Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Algebra 2 Accelerated

Course Number:

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Accelerated / Quadratic Functions **Grade Level(s):** **9 – 12**	**Unit Summary**: Students have studied quadratic functions in Algebra 1. Their background should include factoring quadratic expressions, graphing quadratic equations written in three forms, and solving quadratic equations using a variety of approaches. Students will extend their knowledge of quadratic functions in this chapter. In the previous chapter, students looked at the transformations of linear and absolute value functions. The first lesson in this chapter introduces the same transformations on quadratic functions. The vertex of the absolute value function and the vertex of a quadratic function are key points that help students distinguish quickly the type(s) of transformation(s) displayed in a graph. The second and third lessons look at characteristics of quadratic functions. Where is the function increasing or decreasing? Where is the line of symmetry? What is the maximum/ minimum value of the function? The last lesson of the chapter looks at modeling with quadratic functions. The technique of solving systems from Chapter 1 is extended to a 3-by-3 system. There are four common forms in which quadratics are written, and each gives information about the graph and the behavior of the function. Understanding the connection between the characteristics of a quadratic and its equation can help students apply their knowledge when working with a real-life application.
Essential Question(s): • **How do the constants $a, h,$ and k affect the graph of the quadratic function $g(x) = a(x - h)^2 + k$?** • **What type of symmetry does the graph of $f(x) = a(x - h)^2 + k$ have and how can you describe the symmetry?** • **How can you use a quadratic function to model a real-life situation?**	**Enduring Understanding(s):** • Describe transformations of quadratic functions. • Write transformations of quadratic functions. • Explore properties of parabolas. • Find maximum and minimum values of quadratic functions. • Determine domain and range and state it using interval notation. • Determine intervals of increase and decrease using interval notation. • Solve real-life problems. • Write equations of parabolas. • Solve real-life problems. • Write equations of quadratic functions using vertices, points.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	NJSLS:
2.1 Transformations OF Quadratic Functions **Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.** **Identify the effect on the graph of replacing *f*(*x*) by *f*(*x*) + *k*, *k f*(*x*), *f*(*kx*), and *f*(*x* + *k*) for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.**	**2.1 NJSLS.F-IF.C.7c, NJSLS.F-BF.B.3**
2.2 Characteristics of Quadratic Functions **For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.** **For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.** **Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).** **Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.**	**2.2 NJSLS.F-IF.B.4, NJSLS.F-IF.C.7.c, NJSLS.F-IF.C.9, NJSLS.APR-.B.3**
2.4 Modeling with Quadratic Functions **Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.**	**2.4 NJSLS.A-CED.A.2**

Inter-Disciplinary Connections:

Real-World and Inter-Disciplinary problem solving examples:

Physics p.51 EX5, Physics p.53 # 43 #44, Nature p.54 #45, Physics p.60 EX 5, Physics p.62 #35 #36, Electricity p.71 EX 5

Students will engage with the following text:

Big Ideas MATH Algebra 2

Students will write:

Students will describe the constants a, h, and k affect the graph of the quadratic function $g(x) = a(x - h)^2 + k$.
Students will write the equation of a quadratic function given a graph and explain their reasoning.
Students will describe what type of symmetry does the graph of $f(x) = a(x - h)^2 + k$ have.
Students will describe the symmetry of each graph of a function given its equation.
Students will write the equation of a translated parabola.
Students will write an equation of a parabola using a vertex and a given point.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will uncover and build skills through various classroom learning activities. Investigating algebra activities, modeling examples, using real-life application, using note-taking strategies, and using Smart Board technologies will all be explored as a blend of learning strategies to promote critical thinking, problem solving and performance skills of all learners. Other learning experiences could include alternative lesson openers, math and history applications, problem-solving workshops, interdisciplinary applications and projects.

Suggested warm-up activities, instructional strategies/activities, and assignments:

Section : 2.1 Transformations and Quadratic Functions

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (multiply polynomials)
Teaching Objectives	• Describe transformations of quadratic functions. • Write transformations of quadratic functions.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 51 **Inquire** **Formative Assessment (Mini assessment TE pg. 54)**
Practice and Apply **Assigning Homework**	Big Idea Text pg.52 - 54, #1-33, 35, 37, 39, 46, 50–52
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 2.2 Characteristics of Quadratic Functions

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (give the coordinates of the image of a point after a reflection)
Teaching Objectives	• Explore properties of parabolas. • Find maximum and minimum values of quadratic functions. • Determine domain and range and state it using interval notation. • Determine intervals of increase and decrease using interval notation.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 60 **Inquire** **Formative Assessment (Mini assessment TE pg. 64)**

Practice and Apply **Assigning Homework**	Big Idea Text pg. 61-64, # 1–2, 3-18, 21-26, 33-46, 77, 81–88
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section : 2.4 Modeling with Quadratic Functions

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (write the equation of a line in point slope form given a point and the slope).
Teaching Objectives	• Write equations of quadratic functions using vertices, points.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 79 **Inquire** **Formative Assessment (Mini assessment TE pg. 82)**
Practice and Apply **Assigning Homework**	For objectives relating to system of two, teachers should use Kuta or other supplementary materials. Big Idea Text pg. 80-82 # 1-13, 17-21, 28, 38-41
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period.

- **Diagnostic Pre-Test**
- **Chapter Tests**
- **Periodic Benchmark Tests**
- **End-Of –Course Assessment**
- **Standardized Tests**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

The following assessments require students to utilize various strands of mathematics.

- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Revised 6/2018

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Algebra 2 Accelerated

Course Number:

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Algebra 2 Accelerated /
Quadratic Equations
& Complex Numbers</td><td rowspan="2">Unit Summary:

The strategies for solving quadratic equations presented in the first four lessons were introduced at the end of Algebra 1. The difference now is that solutions are not restricted to real numbers. In Section 3.2, complex numbers are defined and operations on complex numbers presented. This is followed by the technique of completing the square so that the Quadratic Formula can be derived.
In total, students will use five strategies for solving quadratic equations: graphing, square rooting, factoring, completing the square, and using the Quadratic Formula. As the number of strategies increases in the chapter, students should be making informed choices as to which strategy to use given the equation.</td></tr>
<tr><td>Grade Level(s):
9 - 12</td></tr>
<tr><td>Essential Question(s):

• How do we factor by GCF, Difference of two squares and trinomials?

• How can you use the graph of a quadratic equation to determine the number of real solutions of the equation?</td><td>Enduring Understanding(s):

• Factor a variety of expressions by Greatest Common Factor, Difference of two squares as well as factoring trinomials with the following:
(level Basic = prime number no larger than 3, c is composite)
(level Accelerated = smaller composite numbers for A & C)
(level Honors= larger composite numbers A & C)

• Solve quadratic equations by graphing.
• Solve quadratic equations algebraically.
• Solve real-life problems.

• Define and use the imaginary unit i.
• Add, subtract, and multiply complex numbers.</td></tr>
</table>

• What are the subsets of the complex numbers? • How can you complete the square for a quadratic expression? • How can you derive a general formula for solving a quadratic equation?	• Find complex solutions and zeros. • Simplify Square Roots • Solve quadratic equations using square roots. • Solve quadratic equations by completing the square. • Write quadratic functions in vertex form. • Solve quadratic equations using the Quadratic Formula. • Solve real-life problems.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
3 Supplemental	**3 Supplemental**
Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* Factor a quadratic expression to reveal the zeros of the function it defines.	NJSLS.A-SSE.A.2, NJSLS.S-SSE.B.3a,
3.1 Solving Quadratic Equations (Supplement to include higher powers of *i*.)	**3.1**
Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	NJSLS.A-SSE.A.2, NJSLS.A-REI.B.4b, NJSLS.F-IF.C.8a
3.2 Complex Numbers	**3.2**
Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. Solve quadratic equations with real coefficients that have complex solutions. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to	NJSLS.N-CN.A.1, NJSLS.N-CN.A.2, NJSLS.N-CN.C.7, NJSLS.A-REI.B.4b

the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	
3.3 Completing the Square Solve quadratic equations with real coefficients that have complex solutions. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	**3.3** NJSLS.N-CN.C.7, NJSLS.A-REI.B.4b, NJSLS.F-IF.C.8a
3.4 Using the Quadratic Formula Solve quadratic equations with real coefficients that have complex solutions. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	**3.4** NJSLS.N-CN.C.7, NJSLS.A-REI.B.4b

Inter-Disciplinary Connections:

Publishing p.97 Ex 5, Business p.100 # 57, Architecture p.101 #60, Sports p.115 #6, Physics p.117 #63, Sports p.128 #61 & 65, Biology p.129 #67,

Students will engage with the following text:

Big Ideas Math: Algebra 2

Students will write:

Explain why the expression $81 - x^4$ cannot be factored into $(3+x)^2(3-x)^2$.

How can you use the graph of a quadratic equation to determine the number of real solutions of the equation?

How many real solutions does the quadratic equation $x^2 + 3x + 2 = 0$ have? How do you know? What are the solutions?

Is it possible for a number to be both whole and natural? natural and rational? rational and irrational? real and imaginary? Explain your reasoning.

How can you complete the square for a quadratic expression?

How can you derive a general formula for solving a quadratic equation?

Summarize the following methods you have learned for solving quadratic equations: graphing, using square roots, factoring, completing the square, and using the Quadratic Formula.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will uncover and build skills through various classroom learning activities. Investigating algebra activities, modeling examples, using real-life application, using note-taking strategies, and using Smart Board technologies will all be explored as a blend of learning strategies to promote critical thinking, problem solving and performance skills of all learners. Other learning experiences could include alternative lesson openers, math and history applications, problem-solving workshops, interdisciplinary applications and projects.

Suggested warm-up activities, instructional strategies/activities, and assignments:

3 Supplemental:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Make a chart to show the number of x-intercepts of each equation, along with the corresponding point(s) of the x-intercept(s). Are there any patterns you notice? What are they? How can you tell when the vertex will be the minimum of the graph? The maximum?)
Teaching Objectives	• Factor a variety of expressions by Greatest Common Factor, Difference of two squares as well as factoring trinomials with the following: (level Basic = prime number no larger than 3, c is composite) (level Accelerated = smaller composite numbers for A & C) (level Honors= larger composite numbers A & C)
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets (teacher made supplement) **Inquire** **Formative Assessment (Mini assessment teacher made supplement)**
Practice and Apply **Assigning Homework**	Teacher created worksheet using Kuda software or other supplemental material.

Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

3.1 Solving Quadratic Equations (Supplement to include higher powers of *i*.):

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Use a graphing calculator to find the solution to the system of equations, if possible.)
Teaching Objectives	• Solve quadratic equations by graphing. • Solve quadratic equations algebraically. • Solve real-life problems.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 98 **Inquire** **Formative Assessment (Mini assessment TE pg. 102)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.99-102 #1-10, 13-19, 23, 27-32, 47-54, 57, 59, 70, 71, 76–83
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

3.2 Complex Numbers:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Simplify a given algebraic expression.)
Teaching Objectives	• Define and use the imaginary unit i. • Add, subtract, and multiply complex numbers. • Find complex solutions and zeros.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 107 **Inquire** **Formative Assessment (Mini assessment TE pg. 110)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.108-110 #1–31, 37–44, 49–66, 68, 79–84

Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Supplemental: Simplify Radicals

	College Prep
Focus and Motivate **Starting Options (Lesson Warm Up)**	*Suggestions include but not limited to:* Warm-ups have students simplify perfect square roots
Teaching Objectives	• Simplify square roots
Checking for Understanding	*Suggestions include but not limited to:* Exit Tickets Inquiry
Practice and Apply **Assigning Homework**	Use Kuta Software
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

