ACALANES UNION HIGH SCHOOL DISTRICT
COURSE OF STUDY: CURRICULAR AREA – MATH

COURSE TITLE:	GEOMETRY
GRADE LEVEL:	9-12
COURSE LENGTH:	One Year
PREFERRED PREVIOUS COURSE OF STUDY:	Algebra 1
CREDIT:	10 Credits
UC/CSU CREDIT:	Meets UC/CSU credit for mathematics requirement; subject area (“c”)
GRADUATION REQUIREMENT:	Fulfills 10 units of mathematics credit (2 semesters beyond Algebra 1) required for graduation
STANDARDS AND BENCHMARKS:	California State Standards Geometry
ADOPTED:	May 15, 2019
INSTRUCTIONAL MATERIALS:	Big Ideas Learning: Big Ideas Geometry

COURSE DESCRIPTION:

The fundamental purpose of the California State Standards Geometry course is to formalize and extend the mathematics that students learned in the middle grades. This course includes content standards from the conceptual categories of Congruence, Similarity, Right Triangles and Trigonometry, Circles, Expressing Geometric Properties with Equations, Geometric Measurement and Dimension, Conditional Probability, Rules of Probability and Using Probability and Statistics. Through the application of the Standards for Mathematical Practice, students will increasingly engage with the subject matter and grow in mathematical maturity and expertise.

COURSE OBJECTIVES:

Content Objectives

During the course the students will:

1. Develop and extend an understanding of congruence using transformation, proving theorems and making constructions
2. Understand similarity using transformations and proving theorems
3. Define trigonometric ratios and solve problems involving triangles
4. Apply the definitions and properties of the parts of a circle to solving problems
5. Use coordinate geometry to prove geometric theorems
6. Visualize polygons and solids and calculate their perimeters, areas and volumes
7. Analyze real world applications of probability

During the course students will work toward:

1. Active learning through investigation and conjecture
2. Attending to precision and persevering in problem solving
3. Consistent study habits, organization, and personal responsibility for learning
4. Proficiency in writing about mathematics and fluency in using mathematical vocabulary
5. Strategic implementation of instructional technologies
6. Effective communication and collaboration

ASSESSMENT:

Assessments are designed to promote and evaluate mathematical thinking. Teachers use engaging activities that involve students in investigating, conjecturing, verifying, applying, evaluating, and communicating in various assessment modalities.

Formal and informal assessments can be made on the basis of both individual and group work. Assessments should be from a variety of means and could include performance tasks, quizzes, tests, projects, investigations, and daily assignments.

Assessments should be measuring the following claims:
Claim #1 – Concepts & Procedures
Students can explain and apply mathematical concepts, as well as interpret and carry out mathematical procedures with precision and fluency.
Claim #2 – Problem Solving
Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies.
Claim #3 – Communicating Reasoning
Students can clearly and precisely construct viable arguments to support their own reasoning and critique the reasoning of others.
Claim #4 – Modeling and Data Analysis
Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

Performance Tasks

Performance tasks are used to better measure capacities such as depth of understanding, research skills, and complex analysis, which cannot be adequately assessed with selected- or constructed-response items. These tasks may require students to evaluate, optimize, design, plan, model, transform, generalize, justify, interpret, represent, estimate, and calculate solutions. Performance tasks can be used for a variety of purposes such as topic engagement, formative assessment and evaluative assessment. They may be performed individually or in small groups, depending on the purpose of the assessment.

Performance tasks should:

- Integrate knowledge and skills across multiple claims
- Require student-initiated planning and management of information and ideas
- Reflect a real-world task and/or scenario-based problem

- Allow for multiple approaches
- Represent content that is relevant and meaningful to students
- Be assessed using an understandable rubric that provides meaningful feedback for students and the teacher

GRADING GUIDELINES: See AUHSD Grading Guidelines: Final Mark Rubric and Final Course Mark Determination Components

COURSE CONTENT:

Mathematical Practices

The Standards for Mathematical Practice are "habits of the mind of mathematically proficient students". They describe the attributes that mathematics educators at all levels are striving to develop in their students, as these practices are based on key mathematical processes and proficiencies. The goal of implementing these practices is to develop students who can use their knowledge of mathematics in flexible, sophisticated, and relevant ways across multiple disciplines.

