CHINO VALLEY UNIFIED SCHOOL DISTRICT
INSTRUCTIONAL GUIDE
ALGEBRA II HONORS

Course Number	5117
Department	Mathematics
Qualification Guideline	Successful completion of both semesters of Algebra 1 and Geometry (20 credits) and scoring Proficient or Advanced on the most recent California Standards Test in Mathematics
Length of Course	Two (2) semesters/One (1) year
Grade Level	9 - 12
Credit	5 credits per semester/10 total credits - Mathematics
Repeatable	Not repeatable for credit
UC/CSU	Meets “c” mathematics requirement
Board Approved	June 19, 2008

Description of Course - Algebra II Honors should complement and expand on all the mathematical concepts of Algebra 1 and some concepts of Geometry. Review of those concepts should be integrated throughout the course. Emphasis should be placed on abstract thinking skills, the function concept, and the algebraic solution of problems in various content areas, including the solution of systems of equations, logarithmic and exponential functions, the binomial theorem, and the complex number system. This course incorporates all of the California State Content Standards for Algebra II.

Rationale for Course - Algebra II Honors is an advanced course in math designed to prepare students for Trigonometry/Pre-Calculus Honors, Advanced Placement Statistics, and/or Calculus AB/BC, and to prepare students for college entrance tests for community colleges and four-year universities. In general terms, the emphasis of the Algebra II course is on critical and abstract thinking skills that will assist the student to be successful in advanced mathematics courses as well as the workplace. Three California Content Standards in Probability and Statistics included on the Algebra II California Standards Test have been included in this curriculum guide for Algebra II, so that students are properly prepared for these assessment questions. The inclusion of the three standards in Probability and Statistics in the Algebra II Curriculum allows instruction to flow from the counting principles for discrete binomial variables to the rules for elaborating probabilities in binomial distributions. The fact that these probabilities are simply the terms in a binomial expansion provides a strong link between Algebra II and the binomial theorem.

Algebra II Standards

Standard 1 - Students solve equations and inequalities, involving absolute value.

1.1 Objective: Solve for the variable, *x*, in an equation or inequality of the forms, $ax+b=cx+d$, $ax+b>cx+d$, or $ax+b<cx+d$.

1.1.1 Performance Indicator: Given an equation of the form $3x+5=2x-10$, the student will be able to solve for the variable, *x*.

1.2 Objective: Solve for any specific variable in an equation or inequality involving the distributive property.

1.2.1 Performance Indicator: Given an equation of the form $6(x-3)=2(x+1)$, the student will be able to solve for the variable, *x*.

1.3 Objective: Solve for any specific variable in a given formula.

1.3.1 Performance Indicator: Given an equation of the form D = R·T, the student will be able to solve for the rate, R, or time, T.

1.4 Objective: Solve for the variable, *x*, in an equation or inequality of the forms, $|a-bx|=c$, $|a-bx|<c$, or $|a-bx|>c$.

1.4.1 Performance Indicator: Given an equation of the form $|3-6x|=1$, the student will be able to solve for the variable, *x*.

Standard 2 - Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.

2.1 Objective: Solve a system of linear equations and inequalities (in two or three variables) using the graphing method.

2.1.1 Performance Indicator: Given a system of equations or inequalities, such as $x-2y=1$ and $5x-4y=-23$, the student will be able to find any possible solution by graphing the lines or inequalities.

2.1.2 Performance Indicator: Given a system of equations, the student will be able to determine if the system has exactly one solution, no solutions, or infinitely many solutions.

2.2 Objective: Solve a system of linear equations (in two or three variables) using the substitution method.

2.2.1 Performance Indicator: Given a system of equations such as $x+y=4$ and $x-y=2$, the student will be able to find any possible solution by using the substitution method for the lines or inequalities.

