9-12 Honors Algebra II Curriculum

The City of St. Charles School District
Honors Algebra 2 Curriculum

CONTENT AREA: Mathematics	UNIT: Piecewise Functions
COURSE TITLE: Honors Algebra 2	UNIT DURATION: 3 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
• Graphing Calculator, Textbook, Supplemental Handouts	• Solve absolute value equations and inequalities • Graph piecewise functions • Apply piecewise functions
ENDURING UNDERSTANDINGS: • Recognize that the absolute value function is a piecewise function • Equations can have multiple solutions. • Equations can have extraneous solutions. • Students will recognize that graphs can be disconnected. • Real world applications can be represented mathematically	**ESSENTIAL QUESTIONS:** • What are the solutions to an absolute value equation? • How do you graph a piecewise function? • How do you write a piecewise equation from a graph? • How do you write a piecewise equation from an application problem?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
A2.REI.A.1	Create & solve equations and inequalities, including those that involve absolute value	x	
A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems	x	
A2.BF.A.3	Describe the effects of transformations algebraically and graphically...for absolute value functions	x	

The City of St. Charles School District

Honors Algebra 2 Curriculum

OBJECTIVE # 1	Solve and Apply Absolute Value Equations and Inequalities	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.A.1 : Create & solve equations and inequalities, including those that involve absolute value	
WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to solve an absolute value equation • How to solve an absolute value inequality • How to apply absolute value equations and inequalities	• Absolute Value • No Solution (empty set) • Extraneous Solution • Compound Inequality • Intersection • Union • Set Notation	• Solve an absolute value equation • Solve an absolute value inequality • Solve an application problem using absolute value
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model solving absolute value equations & inequalities • Effective questioning • Targeted feedback • Connect material to a real world application	• Summarizing and note taking • Practice solving absolute value equation and inequalities • Practice solving an application problem using absolute value • Self-assessment	• 1-4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Computer Technology • Science	• Solve a linear equation • Solve a linear inequality	• Why do we model with absolute value?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily homework checks • Quizzes • Comprehensive assessment	• Formative • Formative • Summative	1-3 Solve multi-step absolute value equations 1-3 1-4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction	☐Additional Practice ☐Watch video lessons	1-3 Practice solving absolute value equations
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self-guided assignment	☐Student presentation on the information	3-4: Applications of absolute value equations & inequalities

STANDARD: Solve and Apply Absolute Value Equations and Inequalities		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Solve a multi-step absolute value equation • Solve a multi-step absolute value inequality and graph the solution on a number line • Solve an absolute value equation/inequality with no solution or infinitely many solutions. **The student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Evaluates an expression with absolute value • Solves absolute value equations of the form $|ax+b|=c$ • Solves absolute value inequalities of the form $|ax+b|≤c$ or $|ax+b|≥c$ **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 1	Solve and Apply Absolute Value Equations and Inequalities
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.A.1 : Create & solve equations and inequalities, including those that involve absolute value

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to solve an absolute value equation • How to solve an absolute value inequality • How to apply absolute value equations and inequalities	• Absolute Value • No Solution (empty set) • Extraneous Solution • Compound Inequality • Intersection • Union • Set Notation	• Solve an absolute value equation • Solve an absolute value inequality • ☐Solve an application problem using absolute value

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model solving absolute value equations & inequalities • Effective questioning • Targeted feedback • Connect material to a real world application	• Summarizing and note taking • Practice solving absolute value equation and inequalities • Practice solving an application problem using absolute value • Self-assessment	• 1-4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Computer Technology • Science	• Solve a linear equation • ☐Solve a linear inequality	• Why do we model with absolute value?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Daily homework checks - Quizzes - Comprehensive assessment	- Formative - Formative - Summative	1-3 Solve multi-step absolute value equations 1-3 1-4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
Provide additional instruction	☐Additional practice ☐Watch video lessons	1-3 Practice solving absolute value equations
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
Self-guided assignment	☐Student presentation on the information	3-4: Applications of absolute value equations & inequalities

SCORE	DESCRIPTION	SAMPLE TASKS
STANDARD: Solve and Apply Absolute Value Equations and Inequalities		
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Solve a multi-step absolute value equation • Solve a multi-step absolute value inequality and graph the solution on a number line • Solve an absolute value equation/inequality with no solution or infinitely many solutions. **The student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Evaluates an expression with absolute value • Solves absolute value equations of the form $\|ax+b\|=c$ • Solves absolute value inequalities of the form $\|ax+b\|\leq c$ or $\|ax+b\|\geq c$ **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 2	Graph and Interpret Absolute Value Equations	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.IF.A.1: Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems • A2.BF.A.3: Describe the effects of transformations algebraically and graphically...for absolute value functions	

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to graph an absolute value function • How to graph a piecewise function	• Vertex • Domain • Range • Interval Notation • Piecewise Function	• Graph an Absolute Value Function • Identify the domain & range of an absolute value function • ☐Graph a piecewise function

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model graphing absolute value and piecewise functions • Effective questioning • Targeted feedback • Nonlinguistic representations	• Summarizing and note taking • Practice graphing absolute value functions • Practice graphing piecewise functions • Use a graphing calculator to graph a function • Self-assessment	• 2 = skill/concept taught in Algebra 1 • 2 for graphing absolute value functions; 4 for graphing piecewise functions on calculator
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Architecture	• Graph a linear equation	• What is a piecewise function?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?

ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily homework checks • Quizzes • Comprehensive assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4 Graph absolute value and piecewise functions of varying difficulty
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Reteach graphing linear equations	• Practice graphing linear equations, then extend to absolute value • Watch video lessons	2 = skill/concept taught in Algebra 1
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Extend graphing to non-linear pieces • Extend graphing to step functions & greatest integer function	• Students will graph more complex piecewise functions	4 = extended thinking; graphing with a piece that is not linear or graphing a step function

The City of St. Charles School District
Honors Algebra 2 Curriculum
PROFICIENCY SCALES FOR THIS STANDARD

SCORE	DESCRIPTION	SAMPLE TASKS
	STANDARD: Graph and Interpret Absolute Value Equations & Piecewise Functions	
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.0	**The student:** • Graph a piece-wise function • Interpret the domain and range of an absolute value function. **The student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Graphs an absolute value function. • Given a piece-wise function, evaluates the function for the given values. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 3	Write Absolute Value Equations & Piecewise Functions	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.A.1: Create and solve equations, including those that involve absolute value	

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to write an absolute value equation , given a graph • How to write an absolute value equation or inequality, given an application problem • How to write a piecewise function, given an application problem	• Vertex • Equation • Inequality • Function Notation • Domain	• Write an absolute value function from a graph • Solve an application problem by writing an absolute value equation or inequality • Write a piecewise function, given an application problem • Use their function to evaluate/solve a related problem

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model writing absolute value and piecewise functions • Effective questioning • Targeted feedback	• Summarizing and note taking • Practice writing absolute value functions, given a graph • Practice solving application problems involving absolute value/piecewise • Self-assessment	• 3 - working backwards from a graph • 3 and 4 - writing an equation given words and then using the equation to solve a problem
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Income Taxes • Finance	• Solving application problems with linear equations	• How can a piecewise function be used to model a real-life situation?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily homework checks • quizzes • Comprehensive assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1 - 4 Write absolute value equations
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Teach key words to look for when interpreting word problems • Emphasize proper notation	☐Write a piecewise function that has been partially completed ☐Write the function in words, then convert to proper math notation ☐Watch video lessons	2 = Solve a partially completed problem
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Student-created problems	• Develop their own piecewise defined application problem and write the function	4 = extend piecewise functions

