# Jasper City Schools Curriculum Map

## ALGEBRA I

**Course Name: Algebra 1**

**Unit Name: Chapter 1: Foundations for Algebra**

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| **Time Frame:** | **August** |
| **Unit Standards** | 6.) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. [N-Q3]<br>7.) Interpret expressions that represent a quantity in terms of its context.* [A-SSE1]<br>a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]<br>b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]<br>Example: Interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.<br>12.) 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.* [A-CED1]<br>13.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]<br>22.) Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [A-REI10] |
| **Unit Essential Questions** | Big Idea – Variable<br>How can you represent quantities, patterns and relationships?<br>Students will learn to write and evaluate expressions with unknown values.<br>Big Idea – Properties<br>How are properties related to algebra?<br>Properties are used to simplify expressions. |
| **Unit Essential Vocabulary** | 1. absolute value<br>2. additive inverse<br>3. algebraic expression<br>4. base<br>5. coefficient<br>6. constant<br>7. counter example<br>8. deductive reasoning<br>9. distributive property<br>10. element of the set<br>11. equation<br>12. equivalent expression<br>13. evaluate<br>14. exponent<br>15. inductive reasoning<br>16. inequality<br>17. integer<br>18. irrational number<br>19. like terms<br>20. multiplicative inverse<br>21. natural number<br>22. numerical expression<br>23. open sentence<br>24. opposite<br>25. order of operations<br>26. perfect square<br>27. power<br>28. quantity<br>29. radical<br>30. radicand<br>31. rational number<br>32. real number<br>33. reciprocal<br>34. set<br>35. simplify<br>36. solution of an equation<br>37. square root<br>38. subset<br>39. term<br>40. variable<br>41. whole number |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

# Jasper City Schools Curriculum Map

## ALGEBRA I

**Course Name: Algebra 1**

**Unit Name: Chapter 2: Solving Equations**

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| **Time Frame:** | **September** |
| **Unit Standards** | 4.) Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. [N-Q1]<br>6.) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. [N-Q3]<br>12.) 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.* [A-CED1]<br>15.) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. [A-CED4]<br>Example: Rearrange Ohm's law $V = IR$ to highlight resistance $R$.<br>16.) 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. [A-REI1]<br>17.) Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. [A-REI3] |
| **Unit Essential Questions** | Big Idea – Equivalence<br>Can equations that appear to be different be equivalent?<br>Students will find equivalent equations using inverse operations and simplification.<br>Big Idea – Solving Equations and Inequalities<br>How can you solve equations?<br>Students will solve equations using addition, subtraction, multiplication or division.<br>Students will use the Distributive Property to simplify expressions and solve inequalities.<br>Students will use the Multiplication Property of Equality and the Cross Products Property to solve proportions.<br>Big Idea – Proportionality<br>What kinds of relationships can proportions represent?<br>Students will calculate unit rates.<br>Students will use proportions to solve problems involving percents , measurements in similar figures, and indirect measurement.<br>Students will use scale drawings such as maps. |
| **Unit Essential Vocabulary** | 1. Addition Property of Equality<br>2. conversion factor<br>3. cross products<br>4. cross product property<br>5. Division Property of Equality<br>6. equivalent equations<br>7. formula<br>8. identity<br>9. inverse operations<br>10. isolate<br>11. literal equation<br>12. Multiplication Property of Equality<br>13. percent error<br>14. percent change<br>15. percent decrease<br>16. percent increase<br>17. proportion<br>18. rate<br>19. ratio<br>20. relative error<br>21. scale<br>22. scale drawing<br>23. scale model<br>24. similar figures<br>25. Subtraction Property of Equality<br>26. unit analysis<br>27. unit rate |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