2.3 Objective: Solve a system of linear equations (in two or three variables) using Cramer's Rule.

2.3.1 Performance Indicator: Given a system of equations such as $x-2y+3z=9$, $x-3y=4$, and $2x-5y+5z=17$, the student will be able to find any possible solution by Cramer's Rule.

Standard 3 - Students are adept at operations on polynomials, including long division.

3.1 Objective: Add, subtract, multiply, and divide polynomials.

3.1.1 Performance Indicator: Given two polynomials such as $3x^2-5x+4$ and $2x^2+3x+7$, the student will be able to calculate the sum, difference, and product of the polynomials.

3.1.2 Performance Indicator: Given two polynomials such as x^2-5x+4 and $x-4$, the student will be able to calculate the quotient of the polynomials, by factoring or long division.

Standard 4 - Students factor polynomials representing the difference of squares, perfect square trinomials, and the sum and differences of two cubes.

4.1 Objective: Factor using common monomial method.

4.1.1 Performance Indicator: Given a polynomial such as $6x^2-24x+4$, the student will be able to factor the common monomial from the trinomial.

4.2 Objective: Factor a binomial which is in the form of a difference of two squares.

4.2.1 Performance Indicator: Given a polynomial such as $25x^2-4$, the student will be able to factor the binomial into $(5x+2)(5x-2)$.

4.3 Objective: Factor a trinomial of the form ax^2+bx+c, where a, b, and c are real numbers.

4.3.1 Performance Indicator: Given a factorable trinomial such as $6x^2+17x+5$, the student will be able to factor the trinomial into $(2x+5)(3x+1)$.

4.4 Objective: Factor the sum of two cubes.

4.4.1 Performance Indicator: Given a sum of two cubes such as x^3+64, the student will be able to factor the binomial into $(x+4)(x^2-4x+16)$.

4.5 Objective: Factor the difference of two cubes.

4.5.1 Performance Indicator: Given a difference of two cubes such as x^3-27, the student will be able to factor the binomial into $(x-3)(x^2+3x+9)$.

4.6 Objective: Factor using a combination of methods.

4.6.1 Performance Indicator: Given a polynomial such as $3x^3+192$, the student will be able to factor the polynomial into $3(x+4)(x^2-4x+16)$.

4.7 Objective: Factor by grouping and multiple techniques.

4.7.1 Performance Indicator: Given a polynomial such as x^3-2x^2-3x+6, the student will be able to factor the polynomial into $(x-2)(x^2-3)$ by grouping terms that have common monomials.

Standard 5 - Students demonstrate the knowledge of how real and complex numbers are related both arithmetically and graphically. In particular, they can plot complex numbers as points in the plane.

5.1 Objective: Simplify real and complex expressions.

5.1.1 Performance Indicator: Given a square root with a negative radicand such as $\sqrt{-16}$, the student will be able to simplify the expression to 4*i*.

5.1.2 Performance Indicator: Given $i=\sqrt{-1}$, the student will be able to raise i to any power.

5.2 Objective: Graphing Complex numbers.

5.2.1 Performance Indicator: Given a complex number, the student will be able to graph it on the complex plane.

Standard 6 - Students add, subtract, multiply, and divide complex numbers.

6.1 Objective: Perform operations on complex numbers.

6.1.1 Performance Indicator: Given two complex numbers such as $3+5i$ and $6-10i$, the student will be able to find the sum, difference, product, and quotient.

6.1.2 Performance Indicator: Given a complex number, the student will be able to raise it to the second or third power.

6.1.3 Performance Indicator: Given a pure imaginary number, the student will be able to raise it to an integer power.

Standard 7 - Students add, subtract, multiply, divide, reduce and evaluate rational expressions with monomial and polynomial denominators, and simplify complicated fractions including fractions with negative exponents in the denominator.

7.1 Objective: Perform operations on rational expressions.

7.1.1 Performance Indicator: Given a rational expression, the student will be able to simplify the expression.

7.1.2 Performance Indicator: Given two rational expressions, with like or unlike denominators, the student will be able to find their sum, difference, product, and quotient.

