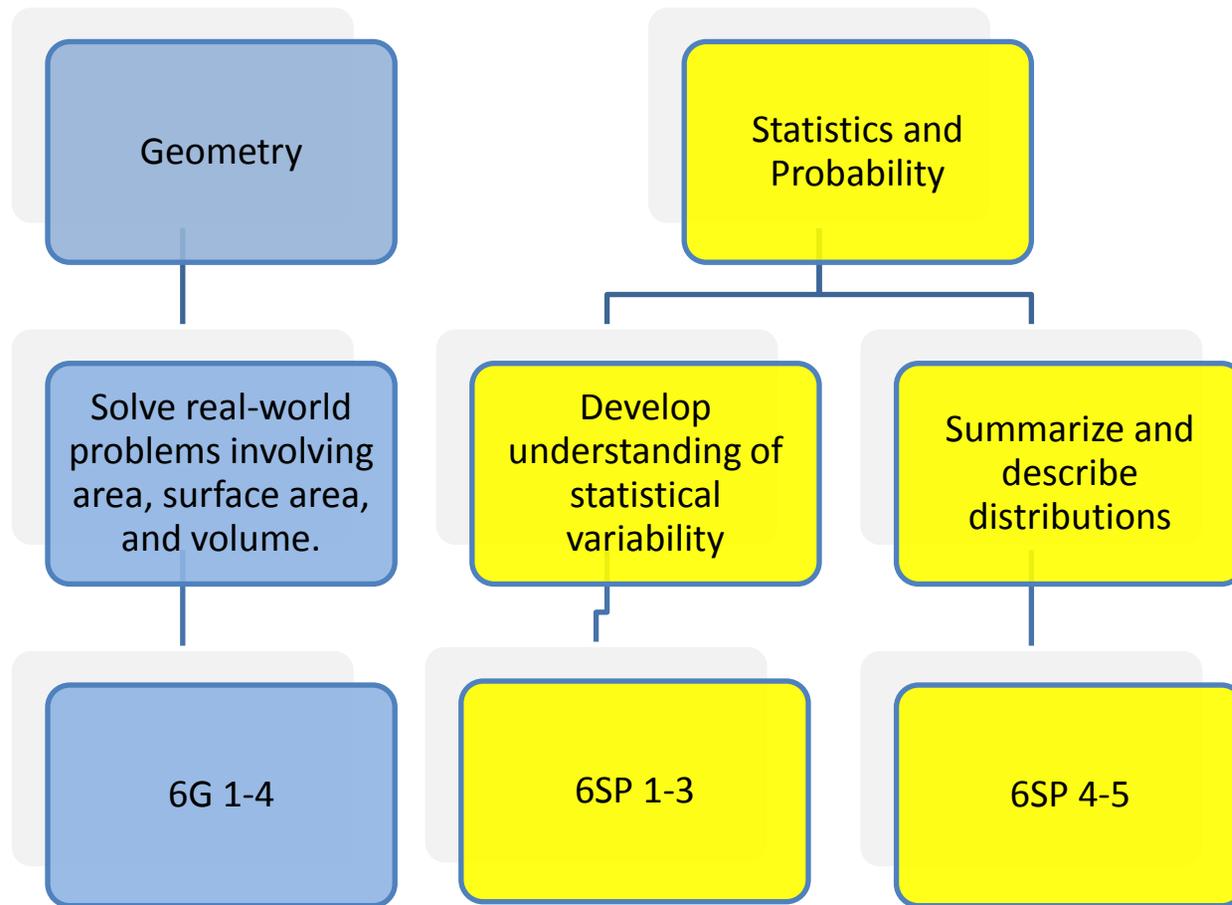


Grade 6
Unit 4
Geometry and Statistics and Probability



GRADE 6 – UNIT 4
Geometry and Statistics and Probability

Critical Area: Description of the critical area: Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability.

Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected. Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.

CLUSTERS	COMMON CORE STATE STANDARDS
Develop understanding of statistical variability.	<p>Statistics and Probability</p> <p>6.SP.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.</i></p> <p>6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>6.SP.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p>
Summarize and describe distributions.	<p>6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>6.SP.5. Summarize numerical data sets in relation to their context, such as by:</p> <ul style="list-style-type: none"> • Reporting the number of observations. • Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. • Giving quantitative measures of center (median and/or mean) and variability (interquartile

	<p>range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.</p> <ul style="list-style-type: none"> Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
Solve real-world and mathematical problems involving area, surface area, and volume.	<p>Geometry</p> <p>6.G.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.</p> <p>6.G.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.</p> <p>6.G.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</p> <p>6.G.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.</p>
MATHEMATICAL PRACTICES	LEARNING PROGRESSIONS
<ol style="list-style-type: none"> Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Construct viable arguments and critique the arguments of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning. 	<p>Click on the links below to access common core team's grade 6 learning progressions for this unit on:</p> <p>Statistics and Probability http://commoncoretools.files.wordpress.com/2011/12/ccss_progression_sp_68_2011_12_26_bis.pdf</p> <p>Geometry http://commoncoretools.files.wordpress.com/2012/06/ccss_progression_g_k6_2012_06_27.pdf</p>

