



HUDSONVILLE HIGH SCHOOL COURSE FRAMEWORK



Course: Algebra 2 Concepts- A

KEY COURSE OBJECTIVES/ENDURING UNDERSTANDINGS (Important ideas and core processes)	OVERARCHING/ESSENTIAL SKILLS OR QUESTIONS (ideas/skills that transcend discipline-specific learning)
<p>Linear Functions</p> <p>Solving Systems of Linear Equations</p> <p>Quadratic Functions</p> <p>Solving Quadratic Functions and Complex Numbers</p> <p>Polynomials</p>	<p>Make sense of problems and persevere in solving them.</p> <p>Reason abstractly and quantitatively.</p> <p>Construct viable arguments and critique the reasoning of others.</p> <p>Model with mathematics.</p> <p>Use appropriate tools strategically.</p> <p>Attend to precision.</p> <p>Look for and make use of structure.</p> <p>Look for and express regularity in repeated reasoning.</p>

UNIT 1 (pacing= 2 days per lesson)	LESSON #	STANDARD (Which standards does this address?)	UNIT LEARNING TARGETS (By the end of the unit, students will be able to. . .)	EXAMPLES	KEY CONCEPTS
Standard Form for Linear Functions	1.1	CCSS.MATH.CONTENT. HSF.IF.B.6 CCSS.MATH.CONTENT. HSF.IF.C.7.A CCSS.MATH.CONTENT. HSF.LE.A.1.A CCSS.MATH.CONT ENT.HSF.LE.A.1.B CCSS.MATH.CONT ENT.HSF.LE.A.1.C	1.1a I can graph equations of horizontal and vertical lines 1.1b I can explain the difference between x and y intercepts. 1.1c I can graph linear equations in standard form using intercepts.	1.Determine what special type of line the follow are, then graph them. a. $x = 3$ 2. Decide whether or not the following equations are written in standard form. If yes, find the x and y intercepts for its graph. a. $3x + 4y = 12$ 3.Find the X and Y intercepts for the following linear functions. Then use the intercepts to graph them. a. $2x + 6y = 12$	Graphing and interpreting linear functions
Slope of Linear Functions	1.2	CCSS.MATH.CONTENT. HSF.IF.B.6 CCSS.MATH.CONTENT. HSS.ID.C.7 CCSS.MATH.CONTENT. HSF.IF.C.7.A CCSS.MATH.CONTENT. HSE.LE.A.1.A CCSS.MATH.CONT ENT.HSF.LE.A.1.B CCSS.MATH.CONT ENT.HSF.LE.A.1.C	1.2a I can characterize the slope of a line 1.2b I can find the slope of a line from a graph 1.2c I can find the slope of a line from a table 1.2d I can calculate the slope from two points	1. Describe the Slope of the line, and then find it from it's graph. 2.Find the slope of the linear function from it's table. 3.Find the slope of the linear function from two points. (4, 0) and (0, 3)	Graphing and interpreting linear functions