7.1.3 Performance Indicator: Given a complex fraction, the student will be able to simplify the fraction.

7.1.4 Performance Indicator: Given an equation involving rational expressions, the student will be able to solve the equation.

Standard 8 - Students solve and graph quadratic equations by factoring, completing the square, or using the quadratic formula. Students apply these techniques in solving word problems. They also solve quadratic equations in the complex number system.

8.1 Objective: Solving quadratic equations.

8.1.1 Performance Indicator: Given a factorable quadratic equation, the student will be able to solve the equation by the factoring method.

8.1.2 Performance Indicator: Given a quadratic equation, the student will be able to solve it by completing the square.

8.1.3 Performance Indicator: Given a quadratic equation, the student will be able to solve the equation by using the quadratic formula over the complex numbers.

8.1.4 Performance Indicator: Given a quadratic equation, the student will be able to determine the nature of its roots by examining its discriminant.

8.1.5 Performance Indicator: Given a word problem which necessitates the use of a quadratic formula or completing the square, the student will be able to solve the problem.

Standard 9 - Students demonstrate and explain the effect changing a coefficient has on the graph of quadratic equations. That is, students can determine how the graph of a parabola changes as a, b, and c vary in the equation $y = a(x-b)^2 + c$.

9.1 Objective: Students shall be able to describe how the graph of a quadratic function changes as the values of the coefficients change.

9.1.1 Performance Indicator: Given a quadratic equation, the student will be able to rewrite the equation into standard form $y = a(x-b)^2 + c$.

9.1.2 Performance Indicator: Given a quadratic equation in the form $y = a(x-b)^2 + c$, the student will be able to determine if the graph opens upward or downward.

9.1.3 Performance Indicator: Given a quadratic equation in the form $y = a(x-b)^2 + c$, the student will be able to determine if the parabola opens more widely or steeply.

9.1.4 Performance Indicator: Given a quadratic equation in the form $y = a(x-b)^2 + c$, the student will be able to determine the vertex and the axis of symmetry of the parabola.

Standard 10 - Students graph quadratic functions and determine the maxima, minima, and zeros of the function.

10.1 Objective: Finding the maxima, minima, and zeros of a quadratic function.

10.1.1 Performance Indicator: Given a quadratic equation in the form $y = ax^2 + bx + c$, the student will be able to determine if the quadratic function has a minimum or maximum that occurs at $x = \frac{-b}{2a}$.

10.1.2 Performance Indicator: Given a quadratic equation in the form $y = ax^2 + bx + c$, the student will be able to determine the zeros of the function by solving the quadratic equation.

10.2 Objective: Graphing quadratic functions.

10.2.1 Performance Indicator: Given a quadratic equation in the form $y = ax^2 + bx + c$, the student will be able to determine the minimum or maximum and zeros of the function and graph the function.

10.3 Objective: Finding quadratic or cubic functions given the zeros.

10.3.1 Performance Indicator: Given the zeros of a function, the student will be able to write the equation.

Standard 11 - Students prove simple laws of logarithms.

11.1 Objective: Students understand the inverse relationship between exponents and logarithms, and use this relationship to solve problems involving logarithms and exponents.

11.1.1 Performance Indicator: Given a logarithmic expression which can be evaluated without the use of a calculator, the student will be able to evaluate the expression.

11.1.2 Performance Indicator: Given a logarithmic equation of the form $\log_b m = n$, the student will be able to write the equation in exponential form, $b^n = m$.

11.1.3 Performance Indicator: Given an exponential equation of the form $b^n = m$, the student will be able to write the equation in logarithmic form, $\log_b m = n$.

11.1.4 Performance Indicator: Given a logarithmic equations, the student will be able to solve the equation by applying logarithmic and exponential theorems.

11.1.5 Performance Indicator: Given an exponential equation, the student will be able to solve the equation by using logarithms.

