High School Year 4 Mathematics

Teacher Blueprint Pages

Chandler Unified School District #80

Please Note—Changes related to the structure of the Teacher Blueprint Pages:

- A sequence within each quarter.
- To help teachers understand the groupings or clusters, a topic name was provided in Year 4, like "Conversion Analysis ". This is followed by the essential understandings of the topic.
- While changes in the provided sequence are not intended, it is understood that changes may be made to serve the needs of *individual* students.
- There is also a document called, "**High School Overview of the 2010 Standards**" to support teacher teams in looking ahead at the Common Core State Standards and understanding what will be required to transition to those standards.

ALL QUARTERS Standards for Mathematical Practice	
Standards	***Explanations and Examples***
HS.MP.1. Make sense of problems and persevere in solving them.	High school students start to examine problems by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. By high school, students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. They check their answers to problems using different methods and continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
HS.MP.2. Reason abstractly and quantitatively.	High school students seek to make sense of quantities and their relationships in problem situations. They abstract a given situation and represent it symbolically, manipulate the representing symbols, and pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Students use quantitative reasoning to create coherent representations of the problem at hand; consider the units involved; attend to the meaning of quantities, not just how to compute them; and know and flexibly use different properties of operations and objects.
HS.MP.3. Construct viable arguments and critique the reasoning of others.	High school students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. High school students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. High school students learn to determine domains to which an argument applies, listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
HS.MP.4. Model with mathematics.	High school students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. High school students making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
HS.MP.5. Use appropriate tools strategically.	High school students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. High school students should be sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. They are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

ALL QUARTERS Standards for Mathematical Practice	
Standards	***Explanations and Examples***
HS.MP.6. Attend to precision.	High school students try to communicate precisely to others by using clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
HS.MP.7. Look for and make use of structure.	By high school, students look closely to discern a pattern or structure. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. High school students use these patterns to create equivalent expressions, factor and solve equations, and compose functions, and transform figures.
HS.MP.8. Look for and express regularity in repeated reasoning.	High school students notice if calculations are repeated, and look both for general methods and for shortcuts. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x2 + x + 1)$, and $(x – 1)(x3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, derive formulas or make generalizations, high school students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Year 4 Quarter 1

Quarter 1 Topic 1: Algebra Review

Topics *might* include:

- **Polynomial Functions: graphs, translations, zeros, extrema, increasing/decreasing intervals**
- **Power Functions: evaluate, continuity, discontinuity**
- **Exponential Functions: graphs, translations, equations, applications**
- **Logarithmic Functions: properties, graphs, equations**
- **Applying Percentages: percent change, random and systematic errors, reasonableness and units, accuracy vs. precision, absolute and relative change, scaling**

Quarter 1 Topic 2: Conversion Analysis

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision.	Include word problems where quantities are given in different units, which must be converted to make sense of the problem. For example, a problem might have an object moving12 feet per second and another at 5 miles per hour. To compare speeds, students convert 12 feet per second to miles per hour: $24000\ \text{sec} \bullet \frac{1\text{min}}{60\,\text{sec}} \bullet \frac{1\text{hr}}{60\,\text{min}} \bullet \frac{1\text{day}}{24\text{hr}}$ which is more than 8 miles per hour. Graphical representations and data displays include, but are not limited to: line graphs, circle graphs, histograms, multi-line graphs, scatterplots, and multi-bar graphs.

Quarter 1 Topic 3: Financial Literacy

Essential Understandings:

- **Managing your finances**
- **Compound interest**
- **Budgeting**
- **Savings plans and investments**
- **Payments**
- **Taxes**
- **Net vs. gross**

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	• A couple wants to buy a house in five years. They need to save a down payment of $8,000. They deposit $1,000 in a bank account earning 3.25% interest, compounded quarterly. How much will they need to save each month in order to meet their goal? • Sketch and analyze the graphs of the following two situations. What information can you conclude about the types of growth each type of interest has? o Lee borrows $9,000 from his mother to buy a car. His mom charges him 5% interest a year, but she does not compound the interest. o Lee borrows $9,000 from a bank to buy a car. The bank charges 5% interest compounded annually. • Calculate the future value of a given amount of money, with and without technology. Calculate the present value of a certain amount of money for a given length of time in the future, with and without technology.
HS.F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.7. Look for and make use of structure.	

