## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

### SUBJECT: Mathematics

### Grade: Algebra 2

<table>
<thead>
<tr>
<th>Strand/Concept</th>
<th>Student Expectation</th>
<th>Student Friendly Learning Objective</th>
<th>Level of Thinking</th>
<th>Academic Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strand: Seeing Structure in Expressions</td>
<td>A-SSE.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments. I M</td>
<td>I can derive the formula for the sum of a finite geometric series (when the common ratio is not 1). I can use the formula for the sum of a finite geometric series (when the common ratio is not 1) to solve problems. For example, calculate mortgage payments.</td>
<td>Analysis</td>
<td>Common ratio Compound interest Decay factor Finite sum Growth factor Index Interest Interest rate Partial sum Payment Power</td>
</tr>
<tr>
<td>Concept: Write expressions in equivalent forms to solve problems.</td>
<td></td>
<td></td>
<td>Application</td>
<td></td>
</tr>
</tbody>
</table>

**TIMELINE:** Quarter 1

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### Colorado SS:

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<table>
<thead>
<tr>
<th>Strand: Interpreting Functions</th>
<th>Student Expectation</th>
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<tbody>
<tr>
<td>Concept: Understand the concept of a function and use function notation.</td>
<td>F-IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$. I M</td>
<td>I can recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.</td>
<td>Comprehension</td>
<td>Domain Function Range Recursively-defined function Sequence</td>
</tr>
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</table>

**Colorado SS:**

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</table>
| **Strand:** Building Functions  
**Concept:** Build a function that models a relationship between two quantities. | 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. | I can write a function that describes a relationship between two quantities.  
I can determine an explicit expression, a recursive process, or steps for calculation from a context. | Comprehension  
Application | Common difference  
Common ratio  
Explicit rule  
Recursive process  
Recursive rule |

**Colorado SS:**

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</table>
| **Strand:** Building Functions  
**Concept:** Build a function that models a relationship between two quantities. | 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. | I can write arithmetic and geometric sequences both recursively.  
With an explicit formula, I can use arithmetic and geometric sequences to model situations, and translate between the two forms. | Comprehension  
Application | Arithmetic sequence  
Common difference  
Common ratio  
Explicit formula  
Geometric sequence  
Recursive formula |

**Colorado SS:**
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</table>
| **Strand:** Linear, Quadratic, and Exponential Models  
**Concept:** Construct and compare linear, quadratic, and exponential models and solve problems. | 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). | I can 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). | Application | Arithmetic sequence  
Domain  
Linear function |

### Colorado SS:

| Strand: Quantities  
**Concept:** Reason quantitatively and use units to solve problems. | N-Q.2 Define appropriate quantities for the purpose of descriptive modeling. | I can define appropriate quantities for the purpose of descriptive modeling. | Application | Continuous  
Derived units  
Discrete  
Rates of change  
Scale |

### Colorado SS:

| Strand: The Complex Number System  
**Concept:** Perform arithmetic operations with complex numbers. | N-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. | I can identify a complex number \(i\) such that \(i^2 = -1\), and every complex number has the form \(a + bi\) with \(a\) and \(b\) real. | Knowledge | Complex number  
Imaginary number  
Imaginary part  
Real part |

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<tr>
<td><strong>Strand:</strong> The Complex Number System</td>
<td>N-CN.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. I M</td>
<td>I can use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.</td>
<td>Comprehension</td>
<td>Associative property Commutative property Distributive property Imaginary number Pure imaginary number</td>
</tr>
<tr>
<td><strong>Concept:</strong> Perform arithmetic operations with complex numbers.</td>
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<tr>
<td><strong>Colorado SS:</strong></td>
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<tr>
<td><strong>Strand:</strong> The Complex Number System</td>
<td>N-CN.7 Solve quadratic equations with real coefficients that have complex solutions. I M</td>
<td>I can solve quadratic equations with real coefficients that have complex solutions.</td>
<td>Application</td>
<td>Completing the square Complex solutions  Conjugate pairs Discriminant Extracting roots Quadratic Formula Real solutions Zeros of a function</td>
</tr>
<tr>
<td><strong>Concept:</strong> Use complex numbers in polynomial identities and equations.</td>
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</table>
| Strand: Reasoning with Equations and Inequalities  
Concept: Solve equations and inequalities in one variable. | A-REI.4 Solve quadratic equations in one variable. I M  
b. Solve quadratic equations by inspection (e.g., for \( x^2 = 49 \)), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as \( a \pm bi \) for real numbers \( a \) and \( b \). I M | I can solve quadratic equations in one variable.  
I can solve quadratic equations by inspection (e.g., for \( x^2 = 49 \)), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation.  
I can recognize when the quadratic formula gives complex solutions and write them as \( a \pm bi \) for real numbers \( a \) and \( b \). | Application | Completing the square  
Complex numbers  
Discriminant  
Quadratic equation  
Quadratic formula |

| Strand: Reasoning with Equations and Inequalities  
Concept: Solve systems of equations. | A-REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line \( y = -3x \) and the circle \( x^2 + y^2 = 3 \). I M | I can solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.  
For example, find the points of intersection between the line \( y = -3x \) and the circle \( x^2 + y^2 = 3 \). | Application | Points of intersection  
System of equations |