STANDARD: Write Absolute Value Equations & Piecewise Functions		
SCORE	DESCRIPTION	SAMPLE TASKS
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Write a piecewise function. • Write an absolute value function, given a graph **The student exhibits no major errors or omissions.**	· A plane descends from 5000ft at 250 ft/min for 6 minutes. After 6 minutes, it descends at 150ft/min. (from 3500 ft) Let t = the number of minutes and A = the altitude. Write a piecewise function for this situation. What is the plane's altitude after 12 minutes? Taisha uses the elliptical cross–trainer at the gym. Her general goal is to burn 280 Calories per workout, but she varies by as much as 25 Calories from this amount on any given day. Write and solve an equation to find the maximum and minimum number of Calories Taisha burns on the cross-trainer.
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Writes a piecewise function with minor errors in the domain. • Given the solutions, writes an absolute value inequality • Writes and solves an absolute value equation or inequality, given a real-life situation. (one variable) **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	Ice cream should be stored at with an allowance of. Write and solve an equation to find the maximum and minimum temperatures at which the ice cream should be stored. · The average depth d of an aquarium tank for dolphins is 50m. The actual depth cannot vary by more than 5m. Write and solve an absolute value inequality to determine acceptable tank depths.

1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

CONTENT AREA: Mathematics	UNIT: Systems of Linear Functions
COURSE: Honors Algebra 2	UNIT DURATION: 4 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
• Graphing Calculator, Textbook, Supplemental Handouts	• Solve a system of linear equations • Graph a system of linear equations and inequalities • Apply systems of linear equations and inequalities
ENDURING UNDERSTANDINGS: • Recognize that a system of equations is two or more equations with the same variable • A system of equations can have no solution • A system of equations can have an infinite number of solutions	ESSENTIAL QUESTIONS: • What are the solutions to a system of equations? • How do you graph a system of equations? • How do you graph a system of inequalities? • How do you solve an application problem by writing a system of equations? • How do you solve an application problem using linear programming?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?				
Standards, Concepts, Content, Skills, Products, Vocabulary				
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD	
A2.REI.B.3	Create and solve systems of equations that may include non-linear equations and inequalities	x		

OBJECTIVE # 1	Solve and Interpret System of Linear Equations		
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.B.3 : Create and solve systems of equations that may include non-linear equations and inequalities		
WHAT SHOULD STUDENTS…			
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	KNOW? *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*		BE ABLE TO DO? *Skills; Products*
• How to solve a system of equations (in 2 and 3 variables)	• System of equations • Substitution Method		• Solve a system of equations in 2 and 3 variables

• Using Algebra • Using Inverse Matrices	• Elimination Method • Ordered Triple • Matrix • Determinant • Inverse Matrix • Identity Matrix	• Using Algebra Solve a system of equations in 2 variables using inverse matrices Use a graphing calculator to solve a system of equations in 3 variables
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model solving systems of linear equations using algebra • Introduce matrices and their operations • Model using matrices to solve a system of equations • Effective questioning • Targeted feedback	• Summarizing and note taking • Practice solving systems of linear equations in 2 and 3 variables • Learn operations with matrices and how to use them to solve a system of equations • Self-assessment	2 - Two variable systems were taught in Algebra 1 3 - Solve a System in 3 variables 3 - Solve a System using matrices
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Engineering	• Solve a linear equation • Solve a system of equations in 2 variables	• What does it mean to solve a system of equations?
HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily homework checks • Quizzes • Comprehensive assessment on solving linear systems of equations	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Additional modeling	☐Additional practice solving systems of equations in 2-variables ☐Watch video lessons	• 1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Peer teaching • Encoding/Decoding Using Matrices	☐Solve more complex systems of equations ☐Peer Teaching ☐Class Presentation on application of inverse matrices	• 3-4

The City of St. Charles School District
Honors Algebra 2 Curriculum
PROFICIENCY SCALES FOR THIS STANDARD

SCORE	DESCRIPTION	SAMPLE TASKS
STANDARD: Solve and Interpret System of Linear Equations		
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student will be able to:** • Solve a system of three equations in three variables • Solve a system of equations using matrices • Given a real-life situation, write and solve a system of equations. **The student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Solves a system of two equations algebraically • Performs operations on matrices • Calculates the determinant of a matrix • Finds the inverse of a matrix **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 2	Graph Systems of Linear Equations and Inequalities	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.B.3: Create and solve systems of equations that may include nonlinear equations and inequalities.	

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• The solution to a system of equations in two variables is the point of intersection of the graphs.	• Consistent • Inconsistent • Dependent • Independent • Ordered Triple • X-y-z coordinate system	• Solve a system of equations by graphing • Solve a system of inequalities by graphing • Plot an ordered triple • Graph an equation in three variables

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model solving a system of linear equations by graphing • Model solving a system of linear inequalities by graphing • Model graphing in the xyz-coordinate system • Effective questioning • Targeted feedback • Nonlinguistic representations	• Summarizing and note taking • Practice graphing systems of linear equations and linear inequalities • Practice graphing in the xyz-coordinate system • Model graphing in the xyz-coordinate system using paper • Self-assessment	• 1-3
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	
• Science • Finance (Cell Phone Plans)	• Graph linear equations • Graph linear inequalities	

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily homework checks • Quizzes • Comprehensive assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Reteach graphing linear equations • Provide a visual for a system of equations in three variables	• Use colored pencils to graph linear inequalities • Model the xyz-coordinate system with paper • Practice graphing systems of equations and inequalities • Watch video lessons	2-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Graph systems of 3 equations in 3 variables • Peer Teaching	• Use graphing software to model the solution to a system of 3 equations in 3 variables • Peer Teaching	3-4

STANDARD: Graph Systems of Linear Equations and Inequalities		
SCORE	DESCRIPTION	SAMPLE TASKS
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student will be able to:** • Plot an ordered triple. • Graph an equation in three variables **The student exhibits no major errors or omissions.**	• Graph the ordered triple (3, -4, 6)
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Identifies an ordered triple given a graph. • Solves a system of equations in two variables by graphing. • Graphs a system of two inequalities **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Graph the system of equations x+y=6 3x-4y=4
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 3	Apply Systems of Inequalities	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.A.1: Create and solve equations and inequalities, including those that involve absolute value. • A2.REI.B.3 Create and solve systems of equations that may include nonlinear equations and inequalities.	
WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to solve problems using linear programming	• Linear Programming • Constraint • Feasible region • Objective Function • Vertices • Optimization • Maximum • Minimum	• Solve an application problem using linear programming
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)

• Academic vocabulary/language
• Model solving an application problem using linear programming
• Cooperative learning
• Effective questioning
• Nonlinguistic representations
• Targeted feedback
	• Summarizing and note taking
	• Practice solving application problems using linear programming
	• Self-assessment
	• Linear programming project
	    • Cooperative learning
	    • Discovery learning
		2-4

INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Business - optimizing profit	• Solving a system of linear inequalities by graphing • Solving an application problem by writing a system of equations	• How can a system of linear inequalities by used to solve a real-life situation?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Quizzes • Comprehensive assessment • Linear Programming Project	• Formative • Formative • Summative • Summative	• 1-3 • 1-3 • 1-4 • 2-4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary • Provide practice problems with the inequalities already written • Provide keywords for interpreting word problems	• Learn vocabulary with flashcards • Practice solving systems of linear inequalities • Use keywords to interpret word problems • Watch video lessons	1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Student-generated problem • More complex linear programming problem • Peer teaching	☐Research and solve a real life problem using linear programming ☐Peer teaching	3-4