11.2 Objective: Students judge the validity of an argument based on whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step.

11.2.1 Performance Indicator: Given an exponential or logarithmic equation, the student will be able to apply exponential or logarithmic theorems to find a solution.

Standard 12 - Students know the laws of exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.

12.1 Objective: Solve problems with real exponents.

12.1.1 Performance Indicator: Given an expression in radical form, the student will be able to change the expression into exponential form.

12.1.2 Performance Indicator: Given an expression in exponential form with rational exponents, the student will be able to change the expression to the radical form

12.1.3 Performance Indicator: Given an expression of the form, $x^{m/n}$, where 'n' is an integer, the student will be able to rewrite the expression in radical form and simplify.

12.1.4 Performance Indicator: Given an expression of the form, x^{-n}, where 'n' is an integer, the student will be able to rewrite the expression in the form $\frac{1}{x^n}$ and simplify.

12.1.5 Performance Indicator: Given a problem with real exponents, such as $(x^m)^n$, the student will be able to simplify the exponential expression, x^{mn}, using the laws of exponents and simplify.

12.1.6 Performance Indicator: Given a problem with real exponents, such as $(x^m)(x^n)$, the student will be able to simplify the exponential expression, x^{m+n}, using the laws of exponents and simplify.

12.1.7 Performance Indicator: Given a problem with real exponents, such as $\frac{x^m}{x^n}$, the student will be able to simplify the exponential expression, x^{m-n}, using the laws of exponents and simplify.

12.1.8 Performance Indicator: Given a problem with real exponents, such as $(xy)^m$, the student will be able to simplify the exponential expression, $x^m y^m$, using the laws of exponents and simplify.

12.1.9 Performance Indicator: Given a problem with real exponents, such as $\left(\frac{x}{y}\right)^m$, the student will be able to simplify the exponential expression, $\frac{x^m}{y^m}$, using the laws of exponents and simplify.

12.1.10 Performance Indicator: Given an exponential equation which can be solved by applying the property $b^x = b^y$ if and only if *x* = *y*, the student will be able to solve the equation.

12.1.11 Performance Indicator: Given a growth or decay problem, the student will be able to solve the problem using their knowledge of exponential functions.

Standard 13 - Students use the definition of logarithms to translate between logarithms in any base.

13.1 Objective: Solve problems with logarithms.

13.1.1 Performance Indicator: Given a logarithmic equation, $\log_b m = n$, which can be solved by applying the property, $b^n = m$, the student will be able to solve the equation.

13.1.2 Performance Indicator: Given a natural logarithmic equation, $\ln m = n$, which can be solved by applying the property, $e^n = m$, the student will be able recognize that e is approximately 2.718.

13.1.3 Performance Indicator: Given a natural logarithmic equation, $\ln m = n$, which can be solved by applying the property, $e^n = m$, the student will be able to solve the equation.

13.1.4 Performance Indicator: Given a logarithmic equation which can be solved by applying the change of base formula, $\log_a x = \frac{\log x}{\log a}$, the student will be able to solve the equation.

Standard 14 - Students understand and use the properties of logarithms to simplify logarithmic expressions and identify their approximate values.

14.1 Objective: Rewriting logarithmic equations.

14.1.1 Performance Indicator: Given a logarithmic expression, $\log 5x^3 y$, the student will be able to rewrite the expression as $\log 5 + 3\log x + \log y$ using logarithmic properties.

14.1.2 Performance Indicator: Given a logarithmic expression, $\ln \frac{z}{(z-1)^2}$, the student will be able to rewrite the expression as $\ln z - 2\ln(z-1)$.

14.2 Objective: Simplifying logarithmic expressions.

14.2.1 Performance Indicator: Given a logarithmic expression, the student will be able to simplify expression using logarithmic properties.

Standard 15 - Students determine if a specific algebraic statement involving rational expressions, radical expressions, logarithmic or exponential functions, is sometimes true, always true, or never true.