**Jasper City Schools Curriculum Map**

**ALGEBRA I**

**Course Name: Algebra 1**

**Unit Name: Chapter 3: Solving Inequalities**

| **Time Frame:** | **September** |
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| **Unit Standards** | 7.) Interpret expressions that represent a quantity in terms of its context.* [A-SSE1]<br>a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]<br>b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]<br>Example: Interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.<br>12.) 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.* [A-CED1]<br>17.) Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. [A-REI3] |
| **Unit Essential Questions** | Big Idea – Variable<br>How do you represent relationships between quantities that are not equal?<br>Students will learn to write and graph inequalities.<br>Big Idea – Equivalence<br>Can inequalities that appear to be different be equivalent?<br>Students will use properties to generate equivalent inequalities.<br>Big Idea – Solving Equations and Inequalities<br>How can you solve inequalities?<br>Equivalent inequalities are generated by using the properties of inequalities.<br>Inequality symbols are reversed when multiplying to dividing or dividing both sides of an inequality by a negative number. |
| **Unit Essential Vocabulary** | 1. complement of a set<br>2. compound inequality<br>3. disjoint sets<br>4. empty set<br>5. equivalent inequalities<br>6. intersection<br>7. interval notation<br>8. roster form<br>9. set builder notation<br>10. solution of an inequality<br>11. union<br>12. universal set |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

**Jasper City Schools Curriculum Map**

**ALGEBRA I**

**Course Name: Algebra 1**

**Unit Name: Chapter 4: An Introduction to Functions**

| **Time Frame:** | **October** |
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| **Unit Standards** | 4.) Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. [N-Q1]<br>5.) Define appropriate quantities for the purpose of descriptive modeling. [N-Q2]<br>7.) Interpret expressions that represent a quantity in terms of its context.* [A-SSE1]<br>a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]<br>b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]<br>Example: Interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.<br>13.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]<br>22.) Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [A-REI10]<br>23.) 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.* [A-REI11]<br>25.) Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If $f$ is a function and $x$ is an element of its domain, then $f(x)$ denotes the output of $f$ corresponding to the input $x$. The graph of $f$ is the graph of the equation $y = f(x)$. [F-IF1]<br>26.) Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. [F-IF2]<br>27.) Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. [F-IF3]<br>Example: The Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.<br>28.) 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.** [F-IF4]<br>29.) Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5]<br>Example: If the function $h(n)$ gives the number of person-hours it takes to assemble $n$ engines in a factory, then the positive integers would be an appropriate domain for the function.<br>34.) Write a function that describes a relationship between two quantities.* [F-BF1]<br>a. Determine an explicit expression, a recursive process, or steps for calculation from a context. [F-BF1a]<br>b. Combine standard function types using arithmetic operations. [F-BF1b]<br>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.<br>35.) Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.* [F-BF2]<br>38.) 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). [F-LE2] |

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| **Unit Essential Questions** | Big Idea – Function<br>How can you represent and describe functions?<br>Students will represent functions using tables, equations and graphs.<br>Students will use function notation.<br>Students will represent arithmetic sequences using function rules.<br>Big Idea – Modeling<br>Can functions describe real-world situations?<br>Graphs will be used to relate two quantities.<br>Students will model real-world situations that are continuous and real-world situations that are discrete. |
| **Unit Essential Vocabulary** | 1. arithmetic sequence<br>2. common difference<br>3. continuous graph<br>4. dependent variable<br>5. discrete graph<br>6. domain<br>7. explicit formula<br>8. function<br>9. function notation<br>10. input<br>11. independent variable<br>12. linear function<br>13. nonlinear function<br>14. output<br>15. range<br>16. recursive formula<br>17. relation<br>18. sequence<br>19. term of a sequence<br>20. vertical line test |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |
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**Jasper City Schools Curriculum Map**

**ALGEBRA I**

**Course Name: Algebra 1**

**Unit Name: Chapter 5: Linear Functions**

| **Time Frame:** | **October** |
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| **Unit Standards** | 4.) Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. [N-Q1]<br>5.) Define appropriate quantities for the purpose of descriptive modeling. [N-Q2]<br>7.) Interpret expressions that represent a quantity in terms of its context.* [A-SSE1]<br>a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]<br>b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]<br>Example: Interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.<br>8.) Use the structure of an expression to identify ways to rewrite it. [A-SSE2]<br>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 $(x^2 - y^2)(x^2 + y^2)$.<br>13.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]<br>28.) 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.** [F-IF4]<br>30.) 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.* [F-IF6]<br>31.) Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7]<br>a. Graph linear and quadratic functions, and show intercepts, maxima, and minima. [F-IF7a]<br>b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b] |
| | 34.) Write a function that describes a relationship between two quantities.* [F-BF1]<br>a. Determine an explicit expression, a recursive process, or steps for calculation from a context. [F-BF1a]<br>b. Combine standard function types using arithmetic operations. [F-BF1b]<br>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.<br>36.) Identify the effect on the graph of 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. [F-BF3]<br>37.) Distinguish between situations that can be modeled with linear functions and with exponential functions. [F-LE1]<br>a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. [F-LE1a]<br>b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. [F-LE1b]<br>c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. [F-LE1c]<br>38.) 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). [F-LE2]<br>40.) Interpret the parameters in a linear or exponential function in terms of a context. [F-LE5]<br>45.) Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. [S-ID6]<br>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* |