The City of St. Charles School District
Honors Algebra 2 Curriculum

STANDARD: Apply Systems of Inequalities		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student will be able to:** • Write, graph and interpret a system of inequalities, given a real-life situation. **The student exhibits no major errors or omissions.**	• Linear Programming
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Given a system of inequalities for a real-life situation, graph the inequalities. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Linear Programming
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

CONTENT AREA: Mathematics	UNIT: Quadratic Functions
COURSE TITLE: Honors Algebra 2	UNIT DURATION: 6 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
Textbook **Supplemental Handouts** **Graphing Calculator**	**Solve Quadratic Equations** **Graph Quadratic Functions** **Apply Quadratic Functions**

ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:
A parabola is the graph of a quadratic function **A quadratic can have real and complex solutions** **A quadratic can be solved using a variety of methods**	**How are the real solutions of a quadratic equation related to the graph of the quadratic function?** **What are the advantages of a quadratic in vertex form? In standard form?** **How is any quadratic related to the parent quadratic function** $y=x2$

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
A2.NQ.B.5	Represent complex numbers.		x
A2.NQ.B.6	Add, subtract, multiply and divide complex numbers.		x
A2.REI.A.1	Create and solve equations and inequalities, including those that involve absolute value.	x	
A2.APR.A.1 E	Extend the knowledge of factoring to include factors with complex coefficients.		x
A2.BF.A.3	Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions	x	
A2.IF.A.1	Identify and interpret key characteristics of functions represented	x	

	graphically, with tables and with algebraic symbolism to solve problems.		
A2.FM.A.1	Create functions and use them to solve applications of quadratic and exponential function modeling problems.	x	

OBJECTIVE # 1	Solve Quadratic Functions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.A.1: Create and solve equations and inequalities, including those that involve absolute value. • A2.NQ.B.6: Add, subtract, multiply and divide complex numbers. • A2.APR.A.1 E: Extend the knowledge of factoring to include factors with complex coefficients.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to solve a quadratic equation • How to perform operations with complex numbers	• Roots • Zeros • Imaginary unit • Complex Number • Discriminant • Completing the square • Complex Conjugate • ☐Quadratic formula	• Add, subtract, multiply & divide complex numbers • Solve a quadratic equation • By factoring • Using the square root property • By completing the square • Using the quadratic formula

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Modeling how to solve quadratic equations & how to perform operations with complex numbers • Effective questioning • Discovery learning • Nonlinguistic representations	• Summarizing and note taking • Graphic organizers • Homework and practice • Discovery Learning • Self-assessment	2-3: Solve quadratic equations with real and complex solutions

The City of St. Charles School District
Honors Algebra 2 Curriculum

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
• Physics	• Simplify Algebraic expressions • Factor quadratic expressions (Algebra 1) • Solve quadratic equations (Algebra 1)	• How can a quadratic function be used to model a real-world situation?
HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive assessment	• Formative • Formative • Summative	• 1 - 3 • 1 - 3 • 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Additional modeling • Emphasize steps used in the different solving methods	• Additional practice • Practice vocabulary and solving methods using flashcards, matching, graphic organizers, foldables. • Watch video lessons	• 1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery Learning • Peer Teaching	• Peer Teach • Present applications of quadratic functions	• 3-4

	STANDARD: Solve Quadratic Functions	
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student will be able to:** • Multiply and Divide Complex numbers • Solve Quadratic Functions with complex roots Factoring (A.SSE.2, F.IF.8a) Completing the square (N.CN.7, F.IF.8a) Using the quadratic formula (N.CN.7, A.SSE.1b **The student exhibits no major errors or omissions.**	• The sum of two squares • Solve a quadratic by completing the Square, in which the coefficient for "b" is odd and/or "a" is not 1
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Add/Subtract and graph complex numbers • Solve Quadratic Functions with real roots Factoring (A.SSE.2, F.IF.8a) Completing the square (N.CN.7, F.IF.8a) Using the quadratic formula (N.CN.7, A.SSE.1b) Given a graph **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Solve a quadratic by completing the Square, in which the coefficient for "b" is even
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the	

	3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 2	**Graph and Interpret Quadratic Functions**
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.BF.A.3 : Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions • A2.IF.A.1: Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• A quadratic function can be graphed from standard form, vertex form and intercept form	• Parabola • Vertex of a parabola • Axis of Symmetry • X-intercepts (roots, zeros) • Standard Form • Vertex Form • Intercept Form • Maximum • Minimum	• Graph a quadratic function that is written in standard, vertex and intercept form • Graph a quadratic inequality • Identify the vertex, maximum, and minimum • Write a quadratic in vertex form, given standard form
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		

The City of St. Charles School District
Honors Algebra 2 Curriculum

TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Modeling • Effective questioning • Nonlinguistic representations • Targeted feedback	• Summarizing and note taking • Homework and practice • Graphic organizers • Self-assessment	1-4

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
• PHysics	• Graphing Quadratic functions in standard form (Algebra 1)	• How can the graph of a quadratic function be used to solve a quadratic equation?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Quizzes • Comprehensive Assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and different forms • Additional Modeling	• Practice graphing quadratic functions • Watch video lessons	• 1-3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery Learning • Peer Teaching	• Research & present how to graphically represent quadratic functions with complex roots • Peer Teaching	• 3-4

STANDARD: Graph and Interpret Quadratic Functions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.0	**The student will be able to:** • Given a real-life situation, write and graph a quadratic equation. • Graph in vertex and intercept form. • Graph quadratic inequalities **The student exhibits no major errors or omissions.**	• Vertical motion • Area problem using max, min
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Graph a quadratic function in standard form • Identify vertex, maximum, and minimum **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Explain how to determine the solution to a quadratic equation using the graph of the quadratic function. What are the solutions to the graph shown?
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 3	Write Quadratic Functions	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.FM.A.1: Create functions and use them to solve applications of quadratic and exponential function modeling problems.	
WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• A quadratic function can be used to model a real-life situation • Three no collinear points are on the graph of exactly one quadratic function	• Roots, Zeros • Maximum/Minimum • Pythagorean Theorem • Area formulas	• Write and solve a quadratic equation, given a real-life situation • Write a quadratic function, given three ordered pairs
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model writing quadratic functions • Effective questioning • Targeted feedback • Connect material to a real world application	• Summarizing and note taking • Practice writing quadratic functions from a real-life situation • Practice writing quadratic functions from three ordered pairs • Self-assessment	1-4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Landscaping • Physics • Architecture	• Multiplying algebraic expressions • Solve a system of equations in three variables • Solving quadratic equations • Geometry formulas	• How can a quadratic function be used to model/solve a real-life situation?
HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily homework checks • Quizzes • Comprehensive assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4 Write quadratic functions of varying difficulty

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Teach key words to look for when interpreting word problems • Additional modeling	☐Additional practice writing quadratic functions ☐Additional practice solving a system of equations in three variables ☐Watch video lessons	1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Quadratic Regression • Peer Teaching	☐Research & present a quadratic regression problem ☐Peer Teaching	3-4

STANDARD: Write Quadratic Functions		
SCORE	DESCRIPTION	SAMPLE TASKS
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student will be able to:** • Given a real-life situation, write and solve a quadratic equation. • Given three ordered pairs, write the quadratic equation. **The student exhibits no major errors or omissions.**	• Vertical Motion, Pythagorean Theorem and Area • Use a graphing calculator to write the equation for the quadratic that passes through (2, 4), (-1, 4) and (5, 6).
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Given an equation that models a real-life situation, solves and interprets the results. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• **An object is launched at 19.6 meters per second (m/s) from a 58.8-meter tall platform. The equation for the object's height s at time t seconds after launch is $s(t) = -4.9t^2 + 19.6t + 58.8$, where s is in meters. When does the object strike the ground?**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

CONTENT AREA: Mathematics	UNIT: Technology
COURSE TITLE: Honors Algebra 2	UNIT DURATION: 36 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT: • **Textbook** • **Graphing Calculator** • **Graphing Software for teacher** • **Supplemental Handouts**	BIG IDEA(S): • **Use technology to model and solve algebra problems**
ENDURING UNDERSTANDINGS: • **A graphing calculator is a useful tool when solving complex algebra problems**	ESSENTIAL QUESTIONS: • **How do you graph an equation using a graphing calculator?** • **How do you use a graphing calculator to perform operations on matrices?** • **How do you use a graphing calculator to solve a system of equations?**

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
A2.REI.A.1	Create and solve equations and inequalities, including those that involve absolute value.		x
A2.REI.B.3	Create and solve systems of equations that may include nonlinear equations and inequalities.	x	
A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	x	
A2.BF.A.3	Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions	x	

OBJECTIVE # 1	Use technology to interpret results
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.A.1: Create and solve equations and inequalities, including those that involve absolute value.