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
Statistics and Probability:	Statistics and Probability:	Statistics and Probability:

<ul style="list-style-type: none"> • Students build on the knowledge and experiences in data analysis. • Students develop a deeper understanding of variability and more precise descriptions of data distributions, using numerical measures of center and spread, and terms such as cluster, peak, gap, symmetry, skew, and outlier. • Students use histograms and box plots to represent and analyze data distributions. • Students formulate questions, design and use a plan to collect relevant data, analyze the data with appropriate methods, and interpret results and draw valid conclusions from the data. 	<p>How are mean, median, and mode related?</p> <p>How are range different from mean, median, and mode?</p> <p>What are the best ways to predict the outcomes of an experiment?</p> <p>How can data be manipulated to show what you want?</p> <p>What kind of conclusions can be made from a set of data, based on numerical measures of center and spread?</p>	<p>Box Plots Cluster Data and Plots Distribution Gap Histogram Interquartile Range Mean, Median Mode Outlier Peak Range Sample space Set of Data Skew Symmetry Tree diagrams Variability and Variation Deviation</p>
<ul style="list-style-type: none"> • Geometry: • Students develop an understanding and solve problems involving areas and volumes. • Students extend previous work and provide a context for developing and using equations involving area and volume. • Students learn to find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. • Students develop visualization skills connected to their mathematical concepts as they recognize the existence of, and visualize components of three-dimensional shapes that are not visible from a given viewpoint. • Students understand and measure the attributes of shapes, and apply area formulas to solve surface area problems. • Students learn to plan the construction of complex three-dimensional compositions through the creation of 	<p>Geometry:</p> <p>What are perimeter and area, and circumference and how are they related?</p> <p>How are perimeter and circumference related?</p> <p>How is geometry used in our world? How is the attributes of space measured?</p> <p>How could you construct a complex three-dimensional composition through the creation of corresponding two-dimensional nets?</p> <p>What strategies could you use to recognize the existence of, and visualize components of three-dimensional shapes that are not visible from a given viewpoint?</p>	<p>Geometry:</p> <p>Area Coordinate plane Counterclockwise Edge Length Ordered pair Origin Polygons Prism Quadrilaterals Quadrants Square units Surface Area Triangles Vertex Volume volume, cubic units x-axis, x-coordinate y-axis, y-coordinate</p>

<p>corresponding two-dimensional nets.</p> <ul style="list-style-type: none"> Students extend their understanding of properties of two-dimensional shapes to use of coordinate systems. 		
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RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
<p>LAUSD Adopted Textbooks</p> <ul style="list-style-type: none"> California Mathematics College Preparatory Mathematics Go Math <p>Click on each list above for Textbook Alignment</p> <p>Teaching and Learning Framework</p> <p>http://illuminations.nctm.org/</p> <p>Illustrative Mathematics</p> <p>6.SP.1 Identifying Statistical Questions</p> <p>6.SP Puppy Weights</p> <p>6.SP Buttons: Statistical Questions</p>	<p>Statistics and Probability: Engage the students in a structured instructional conversations to discuss the four-step statistical investigation:</p> <ol style="list-style-type: none"> Formulate questions that can be answered with data. Design and use a plan to collect relevant data. Analyze the data with appropriate methods. Interpret results and draw valid conclusions from the data that relate to the questions posed. <ul style="list-style-type: none"> Have students use real world connections such as scores of organization skills of students to explore measure of central tendency. Use Language frames for classroom communication regarding interpreting results and drawing conclusions from data. Students can use applets to create data displays. For example: Box Plot Tool and Histogram on the NCTM Illuminations Note that as students display and summarize numerical data (6.SP.4-6), they also support mathematical practices such as make sense of given data (MP.1), model and use statistical data (MP.4, MP.5), and precision in finding and applying statistical measures (MP.6). Have students interpret data displays and measures of center and variability from them. They summarize numerical data sets in relation to their context (6.SP.5). <p>Geometry: Orchestrate a discussion that would have students reason about relationships among shapes to determine area, surface area, and volume. Help students understand area as the number of squares needed to cover a plane figure by using a net activity.</p> <ul style="list-style-type: none"> Students find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. See the example below: Students will decompose trapezoids into triangles and rectangles, and use this reasoning to find formulas for the area of a trapezoid. Students can find areas of shapes on centimeter grid paper by duplicating, 	<p>Formative Assessment</p> <hr/> <p>LAUSD Assessments</p> <p>District assessments can be accessed through: http://achieve.lausd.net/math http://achieve.lausd.net/ccss</p> <p>Use your Single Sign On to access the Interim Assessments</p> <hr/> <p>State Assessment</p> <p>California will be administering the MARTER Balanced Assessment as the course examination for grades 3-8 and 11. The 11th grade assessment will include items from Algebra 1, Geometry, and Algebra 2 standards. For examples, visit the SMARTER Balanced Assessment at: http://www.smarterbalanced.org</p>