<p>Slope Intercept Form of Linear Functions</p>	<p>1.3</p>	<p>CCSS.MATH.CONTENT.HSF.IF.B.6 CCSS.MATH.CONTENT.HSF.IF.C.7.A CCSS.MATH.CONTENT.HSF.LE.A.1.A</p> <p>CCSS.MATH.CONTENT.HSF.LE.A.1.B CCSS.MATH.CONTENT.HSF.LE.A.1.C CCSS.MATH.CONTENT.HSS.ID.C.7</p>	<p>1.3a I can explain what m represents in the formula $y = mx + b$</p> <p>1.3b I can explain what b represents in the formula $y = mx + b$</p> <p>1.3c I can use slope intercept form to graph a linear function</p>	<p>1. Write an equation of a line in <u>slope-intercept form</u> with a given slope and y-intercept. <i>slope : -3 y - intercept : (0, -2)</i></p> <p>2. Use a graph of a linear function to write an equation for the line in <u>slope-intercept form</u>.</p> <p>3.Write an equation for a line in <u>slope-intercept form</u> given points. <i>(4, 0) and (0, 3)</i></p>	<p>Graphing and interpreting linear functions</p>												
<p>Point-Slope Form of Linear Functions</p>	<p>1.4</p>	<p>CCSS.MATH.CONTENT.HSF.IF.B.6 CCSS.MATH.CONTENT.HSF.IF.C.7.A CCSS.MATH.CONTENT.HSF.LE.A.1.A</p> <p>CCSS.MATH.CONTENT.HSF.LE.A.1.B CCSS.MATH.CONTENT.HSF.LE.A.1.C CCSS.MATH.CONTENT.HSS.ID.C.7</p>	<p>1.4a I can explain what y_1 and x_1 represent in the equation $y - y_1 = m(x - x_1)$</p> <p>1.4b I can explain what m represents in the equation $y - y_1 = m(x - x_1)$</p> <p>1.4c I can write an equation for a line in point slope form using 2 given points</p> <p>1.4d I can write an equation for a line in point slope form using a graph</p>	<p>1. Write an equation in <u>point-slope</u> form of the line that passes through the given point and has the given slope. <i>m = 4 passes through (0, 2)</i></p> <p>2. Write an equation in <u>point-slope</u> form of the graph of a line shown.</p> <p>3.Write an equation in <u>point-slope</u> form of the line that passes through 2 given points. <i>(7, 2) (2, 12)</i></p> <p>4.Graph the linear function from an equation in Point-Slope form. <i>y - 5 = -1(x - 3)</i></p>	<p>Graphing and interpreting linear functions</p>												
<p>Modeling with Linear Functions</p>	<p>1.5</p>	<p>CCSS.MATH.CONTENT.HSF.IF.B.6 CCSS.MATH.CONTENT.HSS.ID.B.6.A</p>	<p>1.5a I can determine whether a table follows a linear pattern or not</p> <p>1.5b I can write an equation for a line of fit for a given data</p>	<p>Example 2: Determine if the table represents a linear function.</p> <table border="1"> <tbody> <tr> <td>Months, x</td> <td>9</td> <td>13</td> <td>18</td> <td>22</td> <td>23</td> </tr> <tr> <td>Hair length (in.), y</td> <td>3</td> <td>5</td> <td>7</td> <td>10</td> <td>11</td> </tr> </tbody> </table>	Months, x	9	13	18	22	23	Hair length (in.), y	3	5	7	10	11	<p>Modeling with mathematics</p>
Months, x	9	13	18	22	23												
Hair length (in.), y	3	5	7	10	11												

		<p>CCSS.MATH.CONTENT. HSS.ID.C.7</p> <p>CCSS.MATH.CONTENT. HSS.ID.C.8</p>	<p>set</p> <p>1.5c I can use my calculator to get lines of best fit</p>	<p>Example 3: Use your calculator to get an equation for the line of best fit.</p>	
--	--	---	--	--	--

UNIT 2 (pacing= 2 days per lesson)	LESSON #	STANDARD (Which standards does this address?)	UNIT LEARNING TARGETS (By the end of the unit, students will be able to. . .)	EXAMPLES	KEY CONCEPTS
Systems of Linear Equations	2.1	<p>CCSS.MATH.CONTENT. HSA.REI.C.5</p> <p>CCSS.MATH.CONTENT. HSA.REI.C.6</p>	<p>2.1a I can check solutions of systems of linear equations.</p> <p>2.1b I can solve systems of linear equations by graphing.</p>	<p>1. Tell whether the ordered pair is a solution of the system of linear equations. $(2, 5)$</p> $x + y = 7$ $2x - 3y = -11$ <p>2. Use the graph to solve the system of linear equations. Then check your solution.</p> $x + y = 5$ $y - 2x = -4$	Solving systems of equations
Solving Systems of Linear Equations By Substitution and Elimination	2.2	<p>CCSS.MATH.CONTENT. HSA.REI.C.6</p>	<p>2.2a I can solve systems of linear equations by substitution</p> <p>2.2b I can solve systems of linear equations by elimination</p>	<p>1. Solve the following systems of linear equations by substitution.</p> $y = -2x - 9$ $6x - 7y = -19$ <p>2. Solve the following systems of linear equations by elimination.</p>	Solving systems of equations