3.3 Completing the Square:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Practice factoring the difference of two squares.)
Teaching Objectives	• Solve quadratic equations using square roots. • Solve quadratic equations by completing the square. • Write quadratic functions in vertex form.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 115 **Inquire** **Formative Assessment (Mini assessment TE pg. 118)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.116-118 # 1-19, 25–37, 41–50, 55-61, 66, 69, 74–81
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

3.4 Using the Quadratic Formula:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource. (Substitute for a variable and simplify the expression.)
Teaching Objectives	• Solve quadratic equations using the Quadratic Formula. • Analyze the discriminant to determine the number and type of solutions. • Solve real-life problems.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 126 **Inquire** **Formative Assessment (Mini assessment TE pg. 130)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.127-130 #1-18, 27, 33, 34, 72, 77–84
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period.

- **Diagnostic Pre-Test**
- **Chapter Tests**
- **Periodic Benchmark Tests**
- **End-Of –Course Assessment**
- **Standardized Tests**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

The following assessments require students to utilize various strands of mathematics.

- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Revised 6/2018

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Algebra 2 Accelerated

Course Number:

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Algebra 2 Accelerated / Systems of Equations</td><td rowspan="2">Unit Summary:
Chapter 1 presents topics that were studied in Algebra 1. Students will begin by solving systems of two linear equations, and progress to systems of three equations. Finally, students will use these skills (substitution, eliminations, and graphing) to determine solutions of non-linear systems.</td></tr>
<tr><td>Grade Level(s):
9 – 12</td></tr>
<tr><td>Essential Question(s):
How can you determine the number of solutions of a linear system?
How can you solve a linear system in two variables?
How can you solve a linear system in three variables?
How can you solve a nonlinear system of equations?</td><td>Enduring Understanding(s):
Solve systems of linear equations by substitution and elimination.
Use systems of linear equations to solve real-life problems
Visualize solutions of systems of linear equations in three variables.
Solve systems of linear equations in three variables algebraically.
Solve real life problems.
Solve systems of nonlinear equations.
Solve quadratic equations by graphing</td></tr>
</table>

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
1.4 Solving Linear Systems **Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.** **Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.**	**1.4 NJSLS.A-CED.A.3, NJSLS.A-REI.C.6**
3.5 Solving Nonlinear Systems Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. Solve quadratic equations with real coefficients that have complex solutions. Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	3.5 NJSLS.A-CED.A.3, NJSLS.A-REI.C.7, NJSLS.A-REI.D.11

Inter-Disciplinary Connections:

Real-World and Inter-Disciplinary problem solving examples:
, Business p. 33 EX 4, Business p. 35 #17, #18, Business p. 36 #39, Broadcasting p.137 #50

Students will engage with the following text:

Big Ideas MATH Algebra 2

Students will write:

Students will describe how can you determine the number of solutions of a linear system?

Given a system of three linear equations in three variables, students will explain how you would approach solving such a system.

Students will explain when it might be more convenient to use elimination method than then substitution method to solve a linear system.

How can you solve a nonlinear system of equations?

Would you prefer to use a graphical, numerical, or analytical approach to solve some given nonlinear system of equations? Explain your reasoning.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will uncover and build skills through various classroom learning activities. Investigating algebra activities, modeling examples, using real-life application, using note-taking strategies, and using Smart Board technologies will all be explored as a blend of learning strategies to promote critical thinking, problem solving and performance skills of all learners. Other learning experiences could include alternative lesson openers, math and history applications, problem-solving workshops, interdisciplinary applications and projects.

Suggested warm-up activities, instructional strategies/activities, and assignments:

Section : Supplement 2x2 Systems

	College Prep
Focus and Motivate **Starting Options (Lesson Warm Up)**	*Suggestions include but not limited to:* Warm-ups display a graph of two linear systems and discuss what the intersection represents.
Teaching Objectives	• Solve systems of linear equations by substitution and elimination. • Use systems of linear equations to solve real-life problems • Solve real life problems.
Checking for Understanding	*Suggestions include but not limited to:* Exit Tickets Inquiry Formative Assessment
Practice and Apply **Assigning Homework**	For objectives relating to system of two, teachers should use Kuta or other supplementary materials. Big Ideas Text pg. 28: # 33-38 *Supplemental Text Prentice Hall Algebra 2*: pg 128 #1-43
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section : 1.4 Solving Linear Systems

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (rewriting equations in slope-intercept form)
Teaching Objectives	• **Solve systems of linear equations by substitution and elimination.**

	• **Use systems of linear equations to solve real-life problems** • **Visualize solutions of systems of linear equations in three variables.** • **Solve systems of linear equations in three variables algebraically.** • **Solve real life problems.**
Checking for Understanding	**Suggestions include but not limited to:** **Exit Tickets** **Closure TE p. 15** **Inquire** **Formative Assessment (Mini assessment TE pg. 36)**
Practice and Apply **Assigning Homework**	**For objectives relating to system of two, teachers should use Kuta or other supplementary materials.** Big Idea Text pg. 34-36 **, #** 1-15, 19-23 odd, 36, 40, 44–51
Assess and Reteach **Differentiating Instruction**	**All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…**
Accommodations/Modifications:	**As per individual students' IEP or 504 plan.**

3.5 Solving Nonlinear Systems:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource. Solve a system using a graphing calculator or software.
Teaching Objectives	• Solve systems of nonlinear equations. • Solve quadratic equations by graphing
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 135 **Inquire** **Formative Assessment (Mini assessment TE pg. 138)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.136-138 #1-21, 23, 27-33, 35, 43–47, 58, 61–66
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period.