	• A2.REI.B.3 : Create and solve systems of equations that may include nonlinear equations and inequalities.
	• A2.IF.A.1 : Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.
	• A2.BF.A.3: Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• A graphing calculator can be used to graph an equation • A graphing calculator can be used to solve a system of equations by graphing & using matrices • A graphing calculator can be used to find a regression equation	• Matrices • Inverse Matrix • The solution to a system of equations is the point of intersection	• Use a graphing calculator to: • FInd a regression equation, given a set of data • Find the solution to a system of two equations by graphing • Find the solution to a system of equations (in more than 2 variables) by using matrices

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model the use of the graphing calculator • Effective questioning • Targeted feedback • Nonlinguistic representations	• Summarizing and note taking • Practice using the graphing calculator • Self-assessment	1-3
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Computer Science • Engineering	• Solve a system of equations	• How can technology be used in algebra?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily homework checks • Quizzes • Comprehensive assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Additional Modeling	• Additional practice using the graphing calculator • Watch video lessons	• 1-2
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery Learning • Cooperative Learning • Peer Teaching	• Use the graphing calculator to solve more complex algebra problems. • Peer Teaching	• 3-4

STANDARD: Use technology to interpret results		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Given a set of data, find the linear regression equation using a graphing calculator. • Solve a system of two equations by graphing. • Solve a system of three equations using matrices • **The student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Performs matrix operations using a graphing calculator. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

CONTENT AREA: Mathematics	UNIT: Polynomial Functions
COURSE: Honors Algebra 2	UNIT DURATION: 6 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
• Textbook • Supplemental Handouts • Graphing Calculator	• Perform operations with polynomial functions • Solve polynomial equations • Graph polynomial functions • Apply polynomial functions to real-life situations
ENDURING UNDERSTANDINGS: • Arithmetic operations can be extended to polynomial functions • You can divide polynomials using steps that are similar to the long-division steps that you use to divide whole numbers • Several different factoring patterns can be used to solve a polynomial equation • The characteristics of a polynomial function can be used to create its graph • You can use polynomial functions to model real-life situations	**ESSENTIAL QUESTIONS:** • How do you factor a polynomial expression? • Recognize factoring patterns How do you solve a polynomial equation? How do graph a polynomial function? How do you write a polynomial function, given its zeros? How do you write a polynomial function, given a real-life situation?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?
Standards, Concepts, Content, Skills, Products, Vocabulary

REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
A2.NQ.B.7	Know and apply the Fundamental Theorem of Algebra.	x	
A2.REI.A.1	Create and solve equations and inequalities, including those that involve absolute value.	x	
A2.APR.A.2	Understand the Remainder Theorem and use it to solve problems.	x	
A2.APR.A.3	Find the least common multiple of two or more polynomials.		x
A2.APR.A.5	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to	x	

	sketch the function defined by the polynomial.		
A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	x	
A2.IF.A.2	Translate between equivalent forms of functions.		x
A2.FM.A.1	Create functions and use them to solve applications of quadratic and exponential function modeling problems.	x	
A2.BF.A.1	Create new functions by applying the four arithmetic operations and composition of functions (modifying the domain and range as necessary).	x	

OBJECTIVE # 1	Perform Operations with Polynomial Expressions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	**A2.IF.A.2:** Translate between equivalent forms of functions. **A2.BF.A.1:** Create new functions by applying the four arithmetic operations and composition of functions (modifying the domain and ranges necessary). **A2.APR.A.2:** Understand the Remainder Theorem and use it to solve problems.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
- There are several different factoring patterns that can be used to factor a polynomial - You can divide polynomials using steps that are similar to the long-division steps that you use to divide whole numbers - The Remainder Theorem can be used to evaluate a polynomial	- Degree - Standard form - Terms - Turns - Long division - Synthetic division - Remainder Theorem	- Simplify monomials using rules of exponents - Add, subtract, multiply and divide polynomial expressions - Factor a polynomial expression

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model the use of the graphing calculator • Effective questioning • Targeted feedback	• Summarizing and note-taking • Practice performing operations on polynomial expressions • Self-assessment	1-3
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Business • Science	• Arithmetic operations o Long division of whole numbers • Simplify algebraic expressions	• How do you apply operations with polynomials to a real-life situation?
HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework • Frequent Quizzes • Comprehensive Assessment on operations with polynomial expressions	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic Vocabulary • Additional Modeling	• Additional practice • Practice long division of whole numbers Graphic organizers Peer Tutoring Watch video lessons	1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery Learning • Peer Teaching	☐Research and present how the Binomial Theorem and Pascal's Triangle relates to polynomials ☐Peer Teaching	3-4

The City of St. Charles School District
Honors Algebra 2 Curriculum
PROFICIENCY SCALES FOR THIS STANDARD

SCORE	DESCRIPTION	SAMPLE TASKS
STANDARD: Perform Operations with Polynomial Expressions		
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student will be able to:** • Evaluate a polynomial expression with algebra • Perform operations with polynomials **The student exhibits no major errors or omissions.**	• Find f(x+3) if f(x)=2x3-5x+1 • Multiply (x+2)3 • Long Division and Synthetic Division
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Recognizes or recalls specific terminology, such as: Degree, number of terms, standard form, synthetic division/substitution, direct substitution • Performs basic processes, such as: Evaluate a polynomial with a number Add, subtract, and multiply simple polynomial expressions **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• FInd f(2) if f(x)=2x2-7x+8
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 2	Solve Polynomial Equations

REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.IF.A.2: Translate between equivalent forms of functions. • A2.NQ.B.7: Know and apply the Fundamental Theorem of Algebra. • A2.REI.A.1: Create and solve equations and inequalities, including those that involve absolute value. • A2.APR.A.2: Understand the Remainder Theorem and use it to solve problems. • A2.APR.A.3: Find the least common multiple of two or more polynomials.