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</table>
| Strand: Building Functions  
Concept: Build new functions from existing functions. | F-BF.3 Identify the effect on the graph by replacing \( f(x) \) by \( f(x) + k, k f(x), f(kx), \) 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.  
*Include recognizing even and odd functions from their graphs and algebraic expressions for them.* | I can identify the effect on the graph by replacing \( f(x) \) by \( f(x) + k, k f(x), f(kx), \) and \( f(x + k) \) for specific values of \( k \) (both positive and negative).  
I can find the value of \( k \) given the graphs.  
I can experiment with cases and illustrate an explanation of the effects on the graph using technology.  
*Include recognizing even and odd functions from their graphs and algebraic expressions for them.* | Application | Constant  
Dilation  
Parent function  
Reflection  
Transformation  
Translation |

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<tr>
<td>Strand: Expressing Geometric Properties with Equations.</td>
<td>G-GPE.2 Derive the equation of a parabola given a focus and directrix. I M</td>
<td>I can derive the equation of a parabola given a focus and directrix.</td>
<td>Application</td>
<td>Concave down Concave up Directrix Distance formula Domain Focus Locus Parabola Range Standard form of a parabola</td>
</tr>
<tr>
<td>Concept: Translate between the geometric description and the equation for a conic section.</td>
<td></td>
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</table>

| Strand: Interpreting Categorical and Quantitative Data | S-ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. I 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. I | I can represent data on two quantitative variables on a scatter plot, and describe how the variables are related. I can fit a function to the data. I can 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. | Application | Dependent variable Exponential function Fit Function Independent variable Least squares regression Line of best fit Linear function Outlier Quadratic function Rate of change Regression Residual plot Residuals Scatterplot |
| Concept: Summarize, represent, and interpret data on two categorical and quantitative variables. |                                                          |                                    |                   |                                      |

| Colorado SS: |                                                          |                                    |                   |                                      |

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</table>
| **Strand:** The Complex Number System  
**Concept:** Use complex numbers in polynomial identities and equations. | N-CN.9 Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. | I can identify the Fundamental Theorem of Algebra.  
I can show that the Fundamental Theorem of Algebra is true for quadratic polynomials. | Knowledge  
Application | Degree of a polynomial  
Fundamental Theorem of Algebra  
Roots  
Solutions  
X-intercepts  
Zeros |

**Colorado SS:**

| Strand: Seeing Structure in Expressions  
**Concept:** Interpret the structure of expressions. | A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$. | I can use the structure of an expression to identify ways to rewrite it.  
For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$. | Application | Difference of two squares  
Perfect square trinomial  
Sum of cubes |
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<tr>
<td>Strand: Arithmetic with Polynomials and Rational Expression</td>
<td>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 $p(x)$. I M</td>
<td>I can identify 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 $p(x)$. I M</td>
<td>Comprehension</td>
<td>Factor theorem, Remainder, Remainder theorem, Synthetic division, Synthetic substitution, X-intercept, Zeros</td>
</tr>
<tr>
<td>Concept: Understand the relationship between zeros and factors of Polynomials.</td>
<td></td>
<td>I can apply the Remainder Theorem.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
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<tr>
<th>Strand: Arithmetic with Polynomials and Rational Expression</th>
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<th>Academic Vocabulary</th>
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<tbody>
<tr>
<td>Concept: Understand the relationship between zeros and factors of Polynomials.</td>
<td>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. I M</td>
<td>I can identify zeros of polynomials when suitable factorizations are available. I M</td>
<td>Comprehension</td>
<td>Degree of polynomial, Factors, Leading coefficient, Multiplicity of zeros, Roots, X-intercepts, Zeros</td>
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<tbody>
<tr>
<td><strong>Strand:</strong> Arithmetic with Polynomials and Rational Expression</td>
<td>A-APR.4 Prove polynomial identities and use them to describe numerical relationships. <em>For example, the polynomial identity</em> ((x^2 + y^2)^2 = (x^2 - y^2)^2 + 2xy^2) <em>can be used to generate Pythagorean triples.</em></td>
<td>I can prove polynomial identities and use them to describe numerical relationships. <em>For example, the polynomial identity</em> ((x^2 + y^2)^2 = (x^2 - y^2)^2 + 2xy^2) <em>can be used to generate Pythagorean triples.</em></td>
<td>Analysis</td>
<td>Polynomial identity</td>
</tr>
<tr>
<td><strong>Concept:</strong> Use polynomial identities to solve problems.</td>
<td><strong>Colorado SS:</strong></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

| Strand: Arithmetic with Polynomials and Rational Expression | A-APR.5 Know and apply the Binomial Theorem for the expansion of \((x + y)^n\) in powers of \(x\) and \(y\) for a positive integer \(n\), where \(x\) and \(y\) are any numbers, with coefficients determined for example by Pascal’s Triangle. | I can apply the Binomial Theorem for the expansion of \((x + y)^n\) in powers of \(x\) and \(y\) for a positive integer \(n\), where \(x\) and \(y\) are any numbers, with coefficients determined for example by Pascal’s Triangle. | Application | Binomial Theorem Pascal’s Triangle |
| **Concept:** Use polynomial identities to solve problems. | **Colorado SS:** | | | |
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</table>
| **Strand:** Reasoning with Equations and Inequalities  
**Concept:** Represent and solve equations and inequalities graphically. | 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. | I can 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 $f(x) = g(x)$.  
I can 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 functions. | Analysis  
Application | Elimination  
Point of intersection of two functions  
Properties of equality  
Substitution  
Zero |