- **Diagnostic Pre-Test**
- **Chapter Tests**
- **Periodic Benchmark Tests**
- **End-Of –Course Assessment**
- **Standardized Tests**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

The following assessments require students to utilize various strands of mathematics.

- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Revised 6/2018

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Algebra 2 Accelerated

Course Number:

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Accelerated / Polynomial Functions **Grade Level(s):** **9 - 12**	**Unit Summary**: Polynomial functions are defined and graphed. End behavior of even- and odd- This is the longest chapter in the book, with nine lessons about polynomial functions. Linear and quadratic functions are two types of polynomials, so connections to earlier work are easily made. In the first lesson, polynomial functions are defined and graphed. The notation and vocabulary can be overwhelming for students, though some of the vocabulary was used in Algebra 1. End behavior of even- and odd-degree polynomials is explored. Operations on polynomial expressions are presented so that polynomial expressions can be factored. Prior work with factoring is extended to third- and fourth-degree expressions. Synthetic division is used to efficiently check for possible rational roots when rewriting polynomials in factored form in order to solve polynomial equations. All of the work with operations on polynomials, factoring, and solving leads to the Fundamental Theorem of Algebra in the middle of the chapter: If f(x) is a polynomial of degree n, where n < t; 0, then the equation f(x) = 0 has at least one solution in the set of complex numbers. The corollary to the theorem, namely that an nth-degree polynomial function has exactly n zeros, is the focus of the lesson. The last third of the chapter deals with polynomial functions, in particular the graphs of these functions Concepts that are foundational for work in calculus are presented. Certainly a great deal of content in this chapter is calculator dependent. In fact, symbolic manipulators can perform much of the work presented in the early part of the chapter, and graphing calculators can be used to quickly solve polynomial equations..
Essential Question(s): • What are some common characteristics of the graphs of cubic and quartic polynomial functions? • How can you cube a binomial? • How can you use the factors of a cubic	**Enduring Understanding(s):** • Identify polynomial functions. • Graph polynomial functions using tables and end behavior • Add and subtract polynomials. • Multiply polynomials. • Use Pascal's Triangle to expand binomials • Use synthetic division to divide polynomials by binomials of the form x − k.

polynomial to solve a division problem involving the polynomial?	• Use the Remainder Theorem
• How can you factor a polynomial?	• Factor polynomials. • Use the Factor Theorem
• How can you determine whether a polynomial equation has a repeated solution?	• Find solutions of polynomial equations and zeros of polynomial functions. • Use the Rational Root Theorem. • Use the Irrational Conjugates Theorem.
• How can you determine whether a polynomial equation has imaginary solutions?	• Use the Fundamental Theorem of Algebra. • Find conjugate pairs of complex zeros of polynomial functions.
• How many turning points can the graph of a polynomial function have?	• Use x-intercepts to graph polynomial functions. • Use the Location Principle to identify zeros of polynomial functions. • Find turning points and identify local maximums and local minimums of graphs of polynomial functions.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
4.1 Graphing Polynomial Functions For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	**4.1** NJSLS.F-IF.B.4, NJSLS.F-IF.C.7c
4.2 Adding, Subtracting, and Multiplying Polynomials Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. Prove polynomial identities and use them to describe numerical relationships. Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined.	**4.2** NJSLS. A-APR.A.1, NJSLS.A-APR.C.4, NJSLS.A-APR.C.5
4.3 Dividing Polynomials Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. Rewrite simple rational expressions in different forms; write $^{a(x)}/_{b(x)}$ in the form $q(x) + {}^{r(x)}/_{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	**4.3** NJSLS.A-APR.B.2, NJSLS.A-APR.D.6
4.4 Factoring Polynomials Use the structure of an expression to identify ways to rewrite it. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	**4.4** NJSLS.A-SSE.A.2, NJSLS.A-APR.B.2, NJSLS.A-APR.B.3

4.5 Solving Polynomial Equations Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **4.6 The Fundamental Theorem of Algebra** Extend polynomial identities to the complex numbers. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **4.8 Analyzing Graphs of Polynomial Functions** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	**4.5** NJSLS.A-APR.B.3 **4.6** NJSLS.N-CN.C.8, NJSLS.N-CN.C.9, NJSLS.A-APR.B.3 **4.8** NJSLS.A-APR.B.3, NJSLS.F-IF.B.4, NJSLS.F-IF.C.7c,

Inter-Disciplinary Connections:

Business p.163 #41, Census p.170 #15, Retail p.178 #36, Engineering p.183 Ex 7, Consumer Science p.185 #66, Manufacturing p.195 #49, Science p.201 Ex 5, Business p.203 #45, Money p.204 #53, Swimming p.217 #47

Students will engage with the following text:

Big Ideas Math: Algebra 2

Students will write:

Explain what is meant by the end behavior of a polynomial function.

Describe three different methods to expand $(x + 3)^3$.

Is $(a + b)(a - b) = a^2 - b^2$ an identity? Explain your reasoning.

Explain the Remainder Theorem in your own words. Use an example in your explanation.

How do you know when a polynomial is factored completely?

Explain what a complex conjugate is.

How many solutions does the polynomial equation $(x + 8)3(x - 1) = 0$ have? Explain.

Explain what a local maximum of a function is and how it may be different from the maximum value of the function

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will uncover and build skills through various classroom learning activities. Investigating algebra activities, modeling examples, using real-life application, using note-taking strategies, and using Smart Board technologies will all be explored as a blend of learning strategies to promote critical thinking, problem solving and performance skills of all learners. Other learning experiences could include alternative lesson openers, math and history applications, problem-solving workshops, interdisciplinary applications and projects.

