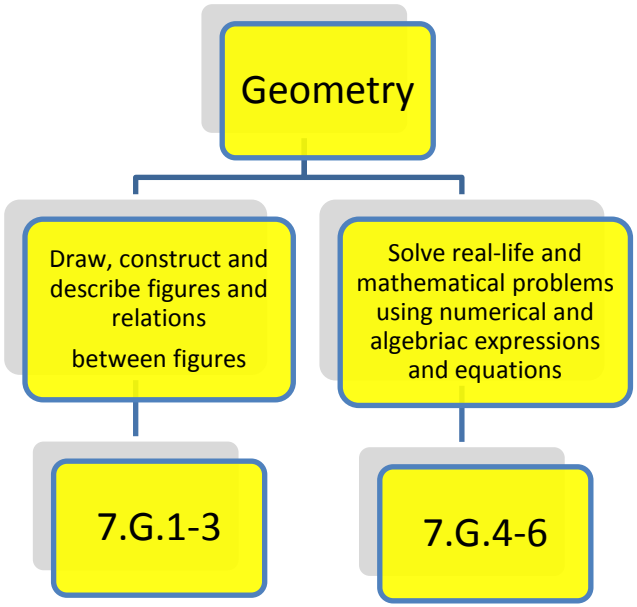
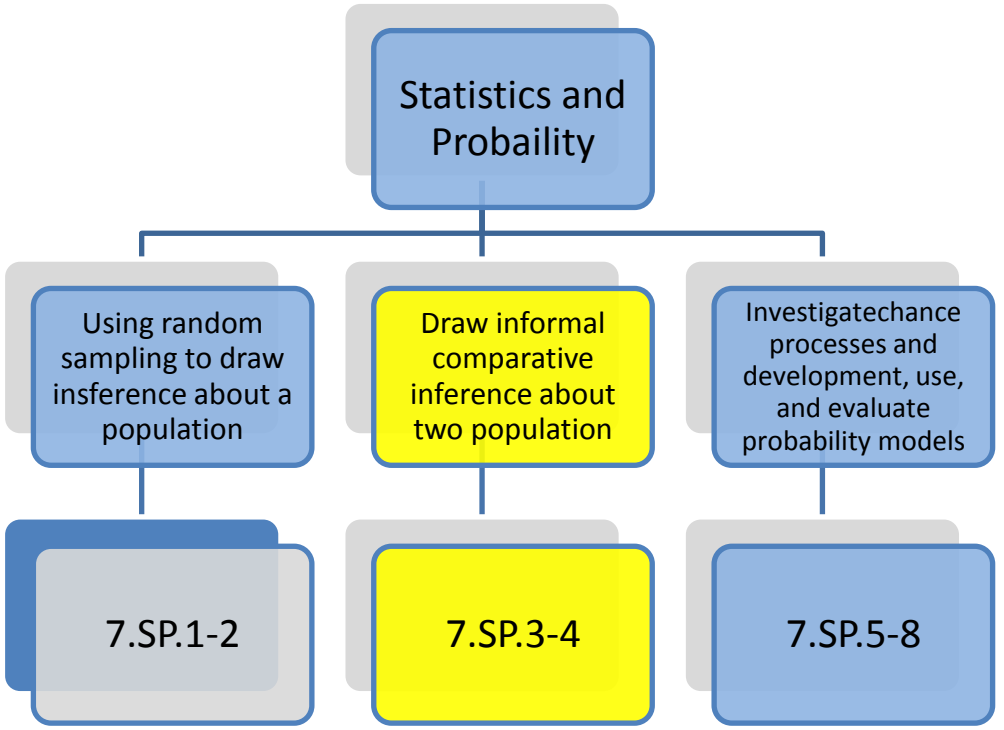
Common Core Math 7

Unit 4

Developing Understanding of Geometry, Statistics and Probability





COMMON CORE MATH 7 – UNIT 4

Developing Understanding of Geometry, Statistics and Probability

Students continue their work with area from Grade 6, solving problems Involving the area and circumference of a circle and surface area of three-dimensional objects. Students reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with relationships between angles formed by Intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Students build on their work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