**Colorado SS:**

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| **Interpreting Functions** | 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. **Key features include:** intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. | For a function that models a relationship between two quantities, I can interpret key features of graphs and tables in terms of the quantities. I can sketch graphs showing key features given a verbal description of the relationship. **Key features include:** intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. | Application | Decreasing  
Domain  
End behavior  
Increasing  
Intercepts  
Negative  
Positive  
Relative maximum  
Relative minimum  
Symmetry |
| **Interpreting Functions** | F-IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. | I can calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. I can estimate the rate of change from a graph. | Application | Average rate of change  
Interval  
Slope |

**Colorado SS:**
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<tr>
<td>Strand: Interpreting Functions</td>
<td>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. I c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.</td>
<td>I can graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. I can graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.</td>
<td>Application</td>
<td>Axis of symmetry</td>
</tr>
<tr>
<td>Concept: Analyze functions using different representations.</td>
<td></td>
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<td>Dependent variable</td>
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<td>Independent variable</td>
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<td>Linear function</td>
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<td>Range</td>
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<td>X-intercepts</td>
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<td>Y-intercepts</td>
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## Colorado SS:

| Strand: Interpreting Functions      | F-IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. | I can compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. | Application       | Exponential function                 |
| Concept: Analyze functions using different representations. |                                                                                     |                                                                                                      |                   | Key features of functions             |
|                                     |                                                                                     |                                                                                                      |                   | Linear function                      |
|                                     |                                                                                     |                                                                                                      |                   | Quadratic function                   |

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<tr>
<td>Strand: Building Functions</td>
<td>F-BF.1 Write a function that describes a relationship between two quantities. I 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. I</td>
<td>I can write a function that describes a relationship between two quantities. I can 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. I</td>
<td>Application</td>
<td>Common difference Common ratio Explicit rule Recursive process Recursive rule</td>
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**RESOURCES AND NOTES FOR QUARTER 1:**
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| **Strand:** Seeing Structure in Expressions  
**Concept:** Interpret the structure of expressions.                                                                 | A-SSE.2 Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$. |
|                                                                                   | I can use the structure of an expression to identify ways to rewrite it. *For example, see* $a - (-a)$ as $(a)(+a)$, *thus recognizing it as a difference of squares that can be factored as* $(a)(+a)$. | Application                                                                                       |                  | Difference of two squares, Perfect square trinomial, Sum of cubes |

**TIMELINE:** Quarter 2

**Colorado SS:**

| Strand: Arithmetic with Polynomials and Rational Expressions  
**Concept:** Rewrite rational expressions.                                                                 | 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. |
|                                                                                   | I can rewrite simple rational expressions in different forms.                                                                                                                                                            | Comprehension                                                                                      |                  | Polynomial long division, Rational expression, Synthetic division, Partial fraction decomposition |

**Colorado SS:**

6/16/15
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

**SUBJECT:** Mathematics  
**Grade:** Algebra 2

<table>
<thead>
<tr>
<th>Strand/Concept</th>
<th>Student Expectation</th>
<th>Student Friendly Learning Objective</th>
<th>Level of Thinking</th>
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</tr>
</thead>
</table>
| **Strand:** Arithmetic with Polynomials and Rational Expressions  
**Concept:** Rewrite rational expressions. | A-APR.7 Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.  
\[ \text{IM} \] | I can determine that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression.  
I can add, subtract, multiply, and divide rational expressions. | Knowledge |  |
|  |  |  | Comprehension |  |
| **Colorado SS:** | | | | |

| Strand: Creating Equations  
**Concept:** Create equations that describe numbers or relationships. | 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.*  
\[ \text{IM} \] | I can create equations and inequalities in one variable and use them to solve problems.  
*Include equations arising from simple rational functions.* | Comprehension Application | Domain  
Exponential  
Extraneous solutions  
Logarithm  
Method of finite differences  
Radical  
Rational |
|  |  |  |  |  |
| **Colorado SS:** | | | | |
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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</table>
| **Strand:** Reasoning with Equations and Inequalities  
**Concept:** Understand solving equations as a process of reasoning and explain the reasoning. | 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. | I can 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.  
I can construct a viable argument to justify a solution method. | Application | Addition property of equality  
Algebraic proof  
Distributive property  
Division property of equality  
Equation  
Extraneous  
Laws of exponents  
Multiplication property of equality  
Reflexive property  
Solution  
Subtraction property of equality  
Symmetric property |

