul style="list-style-type: none"> Use known measurements to calculate desired measurements of squares and rectangles labeled with appropriate units, e.g., use the length of the square to calculate its area AND perimeter. 	MA.4.4.5 Use known measurements to calculate desired measurements of squares and rectangles (e.g., use the length of the square to calculate its area and perimeter)	

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Foundational Benchmark	 Approaching the Benchmark					
Students will	Students will	Students will	Students will	Students will		Students will
<ul style="list-style-type: none"> Describe area as a two-dimensional measurement OR volume as a three-dimensional measurement. 	<ul style="list-style-type: none"> Describe area as a two-dimensional measurement. Describe volume as a three-dimensional measurement. 	<ul style="list-style-type: none"> Identify the appropriate units for area. Identify the appropriate units for volume. 	<ul style="list-style-type: none"> Describe the concept of area and appropriate units. Describe the concept of volume and appropriate units. 	<p>MA.3.4.1 Describe the concept of area and volume and the appropriate units for each</p>		
		<ul style="list-style-type: none"> Use standard unit manipulatives (grid paper, cubes, tiles, etc.) to find area OR volume. Use non-standard unit manipulatives (water, sand, paper clips, etc.) to find area OR volume. 	<ul style="list-style-type: none"> Use standard unit manipulatives (grid paper, cubes, tiles, etc.) to find area AND volume. Use non-standard unit manipulatives (water, sand, paper clips, etc.) to find area AND volume. 	<p>MA.3.4.2 Measure area and volume using standard and non-standard units (e.g., tiles, index cards, grids, cubes)</p>		
<ul style="list-style-type: none"> Measure length in U.S. customary AND metric units. 	<ul style="list-style-type: none"> Measure weight in U.S. customary AND metric units. 	<ul style="list-style-type: none"> Measure length, capacity, AND weight in U.S. customary OR metric units. 	<ul style="list-style-type: none"> Measure length, capacity, AND weight in U.S. customary AND metric units, e.g., pound, kilogram. 	<p>MA.3.4.3 Measure length, capacity, and weight in U.S. customary and metric units (e.g., pound, kilogram)</p>		
		<ul style="list-style-type: none"> Select appropriate tools to measure length, weight, OR capacity. 	<ul style="list-style-type: none"> Select appropriate tools for measuring length, capacity, AND weight in a given situation including metric tools. 	<p>MA.3.4.5 Select appropriate tools for measuring length, capacity, and weight</p>		
<ul style="list-style-type: none"> Using a benchmark unit, estimate the perimeter and area of common shapes. 		<ul style="list-style-type: none"> Measure the perimeter and area of common and irregular shapes. 	<ul style="list-style-type: none"> Estimate and measure perimeter and area of common shapes, e.g., square, triangle, rectangle; and irregular shapes, e.g., a house-shaped pentagon. 	<p>MA.3.4.6 Estimate and measure perimeter and area of common shapes and irregular (e.g., a house-shaped pentagon) shapes</p>	<ul style="list-style-type: none"> Estimate and measure perimeter and area of common shapes such as square, triangle, rectangle and irregular shapes including circles and irregular shapes 	