				$3x + 2y = 4$ $3x - 2y = -4$	
Real World Examples of Systems	2.3	CCSS.MATH.CONTENT. HSA.REI.C.6	2.3a I can write systems to represent real life situations	 <p>Solving Real-Life Problems EXAMPLE 3 Modeling with Mathematics</p> <p>A business with two locations buys seven large delivery vans and five small delivery vans. Location A receives five large vans and two small vans for a total cost of \$235,000. Location B receives two large vans and three small vans for a total cost of \$160,000. What is the cost of each type of van?</p>	Modeling with mathematics
Systems of Linear Inequalities	2.4	CCSS.MATH.CONTENT. HSA.REI.B.3 CCSS.MATH.CONTENT. HSA.CED.A.1 CCSS.MATH.CONTENT. HSA.CED.A.2 CCSS.MATH.CONTENT. HSA.CED.A.3 CCSS.MATH.CONTENT. HSA.REI.D.12	2.4a I can graph linear inequalities in two variables. 2.4b I can graph systems of linear inequalities. 2.4c I can write systems of linear inequalities.	<p>1. Tell whether the ordered pair is a solution of the inequality. $2x + y < -3$ $(-1, 9)$</p> <p>2. Graph $-x + 2y > 2$ in a coordinate plane.</p> <p>3. Graph the system of linear inequalities. $y \leq 3$ $y > x + 2$</p>	Solving systems of inequalities

UNIT 3 (pacing= 2 days per lesson)	LESSON #	STANDARD (Which standards does this address?)	UNIT LEARNING TARGETS (By the end of the unit, students will be able to. . .)	EXAMPLES	KEY CONCEPTS
Transformations of Quadratic Functions	3.1	CCSS.MATH.CONTENT. HSF.BF.B.3	<p>3.1a I can describe a transformation of a quadratic function from its graph</p> <p>3.1b I can describe a transformation of a quadratic function from its equation</p> <p>3.1c write equations to represent a transformation on a quadratic function</p>	<p>1. Describe the transformation of $f(x) = x^2$ represented by $g(x) = (x + 4)^2 - 1$.</p> <p>2. Let the graph of $g(x)$ be a vertical stretch by a factor of 2 and a reflection over the x-axis, followed by a translation 3 units down of the graph of $f(x) = x^2$. Write an equation for $g(x)$.</p>	Transformations on graphs of functions
Characteristics of Quadratics	3.2	<p>CCSS.MATH.CONTENT. HSF.IF.B.6</p> <p>CCSS.MATH.CONTENT. HSF.IF.C.7</p> <p>CCSS.MATH.CONTENT. HSF.IF.C.7.A</p>	<p>3.2a I can label the axis of symmetry of a parabola</p> <p>3.2b I can label the vertex of a parabola</p> <p>3.2c I can determine if the vertex is a max or min.</p> <p>3.2d find the max/min value for a quadratic function</p> <p>3.2e Find x-intercepts</p> <p>3.2f I can identify the 3</p>	<p>EXAMPLE 1 Using Symmetry to Graph Quadratic Function Graph $f(x) = -2(x + 3)^2 + 4$. Label the vertex and axis of symmetry.</p> <p>EXAMPLE 2 Graphing a Quadratic Function in Standard Form Graph $f(x) = 3x^2 - 6x + 1$. Label the vertex and axis of symmetry.</p> <p>EXAMPLE 4 Graphing a Quadratic Function in Intercept Form Graph $f(x) = -2(x + 3)(x - 1)$. Label the x-intercepts, vertex, and axis of symmetry.</p>	Graphing and analyzing Quadratic functions