Suggested warm-up activities, instructional strategies/activities, and assignments:

4.1 Graphing Polynomial Functions:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Evaluate the function for the given value of x.)
Teaching Objectives	• Identify polynomial functions. • Graph polynomial functions using tables and end behavior
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 161 **Inquire** **Formative Assessment (Mini assessment TE pg. 164)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.162-164 #1-20, 25–31, 37, 46, 48, 51–56
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

4.2 Adding, Subtracting, and Multiplying Polynomials:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Simplify Expressions by distribution and combining like terms)
Teaching Objectives	• Add and subtract polynomials. • Multiply polynomials. • Use Pascal's Triangle to expand binomials
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets

	Closure TE p. 169 **Inquire** **Formative Assessment (Mini assessment TE pg. 172)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.170-172 # 1-14, 16-32, 35–47, 50-52, 56, 66–69
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

4.3 Dividing Polynomials:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Factor the expression completely.)
Teaching Objectives	• Use synthetic division to divide polynomials by binomials of the form x − k. • Use the Remainder Theorem
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 176 **Inquire** **Formative Assessment (Mini assessment TE pg. 178)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.177-178 #1–4, 11–32, 38, 41–44
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

4.4 Factoring Polynomials:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Find the greatest common factor of the polynomial.)
Teaching Objectives	• Factor polynomials. • Use the Factor Theorem
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 183 **Inquire** **Formative Assessment (Mini assessment TE pg. 186)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.184-186 #1–49, 72, 77–84

Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

4.5 Solving Polynomial Equations:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Solve linear functions for a single variable)
Teaching Objectives	• Find solutions of polynomial equations and zeros of polynomial functions. • Use the Rational Root Theorem. • Use the Irrational Conjugates Theorem.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 193 **Inquire** **Formative Assessment (Mini assessment TE pg. 196)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.194-196 #1-45, 52, 56, 66–73
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

4.6 The Fundamental Theorem of Algebra:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Identify the degree of the polynomial.)
Teaching Objectives	• Use the Fundamental Theorem of Algebra. • Find conjugate pairs of complex zeros of polynomial functions. • Use Descartes's Rule of Signs.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 201 **Inquire** **Formative Assessment (Mini assessment TE pg. 204)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.202-204 #1-14, 21-29, 33-37, 46, 50, 54–60
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

4.8 Analyzing Graphs of Polynomial Functions:

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Find the vertex of the function.)
Teaching Objectives	• Use x-intercepts to graph polynomial functions. • Find turning points and identify local maximums and local minimums of graphs of polynomial functions.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 215 **Inquire** **Formative Assessment (Mini assessment TE pg. 218)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg.216-218 #1-35, 50, 56, 57
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period.

- **Diagnostic Pre-Test**
- **Chapter Tests**
- **Periodic Benchmark Tests**
- **End-Of –Course Assessment**
- **Standardized Tests**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

The following assessments require students to utilize various strands of mathematics.

- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Revised 6/2018

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Algebra 2 Accelerated

Course Number:

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Accelerated / Rational Exponents and Radical Functions **Grade Level(s):** **9 - 12**	**Unit Summary**: In this unit (Chapter 5) the first part introduces radicals and nth roots and how these may be written as rational exponents. A connection is made to the properties of exponents studied in Algebra 1, noting that now exponents can be rational numbers and are no longer restricted to being nonzero integers. In the middle portion of the chapter, radical expressions, also written in rational exponent form, are represented as functions and are graphed. This leads to a look at what the domains are for each function type. The graphs of radical functions are used to help students think about solutions of radical equations and inequalities. Certainly, one goal is for students to recognize that solving radical equations is an extension of solving other types of functions. The difference, however, is that sometimes extraneous solutions are introduced when solving radical equations, so it is necessary to check apparent solutions. The last lessons in the chapter involve performing the four basic operations on functions and doing so from multiple approaches: symbolic, numerical, and graphical. The last lesson introduces inverse functions—finding the inverse of linear, simple polynomial, and radical functions, and noting that the graphs of inverse functions are reflections in the line y = x.
Essential Question(s): • How can you use a rational exponent to represent a power involving a radical? • How to simplify expressions with rational exponents? • How can you use properties of exponents to simplify products and quotients of radicals? • How can you identify the domain and range of a radical function? • How can you solve a radical equation?	**Enduring Understanding(s):** Students will be able to: • Find nth roots of numbers. • Evaluate expressions with rational exponents. • Solve equations using nth roots. • To simplify expressions with rational exponents. • Use properties of rational exponents to simplify expressions with rational exponents. • Use properties of radicals to simplify and write radical expressions in simplest form. • Graph radical functions. • Write transformations of radical functions. • Graph parabolas. • Solve equations containing radicals and rational exponents. • Add, subtract, multiply, and divide functions. • Find compositions of functions

• How can you use the graphs of two functions to sketch the graph of an arithmetic combination of the two functions? • How can you sketch the graph of the inverse of a function?	• Explore inverses of functions. • Find and verify inverses of nonlinear functions. • Solve real-life problems using inverse functions.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
5.1 *n*th Roots and Rational Exponents Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**5.1** **NJSLS.N-RN.A.1, NJSLS.N-RN.A.2**
5.2 Properties of Rational Exponents and Radicals Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**5.2** **NJSLS.N-RN.A.2**
5.3 Graphing Radical Functions Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	**5.3** **NJSLS.F-IF.C.7b, NJSLS.F-BF.B.3**
5.4 Solving Radical Equations and Inequalities Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	**5.4** **NJSLS.A-REI.A.1, NJSLS.A-REI.A.2**
5.5 Performing Function Operations Combine standard function types using arithmetic operations. Compose functions.	**5.5** **NJSLS.F-BF.A.1b** **NJSLS.F-BF.A.1c**
5.6 Inverse of a Function Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse.	**5.6** **NJSLS.A-CED.A.4, NJSLS.F-BF.B.4a**

Inter-Disciplinary Connections:

Real World and Inter-disciplinary problems:
Medical equipment p240 ex#6, Volume of solids p241 #33 & 34, Engineering p242 #49, Optics p249 #73, Physics p254 ex#3, Physics p257 #39 & 40, Weather p263 ex#2, Biology p266 #13, Biology p272 ex#6, Population p273 #19, Physics p282 #53