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Foundational Benchmark	Approaching the				
Students will	Students will	Students will	Students will		Students will
					with curved sides.
Gr. 2		<ul style="list-style-type: none"> Identify inch markings and centimeter markings on ruler, and feet markings on yard stick. 	<ul style="list-style-type: none"> Measure length using inches, feet, OR centimeters (knows to start at "0" mark). 	<ul style="list-style-type: none"> Measure length using inches, feet, AND centimeters (knows to start at "0" mark). 	MA.2.4.1 Measure length using inches, feet, and centimeters
			<ul style="list-style-type: none"> Identify the appropriate units to measure length, area, capacity, i.e., fluid ounces or liters, OR weight. 	<ul style="list-style-type: none"> Identify the most efficient unit (metric or U.S. customary) for measuring length, area, capacity, i.e., fluid ounces or liters, AND weight. 	MA.2.4.2 Identify appropriate units for measuring length, area, capacity, and weight
			<ul style="list-style-type: none"> Identify objects that could be used in place of standard units to estimate (close, within reason). 	<ul style="list-style-type: none"> Identify objects and/or visual benchmarks, e.g., width of pinky finger is about one centimeter long or the pencil tip is about one millimeter that could be used in place of standard units when estimating (close, within reason). 	MA.2.4.6 Identify objects or visual benchmarks that could be used in place of standard units when estimating
Gr. 1			<ul style="list-style-type: none"> Measure with multiple copies of non-standard units of the same size. 	<ul style="list-style-type: none"> Measure with multiple copies of standard, e.g., inch tiles, foot-long lengths of string; or non-standard, e.g., paper clips, pencils, hand span units of the same size. 	MA.1.4.1 Measure with multiple copies of standard (e.g., inch tiles, foot-long lengths of string) or non-standard (e.g., paper clips, pencils) units of the same size
		<ul style="list-style-type: none"> Show an understanding that length is "how 	<ul style="list-style-type: none"> Identify some measurement tools for 	<ul style="list-style-type: none"> Identify measurement tools that could be used 	MA.1.4.4 Identify measurement

LEVELS OF PROGRESSION BELOW THE BENCHMARK				AT THE BENCHMARK	BENCHMARK	ADVANCED
Foundational Benchmark		Approaching the				
	Students will	Students will	Students will	Students will		Students will
		long,” capacity is “how much space is taken,” and weight is “how heavy.”	measuring length, i.e., yardstick or ruler; or weight, i.e., scale.	to measure length, i.e., yardstick or ruler; capacity, i.e., measuring cup; and weight, i.e., scale.	tools that could be used to measure length, capacity, and weight	given tool, e.g., given a yard stick, student will state that it can be used to measure the length of the room; or given a cup, student will state that it can be used to measure the amount of juice.
Gr. K	<ul style="list-style-type: none"> Identify longer, shorter, heavier, lighter. 	<ul style="list-style-type: none"> Compare and order objects by length and weight. 	<ul style="list-style-type: none"> Compare and order objects by length, weight, capacity (referring to liquid), and volume (referring to how much “stuff” can fit into a space or container). 	<ul style="list-style-type: none"> Compare and order objects according to length, weight, capacity (referring to liquid), area (how much “stuff” can fit into a flat enclosed region), and volume (referring to how much “stuff” can fit into a space or container). 	MA.K.4.1 Compare and order objects according to length, weight, capacity, area, and volume	

Measurement K-8:

CONTENT STANDARD #4 – FLUENCY WITH MEASUREMENT

Understand attributes, units, and systems of units in measurement: and develop and use techniques, tools, and formulas for measuring

Topic: Money/Currency, Time, Temperature Attributes and Units

Topic: Measurement Tools and Techniques

Understanding(s): *Students will understand that...*

- Describing things as accurately as possible enables people to more effectively communicate their observations.
- Equivalent representations for the same value are used for different representations.
- Measurements may be taken directly, or derived from other measurements.
- Accuracy and precision of measurement depends on its purpose.

Essential Questions:

- What determines which measurement attributes, units, and systems of units are to be used?
- What conditions determine the degree of accuracy and precision needed?


Knowledge: *Students will know...*

- Digital versus analog.
- Value of each coin and bill.
- Hour, minute, and second hand.

Skill(s): *Students will be able to...*

- Tell and convert time.
- Estimate and determine elapsed time between two events or times.
- Measure temperature.
- Represent a monetary amount using a variety of combinations of coins and bills.

