ALGEBRA 2 INTEGRATED SYLLABUS
2022-2023 Academic School Year

Marking Period 1

Chapter 4: Transformations (Test: 4.1 - 4.3, 4.5)

Section	Title	*NJSLS*	Problems
4.1, 4.2	Translations Reflections	*NJSLS-G-CO.A.2,* *NJSLS-G-CO.A.4,* *NJSLS-G-CO.A.5* *NJSLS-G-CO.B.6* *NJSLS-G-MG.A.3* *(Formulas Given)*	Big Ideas Text pg. 178 #11-25 odd Big Ideas Text pg. 186 #2-6, 7-19 odd
4.3, 4.5	Rotations Dilations	*NJSLS-G-CO.A.2,* *NJSLS-G-CO.A.4,* *NJSLS-G-CO.A.5* *NJSLS-G-CO.B.6* *NJSLS-G-SRT.A.1.a,* *NJSLS-G-SRT.A.1.b,* *(Formulas Given)*	Big Ideas Text pg.194 #7-15 odd, 28 Big Ideas Text pg. 212 #3, 5, 15-21 odd, 25, 29

Chapter 11: Measuring Length and Area (Test: 11.1- 11.8)

Section	Title	*NJSLS*	Problems
11.1, 11.2	Circumference Areas of Circles	*NJSLS-G-GMD.A.1,* *NJSLS-G-C.B.5,* *NJSLS-G-CO.A.1* *NJSLS-G-MG.A.2,*	Big Ideas Text p. 598 #1, 3-6, 11,
11.3, 11.4, 11.7, 11.8	Areas of Polygons Three-Dimensional Figures Surface Area and Volumes of Cones	*NJSLS-G-GMD.A.3* *NJSLS-G-GMD.B.4* *NJSLS-G-GMD.A.1,* *(Formulas Given)*	Big Ideas Text p. 614-616 #1-29 odd, 33-35, 39, 40, 44, 53-56 Big Ideas Text p. 621-622 #1-27 odd, 37-39, project Big Ideas Text p. 645-646 #1-21 odd, 25, 27-30, project
11.5, 11.6	Volumes of Prisms and Cylinders Volumes of Pyramids	*NJSLS-G-GMD.A.1,* *NJSLS-G-GMD.A.2,* *NJSLS-G-GMD.A.3,* *NJSLS-G-MG.A.3,* *NJSLS-G-MG.A.2,* *NJSLS-G-MG.A.3*	Big Ideas Text p. 631-634 #1-33 odd, 44 , 51, 55-57, project Big Ideas Text p. 639-640 #1-19 odd, 23, 26-29,

		(Formulas Given) NJSLS-G-GMD.A.1, NJSLS-G-GMD.A.3, NJSLS-G-MG.A.1 (Formulas Given)	project

Chapter 9: Right Triangles and Trigonometry (Test: 9.1, 9.4-9.5)

Section	Title	*NJSLS*	Problems
9.1	The Pythagorean Theorem	*NJSLS-G-SRT.B.4, NJSLS-G-SRT.C.8*	Big Ideas Text pg. 236 #3-6, 7-25 odd, 38
9.4	The Tangent Ratio	*NJSLS-G-SRT.C.6, NJSLS-G-SRT.C.8*	Big Ideas Text pg. 256 #7-11, 13-16, 19, 22, 23
9.5	The Sine and Cosine Ratios	*NJSLS-G-SRT.C.6, NJSLS-G-SRT.C.7, NJSLS-G-SRT.C.8*	Big Ideas Text pg. 266 #2-7, 9, 14, 15
9.6	Solving Right Triangles	*NJSLS-G-SRT.C.8, NJSLS-G-MG.A.1, NJSLS-G-MG.A.3*	Big Ideas Text pg. 274 #3-7, 9, 11, 15, 16

Marking Period 2

Chapter 1- Linear Functions (Test: Supplemental 2x2, 1.4, & 3.5)

Section	Title	*NJSLS*	Problems
Supplement	Solving 2x2 Linear Systems Algebraically	*A-REI.C.6*	*For objectives relating to systems 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
1.4	Solving Linear Systems	*A-CED.A.3,*	Big Ideas Text pg. 34: 1, 3-6, 17 Supplemental Text Prentice Hall Algebra 2: pg. 157 #1-21
3.5	Solving Nonlinear Systems Graphically	*A-CED.A.3, A-REI.C.7, A-REI.D.11*	Big Ideas Text pg.136 # 3-14