Students will engage with the following text:

Big Ideas MATH Algebra 2

Students will write:

Students will explain how you use a rational exponent to represent a power involving a radical.
Students will simplify expressions without using a calculator and explain their reasoning.
Students will describe how they can use properties of exponents to simplify products and quotients of radicals.
Students will explain how to identify the domain and range of a radical function?
Students will describe how the domain and range of a radical function are related to the index of the radical.
Students will describe how they solve a radical equation.
Students will explain why they would prefer to use a graphical, numerical, or analytical approach to solve a given equation.
Students will describe how you can use the graphs of two functions to sketch the graph of an arithmetic combination of the two functions.
Students will explain how to sketch the graph of the inverse of a function.
Students will explain relationships when comparing graphs.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will uncover and build skills through various classroom learning activities. Investigating algebra activities, modeling examples, using real-life application, using note-taking strategies, and using Smart Board technologies will all be explored as a blend of learning strategies to promote critical thinking, problem solving and performance skills of all learners. Other learning experiences could include alternative lesson openers, math and history applications, problem-solving workshops, interdisciplinary applications and projects.

Suggested warm-up activities, instructional strategies/activities, and assignments:

Section: 5.1 *n*th Roots and Rational Exponents

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (using properties of integer exponents to simplify expressions)
Teaching Objectives	• Find nth roots of numbers. • Evaluate expressions with rational exponents. • Solve equations using nth roots. • To simplify expressions with rational exponents.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 240 **Inquire** **Formative Assessment (Mini assessment TE pg. 242)**
Practice and Apply **Assigning Homework**	For objectives relating to simplifying expressions with rational exponents teacher should use Kuta or other supplementary materials. Big Ideas Text pg. 241-242 #1-32 35-43, 51–58
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 5.2 Properties of Rational Exponents and Radicals

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (using properties of integer exponents to simplify expressions)
Teaching Objectives	• Use properties of rational exponents to simplify expressions with rational exponents. • Use properties of radicals to simplify and write radical expressions in simplest form.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 247 **Inquire** **Formative Assessment (Mini assessment TE pg. 250)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 248-250 #1-10, 13-27, 29-44, 47-55, 57-63, 65-69, 78, 82–88
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 5.3 Graphing Radical Functions

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (describe the transformations of the parent function $f(x) = x^2$ represented by g.
Teaching Objectives	• Graph radical functions. • Write transformations of radical functions. • Graph parabolas.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 255 **Inquire** **Formative Assessment (Mini assessment TE pg. 258)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 256-258 #1-33, 39-40, 51-66, 64, 69-72
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 5.4 Solving Radical Equations and Inequalities

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Use Exploration 1 Solving Radical Equations pg 261

Teaching Objectives	• Solve equations containing radicals and rational exponents
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 265 **Inquire** **Formative Assessment (Mini assessment TE pg. 268)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 266-268 #1-43, 57, 64-70
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 5.5 Performing Function Operations

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Simplify expressions)
Teaching Objectives	• Add, subtract, multiply, and divide functions • Find composition of functions
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 272 **Inquire** **Formative Assessment (Mini assessment TE pg. 274)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 273-274 #1-20, 22, 28-35 Supplement finding composition of functions using Kuda.
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 5.6 Inverse of a Function

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Solve equations for *y*)
Teaching Objectives	• Explore inverses of functions. • Find and verify inverses of nonlinear functions. • Solve real-life problems using inverse functions.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 280 **Inquire** **Formative Assessment (Mini assessment TE pg. 284)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 281-284 #1–4, 5-19, 22-53, 70, 73–79
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period.

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- **Periodic Benchmark Tests**
- **End-Of –Course Assessment**
- **Standardized Tests**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

The following assessments require students to utilize various strands of mathematics.

- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Revised 6/2018

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Algebra 2 Accelerated

Course Number:

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Accelerated / Exponential and Logarithmic Functions **Grade Level(s):** **9 - 12**	**Unit Summary**: In this unit (Chapter 6) two new types of functions are presented, exponential and logarithmic. The natural base e, an irrational number, is introduced in the second lesson. Students write and graph exponential functions for base e and other bases. Compound interest and continuous compounding are two of the many applications explored. The logarithmic function, which is the inverse of the exponential function, is introduced, and the connection to properties of exponents is made. In addition, transformations of the graphs of both functions are presented in the middle of the chapter. The last part of the chapter looks at solving exponential and logarithmic equations using different approaches: analytical, numerical, and graphical.
Essential Question(s): • What is the natural base e? • What are some of the characteristics of the graph of a logarithmic function? • How can you transform the graphs of exponential and logarithmic functions? • How can you use properties of exponents to derive properties of logarithms? • How can you solve exponential and logarithmic equations? • How can you recognize polynomial, exponential, and logarithmic models?	**Enduring Understanding(s):** • Define and use the natural base e. • Solve real-life problems. • Define and evaluate logarithms. • Graph logarithmic functions. • Transform graphs of exponential functions. • Transform graphs of logarithmic functions. • Write transformations of graphs of exponential and logarithmic functions. • Use the properties of logarithms to evaluate logarithms. • Use the properties of logarithms to expand or condense logarithmic expressions. • Use the change-of-base formula to evaluate logarithms. • Solve exponential equations. • Solve logarithmic equations. • **Classify data sets.**

