

# Hamburg Area School District Course Guide

Name:	Algebra 2 PS
Grade(s):	9-10
Length:	Place an X next to the correct option
х	Full-Year (182 Sessions)
	Semester (90 Sessions)
	Quarter (45 Sessions)
	Other (Specify):
Text:	Algebra 2; McDougal Littell; 2007; Larson, Boswell, Kanold, Stiff
Approved on:	2/24/20

### Description:

This course is designed for students who intend to pursue the higher-level mathematics courses. Throughout this course students will study solving systems of equations and inequalities (2x2 and 3x3), manipulating complex matrices and determinants, graphing and solving polynomial equations, simplifying polynomials and rational exponents, solving and graphing radical equations, simplifying rational expressions and solving rational equations.

Unit: <u>Literal and Absolute Value Equations</u>

Unit Length: <u>1.5 weeks</u>

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How can linear functions be used in real-life situations?	Solve an equation for the indicated variable.	CC.2.2.HS.C.4.A2.1.3.2.2	Observation Questioning Discussion Practice worksheet IXL: A1.I.8; A2.C.6; A1.L.1; A1.L.4; A1.L.3 IXL: A2.C.7 (This assessment will address EQ 3.) IXL: A2.B.4 (This assessment will address EQ 4.) Desmos: Polygraph: Absolute Value Quiz (Students will complete application problems that address EQ 1,2.) Unit test
Why does the order of	Rewrite a formula in order to solve for the indicated variable.	CC.2.2.HS.C.4.A2.1.3.2.2	
operations become particularly important in algebra?	Solve an absolute value equation.	CC.2.2.HS.D.7.A1.1.2.1.1	
How do the words "and" and "or" affect the outcome of an	Solve absolute value inequalities.	CC.2.2.HS.D.7.A1.1.3.1.1	
inequality? In what situations is zero or a negative number an inappropriate answer?	Graph absolute value inequalities.	CC.2.2.HS.D.7.A1.1.3.1.1	

Unit: <u>Functions</u> Unit Length: <u>1 week</u>

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How can linear functions be used in real-life situations?	Identify domain and range from various display methods (ordered pairs, graph, etc.).	CC.2.4.HS.C.1.A2.2.1.1.3	Observation Questioning
How are functions used to	Determine if ordered pairs and graphs (vertical line test) represent a function or not.	CC.2.4.HS.C.2.A2.2.1.1.3	Practice worksheet IXL: A2.B.1; A2.D.5;
we live in, and why are they so important?	Write a linear equation given: a point and a slope, two points, a point and a parallel or perpendicular line, a graph.	CC.2.2.HS.C.5.A2.2.1.1.1	A1.DD.2 Desmos: Marbleslides: Lines Desmos: Polygraph: Lines Desmos: Match My Line Desmos: Polygraph: Scatter Plots Quiz Unit test (Students will complete an application problem that addresses EQ 3,5.) Desmos: Graphing Stories (This assessment will address EQ 1,2,4.)
How do functions help us to make the best decision?	Write the equation of a line of best fit given a scatter plot.	CC.2.2.HS.C.5.A2.2.1.1.1	
What are some different kinds of functions, and what sorts of real-world situations can they model? How are scatter plots used in understanding and interpreting real-world data?	Graph absolute value functions.	CC.2.2.HS.D.10	