Year 4 Quarter 2

Quarter 2 Topic 1: Exponential and Logarithmic Functions		
Essential Understandings: • **Linear vs. exponential growth** • **Double and ½ life population growth** • **Logistic growth** • **Logarithms**		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision.	

Quarter 2 Topic 1: Exponential and Logarithmic Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.A-REI.11. Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision.	Students need to understand that numerical solution methods (data in a table used to approximate an algebraic function) and graphical solution methods may produce approximate solutions, and algebraic solution methods produce precise solutions that can be represented graphically or numerically. Students may use graphing calculators or programs to generate tables of values, graph, or solve a variety of functions. Example: • Given the following equations determine the *x* value that results in an equal output for both functions. $f(x) = 3x - 2$ $g(x) = (x + 3)^2 - 1$
HS.F-LE.5. Interpret the parameters in a linear or exponential function in terms of a context.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model and interpret parameters in linear, quadratic or exponential functions. Example: • A function of the form $f(n) = P(1 + r)^n$ is used to model the amount of money in a savings account that earns 5% interest, compounded annually, where *n* is the number of years since the initial deposit. What is the value of *r*? What is the meaning of the constant *P* in terms of the savings account? Explain either orally or in written format.

Quarter 2 Topic 1: Exponential and Logarithmic Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-BF.1. Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	Students will analyze a given problem to determine the function expressed by identifying patterns in the function's rate of change. They will specify intervals of increase, decrease, constancy, and, if possible, relate them to the function's description in words or graphically. Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model functions. Examples: • You buy a $10,000 car with an annual interest rate of 6 percent compounded annually and make monthly payments of $250. Express the amount remaining to be paid off as a function of the number of months, using a recursion equation. • A cup of coffee is initially at a temperature of 93º F. The difference between its temperature and the room temperature of 68º F decreases by 9% each minute. Write a function describing the temperature of the coffee as a function of time. • The radius of a circular oil slick after t hours is given in feet by $r = 10t^2 - 0.5t$, for $0 \le t \le 10$. Find the area of the oil slick as a function of time.

Quarter 2 Topic 1: Exponential and Logarithmic Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*	HS.MP.2. Reason abstractly and quantitatively. HS.MP.7. Look for and make use of structure.	

Quarter 2 Topic 1: Exponential and Logarithmic Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model and compare linear and exponential functions. Examples: • A cell phone company has three plans. Graph the equation for each plan, and analyze the change as the number of minutes used increases. When is it beneficial to enroll in Plan 1? Plan 2? Plan 3? 1. $59.95/month for 700 minutes and $0.25 for each additional minute, 2. $39.95/month for 400 minutes and $0.15 for each additional minute, and 3. $89.95/month for 1,400 minutes and $0.05 for each additional minute. • A computer store sells about 200 computers at the price of $1,000 per computer. For each $50 increase in price, about ten fewer computers are sold. How much should the computer store charge per computer in order to maximize their profit? Students can investigate functions and graphs modeling different situations involving simple and compound interest. Students can compare interest rates with different periods of compounding (monthly, daily) and compare them with the corresponding annual percentage rate. Spreadsheets and applets can be used to explore and model different interest rates and loan terms. Students can use graphing calculators or programs, spreadsheets, or computer algebra systems to construct linear and exponential functions.

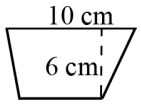
Quarter 2 Topic 1: Exponential and Logarithmic Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-LE.4. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	HS.MP.7. Look for and make use of structure.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to analyze exponential models and evaluate logarithms. Example: • Solve $200\ e^{0.04t} = 450$ for t. Solution: We first isolate the exponential part by dividing both sides of the equation by 200. $e^{0.04t} = 2.25$ Now we take the natural logarithm of both sides. $ln\ e^{0.04t} = ln\ 2.25$ The left hand side simplifies to $0.04t$, by logarithmic identity 1. $0.04t = ln\ 2.25$ Lastly, divide both sides by 0.04 $t = ln\ (2.25) / 0.04$ $t \approx 20.3$

Quarter 2 Topic 2: Graphing Functions

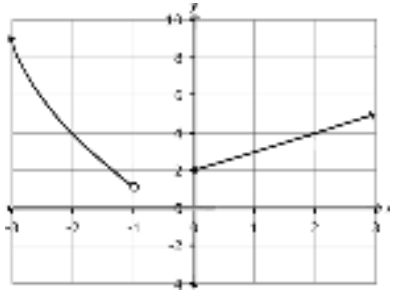
Essential Understandings:

- **Linear and exponential functions**
- **Mathematical modeling**
- **Domain and range**
- **Slope/Rate of change**

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-LE.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	HS.MP.2. Reason abstractly and quantitatively.	Example: Contrast the growth of the $f(x)=x^3$ and $f(x)=3^x$.
HS.F-LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	HS.MP.4. Model with mathematics. HS.MP.8. Look for and express regularity in repeated reasoning.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to construct linear and exponential functions. Examples: • Determine an exponential function of the form $f(x) = ab^x$ using data points from the table. Graph the function and identify the key characteristics of the graph. x | $f(x)$ 0 | 1 1 | 3 3 | 27 • Sara's starting salary is $32,500. Each year she receives a $700 raise. Write a sequence in explicit form to describe the situation.

Quarter 2 Topic 2: Graphing Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically.	Equations can represent real world and mathematical problems. Include equations and inequalities that arise when comparing the values of two different functions, such as one describing linear growth and one describing exponential growth. Examples: • Given that the following trapezoid has area 54 cm^2, set up an equation to find the length of the base, and solve the equation.  • Lava coming from the eruption of a volcano follows a parabolic path. The height *h* in feet of a piece of lava *t* seconds after it is ejected from the volcano is given by $h(t) = -t^2 + 16t + 936$. After how many seconds does the lava reach its maximum height of 1000 feet?

Quarter 2 Topic 2: Graphing Functions

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision.	Key characteristics include but are not limited to maxima, minima, intercepts, symmetry, end behavior, and asymptotes. Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to graph functions. Examples: • Describe key characteristics of the graph of $f(x) = \lvert x - 3 \rvert + 5$. • Sketch the graph and identify the key characteristics of the function described below. $F(x) = \begin{cases} x + 2 \text{ for } x \geq 0 \\ -x^2 \text{ for } x < -1 \end{cases}$  • Graph the function $f(x) = 2^x$ by creating a table of values. Identify the key characteristics of the graph. • Graph $f(x) = 2 \tan x - 1$. Describe its domain, range, intercepts, and asymptotes. Draw the graph of $f(x) = \sin x$ and $f(x) = \cos x$. What are the similarities and differences between the two graphs?

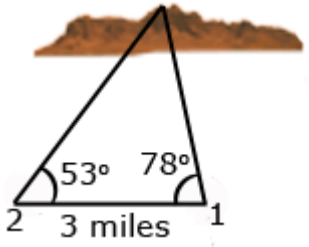
Year 4 Quarter 3

Quarter 3 Topic 1: Geometry

Essential Understandings:

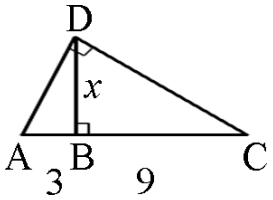
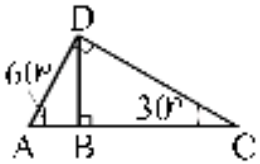
- **Perimeter/Area/Volume**
- **Angle measurement**
- **Comparing volumes**
- **Ratios: surface area to volume**
- **Problem solving with geometry**
- **Latitude and longitude**
- **Angular size and distance**
- **Pitch, grade, slope**
- **Pythagorean theorem identities**

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.G-MG.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).	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically.	Students may use simulation software and modeling software to explore which model best describes a set of data or situation.
HS.G-MG.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use simulation software and modeling software to explore which model best describes a set of data or situation.

Quarter 3 Topic 1: Geometry		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.G-C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.5. Use appropriate tools strategically.	Students may use geometric simulation software to make geometric constructions.
Quarter 3 Topic 2: Trigonometric Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.G-SRT.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).	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics.	Example: • Tara wants to fix the location of a mountain by taking measurements from two positions 3 miles apart. From the first position, the angle between the mountain and the second position is 78^{o}. From the second position, the angle between the mountain and the first position is 53^{o}. How can Tara determine the distance of the mountain from each position, and what is the distance from each position? 
HS.F-TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.		

