Hamburg Area School District
Course Guide

Name:	Algebra 2
Grade(s):	10-12
Length:	*Place an X next to the correct option*
X	Full-Year (182 Sessions)
	Semester (90 Sessions)
	Quarter (45 Sessions)
	Other (Specify):
Text:	Algebra 2; McDougal Littell; 2007; Larson, Boswell, Kanold, Stiff
Approved on:	2/24/2020

Description:
Students develop a higher degree of skill and accuracy in algebraic techniques such as: increasing their ability to solve equations with accuracy, acquiring a functional relationship among given facts, developing habits and attitudes which will be helpful in life situations, understanding the general nature of algebra and broadening their knowledge of fundamental mathematical concepts. This course is designed for students who intend to pursue the higher level mathematics courses.

Algebra 2

Unit: _Literal Equations_
Unit Length: _1.5 weeks_

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How can linear functions be used in real-life situations?

Why does the order of operations become particularly important in algebra? | 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 Quiz (Students will complete application problems that address EQ 1,2.) |
| | Rewrite a formula in order to solve for the indicated variable. | CC.2.2.HS.C.4.A2.1.3.2.2 | |

Algebra 2

Unit: *Introduction to Polynomial Functions*

Unit Length: *3 weeks*

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are polynomial functions used to represent/simulate the world we live in, and why are they so important? How do polynomial functions help us to make the best decision?	Simplify polynomial expressions using laws of exponents.	CC.2.2.HS.D.2.A2.1.2.1.2	Observation Questioning Discussion (EQ 2 will be addressed during instruction.) Practice worksheet (This assessment will address EQ 1.) IXL: A1.V.6; A1.V.7; A2.K.2; A2.K.3 Desmos: Expressions Mash-Up Quiz Exponent True/False Project Exponent Puzzle Activity Unit test
	Add and subtract polynomial expressions.	CC.2.2.HS.D.2.A2.1.2.1.3	
	Multiply polynomial expressions.	CC.2.2.HS.D.2.A2.1.2.1.3	
	Square a binomial using the formula shortcut.	CC.2.2.HS.D.2.A2.1.2.1.3	
	Cube a binomial using the formula shortcut.	CC.2.2.HS.D.2.A2.1.2.1.3	

Unit: _Functions_
Unit Length: _4 weeks_

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are functions used to represent/simulate the world we live in, and why are they so important? How do functions help us to make the best decision? What are some different kinds of functions, and what sorts of real-world situations can they model? How do various functions compare to each other? How do we find the solutions to functions graphically? How do transformations affect the parent function? How is it possible to keep getting closer and closer to something, but never actually touch it?	Identify the domain and range from various display methods (ordered pairs, graph, etc).	CC.2.4.HS.C.1.A2.2.1.1.3	Observation Questioning Discussion (EQ 7 will be addressed during instruction.) Practice worksheet Graded worksheet IXL: A1.Q.2; A1.Q.4; A1.Q.5; A2.D.2; A1.S.19; A1.KK.12; A1.T.1; A1.T.2; A1.T.3; A1.T.5; A1.T.6; A2.F.2; A1.BB.2; A1.DD.1 Desmos: Marbleslides: Lines (This assessment will address EQ 5.) Desmos: Polygraph: Lines (This assessment will address EQ 6.) Desmos: Land the Plane Desmos: Polygraph: Scatter Plots Quiz Review game Unit test (Students will complete an application problem that addresses EQ 2. Students will complete problems that address EQ 4.) Desmos: Graphing Stories (This assessment will address essential questions 1,3 for the unit.)
	Determine if ordered pairs and graphs (vertical line test) represent a function.	CC.2.4.HS.C.2.A2.2.1.1.3	
	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	
	Write the equation of a line of best fit given a scatter plot.	CC.2.2.HS.C.5.A2.2.1.1.1	
	Write a linear inequality given a graph.	CC.2.2.HS.C.5.A2.2.1.1.1	
	Graph a linear inequality and a system of linear inequalities.	CC.2.2.HS.C.5.A2.2.1.1.1	
	Introduce other types of functions through x/y charts (polynomial, absolute value, radical, parabolas, rational).	CC.2.2.HS.D.7.A2.2.2.1.1	

Unit:　　　　　　　*Systems of Linear Equations and Inequalities*
Unit Length:　　*2.5 weeks*

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? How do we know which region on a graph is the solution?	Graph a system of linear equations and find a solution.	CC.2.2.HS.D.10.A1.1.2.2.1	Observation Questioning Discussion Practice worksheet IXL: A1.U.1; A1.U.2; A2.E.2; A2.E.8 Desmos: Polygraph: Linear Systems Desmos: Solutions to Systems of Linear Equations (This assessment will address EQ 1.) Desmos: Polygraph: Systems of Linear Inequalities (This assessment will address EQ 2.) Bingo Unit test
	Write or identify a system of linear equations given a graph.	CC.2.2.HS.D.10.A1.1.2.2.1	
	Solve a 2x2 system of equations using the elimination method.	CC.2.2.HS.D.10.A1.1.2.2.1	
	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	

