Math 3S Essential Learning Outcomes

Unit 1 - Reasoning and Proof

Essential Standards

G-CO.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.

G-CO.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).

G-CO.4 - Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

G-CO.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.

G-CO.9 - Prove theorems about lines and angles.

G-CO.12 - Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.)

A-SSE.1 - Interpret expressions that represent a quantity in terms of its context.

A-REI.1 - Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Essential Learning Outcomes

Outcome #1 - Recognize the role of inductive and deductive reasoning in making conjectures and recognize the limitations of both methods. Use reasoning methods to write if-then statements and their converses and use those if-then reasoning patterns in arguments.

Outcome #2 - Know and be able to use the angle relationship theorems involving two intersecting lines, two parallel lines cut by a transversal, and their converses.

Outcome #3 - Use algebraic notation to represent general patterns and relationships among variables and use algebraic transformations to establish general propositions about quantitative relationships.

Conceptual

- Recognize the role of inductive reasoning in making conjectures and recognize the limitations of inductive reasoning.
- Recognize the need for proof and be able to create a simple deductive argument to prove a mathematical assertion.
- Understand angle relationship theorems involving two intersecting lines, two parallel lines cut by a transversal, and understand the angle sum theorem and exterior angle theorem.

Procedural

- Create a counterexample to prove a claim is false.
- Write if-then statements and their converses and use if-then reasoning patterns in arguments.
- Use theorems about angles, intersecting lines, parallel lines, perpendicular lines, and transversals to construct geometric proofs.
- Use algebraic notation to represent general patterns and relationships among variables.
- Use algebraic transformations to establish general propositions about quantitative relationships.

Unit 2 - Inequalities and Linear Programming

Essential Standards

A-SSE.1 - Interpret expressions that represent a quantity in terms of its context.

A-SSE.3 - Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

A-CED.1 - Create equations and inequalities in one variable including ones with absolute value and use them to solve problems.

A-CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A-CED.3 - Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.

A-REI.2 - Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

A-REI.4 - Solve quadratic equations in one variable.

A-REI.6 - Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A-REI.7 - Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

A-REI.10 - Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

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

Essential Learning Outcomes

Outcome #1 - Understand how to write inequalities that express questions about functions of one or two variables.

Outcome #2 - Know how to solve quadratic inequalities in one variable, and describe the solution set symbolically, as a number line graph, and using interval notation.

Outcome #3 - Solve and graph the solution set of a linear inequality in two variables, a system of inequalities in two variables, and solve linear programming problems involving two independent variables.

Conceptual	Procedural
• Write inequalities to express questions about functions of one or two variables. • Given a graph of one or more functions, solve inequalities related to the function(s). • Describe the solution set of an inequality symbolically, as a graph, as a number line, and using interval notation.	• Solve quadratic inequalities in one variable by solving the corresponding equation algebraically and reasoning about the graph of the related function(s) • Graph the solution set of a linear inequality in two variables • Graph the solution set of a system of inequalities in two variables • Solve linear programming problems involving two independent variables

logarithmic functions. A-REI.12 - Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. F-IF.1 - Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). F-IF.2 - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. F-IF.4 - For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. F-IF.5 - Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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. F-LE.5 - Interpret the parameters in a linear or exponential function in terms of a context.		

Unit 3 - Similarity and Congruence	
Essential Standards	**Essential Learning Outcomes**
G-CO.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). G-CO.4 - Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines,	**Outcome #1** - Build skill in using inductive and deductive reasoning to first discover and then prove geometric relationships and properties based on similarity and congruence. **Outcome #2** - Develop facility in producing deductive arguments in geometric situations using synthetic, coordinate, and transformational methods. **Outcome #3** - Know and be able to use triangle similarity and congruence theorems, properties of special centers of triangles,

parallel lines, and line segments.

G-CO.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.

G-CO.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.

G-CO.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.

G-CO.8 - Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

G-CO.9 - Prove theorems about lines and angles.

G-CO.10 - Prove theorems about triangles.

G-CO.11 - Prove theorems about parallelograms

G-CO.12 - Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.)

G-CO.13 - Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

G-SRT.1 - Verify experimentally the properties of dilations given by a center and a scale factor

G-SRT.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.

G-SRT.3 - Use the properties of similarity transformations to establish the Angle-Angle (AA) criterion for two triangles to

necessary and sufficient conditions for quadrilaterals to be parallelograms and for special quadrilaterals to be congruent, and properties of size transformation and rigid transformations to prove sufficient conditions for congruence of triangles and solve problems.

Conceptual	Procedural
• Know the three theorems providing sufficient conditions to prove triangles are similar (SSS, SAS, AA) • Understand congruence of figures as a special case of similarity of figures • Know the four theorems providing sufficient conditions to prove triangles are congruent (SSS, SAS, AAS, ASA) • Know both necessary and sufficient conditions for quadrilaterals to be (special) parallelograms	• Identifying similar polygons and determine the scale factor of similar polygons • Be able to use the three theorems providing sufficient conditions to prove triangles are similar (SSS, SAS, AA) • Be able to use the four theorems providing sufficient conditions to prove triangles are congruent (SSS, SAS, AAS, ASA) • Be able to use both necessary and sufficient conditions for quadrilaterals to be (special) parallelograms

be similar. G-SRT.4 - Prove theorems about triangles. G-SRT.5 - Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G-C.1 - Prove that all circles are similar. G-MG.3 - Apply geometric methods to solve design problems.		