#### Unit: Systems of Linear Equations and Inequalities

Unit Length: <u>9 weeks</u>

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
What does it mean to solve a system of equations or inequalities?	Graph a system of linear equations and find solution.	CC.2.2.HS.D.10.A1.1.2.2.1	Observation Discussion Questioning
How do we determine the most	Write or identify a system of linear equations given a graph.	CC.2.2.HS.D.10.A1.1.2.2.1	Practice worksheet IXL: A2.E.10; A2.E.2; A2.F.2; A2.G.3; A2.G.4
efficient method for solving a system of equations?	Solve a 2x2 system of equations using the elimination method.	CC.2.2.HS.D.10.A1.1.2.2.1	Desmos: Polygraph: Linear Systems Quiz
How do we know which region on a graph is the solution?	Solve application problems involving 2x2 systems of equations.	CC.2.2.HS.D.10.A1.1.2.2.1	Unit test Desmos: Solutions to Systems of Linear Equations (This assessment will address EQ 1.) Unit Project: Google Sheets (create sheets to solve 2x2 and 3x3 systems)(This assessment will address EQ 2,4.) Desmos: Polygraph: Systems of Linear Inequalities (This assessment will address EQ 3.)
Why would using a matrix to solve a system of equations be useful?	Graph a system of linear inequalities.	CC.2.2.HS.D.10.A1.1.3.2.1	
	Write or identify a system of linear inequalities given a graph.	CC.2.2.HS.D.10.A1.1.3.2.1	
	Solve a 3x3 system of equations using the elimination method.	CC.2.2.HS.D.10.A1.1.2.2.1	
	Add and subtract matrices.	CC.N-VM.8	
	Multiply matrices by a scalar.	CC.N-VM.7	
	Solve for unknown parts of equivalent matrices.	CC.N-VM.6	

Multiply matrices.	CC.N-VM.8	
Evaluate 2x2 determinants.	CC.2.2.HS.D.10	
Solve a 2x2 system of equations using Cramer's Rule.	CC.2.2.HS.D.10	

Unit: <u>Quadratic Functions</u>

Unit Length: <u>7 weeks</u>

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are quadratic functions used to represent/simulate the	Graph parabolas when equation is in standard form.	CC.2.2.HS.D.7.A2.2.2.1.1	Observation Questioning
world we live in, and why are they so important?	Solve application problems using the characteristics of parabolas.	CC.2.2.HS.D.7.A2.2.2.1.1	Discussion Practice worksheet IXL: A2.J.1; A2.J.2; A2.I.1;
How do quadratic functions help us to make the best decision?	Factor the GCF out of a polynomial expression.	CC.2.2.HS.D.5.A2.1.2.2.1	A2.H.6; A1.EE.8; A2.H.4; A2.H.6; A1.AA.5; A1.AA.2 Desmos: Free-Range Functions Desmos: Will It Hit the Hoop? Desmos: Polygraph: Parabolas Desmos: Two Truths and a Lie: Parabolas Quiz Unit test (Students will complete problems that address EQ 5. Students will complete application problems that address EQ 1,2.)
Why do we factor polynomials?	Factor a polynomial in the form x <sup>2</sup> +bx+c.	CC.2.2.HS.D.2.A2.1.2.2.1	
How do we determine the most efficient method for solving a quadratic equation? How do transformations affect the parent function? In what situations is zero or a negative number an inappropriate answer?	Factor a polynomial in the form ax <sup>2</sup> +bx+c.	CC.2.2.HS.D.5.A2.1.2.2.1	
	Solve $x^2$ +bx+c=0 by factoring.	CC.2.2.HS.D.10.A2.1.3.1.1	
	Solve x <sup>2</sup> +bx=0 by factoring.	CC.2.2.HS.D.10.A2.1.3.1.1	
	Solve ax <sup>2</sup> +bx+c=0 by factoring.	CC.2.2.HS.D.10.A2.1.3.1.1	Application problems (These problems will address EQ 3,4,6.)
	Simplify radical expressions with and without variables.	CC.2.1.HS.D.2.A2.1.2.1.2	
	Add and subtract radical expressions.	CC.2.1.HS.D.2.A2.1.2.1.2	