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| | *models.* [S-ID6a]<br>b. Informally assess the fit of a function by plotting and analyzing residuals. [S-ID6b]<br>c. Fit a linear function for a scatter plot that suggests a linear association. [S-ID6c]<br>46.) Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. [S-ID7] |
| **Unit Essential Questions** | Big Idea – Proportionality<br>What does the slope of a line indicate about the line?<br>Students will find slope using a formula.<br>Students will find slope using a graph.<br>Students will analyze various slopes and describe their meaning.<br>Big Idea – Function<br>What information does the equation of a line give you?<br>The equation of a line gives you its slope.<br>The equation of a line gives its y-intercept.<br>Big Idea – Modeling<br>How can you make predictions based on a scatter plot?<br>Students will find the line of best fit.<br>Students will analyze trend lines in scatter plots. |
| **Unit Essential Vocabulary** | 1. absolute value function<br>2. direct variation<br>3. extrapolation<br>4. interpolation<br>5. inverse function<br>6. linear equation<br>7. line of best fit<br>8. negative correlation<br>9. no correlation<br>10. opposite reciprocals<br>11. parallel lines<br>12. perpendicular lines<br>13. piecewise function<br>14. point-slope form<br>15. positive correlation<br>16. rate of change<br>17. residual<br>18. scatter plot<br>19. slope<br>20. slope-intercept form<br>21. standard form of a linear equation<br>22. step function<br>23. trend line<br>24. x intercept<br>25. y intercept |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

# Jasper City Schools Curriculum Map

## ALGEBRA I

**Course Name: Algebra 1**

**Unit Name: Chapter 6: Systems of Equations and Inequalities**

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| **Time Frame:** | **November** |
| **Unit Standards** | 5.) Define appropriate quantities for the purpose of descriptive modeling. [N-Q2]<br>6.) Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. [S-ID7]<br>14.) Represent constraints by equations or inequalities, and by systems of equations and/or inequalities and interpret solutions as viable or non-viable options in a modeling context. [A-CED3]<br>Example: Represent inequalities describing nutritional and cost constraints on combinations of different foods.<br>19.) Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. [A-REI5]<br>20.) Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. [A-REI6]<br>23.) 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.* [A-REI11]<br>24.) Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. [A-REI12] |
| **Unit Essential Questions** | Big Idea – Solving Equations and Inequalities<br>How can you solve a system of equations or inequalities?<br>Students will learn to solve systems of equations or inequalities by graphing.<br>Students will learn to solve systems of equations or inequalities by substitution.<br>Students will learn to solve systems of equations or inequalities by elimination.<br>Big Idea – Modeling<br>Can systems of equations model real-world situations?<br>Students will write equations and inequalities to represent situations.<br>Students will examine constraints placed on real-world situations. |
| **Unit Essential Vocabulary** | 1. consistent<br>2. dependent<br>3. elimination method<br>4. inconsistent<br>5. independent<br>6. linear inequality<br>7. solution of an inequality<br>8. solution of a system of linear equations<br>9. solution of a system of linear inequalities<br>10. substitution method<br>11. system of linear equations<br>12. system of linear inequalities |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