#1 Make sense of problems and persevere in solving them (Hypothesize & Strategize)

- Students are:
  - Making conjectures about what the problem is asking and how they can begin to solve it
  - Checking for the reasonableness of the strategy as the work progresses and making adjustments as needed
- Teachers develop this skill by having students:
  - Explain the meaning of the problem and/or restate the problem
  - Analyze the given information and develop entry points into the problem and develop strategies for solving the problem
  - Execute and evaluate multiple strategies

#2 Reason abstractly and quantitatively (De/Contextualize)

- Students are:
  - Determining what numbers and symbols represent through the use of diagrams, graphs or equations
- Teachers develop this skill by having students:
  - Move between multiple representations to determine the meaning behind quantities
  - Express purely mathematical expressions with real world context and taking quantities out of context and representing them as abstract mathematical ideas or expressions

#3 Construct viable arguments; critique others' reasoning

- Students are:
  - Justifying their thinking by providing evidence based on mathematical properties and using that evidence to evaluate the reasoning of others
- Teachers develop this skill by having students:

- Make conjectures, compare and contrast methods, and identify flawed logic by providing counter-example

#4 Model with Mathematics

- Students are:
  - Interpreting and constructing graphs, tables, number lines, diagrams or equations to model real-world situational data
- Teachers develop this skill by having students:
  - Use models to make interpolative and extrapolative inferences
  - Examine the effectiveness and appropriateness of a model

#5 Use appropriate tools strategically

- Students are:
  - Selecting appropriate math tools and technology to help solve problems including manipulatives, graphing utilities, tables, [matrices], computer applications, compasses, etc.
- Teachers develop this skill by having students:
  - Identify the strengths and weaknesses of different tools in relation to solving a given problem and also use tools to explore, confirm or deepen understanding

#6 Attend to Precision

- Students are:
  - Calculating quantities accurately through proper rounding (based on context), labeling of units of measure, and checking their work
  - Selecting a problem solving method that allows for appropriate precision
- Teachers develop this skill by having students:
  - Formulate precise explanations of their work using vocabulary and justify their rounding process
  - Re-examine their work or thinking process, and then demonstrate the method by which they check their answers

#7 Look For and Make Use of Structure

- Students are:

    - Looking for patterns or relationships and using that structure to simplify complex ideas
- Teachers develop this skill by having students:
    - Extend prior knowledge of similar situations to novel ones or break down complex problems in smaller parts which resemble simpler, more familiar ideas

#8 Look for and express regularity in repeated reasoning (Generalize)

- Students are:
    - Developing general methods, rules, or short cuts and determining when they are appropriate
- Teachers develop this skill by:
    - Facilitating activities which allow for students' "aha!" moments and then helping them use it to develop "rules" based on repeated trials with a process

The following table outlines all content standards and learning objectives taught in the Geometry and Geometry Honors courses. Standards designated with (+) are specific for the Geometry Honors course.

Congruence	
Common Core State Standard (CCSS)	**Learning Objective**
Experiment with transformations in the plane	
CCSS.MATH.CONTENT.HSG.CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc	● Use the basic undefined terms of point, line and plane to develop an understanding of the definitions of other geometric figures ● Name points, lines, planes, segments, rays and angles ● Understand the concepts of segment length and arc length of a circle ● Identify lines, planes, tangent lines, perpendicular lines, parallel lines and pairs of angles formed by transversals ● Identify special pairs of angles including complementary, supplementary and vertical angles
CCSS.MATH.CONTENT.HSG.CO.A.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	● Compare translations, reflections, rotations and dilations ● Identify which transformations preserve measurements and which do not
CCSS.MATH.CONTENT.HSG.CO.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	● Identify symmetry of geometric figures through reflections and rotations
CCSS.MATH.CONTENT.HSG.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	● Use angles, circles, perpendicular lines, parallel lines and line segments to describe one-to-one mappings of translations, reflections and rotations