<table>
<tr><th colspan="3">Unit 4 - Polynomial and Rational Functions (Unit 5 in the Text)</th></tr>
<tr><th>Essential Standards</th><th colspan="2">Essential Learning Outcomes</th></tr>
<tr><td rowspan="2">A-SSE.1 - Interpret expressions that represent a quantity in terms of its context.

A-SSE.2 - Use the structure of an expression to identify ways to rewrite it.

A-APR.1 - Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

A-APR.2 - Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).

A-APR.3 - Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

A-APR.6 - Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.

A-APR.7 - Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a</td><td colspan="2"><u>Outcome #1</u> - Understand how to model real-life situations using polynomial functions and identify the patterns relating those functions in tables, graphs and rules. Use algebraic understanding and conceptual reasoning to find local minimums, local maximums, find solutions, and combine polynomials.

<u>Outcome #2</u> - Be able to use multiple methods along with the vertex form of a quadratic function to solve quadratic equations, locate the vertex of a parabola, and rationalize the need for complex numbers when solving quadratics.

<u>Outcome #3</u> - Know how to use rational functions to model problem situations and find solutions. Analyze graphs of rational functions and understand the role of asymptotes and other characteristics of rational functions. Be able to combine rational expressions through addition, subtraction, and multiplication.</td></tr>
<tr><td>Conceptual

● Model problem situations with polynomial functions

● Connect the degree of a polynomial to local minimum/maximum values and zeroes

● How does combining polynomial expressions affect the degree of the expression

● Know how to use the quadratic formula to analyze</td><td>Procedural

● Add, subtract and multiply polynomial expressions

● Find zeroes of polynomial functions and create polynomial functions with prescribed zeroes

● Express quadratic function rules in vertex form

● Use vertex form of quadratic expressions to solve quadratic equations and locate the vertex of parabolic</td></tr>
</table>

nonzero rational expression; add, subtract, multiply, and divide rational expressions. A-CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A-CN.1 - Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + bi with a and b real. A-CN.2 - Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. A-CN.7 - Solve quadratic equations with real coefficients that have complex solutions. A-REI.4 - Solve quadratic equations in one variable. A-REI.10 - Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). F-IF.1 - Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). F-IF.2 - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. F-IF.4 - For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. F-IF.5 - Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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. F-IF.8 - Write a function defined by an expression in different but equivalent forms to reveal and explain different	solution possibilities and indicate the rationale for extending the number system to include complex numbers ● Analyze graphs of rational functions for asymptotes and holes	graphs ● Use completing the square to prove the quadratic formula ● Create rational functions modeling problem situations ● Simplify rational expressions ● Add, subtract, multiply, and divide rational expressions

properties of the function. F-BF.1 - Write a function that describes a relationship between two quantities. G-GPE.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.		

Unit 5 - Circular Motion and Functions (Unit 6 in the Text)		
Essential Standards	**Essential Learning Outcomes**	
F-BF.3 - Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. F-TF.1 - Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 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. 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. F-TF.5 - Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. G-CO.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. G-CO.12 - Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). G-CO.13 - Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	**<u>Outcome #1</u>** - State and prove properties of tangents to circles, chords, arcs, and central and inscribed angles. Interpret and apply these properties. **<u>Outcome #2</u>** - Analyze pulley and sprocket systems in terms of their transmission factor, angular velocity, and linear velocity. Use sine and cosine functions of angles and radians to model circular motion and other periodic phenomena.	
	Conceptual	**Procedural**
	● Discover and prove that a line tangent to a circle is perpendicular to the radius at the point of tangency and that the two tangent segments to a circle form the same external point are congruent. ● Discover and prove the relationships among the measures of central angles, their chords, and their arcs. ● Discover and prove the properties relating a radius, a chord, and the midpoint and perpendicular bisector of the chord. ● Discover and prove the Inscribed Angle Theorem and the property that inscribed angles that intercept the same or congruent arcs are congruent. ● Analyze situations involving pulleys or sprockets to study angular velocity and linear	● Apply the relationships among the measures of central angles, their chords, and their arcs. ● Apply the properties relating a radius, a chord, and the midpoint and perpendicular bisector of the chord. ● Apply the Inscribed Angle Theorem and the property that inscribed angles that intercept the same or congruent arcs are congruent. ● Use sine and cosine functions to describe rotations of circular objects. ● Use radian and degree measures to measure angles and rotations. ● Use the sine and cosine functions to model periodic patterns of change in various physical phenomena

G-C.2 - Identify and describe relationships among inscribed angles, radii, and chords. G-C.3 - Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. G-C.4 - Construct a tangent line from a point outside a given circle to the circle. 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. Convert between degrees and radians. G-MG.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). 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).	velocity. ● Relate the measure of the central angle of a circle to the length of the arc that the angle intercepts ● Define sine and cosine as functions of real numbers and analyze the resulting periodic graphs.	