# Jasper City Schools Curriculum Map

## ALGEBRA I

**Course Name: Algebra 1**

**Unit Name: Chapter 7: Exponents and Exponential Function**

| Time Frame: | December |
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| Unit Standards | 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. [N-RN1]<br>Example: We define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.<br>2.) Rewrite expressions involving radicals and rational exponents using the properties of exponents. [N-RN2]<br>7.) Interpret expressions that represent a quantity in terms of its context.* [A-SSE1]<br>a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]<br>b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]<br>Example: Interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.<br>9.) Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* [A-SSE3]<br>a. Factor a quadratic expression to reveal the zeros of the function it defines. [A-SSE3a]<br>b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. [A-SSE3b]<br>c. Determine a quadratic equation when given its graph or roots. (Alabama)<br>d. Use the properties of exponents to transform expressions for exponential functions. [A-SSE3c]<br>Example: The expression $1.15^t$ can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.<br>13.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]<br>14.) Represent constraints by equations or inequalities, and by systems of equations and/or inequalities and interpret solutions as viable or non-viable options in a modeling context. [A-CED3]<br>Example: Represent inequalities describing nutritional and cost constraints on combinations of different foods.<br>23.) 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.* [A-REI11]<br>28.) 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.** [F-IF4]<br>29.) Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5]<br>Example: If the function $h(n)$ gives the number of person-hours it takes to assemble $n$ engines in a factory, then the positive integers would be an appropriate domain for the function.<br>31.) Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7]<br>a. Graph linear and quadratic functions, and show intercepts, maxima, and minima. [F-IF7a]<br>b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b]<br>32.) Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8]<br><br>a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. [F-IF8a]<br>b. Use the properties of exponents to interpret expressions for exponential functions. [F-IF8b]<br>Example: Identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, and $y = (1.2)^{t/10}$, and classify them as representing exponential growth and decay.<br>33.) Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [F-IF9]<br>Example: Given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.<br>36.) Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of $k$ (both |

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| | 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. [F-BF3]<br>37.) Distinguish between situations that can be modeled with linear functions and with exponential functions. [F-LE1]<br>a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. [F-LE1a]<br>b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. [F-LE1b]<br>c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. [F-LE1c]<br>38.) 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). [F-LE2]<br>40.) Interpret the parameters in a linear or exponential function in terms of a context. [F-LE5] |
| **Unit Essential Questions** | Big Idea – Equivalence<br>How can you represent numbers less than 1 using exponents?<br>Students will learn to represent numbers using negative exponents.<br>Big Idea – Properties<br>How can you simplify expressions involving exponents?<br>Students will define and use zero and negative exponents.<br>Students will learn the rules for multiplying powers.<br>Students will learn the rules for dividing powers.<br>Big Idea – Function<br>What are the characteristics of exponential functions?<br>Exponential functions may show growth or decay. |
| **Unit Essential Vocabulary** | 1. compound interest<br>2. decay factor<br>3. exponential decay<br>4. exponential function<br>5. exponential growth<br>6. geometric sequence<br>7. growth factor<br>8. index |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

**Jasper City Schools Curriculum Map**

**ALGEBRA I**

**Course Name: Algebra 1**

**Unit Name: Chapter 8: Polynomials and Factoring**

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| **Time Frame:** | **January** |
| **Unit Standards** | 7.) Interpret expressions that represent a quantity in terms of its context.* [A-SSE1]<br>a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]<br>b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]<br>Example: Interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.<br>8.) Use the structure of an expression to identify ways to rewrite it. [A-SSE2]<br>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 $(x^2 - y^2)(x^2 + y^2)$.<br>10.) Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. [A-APR1]<br><br>11.) (+) 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. [A-APR7] |
| **Unit Essential Questions** | Big Idea – Equivalence<br>Can two algebraic expressions that appear to be different be equivalent?<br>Students will add and subtract polynomial expressions.<br>Students will multiply polynomial expressions.<br>Students will factor polynomials.<br>Big Idea – Properties<br>How are the properties of real numbers related to polynomials?<br>Students will use the Commutative and Associative Properties to manipulate polynomial expressions.<br>Students will use the Distributive Property to multiply polynomials and factor polynomials. |
| **Unit Essential Vocabulary** | 1. binomial<br>2. degree of a monomial<br>3. degree of a polynomial<br>4. difference of two squares<br>5. factoring by grouping<br>6. monomial<br>7. perfect square trinomial<br>8. polynomial<br>9. standard form of a polynomial<br>10. trinomial |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