Chapter 4 Part 1- Operations with Polynomials (Test: Section 4.1 Classifying Polynomials, &4.2)

Section	Title	*NJSLS*	Problems
4.1	Classifying Polynomials only	*HSF-IF.B.4*	Big Ideas Text pg. 162 #3-8
4.2	Adding, Subtracting, and Multiplying Polynomials	*A-APR.A.1, A-APR.C.4, A-APR.C.5*	Big Ideas Text pg.170-172 # 1-14, 16-32, 35–47, 50-52, 56, 66–69

Chapter 3 Part 1- Factoring and Quadratic Equations (Test: Factoring Supplemental & 3.1)

Section	Title	*NJSLS*	Problems
Supplement	Factoring Quadratic Expressions	*A-SSE.A.2, A-SSE.B.3a*	Teacher created worksheet using Kuta software or other supplemental material.
3.1	Solving Quadratic Equations	A-SSE.A.2, A-REI.B.4b, F-IF.C.8a, N-RN.A.2	Big Ideas Text pg.99-102 #1-10, 13-19, 23, 27-32, 47-54, 57, 59, 70, 71, 76–83

Marking Period 3

Chapter 2- Quadratic Functions (Test 2.1, 2.2 & 2.4)

Section	Title	*NJSLS*	Problems
2.1	Transformations and Quadratic Functions	*F-IF.C.7c, F-BF.B.3*	`Big Idea Text pg.52 – 54, #1–33, 35, 37, 39, 46, 50–52`
2.2	Characteristics of Quadratic Functions	F-IF.B.4, F-IF.C.7.c, F-IF.C.9, A-APR.B.3	Big Ideas Text pg. 61-64, # 1, 3 - 10, 15-24, 33, 37, 41 – 44, 49 Supplemental Text: Prentice Hall Algebra 2 pg248: #1 – 30 & pg. 256: #27 – 30, 34
2.4	Modeling with Quadratic Functions	A-CED.A.2	Big Ideas Text pg. 80, # 2, 4, 6, 17 Supplemental Text: Prentice Hall

			Algebra 2 pg 255: #13 – 19

Chapter 3 Part 2-Simplifying Radicals and Solving Quadratic Equations
(Test: 3.3-3.4, Simplifying Radicals)

Section	Title	*NJSLS*	Problems
Supplement	Simplify Radicals	N-RN.A.1, N-RN.A.2	*Kuta Software; teacher created resources*
3.3	Completing the Square	N-CN.C.7, A-REI.B.4b, F-IF.C.8a	Big Ideas Text pg.116 # 3-8, 11-16, 25-28, 66, 69 #55-60 *do not use complete the square, use* $h = -b/(2a)$ *and* $k = f(h)$ Supplemental Text: Prentice Hall Algebra 2 pg. 285 #13-20 #28 & 31 *do not use complete the square, use* $h = -b/(2a)$ *and* $k = f(h)$
3.4	Using the Quadratic Formula	A-CED.A.3, A-REI.C.7, A-REI.D.11	Big Ideas Text pg.127 # 15-18, 33, 34,69 Supplemental Text: Prentice Hall Algebra 2 pg. 293 #1-30

NJGPA Practice (Test: NJGPA Practice Test)

Section	Title	*NJSLS*	Problems
NJGPA Practice	NJGPA Practice Test *developed by content teachers and math coach*		*Use supplemental and teacher created resources developed by math coach and content teachers*

Chapter 4 Part 2- Graphing Polynomials (Test: 4.1 & 4.8)

Section	Title	*NJSLS*	Problems
4.1	Graphing Polynomial Functions	*F-IF.B.4, F-IF.C.7c*	Big Ideas Text pg.162 #1, 3-14, 17-20, 25-31, 48 Supplemental Text: Prentice Hall Algebra 2 pg. 309 #1-12
4.8	Analyzing Graphs of Polynomials	A-APR.B.3, F-IF.B.4, F-IF.C.7c, F-BF.B.3	Big Ideas Text pg.216 #3-10, 17-22(Use TI84 or Desmos), 23-30

Marking Period 4

Chapter 4 Part 3- Complex Numbers, Factoring and Solving Higher Degree Polynomials