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
6.2 The Natural Base *e* Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. Interpret the parameters in a linear or exponential function in terms of a context	**6.2** NJSLS.F-IF.C.7e, NJSLS.F-LE.B.5
6.3 Logarithms and Logarithmic Functions Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where $a, c,$ and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	**6.3** NJSLS.F-IF.C.7e, NJSLS.F-BF.B.4a, NJSLS.F-LE.A.4
6.4 Transformations of Exponential and Logarithmic Functions Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. Identify the effect on the graph of replacing *f*(*x*) by *f*(*x*) + *k*, *k f*(*x*), *f*(*kx*), and *f*(*x* + *k*) for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	**6.4** NJSLS.F-IF.C.7e, NJSLS.F-BF.B.3
6.5 Properties of Logarithms Use the structure of an expression to identify ways to rewrite it. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where $a, c,$ and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	**6.5** NJSLS.A-SSE.A.2, NJSLS.F-LE.A.4
6.6 Solving Exponential and Logarithmic Equations Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	**6.6** NJSLS.A-REI.A.1, NJSLS.F-LE.A.4

For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where $a, c,$ and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	

Inter-Disciplinary Connections:

Real World and Inter-disciplinary problems:
Finance p298 ex#2, Banking p299 ex#5, Population p300 #22, Biology p301 #28, Banking p306 ex#3, Finance p308 #35, Chemistry p308 #36, Physics p314 #33, Chemistry p314 #34, Physics p315 #53, Environment p324 #49, Physics p330 #ex6, Cooking p335 #ex2, Chemistry p338 #18, Temperature p338 #19 & 20,

Students will engage with the following text:

Big Ideas MATH Algebra 2

Students will write:

Students will describe the characteristics of the graph of an exponential function.
Students will be able to describe what a horizontal asymptote is and how it affects the graph of an exponential function.
Students will state what the natural base e is.
Students will explain numerous ways in which the natural base e is used in real-life applications.
Students will be able to describe the characteristics of the graph of a logarithmic function.
Students will be able to describe how you can use the graph of an exponential function to obtain the graph of a logarithmic function.
Students will explain how can you transform the graphs of exponential and logarithmic functions.
Students will explain how you can use properties of exponents to derive properties of logarithms.
Students will be able to explain how to use the properties of logarithms to evaluate expressions.
Students will explain how can you solve exponential and logarithmic equations.
Students will justify all steps used when solving equations.
Students will describe how you can recognize polynomial, exponential, and logarithmic models.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will uncover and build skills through various classroom learning activities. Investigating algebra activities, modeling examples, using real-life application, using note-taking strategies, and using Smart Board technologies will all be explored as a blend of learning strategies to promote critical thinking, problem solving and performance skills of all learners. Other learning experiences could include alternative lesson openers, math and history applications, problem-solving workshops, interdisciplinary applications and projects.

Suggested warm-up activities, instructional strategies/activities, and assignments:

Section : 6.2 The Natural Base *e*

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (determine if equations model growth or decay and describe characteristics)
Teaching Objectives	• Define and use the natural base e. • Solve real-life problems.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 306 **Inquire** **Formative Assessment (Mini assessment TE pg. 308)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 307-308 #1-14, 35, 40 ,41 42, 44-51
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section : 6.3 Logarithms and Logarithmic Functions

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Determine solutions to basic exponential equations)
Teaching Objectives	• Define and evaluate logarithms. • Graph logarithmic functions.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 313 **Inquire** **Formative Assessment (Mini assessment TE pg. 316)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 314-316 #1–24, 27-31, 40, 42, 55-59, 65, 68, 72-78
Assess and Reteach	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…

Differentiating Instruction	
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 6.4 Transformations of Exponential and Logarithmic Functions

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Describe transformations of graphs)
Teaching Objectives	• Transform graphs of exponential functions. • Transform graphs of logarithmic functions. • Write transformations of graphs of exponential and logarithmic functions.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 321 **Inquire** **Formative Assessment (Mini assessment TE pg. 324)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 322-324 #: 1-19, 25, 26, 28, 29, 35, 40, 41, 43, 45-47, 57-60
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 6.5 Properties of Logarithms

	Accelerated
Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Use properties of exponents)
Teaching Objectives	• Use the properties of logarithms to evaluate logarithms. • Use the properties of logarithms to expand or condense logarithmic expressions. • Use the change-of-base formula to evaluate logarithms.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 331 **Inquire** **Formative Assessment (Mini assessment TE pg. 332)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 331-332 #1-30, 33-39, 49–56
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 6.6 Solving Exponential and Logarithmic Equations

	Accelerated

Focus and Motivate **Starting Options (Lesson Warm Up)**	**Suggestions include but not limited to:** Warm-ups are available in the Dynamic Classroom Resource (Rewrite exponential and logarithmic equations)
Teaching Objectives	• Solve exponential equations. • Solve logarithmic equations.
Checking for Understanding	**Suggestions include but not limited to:** Exit Tickets Closure TE p. 337 **Inquire** **Formative Assessment (Mini assessment TE pg. 340)**
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 338-339 #1-16, 21-40, 75-78
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period.

- **Diagnostic Pre-Test**
- **Chapter Tests**
- **Periodic Benchmark Tests**
- **End-Of –Course Assessment**
- **Standardized Tests**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

The following assessments require students to utilize various strands of mathematics.

- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Algebra 2 Accelerated

Course Number: 033200

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Accelerated/ Rational Functions **Grade Level(s):** **9 - 12**	**Unit Summary**: In this unit (Chapter 7) introduces rational functions, a new type of function for students to work with. The graphs of rational functions are presented in the second section. Students learn to identify the horizontal and vertical asymptotes by inspecting the equations. Simple transformations of rational functions are also performed. There are two sections on operations with rational functions. Connections are made to operations with fractions, and symbolic manipulation skills are necessary to perform the operations. Although the approach is primarily analytical, graphs are used to confirm that operations have been performed correctly. The chapter ends with a look at solving rational equations. Many of the techniques used to solve proportions are also used to solve rational equations.
Essential Question(s): • What are some of the characteristics of the graph of a rational function? • How can you determine the excluded values in a product or quotient of two rational expressions? • How can you determine the domain of the sum or difference of two rational expressions? • How can you solve a rational equation?	**Enduring Understanding(s):** Students will be able to: • Graph simple rational functions. • Translate simple rational functions. • Graph other rational functions. • Simplify rational expressions. • Multiply rational expressions. • Divide rational expressions. • Add or subtract rational expressions. • Rewrite rational expressions and graph the related function. • Simplify complex fractions. • Solve rational equations by cross multiplying. • Solve rational equations by using the least common denominator. • Use inverses of functions.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
7.2 Graphing Rational Functions	**7.2**