Multiply radical expressions with and without variables.	CC.2.1.HS.D.2.A2.1.2.1.2	
Divide radical expressions (rationalizing with denominator and conjugate of denominator).	CC.2.1.HS.D.2.A2.1.2.1.2	
Solve ax <sup>2</sup> +c=0 by taking square roots (real answers).	CC.2.2.HS.D.10.A2.1.3.1.1	
Simplify radical expressions involving imaginary numbers.	CC.2.1.HS.F.6.A2.1.1.1.1	
Add and subtract expressions involving complex numbers.	CC.2.1.HS.F.6.A2.1.1.2.1	
Multiply expressions involving complex numbers.	CC.2.1.HS.F.6.A2.1.1.2.2	
Divide expressions involving complex numbers (rationalizing with a pure imaginary number and conjugate of denominator).	CC.2.1.HS.F.6.A2.1.1.2.2	
Solve ax <sup>2</sup> +c=0 by taking square roots (complex answers).	CC.2.2.HS.D.10.A2.1.3.1.1	
Solve ax <sup>2</sup> +bx+c=0 by completing the square.	CC.2.2.HS.D.10.A2.1.3.1.1	
Solve ax <sup>2</sup> +bx+c=0 by using the quadratic formula.	CC.2.2.HS.D.10.A2.1.3.1.1	

Solve application problems by solving various types of quadratic equations.	CC.2.2.HS.D.10.A2.1.3.1.1	

Unit: <u>Polynomial Functions</u>

Unit Length: <u>4.5 weeks</u>

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are polynomial functions used to represent/simulate the	Simplify polynomial expressions using laws of exponents.	CC.2.2.HS.D.2.A2.1.2.1.2	Observation Questioning
world we live in, and why are they so important?	Graph polynomial functions.	CC.2.2.HS.D.7.A2.2.2.1.1	Discussion Practice worksheet IXL: A1.V.3; A1.V.5
How do polynomial functions help us to make the best	Add and subtract polynomial expressions.	CC.2.2.HS.D.2.A2.1.2.1.3	IXL: A2.K.14 (This assessment will address EQ 5.)
decision?	Multiply polynomial expressions.	CC.2.2.HS.D.2.A2.1.2.1.3	Desmos: Expressions Mash Up (This assessment will address
polynomials?	Square a binomial using the formula shortcut.	CC.2.2.HS.D.2.A2.1.2.1.3	EQ 4.) Desmos: Polygraph: Polynomials Quiz (Students will complete application problems that address EQ 1,2.) Unit test (Students will complete problems that address EQ 3,6.)
How can functions be represented in multiple ways? How do transformations affect the parent function? How do we find the solutions to a polynomial function algebraically and graphically?	Cube a binomial using the formula shortcut.	CC.2.2.HS.D.2.A2.1.2.1.3	
	Factor and solve polynomial equations in the form: difference of two squares, perfect square trinomials, beyond a GCF, quadratic form, grouping.	CC.2.2.HS.D.5.A2.1.2.2.1	
	Use the Quadratic Formula to solve a polynomial equation after the GCF is factored out.	CC.2.2.HS.D.10.A2.1.3.1.1	
	Divide polynomial expressions using long division.	CC.2.2.HS.C.3.A2.2.2.1.1	

Divide polynomial expressions using synthetic division.	CC.2.2.HS.C.3.A2.2.2.1.1	

Unit: <u>Radical Functions</u>

Unit Length: <u>2.5 weeks</u>

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are radical functions used to represent/simulate the world	Convert rational exponent form to radical form; and vice versa.	CC.2.2.HS.D.2.A2.1.2.1.3	Observation Questioning
we live in, and why are they so important?	Evaluate expressions with rational exponents.	CC.2.2.HS.D.2.A2.1.2.1.3	Discussion Practice worksheet IXL: A1.V.10; A2.M.5;
How do radical functions help us to make the best decision?	Simplify expressions with rational exponents.	CC.2.2.HS.D.2.A2.1.2.1.3	A2.M.6; A2.L.12; A2.L.13 Desmos: Polygraph: Square Root Functions Application problems (Students will complete application problems that address EQ 1,2.) 6.1 / 6.2 Quiz (Students will complete problems that address EQ 3.) Unit test (Students will complete problems that address EQ 4.)
How can we make sense of exponents that are not integers? In what situations is zero or a negative number an inappropriate answer?	Use a calculator to evaluate expressions with rational exponents.	CC.2.2.HS.D.2.A2.1.2.1.3	
	Solve a radical equation where one side is a constant.	CC.2.2.HS.D.10.A2.1.3.1.2	
	Solve a radical equation that contains a radical on each side.	CC.2.2.HS.D.10.A2.1.3.1.2	
	Solve a radical equation with a variable expression on one side.	CC.2.2.HS.D.10.A2.1.3.1.2	

