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.

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…
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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…
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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 $(x^2 - y^2)(x^2 + y^2)$.*	NJSLS.A-SSE.A.2, NJSLS.S-SSE.B.3a,
Factor a quadratic expression to reveal the zeros of the function it defines.	
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 $(x^2 - y^2)(x^2 + y^2)$.*	NJSLS.A-SSE.A.2, NJSLS.A-REI.B.4b, NJSLS.F-IF.C.8a
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.	
3.2 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.	NJSLS.N-CN.A.1, NJSLS.N-CN.A.2, NJSLS.N-CN.C.7,
Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	NJSLS.A-REI.B.4b
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.	
3.3 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.

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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**
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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…
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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…
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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

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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
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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…
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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
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