Quarter 3 Topic 2: Trigonometric Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	HS.MP.2. Reason abstractly and quantitatively.	Students may use applets and animations to explore the unit circle and trigonometric functions. Students may explain (orally or in written format) their understanding.
HS.G-C.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.	HS.MP.2 Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others.	Students can use geometric simulation software to explore angle and radian measures and derive the formula for the area of a sector.
HS.G-SRT.9. Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.7. Look for and make use of structure.	

Quarter 3 Topic 2: Trigonometric Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.G-SRT.10. Prove the Laws of Sines and Cosines and use them to solve problems.	HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	

Quarter 3 Topic 2: Trigonometric Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-TF.3. Use special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π-*x*, π+*x*, and 2π-*x* in terms of their values for *x*, where *x* is any real number.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure.	Examples: • Evaluate all six trigonometric functions of $\theta = \frac{\pi}{3}$. • Evaluate all six trigonometric functions of $\theta = 225^{\circ}$. • Find the value of x in the given triangle where $\overline{AD} \perp \overline{DC}$ and $\overline{AC} \perp \overline{DB}$ $m\angle A = 60°, m\angle C = 30°$. Explain your process for solving the problem including the use of trigonometric ratios as appropriate.  • Find the measure of the missing segment in the given triangle where $\overline{AD} \perp \overline{DC}$, $\overline{AC} \perp \overline{DB}$, $m\angle A = 60°, m\angle C = 30°, \overline{AC} = 12, \overline{AB} = 3$. Explain (orally or in written format) your process for solving the problem including use of trigonometric ratios as appropriate. 
HS.F-TF.4. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.5. Use appropriate tools strategically.	Students may use applets and animations to explore the unit circle and trigonometric functions. Students may explain (orally or written format) their understanding of symmetry and periodicity of trigonometric functions.

Quarter 3 Topic 2: Trigonometric Functions		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.F-TF.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model trigonometric functions and periodic phenomena. Example: • The temperature of a chemical reaction oscillates between a low of 20° C and a high of 120°C. The temperature is at its lowest point when $t = 0$ and completes one cycle over a six hour period. a) Sketch the temperature, T, against the elapsed time, t, over a 12 hour period. b) Find the period, amplitude, and the midline of the graph you drew in part a). c) Write a function to represent the relationship between time and temperature. d) What will the temperature of the reaction be 14 hours after it began? At what point during a 24 hour day will the reaction have a temperature of 60°C?
HS.F-TF.6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.		Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model trigonometric functions. ***Please note: Inverse trigonometric functions are optional.*** Examples: • Identify a domain for the sine function that would permit an inverse function to be constructed. • Describe the behavior of the graph of the sine function over this interval. Explain (orally or in written format) why the domain cannot be expanded any further.

Year 4 Quarter 4

Quarter 4 Topic 1: Statistics

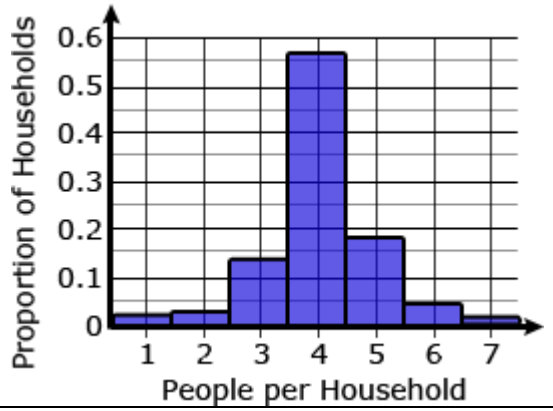
Essential Understandings:

- **Sampling population**
- **Experimental design**
- **Margin of error**
- **Evaluating research studies and surveys**
- **Research components**
- **Confounding, lurking bias**
- **Wording questions (bias)**
- **Variables within a study**
- **Survey design**
- **Central tendencies/measures of center**
- **Line of symmetry**
- **Outliers**
- **Standard deviation**
- **Confidence level**
- **z-Scores**
- **Box & whisker plots and Five Number Summary**

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-IC.1. Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.	HS.MP.4. Model with mathematics. HS.MP.6. Attend to precision.	