WHAT SHOULD STUDENTS…

UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	KNOW? *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	BE ABLE TO DO? *Skills; Products*
• There are several different factoring patterns that can be used to factor a polynomial • Factoring a polynomial equation will help you find its zeros • The factor theorem can be used to find remaining factors of a polynomial function	• Greatest common factor • Formula for Sum & Difference of Cubes • Quadratic formula • Formula for difference of squares • Factor by grouping • Factor Theorem • Complex zeros/roots	• Solve a polynomial equation by factoring and using the zero product property • Given a zero, use the factor theorem to find the remaining zeros

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING

TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Model solving polynomial equations • Effective questioning • Targeted feedback	• Summarizing and note-taking • Practice solving polynomial equations • Self-assessment	1-3

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
• Business • Science	• Factor and solve quadratic equations • Recognize complex zeros	• How do you apply solving polynomials to a real-life situation?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework • Frequent Quizzes • Comprehensive Assessment on operations with polynomial expressions	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic Vocabulary • Additional Modeling	• Additional practice • Graphic organizers • Peer Tutoring • Watch video lessons	1-3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery Learning • Peer Teaching	☐Research and present the rational zero theorem ☐Peer Teaching	3-4

STANDARD: Perform Operations with Polynomial Expressions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student will be able to:** • Solve polynomials of degree 3 or higher by rational root theorem and factoring. **The student exhibits no major errors or omissions.**	Ex: Solve the polynomial equation
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Performs basic processes, such as: Solving quadratics by factoring **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Ex: Solve the polynomial equation
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 3	Graph Polynomial Functions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.APR.A.5: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to sketch the function defined by the polynomial. • A2.IF.A.1: Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• The degree and leading coefficient of a polynomial function can be used to determine end behavior, number of zeros, number of turns • Finding the zeros of a polynomial function will help to graph the function	☐Degree ☐Leading Coefficient ☐End behavior ☐Turns ☐Roots, zeros, *x*-intercepts ☐Even & Odd function ☐Continuous function ☐Domain and range	☐Describe the characteristics of a polynomial, given a graph or equation of a polynomial ☐Graph a polynomial function by finding the zeros and making a table of values

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic Vocabulary/language • Model graphing polynomial functions • Effective questioning • Targeted feedback	☐Summarizing and note-taking ☐Practice graphing polynomials and identifying characteristics ☐Self-assessment	1-3
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Roller Coaster Design	☐Evaluating algebraic expressions ☐x-intercepts ☐Graphing from a table of values	• How do the zeros of a polynomial help you to graph the function?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Practice • Frequent Quizzes • Comprehensive Assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Additional modeling • Nonlinguistic representation	☐Additional Practice ☐Peer tutoring ☐Watch video lessons	1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery Learning • Peer Teaching	• Graph a 4th degree polynomial that has double zeros • Peer Teaching	3-4

STANDARD: Graph and Interpret Polynomial Functions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.0	**The student:** • Graph a polynomial function **The student exhibits no major errors or omissions.**	• Graph the polynomial
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Recognizes or recalls specific terminology, such as: Degree, leading coefficient, end behavior, even & odd function, continuity • Performs basic processes, such as: Classify polynomial functions Given the zeros, graph a polynomial function. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Identify end behavior, degree, and leading coefficient.
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 4	Write and Apply Polynomial Functions	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.FM.A.1: Create functions and use them to solve applications of quadratic and exponential function modeling problems.	

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• A polynomial function can be used to model a real-life situation • A polynomial function can be written from the zeros of the function	☐Zeros ☐Complex conjugate ☐Geometry formulas for area and volume	☐Write a polynomial function, given real and complex zeros ☐Write and solve a polynomial equation, given a real-life situation

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic Vocabulary/Language • Model writing polynomial functions • Effective questioning • Targeted Feedback	☐Summarizing and Notetaking ☐Practice writing polynomial functions ☐Self-Assessment	1-3
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Archaeology • Landscape & design • Meteorology	☐Polynomial ☐Conjugates ☐Writing quadratic functions ☐Applications of quadratic functions	• How can you write a polynomial, given the zeros?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily practice • Frequent Quizzes • Comprehensive Assessment	• Formative • Formative • Summative	• 1-3 • 1-3 • 1-4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Additional modeling • Use technology as a visual aid	☐ Additional practice ☐ Use a graphing calculator to help visualize the zeros ☐ Watch video lessons	1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery Learning • Peer Teaching	☐ Write a polynomial function with more than four complex zeros ☐ Write a polynomial function, given coordinate points ☐ Cubic & quadratic regression ☐ Peer Teaching	3-4

SCORE	DESCRIPTION	SAMPLE TASKS
	STANDARD: Write and Apply Polynomial Functions	
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Write an equation in factored form with complex roots or irrational roots. • Solve an application problem by writing and solving a polynomial equation **The student exhibits no major errors or omissions.**	• Write a polynomial with the given zeros: -1, 4-i •
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Recognizes or recalls specific terminology, such as: Zeros, roots • Performs basic processes, such as: Write an equation in factored form with rational roots. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Write a polynomial with the given zeros: -2, 4, 3
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

CONTENT AREA: Mathematics	UNIT: Radical Functions
COURSE: Honors Algebra 2	UNIT DURATION: 3-4 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
• **Textbook** • **Graphing Calculator** • **Supplemental Handouts**	• **Simplify radical expressions and expressions with rational exponents** • **Perform operations on functions including the composition of functions** • **Solve radical equations and inequalities** • **Graph square root and cube root functions** • **Write inverses of functions**
ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:
• **Real world applications can be represented mathematically** • **Equations can have extraneous solutions** • **All mathematical operations have an inverse operation** • **Graphically, all inverses are reflections of each other over the line y = x.**	• **How will I simplify radical expressions and expressions with rational exponents?** • **How will I perform operations on functions including the composition of functions?** • **How will I solve radical equations and inequalities?** • **How will I graph square root and cube root functions?** • **How will I write inverses of functions?** • **How can I apply radical functions to a real-life situation?**

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
A2.NQ.A.1	Extend the system of powers and roots to include rational exponents.		X
A2.NQ.A.2	Create and recognize equivalent expressions involving radical and exponential forms of expressions.		X
A2.NQ.A.3	Add, subtract, multiply, and divide radical expressions		X
A2.NQ.A.4	Solve equations involving rational exponents and/or radicals and identify situations where extraneous solutions may	X	

	result		
A2.BF.A.1	Create new functions by applying the four arithmetic operations and composition of functions		X
A2.BF.A.2	Derive inverses of functions and compose the inverse with the original functions to show that the functions are inverses.	X	
A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables, and algebraic symbolism	X	
A2.BF.A.3	Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations of cube root and square root functions	X	
A2.REI.A.1	Create and solve equations and inequalities involving radical functions.		

OBJECTIVE # 1	Simplify Radical Expressions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A2.NQ.A.1 Extend the system of powers and roots to include rational exponents. A2.NQ.A.2 Create and recognize equivalent expressions involving radical and exponential forms of expressions. A2.NQ.A.3 Add, subtract, multiply and divide radical expressions. A2.BF.A.1 Create new functions by applying the four arithmetic operations and composition of functions (modifying the domain and range as necessary).