			different forms of quadratic equations																								
Modeling with Quadratics	3.3	CCSS.MATH.CONTENT. HSF.IF.B.6 CCSS.MATH.CONTENT. HSS.ID.B.6.A	<p>3.3a I can write an equation for a quadratic in vertex form</p> <p>3.3b I can write an equation for a quadratic in intercept form</p> <p>3.3c I can use finite differences to determine if something is quadratic or not</p> <p>3.3d I can use quadratic regression to get a model of the data</p>	<p>1. Write an equation for a parabola with the following information: Vertex: (2, 3) point: (0, 1)</p> <p>2. Write an equation for a parabola with the following information: X-intercepts: (2,0) and (6, 0) point: (0,3)</p> <p>3.</p> <div> <table border="1"> <thead> <tr> <th>Miles per hour, x</th> <th>Miles per gallon, y</th> </tr> </thead> <tbody> <tr><td>20</td><td>14.5</td></tr> <tr><td>24</td><td>17.5</td></tr> <tr><td>30</td><td>21.2</td></tr> <tr><td>36</td><td>23.7</td></tr> <tr><td>40</td><td>25.2</td></tr> <tr><td>45</td><td>25.8</td></tr> <tr><td>50</td><td>25.8</td></tr> <tr><td>56</td><td>25.1</td></tr> <tr><td>60</td><td>24.0</td></tr> <tr><td>70</td><td>19.5</td></tr> </tbody> </table> <p>EXAMPLE 4 Using Quadratic Regression</p> <p>The table shows fuel efficiencies of a vehicle at different speeds. Write a function that models the data. Use the model to approximate the optimal driving speed.</p> </div>	Miles per hour, x	Miles per gallon, y	20	14.5	24	17.5	30	21.2	36	23.7	40	25.2	45	25.8	50	25.8	56	25.1	60	24.0	70	19.5	Modeling with mathematics
Miles per hour, x	Miles per gallon, y																										
20	14.5																										
24	17.5																										
30	21.2																										
36	23.7																										
40	25.2																										
45	25.8																										
50	25.8																										
56	25.1																										
60	24.0																										
70	19.5																										

UNIT 4 (pacing= 2 days per lesson)	LESSON #	STANDARD (Which standards does this address?)	UNIT LEARNING TARGETS (By the end of the unit, students will be able to. . .)	EXAMPLES	KEY CONCEPTS
Solving Quadratic Equations (graphing and factoring)	4.1	CCSS.MATH.CONTENT. HSA.REI.B.4 CCSS.MATH.CONTENT. HSF.IF.C.8.A	4.1a I know what to look for when they ask me to solve a quadratic 4.1b I can solve a quadratic from looking at its graph 4.1c I can solve a quadratic by factoring	1.Solve by factoring: $x^2 + 6x + 9$ 2.Solve by Graphing: $x^2 + 5x - 45$	Solving quadratic equations
Imaginary and Complex Numbers	4.2	CCSS.MATH.CONTENT. HSA.REI.B.4 CCSS.MATH.CONTENT. HSA.REI.B.4.B CCSS.MATH.CONTENT. HSF.IF.C.8.A CCSS.MATH.CONTENT. HSN.CN.A.1 CCSS.MATH.CONTENT. HSN.CN.A.2 CCSS.MATH.CONTENT. HSN.CN.B.5 CCSS.MATH.CONTENT.	4.2a I can describe what the imaginary unit is. 4.2b I can use i to simplify negative square roots 4.2c I can write a complex number 4.2d I can add complex numbers 4.2e I can subtract two complex numbers 4.2f I can multiply two complex numbers 4.2g I can find complex solutions to quadratic equations	1.Add. $(5 + 3i) + (-2 + 4i)$ 2.Subtract. $(5 + 2i) - (4 + 2i)$ 3.Multiply. $(5 + 2i)(3 + 4i)$	Operations with complex numbers

		HSN.CN.C.7			
Solving with Square Roots and Completing the Square	4.3	CCSS.MATH.CONTENT. HSA.REI.B.4 CCSS.MATH.CONTENT. HSA.REI.B.4.A CCSS.MATH.CONTENT. HSA.REI.B.4.B CCSS.MATH.CONTENT. HSF.IF.C.8.A	4.3a I can write equations in vertex form if given the vertex 4.3b I can solve quadratics by using square roots 4.3c I can solve quadratics by completing the square	1.Solve by completing the square: $x^2 + 4x + 7 = 0$ 2.Solve by using Square roots: $3x^2 + 4 = 31$	Solving quadratic equations
Using the Quadratic Formula	4.4	CCSS.MATH.CONTENT. HSA.REI.B.4 CCSS.MATH.CONTENT. HSA.REI.B.4.B CCSS.MATH.CONTENT. HSF.IF.C.8.A	4.4a I can solve quadratics using the quadratic formula 4.4b I can determine the number of solutions for a quadratic 4.4c I can describe the discriminant and what it tells me about the parabola	1.Solve with the quadratic formula. $y = x^2 + 3x = 5$ 2. Find the discriminant to determine the number of real zeros for the quadratic function $y = x^2 + 3x = 5$	Solving quadratic equations
Systems of Nonlinear Equations	4.5	CCSS.MATH.CONTENT. HSA.REI.C.6 CCSS.MATH.CONTENT. HSA.REI.C.7	4.5a I can solve systems of nonlinear equations by graphing	1. Draw a picture of a system of 2 parabolas with 2 solutions.	Solving systems of equations
Quadratic Inequalities	4.6	CCSS.MATH.CONTENT. HSA.CED.A.1 CCSS.MATH.CONTENT. HSA.CED.A.2 CCSS.MATH.CONTENT. HSA.CED.A.3	4.6a I can determine if the graph of quadratic inequality is solid or dashed 4.6b I can decide which side of the graph to shade for quadratic inequalities	Graph $y > x^2 + 2x + 3$	Solving systems of inequalities