Quarter 4 Topic 1: Statistics		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-IC.4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically.	Students may use computer generated simulation models based upon sample surveys results to estimate population statistics and margins of error.
HS.S-IC.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.8. Look for and express regularity in repeated reasoning.	Students may use computer generated simulation models to decide how likely it is that observed differences in a randomized experiment are due to chance. Treatment is a term used in the context of an experimental design to refer to any prescribed combination of values of explanatory variables. For example, one wants to determine the effectiveness of weed killer. Two equal parcels of land in a neighborhood are treated; one with a placebo and one with weed killer to determine whether there is a significant difference in effectiveness in eliminating weeds.
HS.S-IC.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.6. Attend to precision.	Students should be able to explain techniques/applications for randomly selecting study subjects from a population and how those techniques/applications differ from those used to randomly assign existing subjects to control groups or experimental groups in a statistical experiment. In statistics, an observational study draws inferences about the possible effect of a treatment on subjects, where the assignment of subjects into a treated group versus a control group is outside the control of the investigator (for example, observing data on academic achievement and socio-economic status to see if there is a relationship between them). This is in contrast to controlled experiments, such as randomized controlled trials, where each subject is randomly assigned to a treated group or a control group before the start of the treatment.

Quarter 4 Topic 1: Statistics

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-MD.1. Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	Students may use spreadsheets, graphing calculators and statistical software to represent data in multiple forms. Example: • Suppose you are working for a contractor who is designing new homes. She wants to ensure that the home models match the demographics for the area. She asks you to research the size of households in the region in order to better inform the floor plans of the home. Solution: • A possible solution could be the result of research organized in a variety of forms. In this case, the results of the research are shown in a table and graph. The student has defined their variable as x as the number of people per household. People per Household / Proportion of Households 1 / 0.026 2 / 0.031 3 / 0.132 4 / 0.567 5 / 0.181 6 / 0.048 7 / 0.015 

Quarter 4 Topic 1: Statistics

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-ID.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.8. Look for and express regularity in repeated reasoning.	Students may use spreadsheets, graphing calculators, and statistical software to create frequency tables and determine associations or trends in the data. Examples: **Two-way Frequency Table** A two-way frequency table is shown below displaying the relationship between age and baldness. We took a sample of 100 male subjects, and determined who is or is not bald. We also recorded the age of the male subjects by categories.

Two-way Frequency Table			
Bald	Age		Total
	Younger than 45	45 or older	
No	35	11	46
Yes	24	30	54
Total	59	41	100

The *total* row and *total* column entries in the table above report the marginal frequencies, while entries in the body of the table are the joint frequencies.

Two-way Relative Frequency Table
The relative frequencies in the body of the table are called conditional relative frequencies.

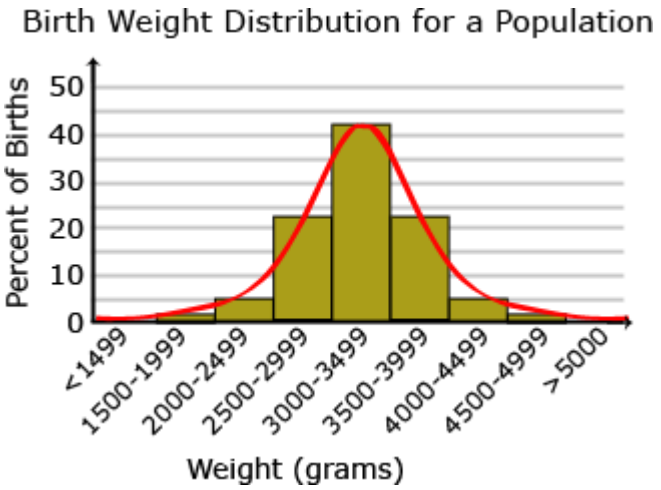
Two-way Relative Frequency Table			
Bald	Age		Total
	Younger than 45	45 or older	
No	0.35	0.11	0.46
Yes	0.24	0.30	0.54
Total	0.59	0.41	1.00

Quarter 4 Topic 1: Statistics		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-CP.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*. For 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.*	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	Students may use spreadsheets, graphing calculators, and simulations to create frequency tables and conduct analyses to determine if events are independent or determine approximate conditional probabilities.

Quarter 4 Topic 1: Statistics		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-ID.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	The residual in a regression model is the difference between the observed and the predicted y for some x(y the dependent variable and $x$the independent variable). So if we have a model $y = ax + b$, and a data point (x_i, y_i) the residual is for this point is: $r_i = y_i - (ax_i + b)$. Students may use spreadsheets, graphing calculators, and statistical software to represent data, describe how the variables are related, fit functions to data, perform regressions, and calculate residuals. Example: • Measure the wrist and neck size of each person in your class and make a scatterplot. Find the least squares regression line. Calculate and interpret the correlation coefficient for this linear regression model. Graph the residuals and evaluate the fit of the linear equations.