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to simplify a radical expression. • How to rationalize a denominator. • How to apply properties of exponents to rational exponents. • How to perform basic function operations. • How to restrict the domain of an algebraic expression.	• Radical Index/Root • Radicand • Interval Notation • Domain • Rationalize • Interpretation of a rational exponent	• Simplify radical expressions • Rationalize a denominator • Apply properties of exponents to rational exponents. • Perform basic function operations. • Restrict the domain of an algebraic expression.
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		

The City of St. Charles School District
Honors Algebra 2 Curriculum

TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• **Demonstrate simplifying radical expressions** • **Demonstrate how to perform basic function operations** • **Demonstrate how to restrict the domain of algebraic expressions.**	• **Practice simplifying radical expressions** • **Practice how to perform basic function operations** • **Practice how to restrict the domain of algebraic expressions.**	DOK Level 2 - 3 Questions # 2, 4, 5, 7, 11, 12, 14, 15, 16, 17 - 22 **See linked document**
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Computer Technology • Science	• Properties of Exponents • Combine Like Terms • Operations with Fractions	• What can be modeled by a radical expression?
HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	FORMATIVE FORMATIVE SUMMATIVE	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	☐Additional practice ☐Test corrections	2-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self-guided assignment	☐Student presentation on the information	3-4

The City of St. Charles School District
Honors Algebra 2 Curriculum

PROFICIENCY SCALES FOR THIS STANDARD

STANDARD 16: Simplify Radical Expressions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Rationalize a radical expression including a complex denominator. • Add, subtract, multiply and divide radical expressions • Simplify radical expressions in both radical form and rational exponent form. • Restrict the domain for algebraic expressions. **The student exhibits no major errors or omissions.**	Questions # 2, 4, 5, 7, 11, 12, 14, 15, 16, 17 - 22 **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Perform operations on functions with minor mistakes. • Add, subtract, multiply, divide simplified radical expressions. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	Questions # 1, 3, 6, 8, 9, 10, 13, 17 - 22 **See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 2	Solving Radical Equations
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A2. NQ. A. 4 Solve equations involving rational exponents and/or radicals and identify situations where extraneous solutions may result. A2.REI.A.1 Create and solve equations and inequalities involving radical functions.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to solve a radical equation • How to solve a radical inequality • How to solve an equation with rational exponents • How to apply radical equations to real-life situations.	• Extraneous Solutions • Radical Equation • Radical Index/Root • Radicand • Interval Notation • Interpretation of a rational exponent	• Solve a radical equation. • Solve a radical inequality. • Solve an equation with rational exponents. • Apply radical equations to real-life situations.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate solving a radical equation and inequality. • Connect material to real-world material.	• Practice solving a radical equations and inequality. • Practice connecting material to real-world situations.	• Questions # 23, 24, 25, 26 **See linked document**
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Science • Architecture • Construction	• Factoring a quadratic • Quadratic Formula • Order of Operations • ☐Solving Linear Equations/Inequalities	Why would we model a situation with a radical equation?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes	FORMATIVE FORMATIVE	1 - 4 2 - 3

| • Comprehensive Test | SUMMATIVE | 1 - 4 |

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional Instruction through Khan Academy or Fort Bend Tutoring	☐Additional practice ☐Test corrections	
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	☐Student presentation on the information	

SCORE	DESCRIPTION	SAMPLE TASKS
STANDARD 17: Solve Radical Equations		
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.0	**The student:** • Solve multi-step radical equations. • Solve multi-step equations with rational exponents. • Solve radical inequalities. **The student exhibits no major errors or omissions.**	• [Questions # 23, 24, 25, 26](#) **See linked document-**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Solve radical equation in which the radical is isolated. • Solve a simply rational exponent equation. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• [Questions # 22, 27](#) **See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District

Honors Algebra 2 Curriculum

OBJECTIVE # 3	Graph Radical Functions and Inequalities
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A2.IF.A.1 Identify and interpret key characteristics of functions represented graphically, with tables and algebraic symbolism to solve problems. A2.BF.A.3 Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations for cube root and square root functions.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to graph cube root and square root functions • How to graph graph a radical inequality • How to state the domain and range	• Interpretation of Vertex Form • Expand • Compress • Reflect • Translate • Domain • Range • Inverse	• Graph cube root and square root functions • Graph graph a radical inequality • State the domain and range

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate how to graph cube root and square root functions • Demonstrate how to graph a radical inequality • Demonstrate how to state the domain and range	• Practice graphing cube root and square root functions • Practice graphing a radical inequality • Practice finding the domain and range	
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	
• Business • Psychology • Engineering	• Graphing a parabola • Graphing a cubic • Finding domain and range of a polynomial	What is modeled using a square root or cube root function?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	FORMATIVE FORMATIVE SUMMATIVE	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	• Additional practice • Test corrections	Questions # 28 - 36 **See linked document**
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	☐Student presentation on the information	

STANDARD 18 : Graphing Radical Functions and Inequalities		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Graph square root function • Graph inverse functions • Graph cube root function • Graph radical inequalities • Identify transformations • Find domain and range **The student exhibits no major errors or omissions.**	• Questions # 28 - 36 **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Graph square root function with minor mistakes • Graph cube root function with minor mistakes • Graph radical inequalities with minor mistakes • Identify transformations with minor mistakes • Find domain and range with minor mistakes **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Questions # 28 - 36 **See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 4	Writing Radical Equations and Inverses
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A2.BF.A.2 Derive inverses of functions and compose the inverse with the original function to show that the functions are inverses.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to write an inverse • How to to write a radical equation given a real world problem • How to verify that two functions are inverses of each other	• Inverse • Cube root • Square root	• Write the inverse of an equation • Model a real-world problem using a radical function • Verify two functions are inverses of each other using the composition of functions

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate how to write an inverse • Demonstrate how to to write a radical equation given a real world problem • Demonstrate how to verify that two functions are inverses of each other	• Practice writing the inverse of an equation • Practice modeling a real-world problem using a radical function • Practice verifying two functions are inverses of each other using the composition of functions	Questions #37 - 42 ** See linked document**
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	
• Business • Psychology • Engineering	• Isolate a variable • Order of operations	What is modeled using a square root or cube root function?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	FORMATIVE FORMATIVE SUMMATIVE	1 - 4 2 - 3 1 - 4

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	☐Additional practice ☐Test corrections	
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	☐Student presentation on the information	

STANDARD 19: Writing Inverses and Radical Equations		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Use composition of functions to verify that two equations are inverses. • Write the inverse of a non-linear equation **The student exhibits no major errors or omissions.**	• Questions # 38, 39, 41, 42 **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Write the inverse of a linear equation. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Questions # 37, 40 **See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

CONTENT AREA: Mathematics	UNIT: Exponential and Logarithmic Functions
COURSE: Honors Algebra 2	UNIT DURATION: 3 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
• **Graphing calculator** • **Textbook** • **Supplemental Handouts**	• **Simplify exponential and logarithmic expressions** • **Solve exponential and logarithmic equations** • **Graph exponential and logarithmic equations** • **Write equations that model exponential and logarithmic situations**
ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:
• **Real world applications can be represented mathematically** • **Equations can have extraneous solutions** • **Exponentials and logarithms are inverses of each other.** • **A logarithm is defined as an exponent.**	• **What are the solutions to a logarithm or exponential equations?** • **How do you graph a logarithmic or exponential functions?** • **How can you model and exponential or logarithmic function?**

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
A2.SSE.A.1	Develop the definition of logarithms based on properties of exponents		X
A2.SSE.A.2	Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic equations	X	
A2.SSE.A.3	Use properties of logarithms to solve equations or find equivalent expressions.		X
A2.SSE.A.4	Understand why logarithmic scales are used and use them to solve problems		X
A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables, and algebraic symbolism	X	
A2.BF.A.3	Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations of exponential and logarithmic functions.	X	

A2.FM.A.1	Create functions and use them to solve applications of exponential functions modeling problems .	X	
A2.REI.A.1	Create and solve equations and inequalities involving exponential and logarithmic functions.		

