

# HUDSONVILLE HIGH SCHOOL COURSE FRAMEWORK



**COURSE / SUBJECT**

**Algebra 1B**

<b>KEY COURSE OBJECTIVES/ENDURING UNDERSTANDINGS</b>	<b>OVERARCHING/ESSENTIAL SKILLS OR QUESTIONS</b>
<p><b>FACTORING POLYNOMIALS</b></p> <p><b>QUADRATIC FUNCTIONS AND EQUATIONS</b></p> <p><b>DATA ANALYSIS AND PROBABILITY</b></p> <p><b>EXPONENTIAL AND RADICAL FUNCTIONS</b></p> <p><b>RATIONAL FUNCTIONS AND EQUATIONS</b></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>

CHAPTER PACING	LESSON NUMBER	STANDARD	UNIT LEARNING TARGETS	EXAMPLE	KEY CONCEPTS
Factoring Polynomials	8.1	ASSE1a	...write the prime factorization of numbers ...find the GCF (Greatest Common Factor) of monomials	<b><math>98 = 2 \cdot 7^2</math></b> <b><math>15x^3</math> and <math>9x^2</math></b> The GCF is: $3x^2$	list all the factors, find the GREATEST common factor
	8.2	ASSE1a ASSE2	...factor polynomials by using the GCF ...factor by grouping	<b><math>8x^3 - 4x^2 - 16x = 4x(2x^2 - x - 4)</math></b> <b><math>6h^4 - 4h^3 + 12h - 8 = (3h - 2)(2h^3 + 4)</math></b>	factor by: "taking something out" (check answer by using distributive property)
	8.3	ASSE2	...factor quadratics when a=1 <b><math>x^2 + bx + c</math></b>	<b><math>x^2 + 8x + 12 = (x + 2)(x + 6)</math></b>	"What multiplies to be c, and adds to be b"
	8.4	ASSE2	...factor quadratics when a ≠ 1 <b><math>ax^2 + bx + c</math></b>	<b><math>5x^2 + 17x + 6 = (5x + 2)(x + 3)</math></b>	strategies to reverse FOIL
	8.5	ASSE2	...factor by using special products	<b><math>9x^2 - 144y^2 = (3x + 12y)(3x - 12y)</math></b> <b><math>x^2 - 14x + 49 = (x - 7)^2</math></b>	recognize and factor Perfect Square Trinomials and Difference of Two Squares
	8.6	ASSE2	...choose the appropriate method for factoring a polynomial		first step always, "Can I take something out?" Then "Is it special?" Then "reverse FOIL"

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Quadratic Functions and Equations	9.1	FIF4 I	...Identify quadratic functions ...determine whether they have a minimum or maximum	$f(x) = -4x^2 - x + 1$ opens up or down? max or min? Domain? Range?	shape is a parabola, Domain and Range, finding 2nd differences, does it have an $x^2$
	9.2 AND 9.3	ASSE3a FIF4 I FIF8a NQ11 ACED2 FIF7a FIF8a	...find the zero's of a quadratic from its graph ...find the axis of symmetry ...find the vertex of a parabola ...graph a quadratic function in the form: $ax^2 + bx + c$ ...can choose & understand the scales for graphic displays ...do all of the above in a real-life situation	$y = 0.25x^2 + 2x + 3$ find the vertex find the Axis of symmetry  $y = x^2 - 2x - 3$  find the zero's	understand that zero's are x-intercepts, use technology to adjust window and find vertex, write the axis of symmetry in the form of a line ex: $x=1$
	9.4	FBF3	...graph and transform (translate, scale change and reflect) quadratic functions	take the parent function and make it open down, slide 2 to the right and 3 down, make it wider	how the value of a impacts the width of a quadratic. Sliding quadratic up/down/left/right
	9.5	ASSE3a ACED3	...solve quadratic equations by graphing	solve: $x^2 + 2x = 8$  answer: -4,2	understand that solving means: find the zero's