Quarter 4 Topic 1: Statistics		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.	HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.8. Look for and express regularity in repeated reasoning.	Students may use spreadsheets, graphing calculators, and statistical software to represent data, describe how the variables are related, fit functions to data, perform regressions, and calculate residuals and correlation coefficients. Example: • Collect height, shoe-size, and wrist circumference data for each student. Determine the best way to display the data. Answer the following questions: Is there a correlation between any two of the three indicators? Is there a correlation between all three indicators? What patterns and trends are apparent in the data? What inferences can be made from the data?
HS.S-ID.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics.HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use spreadsheets, graphing calculators and statistical software for calculations, summaries, and comparisons of data sets. Examples: • The two data sets below depict the housing prices sold in the King River area and Toby Ranch areas of Pinal County, Arizona. Based on the prices below which price range can be expected for a home purchased in Toby Ranch? In the King River area? In Pinal County? o King River area {1.2 million, 242000, 265500, 140000, 281000, 265000, 211000} o Toby Ranch homes {5million, 154000, 250000, 250000, 200000, 160000, 190000} Given a set of test scores: 99, 96, 94, 93, 90, 88, 86, 77, 70, 68, find the mean, median and standard deviation. Explain how the values vary about the mean and median. What information does this give the teacher?

Quarter 4 Topic 1: Statistics		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**

HS.S-ID.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	HS.MP.1. Make sense of problems and persevere in solving them.
	
	HS.MP.2. Reason abstractly and quantitatively.
	
	HS.MP.3. Construct viable arguments and critique the reasoning of others.
	
	HS.MP.4. Model with mathematics.
	
	HS.MP.5. Use appropriate tools strategically.
	
	HS.MP.6. Attend to precision.
	
	HS.MP.7. Look for and make use of structure.
	
	HS.MP.8. Look for and express regularity in repeated reasoning.
		Students may use spreadsheets, graphing calculators, statistical software and tables to analyze the fit between a data set and normal distributions and estimate areas under the curve.
		
		Examples:
		• The bar graph below gives the birth weight of a population of 100 chimpanzees. The line shows how the weights are normally distributed about the mean, 3250 grams. Estimate the percent of baby chimps weighing 3000-3999 grams.
		
		 
		
		• Determine which situation(s) is best modeled by a normal distribution. Explain your reasoning.
		  ○ Annual income of a household in the U.S.
		  ○ Weight of babies born in one year in the U.S.

Quarter 4 Topic 2: Probability

Essential Understandings:

- **Theoretical probability**
- **Experimental probability**
- **Empirical probability simulations**
- **Probability distribution table**
- **Odds for/against**
- **Independent vs. dependent**
- **Either/or probabilities**
- **Law of large numbers**
- **Expected value**
- **Permutations and combinations**

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-MD.6. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model and interpret parameters in linear, quadratic or exponential functions.

Quarter 4 Topic 2: Probability

<table>
<tr><th>Standards
Students are expected to:</th><th>Mathematical Practices</th><th>Explanations/Examples and Resources</th></tr>
<tr><td>HS.S-MD.2. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.</td><td>HS.MP.4. Model with mathematics.

HS.MP.5. Use appropriate tools strategically.

HS.MP.6. Attend to precision.

HS.MP.7. Look for and make use of structure.</td><td>Students may use spreadsheets or graphing calculators to complete calculations or create probability models.

The expected value of an uncertain event is the sum of the possible points earned multiplied by each points' chance of occurring.

Example:
• In a game, you roll a six sided number cube numbered with 1, 2, 3, 4, 5 and 6. You earn 3 points if a 6 comes up, 6 points if a 2, 4 or 5 comes up, and nothing otherwise. Since there is a 1/6 chance of each number coming up, the outcomes, probabilities and payoffs look like this:

<table>
<tr><th>Outcome</th><th>Probability</th><th>Points</th></tr>
<tr><td>1</td><td>1/6</td><td>0 points</td></tr>
<tr><td>2</td><td>1/6</td><td>6 points</td></tr>
<tr><td>3</td><td>1/6</td><td>0 points</td></tr>
<tr><td>4</td><td>1/6</td><td>6 points</td></tr>
<tr><td>5</td><td>1/6</td><td>6 points</td></tr>
<tr><td>6</td><td>1/6</td><td>3 points</td></tr>
</table>