Unit 6 - Recursion and Iteration (Unit 7 in the Text)		
Essential Standards	**Essential Learning Outcomes**	
A-SSE.1 - Interpret expressions that represent a quantity in terms of its context. A-CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A-REI.2 - Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. A-REI.10 - Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). F-IF.2 - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	**<u>Outcome #1</u>** - Represent and solve problems related to sequential change, using subscript and function notation and technological tools. **<u>Outcome #2</u>** - Analyze linear, exponential, and polynomial functions from a recursive point of view, specifically through the study of arithmetic and geometric sequences and finite differences tables. **<u>Outcome #3</u>** - Investigate the general process of iterating functions, and completely analyse the behavior of linear functions when they are iterated, including an analysis of slope to identify attracting and repelling fixed points.	
	Conceptual	**Procedural**
	● Understand the basic concepts of recursive formulas, particularly those of the form An= An-1+b ● Understand the effects of	● Use iteration and recursion to model real-world situations involving sequential change ● Use subscript notation and

F-IF.3 - Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. F-BF.2 - Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	changing certain parameters on the long-term behavior of recursive formulas and the situations they model ● Understand arithmetic sequences and their connections to linear functions, using recursive formulas, function formulas and applications. ● Understand geometric sequences and their connections to exponential functions, using recursive formulas, function formulas and applications.	spreadsheet software to represent formulas that use the words NOW and NEXT and to take advantage of this notation and spreadsheet software to analyze recursive formulas more efficiently. ● Understand and apply arithmetic and geometric series (Sums of Sequences).

Unit 7 - Inverse Functions (Unit 8 in the Text)		
Essential Standards	**Essential Learning Outcomes**	
F-IF.1 - Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). F-IF.4 - For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. F-IF.5 - Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. F-BF.1 - Write a function that describes a relationship between two quantities. F-BF.4 - Find inverse functions. F-BF.5 - Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. A-CED.1 - Create equations and inequalities in one variable including ones with absolute value and use them to solve problems.	**<u>Outcome #1</u>** - Discover conditions that guarantee the existence of inverse functions, develop strategies for finding rules of inverse functions, and use inverse functions to solve problems of coding and decoding information. **<u>Outcome #2</u>** - Develop the definition and important properties of inverses for exponential functions and use those logarithmic functions to solve exponential equations. **<u>Outcome #3</u>** - Develop definitions and important properties for inverses of sine, cosine, and tangent functions and use those inverse functions to solve trigonometric equations.	
	Conceptual	**Procedural**
	● Discover conditions that guarantee the existence of an inverse for a given function. ● Develop and use strategies for recognizing invertible functions from the study of tables of values and/or graphs of those functions. ● Develop and use basic properties of the logarithmic functions. ● Know and be able to use the definition of the inverse sine, inverse cosine, and inverse	● Solve problems using direct and inverse variation. ● Develop and use strategies for finding rules of inverses for linear and power functions. ● Express a positive number as a power of 10. ● Define and evaluate common logarithms. ● Use logarithms to solve exponential equations. ● Use the inverse functions, to

A-REI.1 - Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. 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. F-IF.8 - Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. F-LE.4 - For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. F-TF.5 - Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. 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. F-TF.7 - Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.	tangent functions ● Know and be able to use properties of the inverse sine, inverse cosine and inverse tangent functions.	find one solution (when one exists) of ● Use the inverse functions, to find one solution (when one exists) of a*f(bx) + c= d, where f(x) is the sine, cosine, or tangent. ● Express the general solutions of a trigonometric equation in forms such as x = k + 2πn or x = k + 360°n for any integer n. ● Use trigonometric equations and their solutions to model and answer questions about periodic phenomena

Unit 8 - Samples and Variation (Unit 4 in the Text)		
Essential Standards	**Essential Learning Outcomes**	
S-ID.1 - Represent data with plots on the real number line (dot plots, histograms, and box plots). 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. S-ID.3 - Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). S-ID.4 - Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population	**<u>Outcome #1</u>** - Describe characteristics of a normal distribution; compute and interpret a standardized score; and fit a normal distribution to a set of data and use it to estimate population percentages. **<u>Outcome #2</u>** - Develop a binomial probability distribution and predict whether it will be approximately normal. Compute the expected value and standard deviation of a binomial distribution. Decide whether the data are consistent with a specified population proportion.	
	Conceptual	**Procedural**
	● Describe the characteristics of a normal distribution	● When appropriate, fit a normal distribution to a set of data and use it to estimate

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. S-IC.1 - Understand statistics as a process for making inferences about population parameters based on a random sample from that population. S-MD.2 - Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. 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. 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.	• Understand the the number of standard deviations from the mean is a measure of location • Predict the shape of a binomial distribution	percentages • Use simulation to construct approximate binomial probability distributions • Find and interpret expected values and standard deviations of binomials distributions • Use a fitted normal distribution to estimate probabilities of events in binomial situations • Use a random sample to make an inference about whether a specified proportion p is plausible as the population parameter