# Jasper City Schools Curriculum Map

## ALGEBRA I

**Course Name: Algebra 1**

**Unit Name: Chapter 9: Quadratic Functions and Equations**

| **Time Frame:** | **January** |
|---|---|
| **Unit Standards** | 10.) Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. [A-APR1]<br>11.) (+) 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. [A-APR7]<br>12.) 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.* [A-CED1]<br>13.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]<br>14.) Represent constraints by equations or inequalities, and by systems of equations and/or inequalities and interpret solutions as viable or non-viable options in a modeling context. [A-CED3]<br>Example: Represent inequalities describing nutritional and cost constraints on combinations of different foods.<br>15.) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. [A-CED4]<br>Example: Rearrange Ohm's law $V = IR$ to highlight resistance $R$<br>28.) 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.** [F-IF4]<br>29.) Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5]<br>Example: If the function $h(n)$ gives the number of person-hours it takes to assemble $n$ engines in a factory, then the positive integers would be an appropriate domain for the function.<br>31.) Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7]<br>a. Graph linear and quadratic functions, and show intercepts, maxima, and minima. [F-IF7a]<br>b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b]<br>32.) Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8]<br>a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. [F-IF8a]<br>b. Use the properties of exponents to interpret expressions for exponential functions. [F-IF8b]<br>Example: Identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, and $y = (1.2)^{t/10}$, and classify them as representing exponential growth and decay.<br>33.) Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [F-IF9]<br>Example: Given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.<br>36.) Identify the effect on the graph of 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. [F-BF3]<br>37.) Distinguish between situations that can be modeled with linear functions and with exponential functions. [F-LE1]<br>a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. [F-LE1a]<br>b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. [F-LE1b]<br>c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. [F-LE1c]<br>38.) 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). [F-LE2]<br>39.) Observe, using graphs and tables, that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. [F-LE3]<br>45.) Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. [S-ID6] |

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| | 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.* [S-ID6a]<br>b. Informally assess the fit of a function by plotting and analyzing residuals. [S-ID6b]<br>c. Fit a linear function for a scatter plot that suggests a linear association. [S-ID6c] |
| **Unit Essential Questions** | Big Idea – Functions<br>What are the characteristics of quadratic functions?<br>Students will graph quadratic functions on the coordinate plane.<br>Students will use the discriminant of a quadratic equation to analyze the number of times a function crosses the x-axis.<br>Big Idea – Solving Equations and Inequalities<br>How can you solve a quadratic equation?<br>Students will solve quadratic equations by graphing.<br>Students will solve quadratic equations by factoring.<br>Students will solve quadratic equations by completing the square.<br>Students will solve quadratic equations by using the quadratic formula.<br>Big Idea – Modeling<br>How can you use functions to model real-world situations?<br>Students will use quadratic functions that represent real-world situations.<br>Students will decide if linear, quadratic, or exponential functions appropriately model a set of data. |
| **Unit Essential Vocabulary** | 1. axis of symmetry<br>2. completing the square<br>3. discriminant<br>4. maximum<br>5. minimum<br>6. parabola<br>7. quadratic equation<br>8. quadratic formula<br>9. quadratic function<br>10. root of an equation<br>11. vertex<br>12. zero of a function |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

# Jasper City Schools Curriculum Map

## ALGEBRA I

**Course Name: Algebra 1**

**Unit Name: Chapter 10: Radical Expressions and Equations**

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| **Time Frame:** | **February** |
| **Unit Standards** | 13.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]<br>16.) 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. [A-REI1]<br>31.) Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7]<br>a. Graph linear and quadratic functions, and show intercepts, maxima, and minima. [F-IF7a]<br>b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b] |
| **Unit Essential Questions** | Big Idea – Equivalence<br>How are radical expressions represented?<br>Students will add, subtract, multiply and divide with radicals.<br>Students will rationalize the denominators of radical expressions.<br>Big Idea – Function<br>What are the characteristics of square root functions?<br>Students will draw graphs to examine square root functions.<br>Students will estimate values of square roots.<br>Big Idea – Solving Equations and Inequalities<br>How can you solve a radical equation?<br>Students will use inverse operations to solve equations. |
| **Unit Essential Vocabulary** | 1. conditional<br>2. conjugates<br>3. extraneous solution<br>4. hypotenuse<br>5. like radicals<br>6. Pythagorean Theorem<br>7. radical expression<br>8. square root function<br>9. trigonometric ratios<br>10. angle of depression<br>11. angle of elevation<br>12. conclusion<br>13. converse<br>14. cosine<br>15. hypothesis<br>16. leg<br>17. radical equation<br>18. rationalize the denominator<br>19. sine<br>20. tangent<br>21. unlike radicals |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