15.1 Objective: Identify if a specific algebraic statement is sometimes true, always true, or never true.

15.1.1 Performance Indicator: Given a specific algebraic statement such as $\sqrt{x} > 0$, the student will be able to use the properties of radical expressions to know if the statement is always true, sometimes true, or never true.

15.1.2 Performance Indicator: Given a specific algebraic statement such as $x^{-m} = -x^{m}$, the student will be able to know the statement is false for all m.

15.1.3 Performance Indicator: Given a specific algebraic statement such as $\frac{3x-9}{3} = x-3$, the student will be able to determine the statement true for all values of *x*.

15.1.4 Performance Indicator: Given a specific function such as $f(x) = \frac{1}{x}$, the student will be able to use the properties of rational functions to know that the function is only defined when $x \neq 0$, due to the domain restriction.

Standard 16 - Students demonstrate and explain how the geometry of the graph of a conic section (e.g. asymptotes, foci, eccentricity) depends on the coefficients of the quadratic equation representing it.

16.1 Objective: To understand the geometry of a conic.

16.1.1 Performance Indicator: Given an equation of the form $y = a(x-h)^2 + k$, the student will be able to identify the vertex of the parabola as (h,k).

16.1.2 Performance Indicator: Given an equation of the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ the student will be able to identify the vertices at $(-a,0)$, $(a,0)$, $(0,-b)$, and $(0,b)$, and identify the major axis.

16.1.3 Performance Indicator: Given an equation of the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ the student will be able to identify the foci as $(-c,0)$ and $(c,0)$ when the major axis is the x-axis, where $c^2 = a^2 - b^2$.

16.1.4 Performance Indicator: Given an equation of the form $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ the student will be able to identify the vertices at $(-a,0)$ and $(a,0)$.

16.1.5 Performance Indicator: Given an equation of the form $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ the student will be able to identify the foci at $(-c,0)$ and $(c,0)$, where $c^2=a^2+b^2$.

16.1.6 Performance Indicator: Given an equation of the form $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ the student will be able to identify the asymptotes as $y=\pm\frac{b}{a}x$.

16.1.7 Performance Indicator: Given an equation of the form $x^2+py^2-4x+10y-26=0$, the student will be able to identify which conic the graph will be when $p=1$ or when $p=4$ or when $p=-4$.

Standard 17 - Given a quadratic equation of a conic of the form $ax^2+by^2+cx+dy+e=0$, students can use the method of completing the square to put the equation into standard form and can recognize whether its graph is a circle, ellipse, parabola, or hyperbola. Students can then graph the equation.

17.1 Objective: Identify and graph conics.

17.1.1 Performance Indicator: Given an equation of the form $y=a(x-h)^2+k$, the student will be able to graph the parabola.

17.1.2 Performance Indicator: Given an equation of the form $(x-h)^2+(y-k)^2=r^2$, the student will be able to graph the circle.

17.1.3 Performance Indicator: Given an equation of the form $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$ or $\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$, the student will be able to graph the ellipse.

17.1.4 Performance Indicator: Given an equation of the form $\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$ or $\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$, the student will be able to graph the hyperbola.

17.1.5 Performance Indicator: Given the center and radius of a circle, the student will be able to write the equation of the circle.

17.1.6 Performance Indicator: Given an equation of a conic in general form or in standard form, the student will be able to determine which conic it is.

17.1.7 Performance Indicator: Given an equation of the form $ax^2 + by^2 + cx + dy + e = 0$, students can use the method of completing the square to put the equation into standard form and graph it.

Standard 18 - Students use fundamental counting principles to compute combinations and permutations.

18.1 Objective: Using the Fundamental and General Counting Principles.

18.1.1 Performance Indicator: Given an event with different outcomes, the student will be able to calculate the number of possible outcomes by listing all possibilities and counting them, or by using the Fundamental Counting Principle.