CLUSTERS	COMMON CORE STATE STANDARDS
Geometry **(s/a)^2 Draw, construct, and describe geometrical figures and describe the relationships between them.**	**7.G.1**. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **7.G.2**. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **7.G.3**. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. **7.G.3.1** ***Describe how two or more objects are related in space (e.g., skew lines, the possible ways three planes might intersect).CA***
(s/a)^2 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	**7.G.4**. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **7.G.5**. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. **7.G.6**. Solve real-world and mathematical problems involving area, volume and surface area of two- and three dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
Statistics and Probability **(s/a)^2 Use random sampling to draw inferences about a population.**	**7.SP.1**. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. **7.SP.2**. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the

CLUSTERS	COMMON CORE STATE STANDARDS
	same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
(s/a)[2] Draw informal comparative inferences about two populations.	**7.SP.3**. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* **7.SP.4**. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*
(s/a)[2] Investigate chance processes and develop, use, and evaluate probability models.	**7.SP.5**. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. **7.SP.6**. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.* **7.SP.7**. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* **7.SP.8**. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

CLUSTERS	COMMON CORE STATE STANDARDS
	a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
MATHEMATICAL PRACTICES	**LEARNING PROGRESSIONS**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. **3. Construct viable arguments and critique the arguments 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.**	The Progressions for the Common Core State Standards in Mathematics (draft) for Statistics and Probability shows how the study of Statistics and Probability progress from grades 6 to 8. In Grade 6, students build on the knowledge and experiences in data analysis developed in earlier grades (see K-3 Categorical Data Progression and Grades 2-5 Measurement Progression). In Grade 7, students move from concentrating on analysis of data to production of data, understanding that good answers to statistical questions depend upon a good plan for collecting data relevant to the questions of interest. Because statistically sound data production is based on random sampling, a probabilistic concept, students must develop some knowledge of probability before launching into sampling. The CDE Progress to Algebra continuum K-8 shows the clusters as the build to the study of Statistics and Probability from earlier grades.

[1] **Major Clusters – area of intensive focus where students need fluent understanding and application of the core concepts.**

[2] **Supporting/Additional Clusters – designed to support and strengthen areas of major emphasis/expose students to other subjects.**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
Geometry • Solve problems involving the area and circumference of a circle and surface area of three-dimensional objects. • Reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, which will lead to gaining familiarity with the relationships between angles formed by intersecting lines. Work with three-dimensional	**Geometry** What 2-D figure results from slicing 3-D figures? (cones, spheres, or cylinders) How do you find the surface area and volume of a 3D figure? What is the total number of degrees in supplementary and complementary angles? What is the relationship between vertical and adjacent	**Geometry** Adjacent Complementary Cones Construct Cylinders Plane Rectangular figures Rectangular Supplementary Surface area Two-dimensional (2-D) Three-dimensional (3-D) Vertical

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
figures, relating them to two- dimensional figures by examining cross-sections. • Solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.	angles? How would the volume and surface area be affected when dimensions of a figure are doubled and/or triple?	pyramids Scale Skew Spheres
Probability and Statistics • Compare two data distributions and address questions about differences between populations. • Begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.	**Probability and Statistics** How do you determine which measures of variability should be used to draw informal comparative inferences? How are lists, tables, tree diagrams or simulation used to find the probability of an event? How is probability used to predict frequency of an event?	**Probability and Statistics** Comparative Compound events Deviation Discrepancy Distribution Draw inference Frequency Gauge Inferences Prediction Probability Random Relative Simple events Simulation Statistics Variability Variation

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
NLVM http://nlvm.usu.edu/ **NCTM Illuminations activities** 7.G.1 - Floor Plan - **California Draft Mathematics Framework:** http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp. **LAUSD Adopted Textbooks:** • California Mathematics • College Preparatory Mathematics • Go Math Click on each list above for Textbook Alignment Engage NY Common Core Curriculum Module 5 – Statistics and Probability Module 6 - Geometry	• Journal writing prompts (link) • Technology to show visual representations of geometric figures: Geometry sketchpad • Use visuals to illustrate multiple representations of rate of change • Real-world connections • Structured instructional conversations (Think-Pair-Share)	**Formative Assessments** **Illustrative Mathematics** 7.SP Estimating the Mean State Area **Mathematics Assessment Project** 7.G.4 and 7.G.6 Drawing to Scale: Designing a Garden **LAUSD Assessments** District assessments can be accessed through: http://achieve.lausd.net/math http://achieve.lausd.net/ccss Use your Single Sign On to access the Interim Assessments.