<u>Grade</u>	<u>Reference</u>	<u>Benchmark</u>
Grade 8	-----	<no benchmark for this topic at this grade level>
Grade 7	-----	<no benchmark for this topic at this grade level>
Grade 6	-----	<no benchmark for this topic at this grade level>
Grade 5	MA.5.4.1	Convert simple units within a system of measurement (e.g., millimeters to centimeters, feet to yard, quarts to gallons, gram to kilogram , minutes to hours, days to weeks)
Grade 4	-----	<no benchmark for this topic at this grade level>
Grade 3	MA.3.4.4	Estimate and determine the elapsed time between two events or times
Grade 2	MA.2.4.3	Estimate and measure temperature using standard units (e.g., Fahrenheit, Celsius)
	MA.2.4.4	Tell time to the minute
	MA.2.4.5	Represent a given monetary amount using a variety of combinations of coins and bills
Grade 1	MA.1.4.2	Identify the value of coins and count coin combinations (using like coins) to a dollar
	MA.1.4.3	Tell time to the half-hour and quarter-hour
Grade K	MA.K.4.2	Identify the value of pennies, nickels, and dimes and the equivalence among them (e.g., 5 pennies = 1 nickel)
	MA.K.4.3	Tell time to the hour
	MA.K.4.4	Identify tools used to measure time (i.e., digital and analog clock, calendar)

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Foundational Benchmark			Approaching the			
	Students will	Students will	Students will	Students will		Students will
Gr. 8					<no benchmarks for this grade level>	•
Gr. 7					<no benchmarks for this grade level>	
Gr. 6					<no benchmarks for this grade level>	
Gr. 5				<ul style="list-style-type: none"> Convert from one measurement to another within units in time, e.g., seconds to minutes, months to years, years to decades, decades to centuries, etc. 	MA.5.4.1 Convert simple units within a system of measurement (e.g., millimeters to centimeters, feet to yard, quarts to gallons, gram to kilogram, minutes to hours, days to weeks)	
Gr. 4					<no benchmarks for this grade level>	
Gr. 3		<ul style="list-style-type: none"> Define elapsed time. Identify the start and end times of an event. 	<ul style="list-style-type: none"> Determine the elapse time given quarter hours starting and end times, e.g., if Math starts at 8:15 a.m. and ends at 9:45 a.m., how long is Math class? 	<ul style="list-style-type: none"> Estimate elapsed time between two events. Determine the number of hours and minutes that elapsed between the start and end time of an event. 	MA.3.4.4 Estimate and determine the elapsed time between two events or times	

LEVELS OF PROGRESSION BELOW THE BENCHMARK				AT THE BENCHMARK	BENCHMARK	ADVANCED
Foundational Benchmark	Approaching the					
	Students will	Students will	Students will	Students will		Students will
Gr. 2		<ul style="list-style-type: none"> Identify the Fahrenheit and Celsius scales of a thermometer. 	<ul style="list-style-type: none"> Measure temperature to the closest ten degrees on a thermometer. 	<ul style="list-style-type: none"> Estimate temperature using known benchmarks, e.g., freezing point, boiling point, room temperature. Measure temperature using a Fahrenheit and Celsius thermometer. 	MA.2.4.3 Estimate and measure temperature using standard units (e.g., Fahrenheit, Celsius)	
		<ul style="list-style-type: none"> Read time to the minute on a digital clock. 	<ul style="list-style-type: none"> Tell time to the nearest five minutes on an analog clock. 	<ul style="list-style-type: none"> Tell time to the minute by reading analog and digital clocks. 	MA.2.4.4 Tell time to the minute	<ul style="list-style-type: none"> Calculate elapsed time.
		<ul style="list-style-type: none"> Use pennies, nickels, dimes, quarters, half-dollars to represent whole dollar amounts greater than a dollar, e.g., \$2.00 is 8 quarters or 20 dimes or 2 one dollar bills). 	<ul style="list-style-type: none"> Use combinations of pennies, nickels, dimes, quarters, half-dollars to represent whole dollar amounts greater than a dollar, e.g., \$2.00 is 4 quarters AND 10 dimes OR 20 nickels AND 100 pennies. 	<ul style="list-style-type: none"> Use pennies, nickels, dimes, quarters, half-dollars, bills in different denominations, i.e., \$1.00, \$5.00, \$10.00, etc., to show various combinations of coins and bills for a given monetary amount, e.g., \$2.53 may be represented as: a) \$1.00, \$1.00, quarter, quarter, and three pennies OR b) Ten quarters and three pennies. 	MA.2.4.5 Represent a given monetary amount using a variety of combinations of coins and bills	<ul style="list-style-type: none"> Count change to \$1.00.
Gr. 1	<ul style="list-style-type: none"> Skip count by ten. 	<ul style="list-style-type: none"> Skip count by five. 	<ul style="list-style-type: none"> Name the value of a quarter = 25 cents. Skip count by 25. 	<ul style="list-style-type: none"> Use skip counting to count coins (using like coins) equivalent to any value up to one dollar. 	MA.1.4.2 Identify the value of coins and count coin combinations (using like coins) to a dollar	<ul style="list-style-type: none"> Use skip counting to count coins to any value over a dollar, e.g., 10¢, 20¢, 30¢, 190¢, 200¢ is counting up to \$2.00 by dimes. Use mixed coins, e.g., quarters and dimes to count up to \$1.00.
		<ul style="list-style-type: none"> Define an hour as 60 	<ul style="list-style-type: none"> Tell time to the half- 	<ul style="list-style-type: none"> Tell time to the half- 	MA.1.4.3	