18.1.2 Performance Indicator: Given an event composed of two trials, where one of the trials has 'm' possible outcomes and the other trial has 'n' possible outcomes, the student will be able to calculate the number of possible outcomes, $m \cdot n$, for the event by using the Fundamental Counting Principle.

18.1.3 Performance Indicator: Given a factorial, the student will be able to calculate its value using the factorial formula $n! = n \cdot (n-1) \cdot (n-2)...3 \cdot 2 \cdot 1$.

18.1.4 Performance Indicator: Students will understand a permutation is a collection of distinct objects arranged in a specific order, while a combination is a collection of distinct objects without respect to a specific order.

Standard 19 - Students use combinations and permutations to compute probabilities.

19.1 Objective: Calculating permutations and combinations.

19.1.1 Performance Indicator: Students will understand a permutation is a collection of distinct objects arranged in a specific order, while a combination is a collection of distinct objects without respect to a specific order.

19.1.2 Performance Indicator: Given a collection of 'n' distinct objects that are to be arranged using 'r' different objects at a time, the student will be able to

calculate the number of permutations of 'n' objects selected 'r' at a time by using the Permutation Formula ${}_nP_r = \frac{n!}{(n-r)!}$.

19.1.3 Performance Indicator: Given a collection of 'n' distinct objects that are to be selected 'r' objects at a time, the student will be able to calculate the number of combinations of 'n' objects selected 'r' at a time by using the Combination Formula ${}_nC_r = \frac{n!}{r!(n-r)!}$.

19.1.4 Performance Indicator: The student will be able to calculate the probability of a single random event given the circumstances of the event.

19.1.5 Performance Indicator: The student will be able to find the probability of an event requiring permutations or combinations.

Standard 20 - Students know the Binomial Theorem and use it to expand binomial expressions which are raised to positive integer powers.

20.1 Objective: Simplifying expressions using the Binomial Theorem.

20.1.1 Performance Indicator: The student will be able to generate Pascal's Triangle to the eighth row.

20.1.2 Performance Indicator: Given a binomial to an integer power less than 9, the student will be able to expand it using Pascal's Triangle.

20.1.3 Performance Indicator: Given a binomial to an integer power, the student will be able to generate its first four terms using the Binomial Expansion Theorem.

20.1.4 Performance Indicator: Given a binomial to the n^{th} power, the student will be able to generate its k^{th} term.

Standard 21 - Students apply the method of mathematical induction to prove general statements about the positive integers.

21.1 Objective: To use mathematical induction.

21.1.1 Performance Indicator: The student will be able to identify an induction hypothesis.

21.1.2 Performance Indicator: Given a statement is true for the first n terms, the student will be able to demonstrate that a statement is true for $n+1$ terms.

21.1.3 Performance Indicator: The student will be able to state the conclusion of the mathematical induction proof in appropriate language.

Standard 22 - Students find the general term and the sums of arithmetic series and both finite and infinite geometric series.

22.1 Objective: Solving problems with arithmetic and geometric sequences and series.

22.1.1 Performance Indicator: Given the first few terms of an arithmetic or geometric sequence, the student will be able to determine the next four terms, or common difference or the common ratio.

22.1.2 Performance Indicator: Given the first term and common difference of an arithmetic sequence, the student will be able to determine any term or terms in the sequence.

22.1.3 Performance Indicator: Given the first term and common ratio of a geometric sequence, the student will be able to determine any term or terms in the sequence.

22.1.4 Performance Indicator: Given the first few terms of an arithmetic or geometric sequence, the student will be able to calculate a specific term.

22.1.5 Performance Indicator: Given two numbers, the student will be able to calculate the nth arithmetic or geometric means between them.

22.1.6 Performance Indicator: Given the first few terms of an arithmetic or geometric sequence, the student will be able to determine the sum of the first n terms.

22.1.7 Performance Indicator: Given the first term and common difference of an arithmetic sequence or the first term and an n^{th} term, the student will be able to determine the sum of the first n terms.