Algebra 2

Unit: *Quadratic Functions*
Unit Length: *13 weeks*

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are quadratic functions used to represent/simulate the world we live in, and why are they so important? How do quadratic functions help us to make the best decision? Why do we factor polynomials? How do we determine the most efficient method for solving a quadratic equation? How can functions be represented in multiple ways? How do transformations affect the parent function? In what situations is zero or a negative number an inappropriate answer?	Graph parabolas when equation is in standard form.	CC.2.2.HS.D.7.A2.2.2.1.1	Observation Questioning Discussion (EQ 5 will be addressed during instruction.) Practice worksheet Graded worksheet Bingo IXL: A2.J.2; A2.J.1; A1.BB.1; PC.C.2; PC.C.1; A2.J.11; A2.I.2; A1.AA.4; A2.I.3; A1.AA.5; A1.BB.6; A2.J.5; A1.EE.1; A2.L.9; A1.V.1; A1.BB.5; A2.H.4; A2.H.5; A2.H.6; A2.J.8; A2.J.9 Desmos: Free-Range Functions Desmos: Will It Hit the Hoop? Desmos: Polygraph: Parabolas Desmos: Two Truths and a Lie: Parabolas Quiz Practice Test Unit test (Students will complete problems that address EQ 6. Students will complete application
	Solve application problems using the characteristics of parabolas.	CC.2.2.HS.D.7.A2.2.2.1.1	
	Factor the GCF out of a polynomial expression.	CC.2.2.HS.D.5.A2.1.2.2.1	
	Factor a polynomial in the form x^2+bx+c.	CC.2.2.HS.D.2.A2.1.2.2.1	
	Factor a polynomial in the form ax^2+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 $x^2+bx=0$ by factoring.	CC.2.2.HS.D.10.A2.1.3.1.1	
	Solve $ax^2+bx+c=0$ by factoring.	CC.2.2.HS.D.10.A2.1.3.1.1	
	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	problems that address EQ 1,2.) Application problems (These problems will address EQ 3,4,7.)
	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 $ax^2+c=0$ 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 $ax^2+c=0$ by taking square roots (complex answers).	CC.2.2.HS.D.10.A2.1.3.1.1	
	Solve $ax^2+bx+c=0$ by completing the square.	CC.2.2.HS.D.10.A2.1.3.1.1	

	Solve $ax^2+bx+c=0$ 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: _Polynomial Functions_

Unit Length: _3 weeks_

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are polynomial functions used to represent/simulate the world we live in, and why are they so important? How do polynomial functions help us to make the best decision? Why do we factor polynomials? How can functions be represented in multiple ways?	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	Observation Questioning Discussion Practice worksheet (This assessment will address EQ 4.) Graded worksheet IXL: A2.I.4; A2.I.5; A2.K.5 Desmos: Polygraph: Polynomials Quiz (Students will complete application problems that address EQ 1,2.) Review game Unit test (Students will complete problems that address EQ 3.)
	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	

Algebra 2

Unit: *Radical Functions*

Unit Length: *3 weeks*

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are radical functions used to represent/simulate the world we live in, and why are they so important? How do radical functions help us to make the best decision? How can we make sense of exponents that are not integers? In what situations is zero or a negative number an inappropriate answer?	Convert rational exponent form to radical form; and vice versa (basic).	CC.2.2.HS.D.2.A2.1.2.1.3	Observation Questioning Discussion Practice worksheet Bingo IXL: A2.M.1; A2.I.13 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.) Practice Test Unit test (Students will complete problems that address EQ 4.)
	Evaluate expressions with rational exponents (basic).	CC.2.2.HS.D.2.A2.1.2.1.3	
	Simplify expressions with rational exponents (basic).	CC.2.2.HS.D.2.A2.1.2.1.3	
	Use a calculator to evaluate expressions with rational exponents (basic).	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	

Unit: _Rational Functions_
Unit Length: _3 weeks_

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How are rational functions used to represent/simulate the world we live in, and why are they so important? How do rational functions help us to make the best decision? How can functions be represented in multiple ways? In what situations is zero or a negative number an inappropriate answer?	Factor and simplify rational expressions.	CC.2.2.HS.D.2.A2.1.2.2.2	Observation Questioning Discussion Practice worksheet (Students will complete application problems that address EQ 1,2.) IXL: A1.GG.3; A1.C.5 IXL: A2.N.4 (This assessment will address EQ 3.) Quiz Review game Unit test (This assessment will address EQ 4.)
	Multiply rational expressions.	CC.2.2.HS.D.2.A2.1.2.2.2	
	Divide rational expressions.	CC.2.2.HS.D.2.A2.1.2.2.2	
	Solve basic rational equations.	CC.2.2.HS.D.10.A2.1.3.1.2	

Algebra 2

Unit: *Probability*
Unit Length: *1.5 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? Does order matter in analysis of multiple events? Does probability give actual outcomes?	Compute probability and odds.	CC.2.4.HS.B.7.A2.2.3.2.2	Observation Questioning Discussion Practice worksheet Graded 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.) 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	
	Compute probability of independent and dependent events (probability of A then B).	CC.2.4.HS.B.7.A2.2.3.2.3	

Algebra 2

Unit: *Statistical Measures*
Unit Length: *1.5 weeks*

ESSENTIAL QUESTIONS FOR THE UNIT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS	SAMPLE FORMATIVE AND SUMMATIVE ASSESSMENTS
How can data collection help in making decisions? How can we use statistical measures to make predictions and decisions about the world around us? How can parameters be adjusted to help in making the best fit for a given situation? Why is the average so important? What is the best way to find out about a group of people?	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 Project: Weather Project Unit test
	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	
	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	
	Draw box-and-whisker plots.	CC.2.4.HS.B.5.A1.2.3.2.2	
	Calculate an interquartile range.	CC.2.4.HS.B.3.A1.2.3.1.1	