**Colorado SS:**

| Strand: Reasoning with Equations and Inequalities  
**Concept:** Understand solving equations as a process of reasoning and explain the reasoning. | A-REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. | I can solve simple rational equations in one variable.  
I can give examples showing how extraneous solutions may arise. | Comprehension  
Application | Domain  
Extraneous solutions  
Radical equations  
Rational equations |

**Colorado SS:**

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<tbody>
<tr>
<td><strong>Strand: Reasoning with Equations and Inequalities</strong></td>
<td>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. <strong>M</strong></td>
<td>I can 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) ). I can 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 rational functions.</td>
<td><strong>Analysis</strong></td>
<td>Elimination Point of intersection of two functions Properties of equality Substitution Zero</td>
</tr>
<tr>
<td><strong>Concept: Represent and solve equations and inequalities graphically.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strand: Interpreting Functions</strong></td>
<td>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. <strong>C</strong> d. Graph rational functions, identifying zeroes and asymptotes when suitable factorizations are available, and showing end behavior. <strong>M</strong></td>
<td>I can graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. I can graph rational functions, identifying zeroes and asymptotes when suitable factorizations are available, and showing end behavior.</td>
<td><strong>Application</strong></td>
<td>End behavior Exponential function Intercepts Linear function Quadratic function Vertex</td>
</tr>
<tr>
<td><strong>Concept: Analyze functions using different representations.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

## SUBJECT: Mathematics  
### Grade: Algebra 2

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</table>
| **Strand:** Building Functions  
**Concept:** Build a function that models a relationship between two quantities. | F-BF.1 Write a function that describes a relationship between two quantities.  
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. | I can write a function that describes a relationship between two quantities.  
I can 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. | Application | Constant  
Exponential function  
Linear function  
Quadratic function |

### Colorado SS:

## Strand: Building Functions  
### Concept: Build a function that models a relationship between two quantities.

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</table>
| F-BF.1 Write a function that describes a relationship between two quantities.  
c. Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. | I can write a function that describes a relationship between two quantities.  
I can compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. | Application | |

### Colorado SS:
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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</thead>
</table>
| **Strand:** Building Functions  
**Concept:** Build new functions from existing functions. | F-BF.4 Find inverse functions. IM  
a. Solve an equation of the form \( f(x) = c \) for a simple function \( f \) that has an inverse and write an expression for the inverse. For example, \( f(x) = 2x^3 \) or \( f(x) = (x+1)/(x-1) \) for \( x \neq 1 \). IM | I can find inverse functions.  
I can solve an equation of the form \( f(x) = c \) for a simple function \( f \) that has an inverse and write an expression for the inverse. For example, \( f(x) = 2x^3 \) or \( f(x) = (x+1)/(x-1) \) for \( x \neq 1 \). | Comprehension | Comprehension  
| **Colorado SS:** | | | | Literal equation |

| Strand: Quantities  
**Concept:** Reason quantitatively and use units to solve problems. | N-Q.2 Define appropriate quantities for the purpose of descriptive modeling. C | I can define appropriate quantities for the purpose of descriptive modeling. | Application | Continuous  
Derived units  
Discrete  
Rate of change  
Scale |
| **Colorado SS:** | | | | |

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## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

### SUBJECT: Mathematics

### Grade: Algebra 2

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<tbody>
<tr>
<td><strong>Strand:</strong> The Real Number System</td>
<td><strong>Concept:</strong> Extend the properties of exponents to rational exponents.</td>
<td>N-RN. 1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. <em>For example, we define</em> $5^{\frac{1}{3}}$ <em>to be the cube root of 5 because we want</em> $(5^{\frac{1}{3}})^3 = 5^{\frac{1}{3} \cdot 3}$ <em>to hold, so</em> $(5^{\frac{1}{3}})^3$ <em>must equal 5.</em></td>
<td>Comprehension</td>
<td>Exponent Integer Property Radical Value</td>
</tr>
</tbody>
</table>

**Colorado SS:**

| Strand: The Real Number System | N-RN. 2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. | I can rewrite expressions involving radicals and rational exponents using the properties of exponents. | Comprehension | Expoten Expression Radical |

**Colorado SS:**

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<tbody>
<tr>
<td>Strand: Interpreting Functions</td>
<td>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. <strong>Key features include:</strong> intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. C</td>
<td>For a function that models a relationship between two quantities, I can interpret key features of graphs and tables in terms of the quantities. I can sketch graphs showing key features given a verbal description of the relationship. <strong>Key features include:</strong> intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</td>
<td>Application</td>
<td>Decreasing, Increasing, Intercepts, Negative, Positive, Relative maximum, Relative minimum, Symmetry</td>
</tr>
<tr>
<td>Concept: Interpret functions that arise in applications in terms of the context.</td>
<td></td>
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</tbody>
</table>