Rewrite simple rational expressions in different forms; write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$ where *a*(*x*), *b*(*x*), *q*(*x*), and *r*(*x*) are polynomials with the degree of *r*(*x*) less than the degree of *b*(*x*), using inspection, long division, or, for the more complicated examples, a computer algebra system. Identify the effect on the graph of replacing *f*(*x*) by *f*(*x*) + *k*, *k f*(*x*), *f*(*kx*), and *f*(*x* + *k*) for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them	NJSLS.A-APR.D.6, NJSLS.F-BF.B.3
7.3 Multiplying and Dividing Rational Expressions Rewrite simple rational expressions in different forms; write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$ where *a*(*x*), *b*(*x*), *q*(*x*), and *r*(*x*) are polynomials with the degree of *r*(*x*) less than the degree of *b*(*x*), using inspection, long division, or, for the more complicated examples, a computer algebra system. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	**7.3** NJSLS.A-APR.D.6 NJSLS.A-APR.D.7,
7.4 Adding and Subtracting Rational Expressions Rewrite simple rational expressions in different forms; write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$ where *a*(*x*), *b*(*x*), *q*(*x*), and *r*(*x*) are polynomials with the degree of *r*(*x*) less than the degree of *b*(*x*), using inspection, long division, or, for the more complicated examples, a computer algebra system. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	**7.4** NJSLS.A-APR.D.6 NJSLS.A-APR.D.7,
7.5 Solving Rational Equations Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	**7.5** NJSLS.A-CED.A.4, NJSLS.A-REI.A.1, NJSLS.A-REI.A.2

Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	

Inter-Disciplinary Connections:

Real World and Inter-disciplinary problems:
Construction pg362 #ex4, Capacity pg364 #25, 3D printing pg369 #ex5, Weather pg371 #45, Business pg371 #46, Income pg379 #ex7, Healthcare pg381 #37, Physics pg389 #46, Cost pg395 #ex6, Fuel cost pg397 #45

Students will engage with the following text:

Big Ideas MATH Algebra 2

Students will write:

Students will be able to state asymptotes and the general shape of a rational function.
Students will be able to describe characteristics of the graph of a rational function. (intercepts, domain, range and asymptotes)
Students will state excluded values of a rational expression.
Students will determine the domain of the sum or difference of rational expressions.
Students will explain the steps needed to solve a rational equation.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will uncover and build skills through various classroom learning activities. Investigating algebra activities, modeling examples, using real-life application, using note-taking strategies, and using Smart Board technologies will all be explored as a blend of learning strategies to promote critical thinking, problem solving and performance skills of all learners. Other learning experiences could include alternative lesson openers, math and history applications, problem-solving workshops, interdisciplinary applications and projects.

Suggested warm-up activities, instructional strategies/activities, and assignments:

Section : 7.2 Graphing Rational Functions

	College Prep
Focus and Motivate **Starting Options (Lesson Warm Up)**	*Suggestions include but not limited to:* Warm-ups are available in the Dynamic Classroom Resource (use transformations to graph parabolas)
Teaching Objectives	• Graph simple rational functions. • Translate simple rational functions. • Graph other rational functions.
Checking for Understanding	*Suggestions include but not limited to:* Exit Tickets Closure TE p. 3369 Inquiry Formative Assessment (Mini assessment TE pg. 372)
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 370: #1-18, 20-32, 43, 44, 59-66
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section : 7.3 Multiplying and Dividing Rational Expressions

	College Prep
Focus and Motivate **Starting Options (Lesson Warm Up)**	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (Multiply and divide fractions)
Teaching Objectives	• Simplify rational expressions. • Multiply rational expressions. • Divide rational expressions.
Checking for Understanding	Suggestions include but not limited to: Exit Tickets Closure TE p. 379 Inquiry Formative Assessment (Mini assessment TE pg. 382)
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 380: #1-8, 11-24,25, 27-34, 42, 50-57
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…

Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 7.4 Adding and Subtracting Rational Expressions

	College Prep
Focus and Motivate **Starting Options (Lesson Warm Up)**	*Suggestions include but not limited to:* Warm-ups are available in the Dynamic Classroom Resource (Add and subtract fractions)
Teaching Objectives	• Add or subtract rational expressions. • Simplify complex fractions.
Checking for Understanding	*Suggestions include but not limited to:* Exit Tickets Closure TE p. 387 Inquiry Formative Assessment (Mini assessment TE pg. 390)
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 380: #1-26, 39-42, 54,
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
Accommodations/Modifications:	As per individual students' IEP or 504 plan.

Section: 7.5 Solving Rational Equations

	College Prep
Focus and Motivate **Starting Options (Lesson Warm Up)**	*Suggestions include but not limited to:* Warm-ups are available in the Dynamic Classroom Resource (Solve equations with variables on both sides)
Teaching Objectives	• Solve rational equations by cross multiplying. • Solve rational equations by using the least common denominator. • Use inverses of functions.
Checking for Understanding	*Suggestions include but not limited to:* Exit Tickets Closure TE p. 395 Inquiry Formative Assessment (Mini assessment TE pg. 398)
Practice and Apply **Assigning Homework**	Big Ideas Text pg. 398: #2-11, 15-30, 37-44, 46, 61-64
Assess and Reteach **Differentiating Instruction**	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc…
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- **Classwork**

Accommodations/Modifications:

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