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	9.6	ASSE1a ASSE1b ASSE3a ACED3 AREI4b FIF8a	<p>...use factoring to interpret meaning in real world problems.</p> <p>...view quadratic functions as multiple factors</p> <p>...identify the zeros of a quadratic function algebraically.</p> <p>...determine if a solution to a quadratic equation is appropriate in the given situation.</p> <p>... solve a quadratic equation by factoring</p>	<p>The height of a rocket launched upward from a 160 foot cliff is modeled by the function <math>h(t) = -16t^2 + 48t + 160</math>, where <math>h</math> is height in feet and <math>t</math> is time in seconds. Find the time it takes the rocket to reach the ground at the bottom of the cliff.</p>	factor to find zero's
	9.7	ACED1 AREI4b	<p>...create quadratic equations in one variable and solve.</p> <p>...solve a quadratic equation by taking the square root</p>	<p><b><math>-3x^2 + 90 = 0</math></b></p> <p><math>x \approx \pm 5.48</math></p>	solve quadratics when b=0

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	9.8	ASSE3b AREI4a AREI4b FIF8a	...identify maximum and minimum values by completing the square. ...solve quadratic equations by completing the square ...solve a quadratic equation by completing the square	<b><math>t^2 - 8t - 5 = 0</math></b> answer: $t = 4 + \sqrt{21}$ or $t = 4 - \sqrt{21}$	take half of "b" and square it
	9.9	ACED3 AREI4b	...determine if a solution to a quadratic equation is appropriate in the given situation. ...solve a quadratic equation using the quadratic formula	<b>Solve using the quadratic equation:</b> <b><math>-3x^2 + 5x = -2</math></b>	memorize the quadratic formula, understand the discriminant
	10.1	SID1	...read, interpret choose an appropriate table or graph to display data	Use the given data to make a graph. Explain why you choose that type of graph	Organize data in tables and graphs
	10.2	SID1	..create stem and leaf plot. ..create frequency table and histogram.	Create a stem and leaf plot from the following data: 2, 12, 4, 8, 5, 8, 11, 3, 6, 9, 8.	Frequency, frequency table, histogram, cumulative frequency table.
	10.3	SID1 SID2	..describe the central tendency of a data set. ..create a box and whisker plot.	Make a box and whisker plot of the following data: 25, 17, 14, 27, 20, 11, 29, 32.	Mean, median, Mode, Outliers, Range, quartiles, and IQR

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	10.4		<p>..recognize misleading graphs.            ..recognize misleading statistics.</p>	<p>A researcher asks 5 people if they like to snow ski. Four people respond yes. Explain why the following statement is misleading "80% of people like to snow ski."</p>	<p>Random Sample, purpose of misleading graphs, reason for misleading graphs.</p>
	10.5		<p>..determine the experimental probability of an event.            ..use experimental probability to make predictions.</p>	<p>Identify the sample space and the probability of flipping two pennies and getting both tails.</p>	<p>Experiment, trial, outcome, sample space, event and probability.</p>
	10.6		<p>..determine the theoretical probability of an event.            ..convert between probability and odds.</p>	<p>Find the theoretical probability of randomly selecting B from the letters ALGEBRA.</p>	<p>Theoretical talks about "What will happen?" We do this to predict what will happen.</p>
	10.7		<p>..find the probability of independent events.            ..find the probability of dependent events.</p>	<p>A number cube is rolled two times. What is the probability of rolling an even number first and then a number less than 3?</p>	<p>Use fractions, percents or decimals to represent probability. Remember: part/whole.</p>
	10.8		<p>..solve problems involving permutations.            ..solve problems involving combinations.</p>	<p>Tell whether the following situations are combinations and permutations. Then give the number of outcomes.  <b>When ordering pizza you can choose 2 toppings out of 8 possible. How many types pizzas can you order?</b></p>	<p>For permutation order matters. Also talk about Fundamental Counting Principle for passwords.</p>

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<b>EXPONENTIAL AND RADICAL FUNCTIONS</b>	11.1	<b>FBF2</b>	..recognize and extend geometric sequences. ..find the nth term of a geometric sequence.	What is the 15th term of the sequence 4, -8, 16, -32, 64,..?	Write and find the nth term of a geometric sequence explicitly.
	11.2	<b>FIF73 FLE1C FLE5 ACED2</b>	..evaluate exponential functions. ..identify and graph exponential functions.	Tell whether the set is an exponential function and explain {(0,0),(1,2),(2,-16),(3,-54)} Graph $y = -0.5(3)^x$ . The function $y = 11.6(1.009)^x$ models the energy use in BTU's where x is the number of years after 2003. What is the energy usage in 2013?	Graph exponential functions and identify intercept and end behavior. Recognize exponential situations. Identify and explain the components of an exponential function.
	11.3	<b>FLE2 ASSE1b ACED1 FIF8b FLE5</b>	..solve problems involving exponential decay and growth.	<b>Write and exponential function and solve the following situation.</b> You invest \$12,000 at a rate of 6% for 15 years.	Construct an exponential function from a description. View compound interest, exponential functions as multiple factors. Create exponential equations in one variable and solve. compare and contrast the differences between growth and decay. Identify and explain the components of an exponential function.