Section	Title	*NJSLS*	Problems
3.2	Complex Numbers *include higher powers of i	*N-CN.A.1, N-CN.A.2, N-CN.C.7, A-REI.B.4b*	Big Ideas Text pg.108 # 1-12, 23-30, 37-44, 49-60, 68 Supplemental Text: Prentice Hall Algebra 2 pg. 278 #1-18, 29-46
4.3	Dividing Polynomials	A-APR.B.2, A-APR.D.6	Big Ideas Text pg.177 #11-22, 25-32 Supplemental Text: Prentice Hall Algebra 2 pg. 324 #13-22
4.5	Solving Polynomial Equations	A-APR.B.3	Big Ideas Text pg.194 #3-20, 25-38(must give 1 zero), 41, 42, 56a Supplemental Text: Prentice Hall Algebra 2 pg. 339 #1-5 (must give 1 zero), 7-10 (must give 1 zero), 13-18, 19, 21, 23
4.6	The Fundamental Theorem of Algebra	N-CN.C.8, N-CN.C.9, A-APR.B.3	Big Ideas Text pg.202 #3-16, 21, 22, 25 Supplemental Text: Prentice Hall Algebra 2 pg. 343 #9-16

Chapter 5: Rational Exponents and Radical Functions (Test: 5.1, 5.2, & 5.4)

Section	Title	*NJSLS*	Problems
5.1	nth Roots and Rational Exponents	*N-RN.A.1, N-RN.A.2*	*For objectives relating to simplifying expressions with rational exponents teacher should use Kuta or other supplementary materials.* Big Ideas Text pg. 241: #5-10,

Section	Title	NJSLS	Problems
			21-31, 35-42, 51-54 Supplemental Text: Prentice Hall Algebra 2 pg. 389 #1-49
5.2	Properties of Ratonal Exponents and Radicals	N-RN.A.2	Big Ideas Text pg. 248: #1-6, 13-16, 37, 41, 42, 44, 49-52, 57, 58, 63, 65, 66, 82- 87 Supplemental Text: Prentice Hall Algebra 2 pg. 377 #1-35 and pg382 #1-12
5.4	Solving Radical Equations and Inequalities	A-REI.A.1, A-REI.A.2	Big Ideas Text pg. 266: #1-18, 21, 22, 27-32, 35, 36, 58 Supplemental Text: Prentice Hall Algebra 2 pg. 394: #1-30

Chapter 5: Rational Exponents and Radical Functions (Test: 53, 5.5 & 5.6)

Section	Title	*NJSLS*	Problems
5.3	Graphing Radical Functions	*F-IF.C.7b, F-BF.B.3*	Big Ideas Text pg. 256: #1-11, 19, 21, 22, 27, 64 Supplemental Text: Prentice Hall Algebra 2 pg. 417: #1-8, 12, 15, 18-21
5.5	Performing Function Operations	F-BF.A.1b	Big Ideas Text pg. 273: #5, 6, 19, 20, 28-31 Supplemental Text: Prentice Hall Algebra 2 pg. 400: #1-44
Supplement	Composition of Functions	F-BF.A.1c	*Supplement Composition of functions using Kuta Software*
5.6	Inverse of a Function	A-CED.A.4, F-BF.B.4a	Big Ideas Text pg. 281: #5 – 8, 13-20, 22, 29, 30, 73-79 Supplemental Text: Prentice Hall Algebra 2 pg. 410: #1-34

Course Expectations and Skills

- Students are required to have proficiency in all prerequisite topics for Algebra 1 and Geometry. Those who do not demonstrate proficiency will be required to seek additional help after school to close their achievement gap in order to be successful in this course.
- Students are required to learn and utilize a graphing calculator (TI-84+) in this course. They are encouraged to purchase a graphing calculator, but not required. Classroom sets are available for teachers to use as needed. In addition, free on-line graphing apps and programs are promoted by teachers for students to use on homework.
- Students are required to participate in both small and large group discussions and activities, as directed.
- Students are required to complete a project each marking period, including those which require the use of technology.