## <u>Algebra 2 PS</u>

Unit: <u>Rational Functions</u>

Unit Length: 5.5 weeks

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are rational functions	Graph rational functions (basic).	CC.2.2.HS.D.7.A2.2.2.1.1	Observation Questioning
world we live in, and why are they so important?	Factor and simplify rational expressions.	CC.2.2.HS.D.2.A2.1.2.2.2	Discussion Practice worksheet (Students will complete
How do rational functions help	Multiply rational expressions.	CC.2.2.HS.D.2.A2.1.2.2.2	application problems that address EQ 1,2.)
us to make the best decision?	Divide rational expressions.	CC.2.2.HS.D.2.A2.1.2.2.2	IXL: A2.N.4 (This assessment will address
getting closer and closer to something, but never actually touch it?	Add and subtract rational expressions with like denominators.	CC.2.2.HS.D.2.A2.1.2.2.2	Desmos: Polygraph: Rational Functions 8.1 / 8.2 Quiz (Students will complete problems
How can functions be represented in multiple ways?	Add and subtract rational expressions with unlike denominators (basic).	CC.2.2.HS.D.2.A2.1.2.2.2	that address EQ 3,5.) Unit test (This assessment will address
How do transformations affect the parent function?	Solve basic rational equations.	CC.2.2.HS.D.10.A2.1.3.1.2	
In what situations is zero or a negative number an inappropriate answer?			

Unit:ProbabilityUnit Length:2.5 weeks

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How can we use probability to make predictions and decisions about the world around us?	Compute probability and odds.	CC.2.4.HS.B.7.A2.2.3.2.2	Observation Questioning Discussion Practice worksheet IXL: A1.JJ.1; 7.DD.1; 8.EE.1; 8.EE.7 IXL: A1.JJ.2 (This assessment will address EQ 1.) Desmos: Chance Experiments (This assessment addresses EQ 3.) Quiz Unit test (This assessment will address EQ 2.)
	Compute probability of mutually exclusive and not mutually exclusive events (probability of A or B).	CC.2.4.HS.B.7.A2.2.3.2.3	
Does order matter in analysis of multiple events? Does probability give actual outcomes?	Compute probability of independent and dependent events (probability of A then B).	CC.2.4.HS.B.7.A2.2.3.2.3	

## <u>Algebra 2 PS</u>

Unit: <u>Statistical Measures</u>

Unit Length: <u>2 weeks</u>

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How can data collection help in making decisions?	Calculate measures of central tendency and dispersion (mean, median, mode and range).	CC.2.4.HS.B.5.A1.2.3.2.1	Observation Questioning Discussion (EQ 1,3,4,5 will be addressed during instruction.) Practice worksheet (This assessment will address EQ 2.) IXL: 8.DD.1; 8.DD.6; 8.DD.8 Quiz Unit test
How can we use statistical measures to make predictions and decisions about the world around us?	Identify outliers.	CC.2.4.HS.B.5.A1.2.3.2.1	
	Calculate missing data from data sets, given a measure of central tendency or dispersion.	CC.2.4.HS.B.5.A1.2.3.2.1	
How can parameters be adjusted to help in making the best fit for a given situation?	Calculate measures of central tendency and dispersion if a change is made to the data set.	CC.2.4.HS.B.5.A1.2.3.2.1	
Why is the average so important?	Draw box-and-whisker plots.	CC.2.4.HS.B.5.A1.2.3.2.2	
What is the best way to find out about a group of people?	Calculate interquartile range.	CC.2.4.HS.B.3.A1.2.3.1.1	