	<p>composing, and decomposing shapes. These experiences will make them familiar with the processes that result in the derivations of the formulas shown below. Starting with a basic understanding of the area of a rectangle of base units and height units being square units, along with the relationship between rectangles and triangles, and the law of conservation of area, students can justify area formulas for various shapes.</p> <ul style="list-style-type: none"> • Students represent shapes in the coordinate plane. They find lengths of sides that contain vertices with a common x- or y-coordinate, representing an important step for later grade eight understanding of how to use the distance formula to find the distance between any two points in the plane. • Have students construct three-dimensional shapes using nets and build on their work with areas (6.G.4) by finding surface areas using nets. 	
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LANGUAGE GOALS for low achieving, high achieving, students with disabilities and English Language Learners

Students will recognize and write statistical questions. How old am I?” is not a statistical question, but “How old are the students in my school?”
 Students will explain the meaning of statistical distribution.
Example: Statistical distribution is _____ because _____.

Students will compare and contrast the differences between measure of center tendency for a numerical data set and variation in data.
Example: Measure of central tendency is _____ and variability describes how _____.

Students will discuss and write how to determine the area of right triangles, other triangles, special quadrilaterals, and polygons.
Example: When I find the area of my rectangular classroom floor, I _____ the length by the _____.

Students will apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths.

PERFORMANCE TASKS

<p>Statistics and Probability: Inside Mathematics</p> <p><i>Statistics and Probability (SP)</i></p> <p>6.SP.1, SP.4, SP.5- Through the Grapevine: <u>Problem of the Month</u></p> <p>6.SP.2 - Pick a Pocket: <u>Problem of the Month</u></p> <p>6.SP.3, SP.5 - Baseball Players: <u>Task</u></p>	<p>Illustrative Mathematics</p> <p>6-SP.2.5d Electoral College</p> <p>6.SP.4 Puppy Weights</p> <p>6.SP4. 5c Puzzle Times</p> <p>Mathematics Assessment Project Mean, Median, Mode, and Range:</p>
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<p>Geometry: Mathematics Assessment Project 6.G.4 and MP1,3,4 – Designing Candy Cartons 6.G.2 and 6.G.4 Fruit Boxes 6.G.4 Smoothie Box 6.SP. 4 – 5 Candy Bars 6.SP.5 Suzi’s Company</p>	<p>Research Development and Accountability 6G.1 – Triangle Try Outs. Use this activity as enrichment activity</p> <p>Inside Mathematics 6.G.1 Polly Gone: Problem of the Month 6.G.2 - Building Blocks: Task</p>	
DIFFERENTIATION 		
UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
<p>Statistics and Probability:</p> <ul style="list-style-type: none"> • Students apply their understanding of data and how to construct line plots. • Students apply and extend their knowledge of symmetric shapes • Students use their knowledge in division, fractions, and decimals in computing a new measure of center-arithmetic mean, often simply called the mean. <p>Geometry:</p> <ul style="list-style-type: none"> • Students should be provided opportunities prior to the lesson to develop apply and extend competencies in shape composition and decomposition, especially with spatial structuring of rectangular arrays. • Have students apply previous understandings of the coordinate plane to graphs. • Students model and find area of a triangle from a square and a rectangle by decomposition. 	<p>Acceleration for high achieving students:</p> <p>Relate the area of study to other subjects within, between, and across disciplines. Such as in, Geography and Environmental Literacy</p> <p>Students apply knowledge and understanding of data collection to answer questions regarding – the emergence and expansion and decline of civilizations, societies and regions</p> <p>LEARN NC Interdisciplinary Math and Social Studies, Gridding an archaeological dig site http://www.learnnc.org/lp/pages/1005</p> <p>Students represent shapes in the coordinate plane. They find lengths of sides that contain vertices with a common x- or y-coordinate, representing an important step for later grade eight understanding of how to use the distance formula to find the distance between any two points in the plane.</p>	<p>Intervention for low achieving students and students with disabilities:</p> <ul style="list-style-type: none"> • Small teacher to student ratio discussion • Emphasize think-pair-share • Build the 2-D AND 3-D geometric figures to give students the opportunity to make connections between the real and the abstract • Make connections to real life • • Use Physical Objects to demonstrate the math. In geometry : Such as cones, squares, etc. • In probability and statistics: Census data, experimental results could be collected from the newspaper or the internet. Students would display and interpret the data in charts

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