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
		State Assessments California will be administering the SMARTER Balance Assessment as the end of course for grades 3-8 and 11. The 11th grade assessment will include ítems from Algebra 1, Geometry, and Algebra 2 standards. For examples, visit the SMARTER Balance Assessment at: SBAC - http://www.smarterbalanced.org/

LANGUAGE GOALS for **low achieving, high achieving, students with disabilities and English Language Learners**

- Students will understand that some verbs have different meanings in different mathematical situations. (draw)
- Students will be able to interpret the characteristics of 2D and 3D figures in order to manipulate them.
  Example: The difference between 2D figure and 3D figure is _____.

- Students will understand the context and relationship between data in order to make prediction and draw inferences.
  Example: Given two different sets of data, I can predict that _____ . Based on this prediction, I could draw inference that _____.

- Students will be able to select the appropriate formulas needed to solve real-world and mathematical problems.
  Example: I can compare the formulas for computing area, surface area, and volume of figures and objects, by _____.

- Students will be able to justify steps taken to arrive at a logical conclusion.
  Example: If the situation is_____, then I can conclude that _____.

PERFORMANCE TASKS

Mathematics Assessment Project

- 7.G.6 Maximizing Area: Gold Rush
- 7.G.4 and 7.G.6 Using Dimensions: Designing a Sports Bag
- 7.G.4 and 7.G.6 Drawing to Scale: Designing a Garden
- 7.SP.1 Estimating: Counting Trees
- 7.G.6 Estimations and Approximations: The Money Munchers
- 7.SP.5-8 Evaluating Statements About Probability

Illustrative Mathematics

- 7.SP.1, 7.SP.2 and 7.SP.7 Estimating the Mean State Area
- 7.SP.2 and &.SP.7 Election Poll, Variation 1
- 7.SP.2 and SP.2 Election Poll, Variation 2

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<tr><th colspan="3">DIFFERENTIATION 🕮</th></tr>
<tr><th>UDL/ FRONT LOADING</th><th>ACCELERATION</th><th>INTERVENTION</th></tr>
<tr><td>Statistics and Probability:

• Students Formulate questions that can be answered with data
• Students design and use a plan to collect relevant data
• Students analyze the data with appropriate methods
• Students are able to interpret results and draw valid conclusions from the data that relate to the questions posed.
• Such investigations involve making sense of practical problems by turning them into statistical investigations; moving from context to abstraction and back to context; repeating the process of statistical reasoning in a variety of contexts.

Geometry:
• Students work on problems involving areas and volumes.
• Students understand multiple algorithms for the volume of prisms
• Students apply visualization skills connected to solve the area of 3D shapes.
• Students can construct 3d models from 2d models.</td><td>Acceleration for high achieving students:

Provide students with opportunities to be recognized for their previous knowledge and to be allowed to avoid redundant learning by being encouraged to learn the sophisticated and advanced information and skills of the curriculum at their own rate. This also includes the opportunity for students to make personal meeting of the lesson.

Statistics and Probability:
Simulating probability experiments via technology where students collect meaningful data (type of music, who eats cafeteria food). Use the following activity for acceleration: Election Poll, Variation 3
http://www.illustrativemathematics.org/illustrations/558

Geometry:
Extension of standard 7G.3 - Students describe or define the features or characteristics of 2-D geometric figures that result when 3d figures are sliced horizontally, vertically or diagonally.</td><td>Intervention for low achieving students and students with disabilities:

• Small teacher to student ratio discussion – have students draw informal comparative inferences about two populations (boys vs. girls)
• Data discussed comes from sampling life data (soccer team height vs. football team height)
• Use Physical objects to demonstrate the math. In geometry : Such as cones, squares, sphere, etc.
In probability and statistics: Census data, experimental results</td></tr>
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