22.1.8 Performance Indicator: Given the first term and common ratio of a geometric sequence or the first term and an n^{th} term, the student will be able to determine the sum of the first n terms.

22.1.9 Performance Indicator: Given an infinite geometric series, the student will be able to determine its sum when it exists.

Standard 23 - Students derive the summation formula for arithmetic series and both finite and infinite geometric series.

23.1 Objective: Deriving summation formulas for arithmetic and geometric series.

23.1.1 Performance Indicator: The student will learn how to manipulate the general form of a series to produce the summation formula.

Standard 24 - Students solve problems involving functional concepts such as composition, inverse, and arithmetic operations on functions.

24.1 Objective: Solving problems using composition, inverse, and arithmetic operations on functions.

24.1.1 Performance Indicator: Given two polynomial functions, $f(x)$ and $g(x)$, the student will be able to find the composition of the two functions, $f(g(x))$ or $g(f(x))$.

24.1.2 Performance Indicator: Given a polynomial function, $f(x)$, whose inverse exists, the student will be able to find the inverse of the function.

24.1.3 Performance Indicator: Given two polynomial functions, $f(x)$ and $g(x)$, the student will be able to solve problems involving arithmetic operations on the functions, such as addition, subtraction, multiplication, and division.

Standard 25 - Students use properties from number systems to justify steps in combining and simplifying functions.

25.1 Objective: Using properties of the number system.

25.1.1 Performance Indicator: Given two functions, $f(x)$ and $g(x)$, the student will be able to solve problems involving addition, subtraction, multiplication, and division, and justify each step in finding the solution.

Probability and Statistics Standards

Standard 1 – Students know the definition of the notion of *independent events* and can use the rules for addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces.

1.0 Objective: Knowledge of Independent events and probability computations

1.1 Performance Indicator: The student will be able to define the probability of an event occurring is the relative frequency with which that event is likely to occur.

1.2 Performance Indicator: Given the number of outcomes corresponding to the chosen event and the total number of possible outcomes, the student will be able to calculate the probability of an event occurring.

1.3 Performance Indicator: Given the appropriate information, the student will be able to recognize mutually exclusive events and calculate their probability using the addition rule.

1.4 Performance Indicator: Students will know that two events, A and B, are independent if the outcome of one event, A, does not influence or change the outcome of the other event, B.

1.5 Performance Indicator: Given the appropriate information, the student will be able to recognize independent events and calculate their probabilities using the multiplication rule.

1.6 Performance Indicator: Students will know for two independent events, A and B, the probability that both A *and* B occur is the product of the probabilities of the two events. $P(A \text{ and } B) = P(A \cap B) = P(A) \cdot P(B)$

1.7 Performance Indicator: Students will know that the complement of an event, A, occurring is one minus the probability that the event does not occur, $P(A) = 1 - P(A^c)$.

Standard 2 - Students know the definition of the notion of *conditional probability* and use it to solve for probabilities in finite sample spaces.

2.0 Objective: Knowledge of conditional probability

2.1 Performance Indicator: Students will be able to recognize the probability from an event with a conditional distribution.

2.2 Performance Indicator: Students will know that a probability that takes into account a given condition is called a conditional probability.

2.3 Performance Indicator: Students will know that a conditional probability of the event B *given* event A has occurred is calculated by restricting the outcomes to event A and finding the fraction of those outcomes where event B also occurs. $P(B \mid A) = \dfrac{P(B \cap A)}{P(A)}$

Standard 7 - Students compute the variance and the standard deviation of a distribution of data.

7.0 Objective: Knowledge of data analysis

7.1 Performance Indicator: Given a set of data, students will be able to calculate the measures of central tendency of the data, such as mean, median, and mode.

7.2 Performance Indicator: Given a set of data, students will be able to calculate the measures of spread of the data, such as range, variation, and standard deviation.