Resources

Text Book: Big Ideas Algebra 2, Big Ideas Geometry, Big Ideas Algebra 1

Assessment Information

Department of Mathematics- Algebra 2 Integrated

Marking Period 1	Marking Period 2	Marking Period 3	Marking Period 4
Major (MAJ): Summative 30%	Major (MAJ): Summative 30%	Major (MAJ): Summative 30%	Major (MAJ): Summative 30%
Benchmark (BMK): 10%	Benchmark (BMK): 10%	Benchmark (BMK): 10%	Benchmark (BMK): 10%
Project (PRJ): 15%	Project (PRJ): 15%	Project (PRJ): 15%	Project (PRJ): 15%
Minor (MIN): Formative 25%	Minor (MIN): Formative 25%	Minor (MIN): Formative 25%	Minor (MIN): Formative 25%
Class Participation (CP): 5%	Class Participation (CP): 5%	Class Participation (CP): 5%	Class Participation (CP): 5%

Homework (HW): 15%	Homework (HW): 15%	Homework (HW): 15%	Homework (HW): 15%

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated/Geometry Chapter 4: Transformations	Unit Summary: In this unit, students will perform translations with vectors and Algebra. They will reflect figures in a given line, rotate figures about a point, identify line and rotational symmetry, and perform dilations using drawing tools.
Grade Level(s): 11-12	
Essential Question(s): ● **How do you translate a figure using a vector?** ● **How do you reflect a figure in the line y=x?** ● **How do you rotate a figure 90o, 180o or 270o about the origin?** ● **What is a glide reflection?** ● **When does a figure have line symmetry?**	**Enduring Understanding(s):** Students will be able to: ● Use a vector to translate a figure. ● Reflect a figure in any given line. ● Rotate figures about a point. ● Perform combinations of two or more transformations. ● Identify line and rotational symmetries of a figure. ● Use drawing to draw dilations.

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. Experiment with transformations in the plane.
- *Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g.l translation versus horizontal stretch).*
- *Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.*
- *Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometric software. Specify a sequence of transformations that will carry a given figure onto another.*
 	
2. Perform operations with vectors.
- *Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v).*
 	
3. Understand similarity in terms of similarity transformations
- *Verify experimentally the properties of dilations given by a center and a scale factor:*
    a. *A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.*
    b. *The dilation of a line segment is longer or shorter in the ratio given by the scale factor.*
- *Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.*
	1. *NJSLS-G-CO.A.2, NJSLS-G-CO.A.4, NJSLS-G-CO.A.5*
	
	2. *NJSLS-N-VM.A.1*
	
	3. *NJSLS-G-SRT.A.1.a, NJSLS-G-SRT.A.1.b, NJSLS-G-SRT.A.2*

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Finding a Minimum Distance- Shopping (p. 185)	**1. Design a solution to a complex real-world problem by** breaking it down into smaller, more manageable problems that can be solved through engineering.	**1. SCI.HS-ETS1-2**
		2. SCI.HS-ETS1-2

2. Finding a Minimum Distance - Delivery (p. 187)	**2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.**	
3. Finding the Length of an Image (p.211)	**3. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.**	**3. SCI.HS-ETS1-2**

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	Mathematical Practices:
- Critical thinking - Creativity - Collaboration - Communication - Information literacy - Technology literacy - Media literacy - Flexibility - Leadership - Initiative - Productivity - Social skills	- Make sense of problems and persevere in solving them - Reason abstractly and quantitatively - Construct viable arguments and critique the reasoning of others - Model with mathematics - Use appropriate tools strategically - Attend to precision - Look for and make use of structure - Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
- **Geometry, A Common Core Curriculum- Big Ideas Math,** *Big Ideas Learning LLC, 2019*

Online resources incorporated through the year, including but not limited to:
- **BigIdeasMath.com- publisher online assignments, resources, and text**
- **Desmos- online graphing tool**
- **G Suite for Education- Google Classroom, Docs, Drive, Mail, etc.**
- **NJGPA formula sheet**

Calculators:
TI-84 Plus graphing calculator

Students will write:

Students will define and compare/contrast given terms. Students will describe and write about a diagram using mathematical language. Students will relate real world situations using geometry terminology. Students will also prove postulates and theorems.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

Opportunities for developing students' understanding in this chapter include: investigating geometry activities, problem solving workshops, modeling examples, using real-life application and construction of models or other hands-on activities such as projects. Technology such as animated geometry, Smart Board, graphing calculators, and Geometer's Sketchpad will also be explored through the learning experience. Other interests could include, but are not limited to alternative lesson openers, using note taking strategies, math and history applications, and interdisciplinary applications.