**Colorado SS:**
### Strand: Seeing Structure in Expressions

#### Concept:
Write expressions in equivalent forms to solve problems.

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</thead>
<tbody>
<tr>
<td>A-SSE.3</td>
<td>Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.</td>
<td>I can choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.</td>
<td>Application</td>
<td>Exponential expression</td>
</tr>
<tr>
<td>c. Use the properties of exponents to transform expressions for exponential functions. For example the expression $1.15^t$ can be rewritten as $(1.15^{1/12})^{12t} = 1.01212t$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</td>
<td>I can use the properties of exponents to transform expressions for exponential functions.</td>
<td>Comprehension</td>
<td>Exponential function</td>
<td></td>
</tr>
</tbody>
</table>

### Strand: Interpreting Functions

#### Concept:
Interpret functions that arise in applications in terms of the context.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>F-IF.6</td>
<td>Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.</td>
<td>I can calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. I can estimate the rate of change from a graph.</td>
<td>Application</td>
<td>Average rate of change</td>
</tr>
</tbody>
</table>

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<tbody>
<tr>
<td>Strand: Interpreting Functions</td>
<td>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. C e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. I</td>
<td>I can graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. I can graph exponential and logarithmic functions, showing intercepts and end behavior.</td>
<td>Application</td>
<td>Axis of symmetry, Domain, Independent variable, Linear function, Range, X-intercepts, Y-intercepts</td>
</tr>
</tbody>
</table>

Colorado SS:

| Strand: Interpreting Functions | F-IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. I M b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as \( y = (1.02)^t \), \( y = (0.97)^t \), \( y = (1.01)^{12t} \), \( y = (1.2)^{10t} \), and classify them as representing exponential growth or decay. I M | I can write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. I can use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as \( y = (1.02)^t \), \( y = (0.97)^t \), \( y = (1.01)^{12t} \), \( y = (1.2)^{10t} \), and classify them as representing exponential growth or decay. | Application | Decay factor, Exponent properties, Exponential function, Exponential growth model, Exponential decay model, Growth factor |

Colorado SS:
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<tr>
<td>Strand:</td>
<td>Interpret Functions</td>
<td>I can compare properties of two functions each represented in a different way (algebraically,</td>
<td>Application</td>
<td>Exponential function</td>
</tr>
<tr>
<td>Concept:</td>
<td>Analyze functions using different representations.</td>
<td>graphically, numerically in tables, or by verbal descriptions). For example, given a graph of</td>
<td></td>
<td>Key features of</td>
</tr>
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<td></td>
<td></td>
<td>one quadratic function and an algebraic expression for another, say which has the larger</td>
<td></td>
<td>functions</td>
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<td></td>
<td></td>
<td>maximum.</td>
<td></td>
<td>Linear function</td>
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<td>For example, given a graph of one quadratic function and an algebraic expression for another, say</td>
<td></td>
<td>Quadratic function</td>
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<tr>
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<td>which has the larger maximum.</td>
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<tr>
<td>Strand:</td>
<td>Building Functions</td>
<td>I can write a function that describes a relationship between two quantities.</td>
<td>Application</td>
<td>Common difference</td>
</tr>
<tr>
<td>Concept:</td>
<td>Build a function that models a relationship between two quantities.</td>
<td>I can determine an explicit expression or steps for calculation from a context. For example,</td>
<td>Application</td>
<td>Common ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>build a function that models the temperature of a cooling body by adding a constant function to a</td>
<td></td>
<td>Explicit rule</td>
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<td></td>
<td></td>
<td>decaying exponential, and relate these functions to the model.</td>
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<tr>
<td></td>
<td></td>
<td>For example, build a function that models the temperature of a cooling body by adding a constant</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>function to a decaying exponential, and relate these functions to the model.</td>
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</tr>
<tr>
<td>Strand: Building Functions</td>
<td>F-BF.3 Identify the effect on the graph of replacing ( f(x) ) by ( f(x) + k ), ( f(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. <em>Include recognizing even and odd functions from their graphs and algebraic expressions for them.</em></td>
<td>I can identify the effect on the graph of replacing ( f(x) ) by ( f(x) + k ), ( f(x) ), ( f(kx) ), and ( f(x + k) ) for specific values of ( k ) (both positive and negative).</td>
<td>Application</td>
<td>Constant \nDilation \nParent function \nReflection \nTransformation \nTranslation</td>
</tr>
<tr>
<td>Concept: Build new functions from existing functions.</td>
<td></td>
<td>I can find the value of ( k ) given the graphs.</td>
<td>Application</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I can experiment with cases and illustrate an explanation of the effects on the graph using technology. <em>Include recognizing even and odd functions from their graphs and algebraic expressions for them.</em></td>
<td>Application</td>
<td></td>
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</tbody>
</table>

**Colorado SS:**

| Strand: Building Functions | F-BF.5 Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. | I can determine the inverse relationship between exponents and logarithms. | Application | |
| Concept: Build new functions from existing functions. | | I can use the inverse relationship between exponents and logarithms to solve problems involving logarithms and exponents. | Application | |
| | | | | |