CCSS.MATH.CONTENT.HSG.CO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	● Be able to graph or draw transformations ● Describe and use compositions of transformations
Understand congruence in terms of rigid motions	
CCSS.MATH.CONTENT.HSG.CO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	● Perform rigid motion transformations of given geometric figures ● Analyze congruence transformations
CCSS.MATH.CONTENT.HSG.CO.B.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	● Match all pairs of corresponding segments and angles of congruent polygons ● Identify congruent polygons by investigating whether all corresponding parts are congruent
CCSS.MATH.CONTENT.HSG.CO.B.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	● Demonstrate how ASA, SAS and SSS are used to conclude triangles are congruent

Proving Geometric Theorems	
CCSS.MATH.CONTENT.HSG.CO.C.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints..	● Apply definitions, postulates and theorems to prove conjectures regarding congruent segment and angle relationships
CCSS.MATH.CONTENT.HSG.CO.C.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.	● Apply definitions, postulates and theorems to prove conjectures regarding triangle relationships
CCSS.MATH.CONTENT.HSG.CO.C.11 Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.	● Solve a system using elimination ● Apply definitions, postulates and theorems to prove conjectures regarding parallelograms

Make Geometric Constructions	
CCSS.MATH.CONTENT.HSG.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	● Use a compass and straightedge to perform basic geometric constructions
CCSS.MATH.CONTENT.HSG.CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	● Use a compass and straightedge to perform geometric constructions involving inscribed polygons in a circle

Similarity and Right Triangles	
Common Core State Standard (CCSS)	**Learning Objective**
Understand similarity in terms of similarity transformations	
CCSS.MATH.CONTENT.HSG.SRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor	● Identify and perform dilations -Solve real-life problems involving scale factors
CCSS.MATH.CONTENT.HSG.SRT.A.1.A A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged	● Understand the relationship of corresponding lines under dilations.

CCSS.MATH.CONTENT.HSG.SRT.A.1.B The dilation of a line segment is longer or shorter in the ratio given by the scale factor	● Use fractions, decimals or percentages to express a scale factor ● Determine if a dilation is an enlargement or a reduction based upon a given scale factor
CCSS.MATH.CONTENT.HSG.SRT.A.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	● Use similarity statements ● Find corresponding lengths in similar polygons using proportions ● Find perimeters and areas of similar polygons ● Decide whether polygons are similar
CCSS.MATH.CONTENT.HSG.SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	● Investigate the proof of the Angle ● Angle Similarity Theorem ● Use the Angle ● Angle Similarity Theorem ● Solve real-life problems
Prove theorems involving similarity	
CCSS.MATH.CONTENT.HSG.SRT.B.4 Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity	● Use SSS Similarity and SAS Similarity to prove triangles similar ● Use the Triangle Proportionality Theorem and its converse ● Use the Triangle Angle Bisector Theorem
CCSS.MATH.CONTENT.HSG.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	● Apply similarity concepts to explore relationships between geometric figures

Define trigonometric ratios and solve problems involving right triangles	
CCSS.MATH.CONTENT.HSG.SRT.C.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	● Understand the derivation of trigonometric ratios using right triangle similarity ● Use trigonometric ratios to find missing angle measures or side lengths
CCSS.MATH.CONTENT.HSG.SRT.C.7 Explain and use the relationship between the sine and cosine of complementary angles.	● Recognize the sine ratio of a given angle as the complement of the cosine of the same angle
CCSS.MATH.CONTENT.HSG.SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*	● Apply the trigonometric ratios to real live problems ● Use angles of elevation and depression to solve problems
Apply trigonometry to general triangles	
CCSS.MATH.CONTENT.HSG.SRT.D.9 (+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	● Use sine ratio to derive an alternate area of a triangle formula.
CCSS.MATH.CONTENT.HSG.SRT.D.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.	● Recognize when to use either the Law of Sines or Law of Cosines ● Solve triangles using the Law of Sines or Law of Cosines ● Ambiguous case: determine whether an SSA scenario produces 0, 1 or 2 triangles
CCSS.MATH.CONTENT.HSG.SRT.D.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	● Apply Law of Sines or Law of Cosines to solve non-right triangles for real world applications