**Jasper City Schools Curriculum Map**

**ALGEBRA I**

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| **Course Name: Algebra 1** | |
| **Unit Name:** Chapter 11: Rational Expressions and Functions | |
| **Time Frame:** | **March** |
| **Unit Standards** | 10.) Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. [A-APR1]<br>11.) (+) 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. [A-APR7]<br>12.) 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.* [A-CED1]<br>13.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]<br>16.) 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. [A-REI1]<br>26.) Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. [F-IF2]<br>28.) 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.** [F-IF4]<br>29.) Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5]<br>Example: If the function $h(n)$ gives the number of person-hours it takes to assemble $n$ engines in a factory, then the positive integers would be an appropriate domain for the function. |
| **Unit Essential Questions** | Big Idea – Equivalence<br>How are rational expressions represented?<br>Students will graph rational expressions.<br>Students will simplify rational expressions.<br>Big Idea – Function<br>What are characteristics of rational functions?<br>Graphing will be used to show rational functions.<br>Students will add, subtract, multiply, and divide rational expressions.<br>The concept of inverse variation will be explored.<br>Big Idea – Solving Equations and Inequalities<br>How can you solve a rational equation?<br>Students will use inverse operations to solve a rational equation.<br>Students will identify extraneous solutions. |
| **Unit Essential Vocabulary** | 1. asymptote<br>2. constant of variation (inverse)<br>3. excluded value<br>4. inverse variation<br>5. rational equation<br>6. rational expression<br>7. rational function |

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| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |

# Jasper City Schools Curriculum Map

## ALGEBRA I

**Course Name:** Algebra 1

**Unit Name:** Chapter 12: Data Analysis and Probability

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| **Time Frame:** | **April** |
| **Unit Standards** | 4.) Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. [N-Q1]<br>5.) Define appropriate quantities for the purpose of descriptive modeling. [N-Q2]<br>41.) Represent data with plots on the real number line (dot plots, histograms, and box plots). [S-ID1]<br>42.) Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. [S-ID2]<br>43.) Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). [S-ID3]<br>44.) Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. [S-ID5]<br>47.) 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. [S-CP2] |
| **Unit Essential Questions** | Big Idea – Data Collection and Analysis<br>How can collecting and analyzing data help you make decisions or predictions?<br>Students will find measures of central tendency.<br>Students will examine samples and conduct surveys.<br>Students will make predictions based on the data they collect and observe.<br>Big Idea – Data Representation<br>How can you make and interpret different representations of data?<br>Students will organize data in displays such as matrices, frequency tables, histograms, and box-and-whisker plots.<br>Students will describe a data set by using measures of central tendency.<br>Big Idea – Probability<br>How is probability related to real-world events?<br>Theoretical and experimental probabilities will be compared.<br>Students will find probabilities of simple events and compound events. |
| **Unit Essential Vocabulary** | 1. bias<br>2. bivariate<br>3. box-and-whisker plot<br>4. combination<br>5. complement of an event<br>6. compound events<br>7. dependent events<br>8. element<br>9. frequency<br>10. histogram<br>11. independent events<br>12. interquartile range<br>13. matrix<br>14. measure of central tendency<br>15. outcome<br>16. outlier<br>17. overlapping events<br>18. percentile<br>19. permutation<br>20. population<br>21. probability<br>22. qualitative<br>23. quantitative<br>24. quartile<br>25. range<br>26. sample<br>27. scalar multiplication<br>28. univariate |
| **Resources** | Student Edition Text<br>Practice and Problem Solving Workbook<br>Teacher Edition Text<br>Online Teacher Resources |
| **Assessment(s)** | Exit Passes<br>Homework Assignments<br>Formative Quizzes<br>End of Unit Test |