OBJECTIVE # 1	Simplifying Exponential and Logarithmic Expressions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A2.SSE.A.1 Develop the definition of logarithms based on properties of exponents. A2.SSE.A.2 Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic equations. A2.SSE.A.3 Use properties of logarithms to find equivalent expressions.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to convert between logarithmic and exponential form. • How to evaluate a logarithm • How to expand and condense logarithms using the properties of logarithms. • How to simplify exponential expressions.	• Log • Exponential • Condense • Expand	• Expand logarithms • Condense logarithms • Simplify logarithmic and exponential expressions.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate how to convert between logarithmic and exponential form. • Demonstrate how to evaluate a logarithm • Demonstrate how to expand and condense logarithms using the properties of logarithms. • Demonstrate how to simplify exponential expressions.	• Practice converting between logarithmic and exponential form. • Practice evaluating a logarithm. • Practice expanding and condensing logarithms and using the properties of logarithms**.** • Practice simplifying exponential expressions.	Questions # 1 - 16 **See linked document**

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
•	• Properties of exponents	• How can a logarithm be applied to help us solve problems?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	• Additional practice • Test corrections	1-3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	• Student presentation on the information	3-4

SCORE	DESCRIPTION	SAMPLE TASKS
STANDARD 20: Simplify Logarithmic and Exponential Expressions		
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Use the properties of logarithms to condense and expand logarithms. **The student exhibits no major errors or omissions.**	• [Questions # 10 - 16](#) ** See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Convert between logarithmic and exponential form. • Evaluate a logarithm • Simplify exponential expressions **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• [Questions # 1 - 9](#) **See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 2	Solve exponential and logarithmic equations
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A2.SSE.A.3 Use properties of logarithms to solve equations A2.SSE.A.4 Understand why logarithmic scales are used and use them to solve problems. A2.REI.A.1 Create and solve equations and inequalities involving exponential and logarithmic functions.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
- Logarithms and exponentials are inverses of each other. - How solve a logarithmic equation. - How to solve an exponential equation. - How to apply properties of logarithms to solve an equation. - How to check for extraneous solutions for logarithmic equations.	- Logarithm - Exponential - Extraneous Solution	- Solve a logarithmic equation. - Solve an exponential equation. - Identify extraneous solutions for logarithmic equations.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Demonstrate that logarithms and exponentials are inverses of each other. - Demonstrate how solve a logarithmic equation. - Demonstrate how to solve an exponential equation. - Demonstrate how to apply properties of logarithms to solve an equation. - Demonstrate how to check for extraneous solutions for logarithmic equations.	- Practice solving exponential equations. - Practice solving logarithmic equations. - Practice checking for extraneous solutions.	1-4 1-4 1-4 Questions # 17 - 28 **See linked document**

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	
• Science • Engineering	• Solve linear equation • Factor • Order of operations • Quadratic formula	

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	• Additional practice • Test corrections	1-3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	• Student presentation on the information	

SCORE	DESCRIPTION	SAMPLE TASKS
STANDARD 21: Solve Logarithmic and Exponential Equations		
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.0	**The student:** • Solve exponential equations with unlike bases. • Solve logarithmic equations that require changing forms. **The student exhibits no major errors or omissions.**	• Questions # 17 - 19, 21, 23, 25 - 27, 29 **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Solve exponential equations that contain like bases or can be rewritten with like bases. • Solve logarithmic equations that contain like bases. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Questions # 20, 24, 28 **See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District

Honors Algebra 2 Curriculum

OBJECTIVE # 3	Graph exponential and logarithmic functions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A.1F.A.1 Identify and interpret key characteristics of functions represented graphically with tables and with algebraic symbolism to solve problems. A2.BF.3 Describe the effects of transformations algebraically and graphically creating vertical and horizontal translations, vertical and horizontal reflections, and dilations of exponential and logarithmic functions.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to graph a logarithmic function. • How to graph an exponential function. • How to describe the domain and range of an exponential function. • How to describe the domain and range of a logarithmic function.	• Domain • Range • Asymptote • Vertex Form	• Graph a logarithmic function. • Graph an exponential function. • Describe the domain and range of an exponential function. • Describe the domain and range of a logarithmic function.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate how to graph a logarithmic function. • Demonstrate how to graph an exponential function. • Demonstrate how to describe the domain and range of an exponential function. • Demonstrate how to describe the domain and range of a logarithmic function.	• **Practice graphing logarithmic functions.** • **Practice graphing exponential functions.** • **Practice describing the domain and range of logarithmic.** • **Practice describing the domain and range for exponential functions.**	1-4 1-4 3 3 Questions # 30 - 44 **See linked document**
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	
• Science • Engineering	• Vertex Form • Equation of horizontal and vertical lines	

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	• Additional practice • Test corrections	
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	• Student presentation on the information	

STANDARD 22: Graph Exponential and Logarithmic Functions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Graph a logarithmic function • Graph an exponential function • State the domain and range for logarithmic and exponential functions. **The student exhibits no major errors or omissions.**	• [Questions # 30 - 44](#) **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Graph a logarithmic function with minor errors. • Graph an exponential function with minor errors. • State the domain and range for logarithmic and exponential functions with minor mistakes. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• [Questions # 30 - 44](#) ** See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 4	Write Exponential and Logarithmic Equations
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	A2.FM.A.1 Create functions and use them to solve applications of exponential functions modeling problems.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to write inverses for exponential and logarithmic functions. • How to model a real-life situation using logarithmic and exponential functions.	• Inverses • Exponential Growth/Decay Model • Compound Interest	• Write inverses for exponential and logarithmic functions. • Model real-life situation using logarithmic and exponential functions.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate how to write inverses for exponential and logarithmic functions. • Demonstrate how to model a real-life situation using logarithmic and exponential functions.	• Practice writing inverses for exponential and logarithmic functions. • Practice modeling real-life situation using logarithmic and exponential functions.	1-4 1-4 Questions # 40 - 48 **See linked document**
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	
• Science • Finance	• Writing Inverses • Order of operations	

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	• Additional practice • Test corrections	
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	• Student presentation on the information	

STANDARD 23: Write Exponential and Logarithmic Equations

SCORE	DESCRIPTION	SAMPLE TASKS
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Writes inverse of logarithmic and exponential function • Models real-life scenarios using exponential and logarithmic functions. **The student exhibits no major errors or omissions.**	• Questions # 40 - 48 **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Writes inverses of logarithmic and exponential functions with minor mistakes. • Models real-life scenarios with minor mistakes. **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Questions # 40 - 48 **See linked document**
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

CONTENT AREA: Mathematics	UNIT: Rational Functions
COURSE: Honors Algebra 2	UNIT DURATION: 3 Weeks

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
• **Graphing Calculator** • **Textbook** • **Supplemental Handouts**	• **Simplify rational expressions** • **Solve rational equations** • **Graph rational equations** • **Write variation functions**

ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:
• **Real world applications can be represented mathematically** • **Equations can have extraneous solutions** • **Domain has restrictions** • **Asymptotes are where a graph approaches**	• **What are the solutions to a rational function?** • **How do you simplify rational expressions?** • **How do you graph rational functions?** • **How can you model rational functions?**

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
A2.APR.A.3	Add, subtract , multiply, and divide rational expressions.		X
A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables, and with algebraic symbolism.	X	
A2.BF.A.3	Describe the effects of transformations algebraically and graphically creating vertical and horizontal translations, vertical and horizontal reflections and dilations for rational functions.	X	
A2.REI.A.2	Solve rational equations where numerators and denominators are polynomials and where extraneous solutions may result.	X	

OBJECTIVE # 1	Simplify Rational Expressions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.APR.A.3 Add, subtract , multiply, and divide rational expressions including complex fractions.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*

• How to get a common denominator • How to add and subtract rationals • How to multiply and divide rationals • How to use factor and reduce rationals	• Complex fraction • Reduce • LCD, least common denominator • Factor • reciprocal	• Add rationals • Subtract rationals • Multiply rationals • Divide rationals • Simplify rationals • Simplify complex fractions