**Colorado SS:**
## Approved Facility Schools Curriculum Document

**Subject:** Mathematics  
**Grade:** Algebra 2

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</table>
| **Strand:** Linear, Quadratic, and Exponential Models  
**Concept:** Construct and compare linear, quadratic, and exponential models and solve problems. | 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). M | I can construct exponential functions, including geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). | Application | Arithmetic sequence  
Domain  
Exponential function  
Geometric sequence  
Linear function |
| **Colorado SS:** | | | | |
| **Strand:** Linear, quadratic, and Exponential Models  
**Concept:** Construct and compare linear, quadratic, and exponential models and solve problems. | 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. I M | For exponential models, I can 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 \( e \). I can evaluate the logarithm using technology. | Comprehension | Base  
Common logarithm  
Exponential model  
Logarithm  
Natural logarithm |
| **Colorado SS:** | | | | |
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

### Subject: Mathematics  Grade: Algebra 2

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</table>
| **Strand:** Linear, quadratic, and Exponential Models  
**Concept:** Interpret expressions for functions in terms of the situation they model. | F-LE.5 Interpret the parameters in a linear or exponential function in terms of a context. I M | I can interpret the parameters in a linear or exponential function in terms of a context. | Application | Base  
Exponential function  
Linear function  
End behavior  
Parameter  
Power  
Rate of growth  
Ratio  
Slope  
Y-intercept |

### Colorado SS:

| Strand: Building Functions  
**Concept:** Build a function that models a relationship between two quantities. | F-BF.1 Write a function that describes a relationship between two quantities.  
c. Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. | I can write a function that describes a relationship between two quantities.  
I can compose functions.  
For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. | Application | Application |

### Colorado SS:
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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**RESOURCES AND NOTES FOR QUARTER 2:**
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2  

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</table>
| Strand: Conditional Probability and the Rules of Probability  
Concept: Understand independence and conditional probability and use them to interpret data.  
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").  
I M | 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").  
I M | I can 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").  
I M | Application | Complement  
Element  
Empty Set  
Event  
Intersection  
Probability  
Sample Space  
Set  
Subset  
Theoretical Probability  
Tree Diagram  
Union  
Universal Set  
Venn Diagram |
| Strand: Conditional Probability and the Rules of Probability  
Concept: Understand independence and conditional probability and use them to interpret data.  
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.  
I M | 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.  
I M | I can determine 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.  
I M | Application | Event  
Dependent Events  
Independent Events  
Intersection  
Joint Probability  
Probability |

### Colorado SS:

**TIMELINE:** Quarter 3

6/16/15
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

### SUBJECT: Mathematics  
**Grade:** Algebra 2

<table>
<thead>
<tr>
<th>Strand/Concept</th>
<th>Student Expectation</th>
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<th>Academic Vocabulary</th>
</tr>
</thead>
</table>
| Strand: Conditional Probability and the Rules of Probability  
Concept: Understand independence and conditional probability and use them to interpret data. | S-CP.3 Understand the conditional probability of A given B as \( P(A \text{ and } B) / P(B) \), 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. | I can determine the conditional probability of A given B as \( P(A \text{ and } B) / P(B) \), 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. | Application | A Given B  
Conditional Probability  
Dependent Events  
Independent Events  
Joint Probability |

### Colorado SS:

| Strand: Conditional Probability and the Rules of Probability  
Concept: Understand independence and conditional probability and use them to interpret data. | 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. | I can construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. I can 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. | Application | Association  
Categorical Variable  
Conditional Probability  
Dependent Events  
Experimental Probability  
Independent Events  
Joint Probability  
Marginal Probability  
Quantitative  
Random Sample  
Theoretical probability  
Two-Way frequency Table |

### Colorado SS:
## Strand/Concept

**Strand:** Conditional Probability and the Rules of Probability

**Concept:** Understand independence and conditional probability and use them to interpret data.

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</thead>
<tbody>
<tr>
<td>S-CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. <em>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.</em></td>
<td>I can recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. <em>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.</em></td>
<td>Analysis</td>
<td>Conditional Dependent Independent</td>
</tr>
</tbody>
</table>

### Colorado SS:

**Strand:** Conditional Probability and the Rules of Probability

**Concept:** Use the rules of probability to compute probabilities of compound events in a uniform probability model.

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<tbody>
<tr>
<td>S-CP.8 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.</td>
<td>I can 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.</td>
<td>Application</td>
<td>Conditional probability Intersecting Sets Mutually exclusive Subset Two Way Table Venn Diagram</td>
</tr>
</tbody>
</table>