LEVELS OF PROGRESSION BELOW THE BENCHMARK				AT THE BENCHMARK	BENCHMARK	ADVANCED
Foundational Benchmark	Approaching the					
	Students will	Students will	Students will	Students will		Students will
		minutes; half-hour as 30 minutes.	hour by reading an analog clock, i.e., identifies when the minute hand points at six, it is half past the hour).	hour and quarter-hour by reading an analog clock, i.e., identifies when the minute hand points at three, it is a quarter past the hour; when the minute hand points at nine, it is a quarter till the hour.	Tell time to the half-hour and quarter-hour	
Gr. K		<ul style="list-style-type: none"> Identify a penny and its value. 	<ul style="list-style-type: none"> Differentiate a nickel from a dime and their values. 	<ul style="list-style-type: none"> Identify the value of pennies, nickels, and dimes. Use pennies and nickels and/or dimes to demonstrate different combinations of coins equivalent to five cents and ten cents. 	MA.K.4.2 Identify the value of pennies, nickels, and dimes and the equivalence among them (e.g., 5 pennies = 1 nickel)	
	<ul style="list-style-type: none"> Identify an analog clock and a digital clock. 	<ul style="list-style-type: none"> Identify the long hand (minute hand) and short hand (hour hand) of an analog clock. 	<ul style="list-style-type: none"> Describe events of the day to show passing of time, i.e., before school, recess, lunch, and after school. 	<ul style="list-style-type: none"> Tell time to the hour by reading analog and digital clocks. 	MA.K.4.3 Tell time to the hour	
				<ul style="list-style-type: none"> Identify digital and analog clocks as tools to read time. Identify the calendar as a tool to represent dates and days of the week in a calendar year. 	MA.K.4.4 Identify tools used to measure time (i.e., digital and analog clock, calendar)	

Measurement: PROPERTIES AND RELATIONSHIPS: K-8

CONTENT STANDARD #4 – FLUENCY WITH MEASUREMENT

Understand attributes, units, and systems of units in measurement and develop and use techniques, tools, and formulas for measuring

Topic: Angles, Triangles, Circles Attributes and Units

Topic: Measurement Tools and Technique

Understanding(s): *Students will understand that...*

- Describing things as accurately as possible enables people to more effectively communicate their observations.
- Accuracy and precision of measurement depends on its purpose.
- Describing things as accurately as possible enables people to compare their observations with those of others.
- Angles can be measured, constructed, and classified by their degree measure.