UNIT 5 (pacing= 2 days per lesson)	LESSON #	STANDARD (Which standards does this address?)	UNIT LEARNING TARGETS (By the end of the unit, students will be able to . . .)	EXAMPLES	KEY CONCEPTS
Naming and Graphing Polynomial Functions	5.1	CCSS.MATH.CONTENT. HSF.IF.C.7.C	5.1a I can identify and name polynomials from their equations 5.1b I can identify and name polynomials from their graphs 5.1c I can graph polynomial functions 5.1d I can describe what end behavior of a graph is 5.1e I can determine the end behavior of polynomial 5.1f I can determine the leading coefficient of a polynomial 5.1g I can determine the degree of a polynomial	1. Determine if the following is a polynomial or not. If yes, answer the following questions as well. $x^3 - 2x^2 + 4x^4 - 2 + x$ Write this in standard form. What is the degree. What is the name? What is the leading coefficient? What does it's graph look like? What is the end behavior?	Graphing and analyzing polynomial functions
Adding, Subtracting, and Multiplying Polynomials	5.2	CCSS.MATH.CONTENT. HSA.APR.A.1	5.2a I can add two polynomials 5.2b I can subtract two polynomials 5.2c I can multiply polynomials	1. Add the polynomials: $(3x - 3x^2 + 2 - 7x^4) + (2x - 1x^2 + 2)$ 2. Subtract the polynomials: $(3x - 3x^2 + 2 - 7x^4) - (2x - 1x^2 + 2)$ 3. Multiply the polynomials: $(3x^2 + 2x - 7)(2x - 1x^2 + 3)$	Operations with polynomials
Dividing Polynomials	5.3	CCSS.MATH.CONTENT. HSA.APR.A.1	5.3a divide Polynomials with Synthetic Division	1. Divide the following: $(x^2 + x + 12) \div (x - 5)$	Operations with polynomials

<p>Solving Polynomial Equations</p>	<p>5.4</p>	<p>CCSS.MATH.CONTENT. HSA.APR.B.2</p>	<p>5.4a I can find zeros of polynomial functions by graphing 5.4b I can determine the number of real solutions a polynomial equation has 5.4c I can determine the number of complex solutions a polynomial equation has</p>	<p>Find all real zeros of $f(x) = 10x^4 - 11x^3 - 42x^2 + 7x + 12$</p>	<p>Solving polynomial equations</p>																
<p>Modeling with Polynomial Functions</p>	<p>5.5</p>	<p>CCSS.MATH.CONTENT. HSS.ID.B.6.A</p>	<p>5.5a I can Use finite differences to determine what type of polynomial represents the data 5.5b Explain what regression gives you 5.5c Use technology to find models for data sets</p>	<p>EXAMPLE 2 Writing a Function Using Finite Differences</p> <p>Use finite differences to determine the degree of the polynomial function that fits the data. Then use technology to find the polynomial function.</p> <table border="1"> <tbody> <tr> <td>x</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>f(x)</td> <td>1</td> <td>4</td> <td>10</td> <td>20</td> <td>35</td> <td>56</td> <td>84</td> </tr> </tbody> </table>	x	1	2	3	4	5	6	7	f(x)	1	4	10	20	35	56	84	<p>Modeling with mathematics</p>
x	1	2	3	4	5	6	7														
f(x)	1	4	10	20	35	56	84														