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	11.4	<b>FLE1a</b> <b>FIF4</b> <b>FLE3</b>	<p>..Compare linear, quadratic, and exponential models.</p> <p>..Given a set of data, decide which type of functions models the data and write an equation to describe the function.</p>	<p>Which model best describes the following set of data?  <math>\{(0,200),(1,184),(2,136),(3,56)\}</math></p>	<p>Decide if a table of values represents a linear, quadratic, or exponential functions. Interpret characteristics of quadratic, linear and exponential graphs &amp; tables. Compare linear, quadratic and exponential functions.</p>
	11.5	<b>FIF7b</b>	<p>..identify square-root functions and their domains and ranges.</p> <p>..graph square-roots functions.</p>	<p>Find the domain and graph <math>y = \sqrt{3x-1}</math>.</p>	<p>Graph square-root functions.</p>
	11.6		<p>..simplify radical expressions.</p>	<p>Simplify <math>\sqrt{\frac{27x^3}{48}}</math>.</p>	<p>Simplify the radicand first. Then look for perfect squares to factor out.</p>
	11.7		<p>..add or subtract radical expressions.</p>	<p>Simplify <math>\sqrt{242} - \sqrt{128}</math>.</p>	<p>Only combine terms if they have like radicals.</p>
	11.8		<p>..multiply and divide radical expressions.</p> <p>..rationalize denominators.</p>	<p>Simplify <math>(6 + \sqrt{3})(2 - \sqrt{3})</math></p> <p>Simplify <math>\frac{\sqrt{5}}{\sqrt{6}}</math></p>	<p>Radicands can only be multiplied by radicands. We cannot leave a radical in the denominator.</p>
	11.9		<p>..solve radical equations.</p>	<p>Solve <math>\sqrt{3x+1} - \sqrt{2x+5} = 0</math></p>	<p>Squaring the equation is the inverse of square root. Review and apply PEMDAS.</p>

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<b>RATIONAL FUNCTIONS AND EQUATIONS</b>	12.1	FBF4a	..identify, write, and graph inverse variation.	Write and graph the inverse variation in which $y = 0.25$ and $x = 12$ .	I can find the inverse of a function.
	12.2	Algebra 2 Standard	..identify excluded values of rational functions. ..graph rational functions.	Identify the excluded values, asymptotes and graph $y = \frac{12}{x}$ .	Excluded values are the asymptotes on the graph. Begin graphing with the asymptotes.
	12.3	Algebra 2 Standard	..simplify rational expressions. ..identify excluded values of rational expressions.	Simply and find the excluded value for $\frac{5t^3}{10t^2 + 15t}$ .	Use the original denominator to find the excluded value. Factor the numerator and denominator in order to simplify.
	12.4	Algebra 2	..multiply and divide rational expressions.	Multiply $\frac{b-2}{3} \cdot \frac{12}{2b-4}$ . Divide $\frac{3}{b} \div \frac{b+1}{2b}$ .	Reinforce the principles of multiplying fractions. Also reinforce the principles of simplifying the solutions.
	12.5	Algebra 2 Standard	..add and subtract rational expressions with like denominator. ..add and subtract rational expressions with unlike denominator.	Solve $\frac{7}{h-5} - \frac{4}{5-h}$ .	Rationals can only be added or subtracted if there is a common denominator. Use the LCD of the denominators.

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	12.6	Algebra 2 Standard	..divide polynomials by a monomial or binomial.	Divide $(x^2 + 4x + 7) \div (x + 1)$	Long division and synthetic divisions processes will be used to find a solution.
	12.7	Algebra 2 Standard	..solve rational equations. ..identify extraneous solutions.	Solve and identify any extraneous solution: $\frac{3}{4x} + \frac{2}{x+6} = \frac{5}{8}$	For proportions, use cross multiplying. Use the LCD to eliminate the denominators but use the original denominators for extraneous solutions.