Essential Question(s):

- What determines which measurement attributes, units, and systems of units are to be used?
- What conditions determine the degree of accuracy and precision needed?

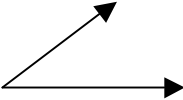
Knowledge: *Students will know...*

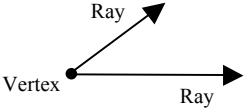
- Right angle.
- Acute angle.
- Obtuse angle.
- Straight angle.
- Degree measure.

Skill(s): *Students will be able to...*

- Estimate and measure angles.
- Construct angles.
- Categorize angles by their degree measures.

Grade	Reference	Benchmark
Grade 8	-----	<no benchmark for this topic at this grade level>
Grade 7	-----	<no benchmark for this topic at this grade level>
Grade 6	MA.6.4.2	Construct angles with a given degree measure
Grade 5	MA.5.4.2	Select and apply appropriate customary and metric units and tools to measure angles
	MA.5.4.4	Estimate and measure the size of an angle
Grade 4	MA.4.4.3	Classify right angles, acute angles, obtuse angles, and straight angles
Grade 3	-----	<no benchmark for this topic at this grade level>
Grade 2	-----	<no benchmark for this topic at this grade level>
Grade 1	-----	<no benchmark for this topic at this grade level>
Grade K	-----	<no benchmark for this topic at this grade level>

LEVELS OF PROGRESSION BELOW THE BENCHMARK			AT THE BENCHMARK	BENCHMARK	ADVANCED
Foundational Benchmark	Approaching the				
	Students will	Students will	Students will		Students will
Gr. 8					<no benchmarks for this grade level>
Gr. 7					<no benchmarks for this grade level>
Gr. 6			<ul style="list-style-type: none"> Using the vertex, draw one side of the desired angle and complete the measurement by constructing the second side of the angle using a protractor or angle ruler. 	<ul style="list-style-type: none"> Construct angles with a given degree measure (no given vertex or ray to start from) indicating which angle to look at, interior or exterior. 	MA.6.4.2 Construct angles with a given degree measure
Gr. 5			<ul style="list-style-type: none"> Use a nonstandard tool to estimate angle measurements, e.g., use the corner of a sheet of paper to represent a 90 degree angle. 	<ul style="list-style-type: none"> Use a protractor or angle ruler to measure an angle in degrees. 	MA.5.4.2 Select and apply appropriate customary and metric units and tools to measure angles
			<ul style="list-style-type: none"> Describe angle measures using 90° and 180° as benchmarks, e.g., student may say, "I know this angle is less than 90°." 	<ul style="list-style-type: none"> Use understanding of a 360° circle and the number of degrees for one-fourth, one-half, and three-fourths circle as benchmarks to estimate the size of an angle. Use a protractor or angle ruler to measure the angle. 	MA.5.4.4 Estimate and measure the size of an angle

LEVELS OF PROGRESSION BELOW THE BENCHMARK			AT THE BENCHMARK	BENCHMARK	ADVANCED	
Foundational Benchmark	Approaching the					
	Students will	Students will	Students will		Students will	
Gr. 4	<ul style="list-style-type: none"> Define parts of an angle, e.g., what are the vertex and ray? 	<ul style="list-style-type: none"> Explain that the size of an angle depends upon the degree measure between the rays and not the "length" of the rays. 	<ul style="list-style-type: none"> Define and identify right, acute, obtuse, and straight angles. 	<ul style="list-style-type: none"> Classify angles as being right, acute, obtuse, or straight. 	<p>MA.4.4.3 Classify right angles, acute angles, obtuse angles, and straight angles</p>	<ul style="list-style-type: none"> Identify and justify a given angle as being a right angle, acute angle, obtuse angle, or straight angle.
Gr. 3					<no benchmarks for this grade level>	
Gr. 2					<no benchmarks for this grade level>	
Gr. 1					<no benchmarks for this grade level>	
Gr. K					<no benchmarks for this grade level>	