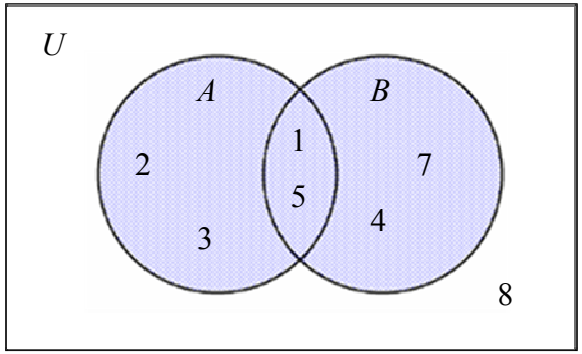
The expected value is sum of the products of the probability and points earned for each outcome (the entries in the last two columns multiplied together):

$\left(\frac{1}{6}\right)\bullet 0+\left(\frac{1}{6}\right)\bullet 6+\left(\frac{1}{6}\right)\bullet 0+\left(\frac{1}{6}\right)\bullet 6+\left(\frac{1}{6}\right)\bullet 6+\left(\frac{1}{6}\right)\bullet 3=3.50$ points</td></tr>
</table>

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-MD.5. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. a. Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.*	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.	Different types of insurance to be discussed include but are not limited to: health, automobile, property, rental, and life insurance. Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model and interpret parameters in linear, quadratic or exponential functions.

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-CP.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*.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure.	
HS.S-CP.6. Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students could use graphing calculators, simulations, or applets to model probability experiments and interpret the outcomes.

Quarter 4 Topic 2: Probability

Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-CP.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").	HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure.	Intersection: The **intersection** of two sets *A* and *B* is the set of elements that are common to both set *A* **and** set *B*. It is denoted by $A \cap B$ and is read '*A* intersection *B*'. • $A \cap B$ in the diagram is {1, 5} • this means: BOTH/AND  Union: The **union** of two sets *A* and *B* is the set of elements, which are in *A* **or** in *B* **or** in both. It is denoted by $A \cup B$ and is read '*A* union *B*'. • $A \cup B$ in the diagram is {1, 2, 3, 4, 5, 7} • this means: EITHER/OR/ANY • *could* be both

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Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-CP.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.	HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure.	
HS.S-CP.7. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.	HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure.	Students could use graphing calculators, simulations, or applets to model probability experiments and interpret the outcomes. Example: • In a math class of 32 students, 18 are boys and 14 are girls. On a unit test, 5 boys and 7 girls made an A grade. If a student is chosen at random from the class, what is the probability of choosing a girl or an A student?

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-CP.8. Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B\|A) = P(B)P(A\|B)$, and interpret the answer in terms of the model.	HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision. HS.MP.7. Look for and make use of structure.	Students could use graphing calculators, simulations, or applets to model probability experiments and interpret the outcomes.

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-CP.9. Use permutations and combinations to compute probabilities of compound events and solve problems.	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use calculators or computers to determine sample spaces and probabilities. Example: You and two friends go to the grocery store and each buys a soda. If there are five different kinds of soda, and each friend is equally likely to buy each variety, what is the probability that no one buys the same kind?

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-CP.5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics. HS.MP.6. Attend to precision. HS.MP.8. Look for and express regularity in repeated reasoning.	Examples: • What is the probability of drawing a heart from a standard deck of cards on a second draw, given that a heart was drawn on the first draw and not replaced? Are these events independent or dependent? • At Johnson Middle School, the probability that a student takes computer science and French is 0.062. The probability that a student takes computer science is 0.43. What is the probability that a student takes French given that the student is taking computer science?

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-MD.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model and interpret parameters in linear, quadratic or exponential functions.

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-MD.4. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model and interpret parameters in linear, quadratic or exponential functions.

Quarter 4 Topic 2: Probability		
Standards *Students are expected to:*	**Mathematical Practices**	**Explanations/Examples and Resources**
HS.S-MD.3. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.3. Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics. HS.MP.5. Use appropriate tools strategically. HS.MP.7. Look for and make use of structure.	Students may use graphing calculators or programs, spreadsheets, or computer algebra systems to model and interpret parameters in linear, quadratic or exponential functions.