### Colorado SS:
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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</table>
| **Strand:** Conditional Probability and the Rules of Probability  
**Concept:** Use the rules of probability to compute probabilities of compound events in a uniform probability model. | 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. IM | I can 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. | Application | Empty Set  
Intersecting Sets  
Mutually exclusive  
Subset  
Two Way Table  
Venn Diagram |
| **Strand:** Conditional Probability and the Rules of Probability  
**Concept:** Use the rules of probability to compute probabilities of compound events in a uniform probability model. | 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. IM | I can 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. | Application | Conditional probability  
Dependent events  
Independent events  
Intersecting Sets  
Subset  
Two Way Table  
Venn Diagram |
| **Strand:** Conditional Probability and the Rules of Probability  
**Concept:** Use the rules of probability to compute probabilities of compound events and solve problems. IM | S-CP.8 Use permutations and combinations to compute probabilities of compound events and solve problems. | I can use permutations and combinations to compute probabilities of compound events and solve problems. | Application | Compound Event  
Combination  
Factorial  
Outcomes  
Permutation |

### Colorado SS:

6/16/15
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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</table>
| **Strand:** Using Probability to Make Decisions  
**Concept:** Use probability to evaluate outcomes of decisions. | S-MD.8 Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). I M | I can use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). | Application | Bias  
Convenience samples  
Counting methods  
Experimental probability  
Fairness  
Random number generator  
Random samples  
Theoretical probabilities  
z-score |

**Colorado SS:**

### Strand: Using Probability to Make Decisions  
**Concept:** Use probability to evaluate outcomes of decisions.

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). I M

I can analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).  

Analysis  
Complimentary events  
Conditional probability  
Independent events

**Colorado SS:**
## Strand/Concept

**Strand:** Making Inferences and Justifying Conclusions  
**Concept:** Understand and evaluate random processes underlying statistical experiments.

### Student Expectation

- S-IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. IM

### Student Friendly Learning Objective

- I can define statistics as a process for making inferences about population parameters based on a random sample from that population.

### Level of Thinking

- Comprehension

### Academic Vocabulary

- Categorical Data  
- Census  
- Individuals  
- Numerical Data  
- Parameter  
- Population  
- Qualitative Data  
- Quantitative Data  
- Representative Sample  
- Sampling  
- Statistic  
- Survey

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### Colorado SS:

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**Strand:** Making Inferences and Justifying Conclusions  
**Concept:** Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

### Student Expectation

- S-IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. IM

### Student Friendly Learning Objective

- I can determine the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each

### Level of Thinking

- Application

### Academic Vocabulary

- Bias  
- Convenience Sample  
- Experimental Study  
- Observational Study  
- Simple Random Sample  
- Stratified Random Sample  
- Subject  
- Systematic Random Sample  
- Treatment  
- Voluntary Sample

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### Colorado SS:
### APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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</table>
| **Strand:** Making Inferences and Justifying Conclusions  
**Concept:** Make inferences and justify conclusions from sample surveys, experiments, and observational studies. | S-IC.6 Evaluate reports based on data. IM | I can evaluate reports based on data. | Evaluation | Bias  
Comparative Experiment (I.E. 2 Treatments)  
Confidence Interval  
Correlation Coefficient  
Experimental Study  
Margin Of Error  
Observational Study  
Randomized  
Sample Size  
Significant, As In Statistics  
Survey |
| **Strand:** Making Inferences and Justifying Conclusions  
**Concept:** Understand and evaluate random processes underlying statistical experiments. | S-IC.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model? IM | I can decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model? | Application | Experimental  
Probability  
Histogram  
Independence  
Probability Distribution  
Random Variable  
Theoretical Probability |

**Colorado SS:**

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6/16/15
### APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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</table>
| **Strand:** Making Inferences and Justifying Conclusions  
**Concept:** Make inferences and justify conclusions from sample surveys, experiments, and observational studies. | S-IC.4 Use data from a sample survey to estimate a population mean or margin of error through the use of simulation models for random sampling. I M | I can use data from a sample survey to estimate a population mean or margin of error through the use of simulation models for random sampling. | Application | Critical Value (Z*)  
Confidence Interval  
Margin Of Error  
Mean (X-Bar)  
Parameter  
Proportion (P-Hat)  
Random Sample Statistic |

**Colorado SS:**  
Define and explain the meaning of significance, both statistical (using p-values) and practical (using effect size).
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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</table>
| **Strand:** Making Inferences and Justifying Conclusions  
**Concept:** Make inferences and justify conclusions from sample surveys, experiments, and observational studies. | S-IC.6 Evaluate reports based on data. IM | I can evaluate reports based on data. | Evaluation | Bias  
Comparative  
Experiment (i.e. 2 Treatments)  
Confidence Interval  
Correlation Coefficient  
Experimental Study  
Margin Of Error  
Observational Study  
Randomized  
Sample Size  
Significant, As in Statistics  
Survey |

**Colorado SS:** Analyze the cost of insurance as a method to offset the risk of a situation.
<table>
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**RESOURCES AND NOTES FOR QUARTER 3:**

6/16/15
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

### SUBJECT: Mathematics  
**Grade:** Algebra 2

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Strand:</strong> Quantities</td>
<td>N-Q.2 Define appropriate quantities for the purpose of descriptive modeling. M</td>
<td>I can define appropriate quantities for the purpose of descriptive modeling.</td>
<td>Application</td>
<td>Continuous</td>
</tr>
<tr>
<td><strong>Concept:</strong> Reason quantitatively and use units to solve problems.</td>
<td></td>
<td></td>
<td></td>
<td>Derived units</td>
</tr>
<tr>
<td><strong>Colorado SS:</strong></td>
<td></td>
<td></td>
<td></td>
<td>Discrete</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rates of change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Scale</td>
</tr>
<tr>
<td><strong>Strand:</strong> Interpreting Functions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Concept:</strong> Interpret functions that arise in applications in terms of the context.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Colorado SS:</strong></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**TIMELINE:** Quarter 4