Circles	
Common Core State Standard (CCSS)	**Learning Objective**
Understand and apply theorems about circles	
CCSS.MATH.CONTENT.HSG.C.A.1 Prove that all circles are similar.	● Use dilation to prove that all circles are similar.
CCSS.MATH.CONTENT.HSG.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	● Define vocabulary and explore angles, radii, and chords in circles ● Relate arcs to central and inscribed angles ● Show the relationship between inscribed angles and the intercepted arc
CCSS.MATH.CONTENT.HSG.C.A.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	● Use software or constructions to relate ideas of inscribed and circumscribed triangles and quadrilaterals
CCSS.MATH.CONTENT.HSG.C.A.4 (+) Construct a tangent line from a point outside a given circle to the circle.	● Construct a perpendicular to the radius of a circle to make a tangent.
Find arc lengths and areas of sectors of circles	
CCSS.MATH.CONTENT.HSG.C.B.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	● Derive the formula for the arc length ● Derive the formula for the area of a sector as a portion of the area of the circle ● Understand the relationship between degrees and radians; convert from one to the other

Expressing Geometric Properties with Equations	
CCSSM Common Core State Standard (CCSS)	**Learning Objective**
Translate between the geometric description and the equation for a conic section.	
G.GPE.A.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	● Derive the standard form of the equation of a circle on a coordinate plane ● Complete the square to write equations of circles in standard form
G.GPE.A.2 Derive the equation of a parabola given a focus and directrix.	● Derive the standard form of the equation of a parabola on a coordinate plane
G.GPE.A.3 (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	● Given two foci (horizontal or vertical on a coordinate plane) find all the points where the **sum** of the distances from the foci is constant. Define this set as an ellipse. Do the same with a **difference** to show that it gives us a hyperbola.
G.GPE.A.3.1 (+) Given a quadratic equation of the form ax^2+bx^2+cx+dx+e=0, use the method for completing the square to put the equation into standard form; identify whether the graph of the equation is a circle, ellipse, parabola, or hyperbola and graph the equation.	● Identify which conic section equation corresponds with an ellipse, circle, hyperbola, or parabola ● Graph the conic section ● Complete the square to put an equation in general form into the equation for a conic section
Use coordinates to prove simple geometric theorems algebraically	

G.GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).	● Use the slope, distance and midpoint formulas to prove key ideas
G.GPE.B.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	● Identify and compare slopes of parallel and perpendicular lines
G.GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	● Determine and apply the ratio of a partitioned line segment to the coordinates of a point on the segment
G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*	● Determine the perimeter of a polygon using the distance formula

Geometric Measurement and Dimension	
Common Core State Standard (CCSS)	**Learning Objective**
Explain volume formulas and use them to solve problems	
CCSS.MATH.CONTENT.HSG.GMD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments	● Understand the derivation of pi ● Understand how Cavalieri's principle relates to the volume of three dimensional figures
CCSS.MATH.CONTENT.HSG.GMD.A.2 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	● Apply Cavalieri's principle to spheres and other solids
CCSS.MATH.CONTENT.HSG.GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*	● Use formulas to solve problems for volumes of cylinders, pyramids and cones
Visualize relationships between two-dimensional and three-dimensional objects	
CCSS.MATH.CONTENT.HSG.GMD.B.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	● Describe cross sections of three dimensional figures ● Sketch and describe solids of revolution
CCSS.MATH.CONTENT.HSG.GMD.B.5 Know that the effect of a scale factor k greater than zero on length, area, and volume is to multiply each by k, k squared, k cubed respectively; determine length, area and volume measures using scale factors.	● Determine area and volume ratios from a given scale factor ● Use proportions to help solve problems involving similar solids