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate how to get a common denominator • Demonstrate how to add and subtract rationals • Demonstrate how to multiply and divide rationals • Demonstrate how to use factor and reduce rationals	• **Practice adding fractions with common denominator** • **Practice getting a common denominator** • **Practice multiplying rationals** • **Practice dividing rationals** • **Practice simplifying complex fractions**	1-4 1-4 1-4 1-4 1-4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Medicine • Science • engineering	• Adding and subtracting fractions with no variables • Multiplying and dividing fractions with no variable • Factoring polynomials • Reducing fractions • Properties of exponents	• How can simplifying rational expressions help to solve and graph rational functions?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

The City of St. Charles School District
Honors Algebra 2 Curriculum

| HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? |||
| *Possible Interventions* |||
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	☐Additional practice ☐Test corrections	1-3 1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	☐Student presentation on the information	3-4

STANDARD 24: Simplify Rational Expressions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Add, subtract, multiply and divide rational expressions including complex fractions. **The student exhibits no major errors or omissions.**	(3x+2-6x2-4)/(3xx2+2x-3+xx2-9)
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Recognizes or recalls specific terminology, such as: Common denominator Simplify Reduce reciprocal • Performs basic processes, such as: Add and subtract rational expressions with a common denominator Add and subtract rational expressions without a common denominator Multiply rational expressions Divide rational expressions Simplify complex fractions **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• (3x+2-6x2-4)x2+2x-3
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 2	Solve rational equations	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.REI.A.2 Solve rational equations where numerators and denominators are polynomials and where extraneous solutions may result.	
WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to solve rationals using cross-multiplication method • How to solve rational functions by multiplying by the least common denominator. • How to determine if a solution is extraneous	• Cross-multiplication • LCD, least common denominator • Extraneous solution • Undefined values • Domain • Factoring • Rational roots • rational	• Solve rationals using cross-multiplication method • Solve rational functions by multiplying by the least common denominator. • Determine if a solution is extraneous
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Demonstrate how to solve rationals using cross-multiplication method • Demonstrate how to solve rational functions by multiplying by the least common denominator. • Demonstrate how to determine if a solution is extraneous	• Practice solving rationals using cross-multiplication method • Practice solving rational functions by multiplying by the least common denominator. • Practice how to find the domain and determine if a solution is extraneous	1-4 1-4 1-4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Engineering • Science • architecture	• Multiply polynomials • Simplify polynomials • Find a least common denominator • Factor • Solve polynomials • Find domain	How can rational functions be applied to help us solve real life problems?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	☐Additional practice ☐Test corrections	1-3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	☐Student presentation on the information	

SCORE	DESCRIPTION	SAMPLE TASKS
STANDARD 25: Solve Rational Equations		
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.0	**The student:** • Solve rational functions with just one term on each side of the equation. At least one of the terms is nonlinear. • Solve rational functions with multiple terms on one or both sides of the equation. At least one of the terms is nonlinear. • Solve a rational function that has at least one extraneous solution **The student exhibits no major errors or omissions.**	• x+2x+1=x-3x • x+2x+1=x-3x+x+2x2+2x+1
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Solve rational functions with just one term on each side of the equation. Terms are linear. • Solve rational functions with multiple terms on one or both sides of the equation. Terms are linear. • Solve a rational function that has an extraneous solution **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• x+2x+1=34x • x+2x+1=x-35+2x+1
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 3	Graph Rational Functions	
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A2.IF.A.1 Identify and interpret key characteristics of functions represented graphically with tables and with algebraic symbolism. • A.BF.A.3 Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations for rational functions.	
WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to graph a rational function in basic standard form of a, h, and k • How to describe domain and range of rational functions in standard form • How to find asymptotes and holes in graph if not in standard form of a, h, and k.	• Domain • Range • Asymptote • translations	• How to graph a rational function in basic standard form of a, h, and k • How to describe domain and range of rational functions in standard form • How to find asymptotes and holes in graph if not in standard form of a, h, and k.
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• How to graph a rational function in basic standard form of a, h, and k • How to describe domain and range of rational functions in standard form • How to find asymptotes and holes in graph if not in standard form of a, h, and k. •	• How to graph a rational function in basic standard form of a, h, and k • How to describe domain and range of rational functions in standard form • How to find asymptotes and holes in graph if not in standard form of a, h, and k.	1-4 1-4 1-4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Medical • Science • Engineering	• Vertex form • Asymptotes • Equations of lines • Domain • Range	How can graphs of rational functions help predict information that might occur if trend continues?

The City of St. Charles School District
Honors Algebra 2 Curriculum

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	☐Additional practice ☐Test corrections	
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	☐Student presentation on the information	

The City of St. Charles School District
Honors Algebra 2 Curriculum

STANDARD 26: Graph Rational Functions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Graph rational functions in standard a, h, k form • Graph rational functions not in the standard a, h, k form • State domain and range for rational functions **The student exhibits no major errors or omissions.**	• $y = \frac{3}{x-2} - 5 + \frac{3}{x} - 2$ • $y = \frac{3}{x-2} - 5 + \frac{3}{x-2} + 2$ • $y = \frac{3}{x-2} - 5 + \frac{2}{x} - 2$
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Graph rational functions in standard form a, h, k • Graph rational functions that can be rewritten in standard form with a, h, k **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• $y = \frac{2}{x-2} + 5$ • $y = \frac{-5 + 2}{x-2}$
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

The City of St. Charles School District
Honors Algebra 2 Curriculum

OBJECTIVE # 4	Write and Apply Variations Functions		
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• A.FM.A.1 create functions and use them to solve application problems.		
WHAT SHOULD STUDENTS…			
UNDERSTAND? Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.	**KNOW?** Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY	**BE ABLE TO DO?** Skills; Products	
• How to write direct, inverse, and joint variation functions • How to model a real-life situation using rational functions	• Direct • Inverse • Joint • variation	• Write direct, inverse, and joint variation functions • Model a real-life situation using rational functions	
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING			
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)	
• Demonstrate how to write direct, inverse, and joint variation functions • Demonstrate how to model a real-life situation using rational functions	• Practice writing direct, inverse, and joint variation functions • Practice modeling a real-life situation using rational functions	1-4 1-4	
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**	
• Medical • Science • Engineering • Music	• Linear equation • Inverses • constant	How can writing an inverse variation help solve problems?	
HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?			
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)	
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4	
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?			

Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Provide additional instruction from Khan Academy or Fort Bend Tutoring.	• Additional practice • Test corrections	
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Self guided assignments	• Student presentation on the information	

STANDARD 27: Write and Apply Variation Functions

SCORE	DESCRIPTION	SAMPLE TASKS
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Writes direct, inverse, and joint variation functions • Models real-life scenarios using direct, inverse, and joint variations. **The student exhibits no major errors or omissions.**	• The owners of Roller Plus determine that the monthly sales, S, of its skates vary directly as its advertising budget, A and inversely as the price of the skates, P. When $60,000 is spent on advertising and the price of the skates is $40, the monthly sales are 12,00 pairs of rollerblades. Determine the monthly sales if the amount of the advertising budget is increased to $70,000. • The volume of a cone, V, varies jointly as its height, h, and the square of its radius, r. A cone with a radius measuring 6 feet and a height measuring 10 feet has a volume of 120 cubic feet. Find the volume of a cone having a radius of 12 feet and a height of 2 feet.
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • Writes direct and inverse variation functions • Models real-life scenarios with minor mistakes **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• The volume of blood, B, in a person's body varies directly as body weight, W. A person who weighs 160 pounds has approximately 5 quarts of blood. Estimate the number of quarts of blood in a person who weighs 200 pounds • The length of a violin string varies inversely as the frequency of its vibrations. A violin string 8 inches long vibrates at a frequency of 640 cycles per second. What is the frequency of a 10-inch string?

1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	