**Colorado SS:**

**6/16/15**
### APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

**SUBJECT:** Mathematics  
**Grade:** Algebra 2

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</tr>
</thead>
</table>
| **Strand:** Interpreting Functions  
**Concept:** Interpret functions that arise in applications in terms of the context. | F-IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. M | I can calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. I can estimate the rate of change from a graph. | Application | Average rate of change  
Interval  
Slope |
| **Strand:** Interpreting Functions  
**Concept:** Analyze functions using different representations. | 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. M  
e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. M | I can graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. I can graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. | Application | End behavior  
Exponential function  
Intercepts  
Linear function  
Quadratic function  
Vertex |

**Colorado SS:**

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6/16/15
## APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

**SUBJECT:** Mathematics  
**Grade:** Algebra 2

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</thead>
</table>
| **Strand:** Interpreting Functions  
**Concept:** Analyze functions using different representations. | F-IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. | I can compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. | Application | Exponential function  
Key features of functions  
Linear function  
Quadratic function |

### Colorado SS:

| Strand: Building Functions  
**Concept:** Build new functions from existing functions. | F-BF.3 Identify the effect on the graph by replacing f(x) by f(x) + k, f(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. Include recognizing even and odd functions from their graphs and algebraic expressions for them. | I can identify the effect on the graph by replacing f(x) by f(x) + k, f(x), f(kx), and f(x + k) for specific values of k (both positive and negative). I can find the value of k given the graphs. I can experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. | Application  
Analysis | Constant  
Dilation  
Parent function  
Reflection  
Transformation  
Translation |

### Colorado SS:

6/16/15
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</table>
| Strand: Trigonometric Functions  
Concept: Extend the domain of trigonometric functions using the unit circle. | F-TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. IM | I can define radian measure of an angle as the length of the arc on the unit circle subtended by the angle. | Knowledge | Angle of rotation  
Co-terminal  
Initial side  
Intercepted arc  
Radian measure  
Standard position  
Terminal side  
Unit circle |
| Strand: Trigonometric Functions  
Concept: Extend the domain of trigonometric functions using the unit circle. | 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. IM | I can 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. | Application | Cosine function  
Co-terminal  
Quadrantal angles  
Reference angle  
Sine function  
Special right triangles  
Tangent function  
Unit circle |

Colorado SS:
### APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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</table>
| **Strand:** Trigonometric Functions  
**Concept:** Model periodic phenomena with trigonometric functions. | F-TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. IM | I can choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. | Academic | Amplitude  
Domain  
Horizontal translation  
Periodic function  
Phase shift  
Midline  
Range  
Sinusoid  
Vertical dilation  
Vertical translation |

**Colorado SS:**

| Strand: Trigonometric Functions  
**Concept:** Prove and apply trigonometric identities. | F-TF.8 Prove the Pythagorean identity \( \sin^2(\theta) + \cos^2(\theta) = 1 \) and use it to find \( \sin(\theta) \), \( \cos(\theta) \), or \( \tan(\theta) \) given \( \sin(\theta) \), \( \cos(\theta) \), or \( \tan(\theta) \) and the quadrant of the angle. IM | I can prove the Pythagorean identity \( \sin^2(\theta) + \cos^2(\theta) = 1 \). I can use the Pythagorean identity to find \( \sin(\theta) \), \( \cos(\theta) \), or \( \tan(\theta) \) given \( \sin(\theta) \), \( \cos(\theta) \), or \( \tan(\theta) \) and the quadrant of the angle. | | Quadrants  
Unit circle |

**Colorado SS:**

| Strand: Reasoning with Equations and Inequalities  
**Concept:** Solve systems of equations. | A-REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. IM | I can solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. | Application | Graphing  
Linear combination  
Solution  
Substitution |

**Colorado SS:**
# APPROVED FACILITY SCHOOLS CURRICULUM DOCUMENT

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**Grade:** Algebra 2

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</table>
| Strand: Interpreting Categorical and Quantitative Data  
Concept: Summarize, represent, and interpret data on two categorical and quantitative variables. | S-ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. M  
 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. M | I can represent data on two quantitative variables on a scatter plot, and describe how the variables are related.  
I can fit a function to the data.  
I can 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. | Application | Dependent variable  
Exponential function  
Fit  
Function  
Independent variable  
Least squares  
regression  
Line of best fit  
Linear function  
Outlier  
Quadratic function  
Rate of change  
Regression  
Residual plot  
Residuals  
Scatterplot |

**Colorado SS:**
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### RESOURCES AND NOTES FOR QUARTER 4 :