CCSS.MATH.CONTENT.HSG.GMD.B.6 Verify experimentally that in a triangle, angle opposites longer sides are larger, sides opposite larger angles are longer and the sum of any two sides lengths is greater than the remaining side length; apply these relationships to solve real-world and mathematical problems.	● Use Triangle Inequality Theorem, Triangle Longer Side Theorem, and Triangle Larger Angle Theorem to compare side lengths and angle measures within a triangle ● Use SSS inequality and SAS inequality to compare lengths and angle measures of two or more triangles

Modeling with Geometry	
Common Core State Standard (CCSS)	**Learning Objective**
Apply geometric concepts in modeling situations	
G.MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*	● Describe objects using geometric shapes and measurement.
G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*	● Connect density to area and volume.
G.MG.A.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	● Use geometric methods to create objects and design problems based on them, such as minimizing materials for a given volume, or working with scale models.

Statistics and Probability	
Common Core State Standard (CCSS)	**Learning Objective**
Conditional Probability and the Rules of Probability	
CCSS.MATH.CONTENT.HSS.CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). *	● Define a sample space of possible outcomes: the set of all possible outcomes of an experiment.(roll two dice and create a 6x6 chart of dice roll combinations, flip 3 coins and list possible combinations of heads/tails.) ● Define an "event" as a group of possible outcomes, such as, all possible rolls of doubles ● Consider combined groupings of events, using intersection (overlapping - odd number and greater than 6), union (combination - rolls of 4 OR 7), and complements (NOT including one five) ● Define theoretical probability vs. experimental probability
CCSS.MATH.CONTENT.HSS.CP.A.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. *	● Define independent vs. dependent events: two events are independent events when the occurrence of one event does not affect the occurrence of the other event. Two events are dependent events when the occurrence of one event does affect the occurrence of the other event. ● Examples of Independent events: include separate events that do not affect each other (flip a coin after having flipped heads just before); Examples of dependent events: conditional probability shows one outcome may depend on outcome of prior outcome (in a bag of blue and red marbles, if a blue one is pulled and not replaced, the probability of choosing a second blue depends on the first). ● Test for independence by multiplying probabilities of two events, and if the product = probability of both events, the events are independent.

CCSS.MATH.CONTENT.HSS.CP.A.3 Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. *	● Define and calculate conditional probabilities - where the probability of one event depends on the outcome of a prior event. ● Define Conditional probability as the chance that one thing happens (A), assuming that another thing (B) also happens. That's usually written as P(A|B), and pronounced as "the probability of A given B." ● Calculate the separate probability of two events: e.g., being math major or liking chocolate ice cream, then determine the probability of both together (being a math major and liking chocolate ice cream); if the multiplied product of the two individual events = the probability of both being true, the events are independent ● Use the Multiplication Principal to decide if two events are independent and to calculate conditional probabilities
CCSS.MATH.CONTENT.HSS.CP.A.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.	● Construct and interpret two-way frequency tables of data for two categorical variables. Calculate probabilities from the table. Use probabilities from the table to evaluate independence of two variables. (Example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.) ● Construct a two-way table from a Venn Diagram and vice versa ● Find joint, marginal, and relative frequencies of two-way table
CCSS.MATH.CONTENT.HSS.CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.*	● Understand typical cases of independence: dice, spinners, coins ● Understand typical cases of dependence: cards, marbles ● Set up tree diagrams to chart possible outcomes
Use probability to evaluate outcomes of decisions	
CCSS.MATH.CONTENT.HSS.MD.B.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).*	● Understand whether events are truly random, or introduce bias. A "clean" or "fair" decision would be fully random

	● Employ dice, coins, random number generators, lots, and many other things in order to ensure fairness
CCSS.MATH.CONTENT.HSS.MD.B.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). *	● Consider probabilities in making a decision - is the game fair? ● How does a probability affect a choice ● Use a decision tree, including with probabilities and expected values to consider the likelihood of a favorable outcome