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

4.1 Translations:

Warm-up/Starting Options	Explorations p. 173, NJSLA-M problems
Practice and Apply	p. 178 #11-25 odd
Resources	Online Dynamic Classroom has all resources. Review: Practice A, Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review NJSLA-M resources

Section 4.2 Reflections:

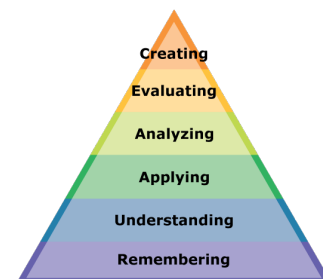| Warm-up/Starting Options	Explorations p. 181, NJSLA-M problems
Practice and Apply	p. 186 #2-6, 7-19 odd
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review NJSLA-M problems

Section 4.3 Rotations:

Warm-up/Starting Options	Explorations p. 189, NJSLA-M problems
Practice and Apply	p. 194 #7-15 odd, 28
Resources	Online Dynamic Classroom has all resources available.

	Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review STEM Video and Performance Task: Rotational Doors

Section 4.5 Dilations:

Warm-up/Starting Options	Explorations p. 207, NJSLA-M problems
Practice and Apply	p. 212 # 3, 5, 15-21 odd, 25, 29
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

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.

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering

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, warm-up/exit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 2 Integrated curriculum/syllabus at the conclusion of an instructional time period:
- Diagnostic Pre-Test
- Chapter Assessments
- Periodic Benchmark Assessments
- End of Course Assessments
- Standardized Tests

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

The following assessments require students to utilize various strands of mathematics:
- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As stated in IEP or 504
- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated/Geometry Chapter 11: Circumference, Area, and Volume	Unit Summary: In this unit, the study of circumference, area, and volume finishes the study of the measurement of solids. Students will come to this chapter with knowledge of many formulas for surface area and volume. These will be reviewed and new formulas will be added. Different from middle school is that students now have a greater ability to solve equations. In this chapter, students will do additional work with circles involving arc length and area of sectors. Students will also find the area of regular polygons.
Grade Level(s): 11-12	
Essential Question(s): ● **How can you find the length of a circular arc?** ● **How can you find the area of a regular polygon?** ● **How can you find the volume of a prism or cylinder?** ● **How can you find the volume of a pyramid?** ● **How can you find the surface area and volume of a cone?** ● **How can you find the surface area and volume of a sphere?**	**Enduring Understanding(s):** Students will be able to: ● Find the length of a circular arc. ● Find the area of a regular polygon. ● Find the volume of a prism or cylinder. ● Find the volume of a pyramid. ● Find the surface area and volume of a cone. ● Find the surface area and volume of a sphere.

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. Find surface area of geometric shapes. - *Identify the shapes of two-dimensional cross-sections of the three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.* - *Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.* - *Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk as a cylinder).* **2. Find the volume of geometric shapes.** - *Identify the shapes of two-dimensional cross-sections of three dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.* - *Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid and cone.* - *Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.* - *Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.* - *Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk as a cylinder).*	**1.** *NJSLS-G-GMD.B.4, NJSLS-G-GMD.A.1, NJSLS.G-MG.A.1* **2.** *NJSLS.G-GMD.B.4, NJSLS.G-GMD.A.1, NJSLS.G-GMD.A.2, NJSLS-G.GMD.A.3, NJSLS-G.MG.A.1*

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Using Circumference to Find Distance Traveled (p.596)	**1. Process data and report results.**	**1.** TECH.8.1.12.E.CS4
2. Estimate Earth's Circumference (p. 599)	**2. Analyze and interpret data to determine scale properties of objects in the solar system.**	**2.** SCI.MS-ESS1-3
3. Population Density (p. 603)	**3. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.**	**3.** SCI.MS-LS2-4

The following 21ˢᵗ century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21ˢᵗ Century skills:
- Critical thinking
- Creativity
- Collaboration
- Communication
- Information literacy
- Technology literacy
- Media literacy
- Flexibility
- Leadership
- Initiative
- Productivity
- Social skills

Mathematical Practices:
- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
- **Geometry, A Common Core Curriculum- Big Ideas Math,** *Big Ideas Learning LLC, 2019*

Online resources incorporated through the year, including but not limited to:
- **BigIdeasMath.com- publisher online assignments, resources, and text**
- **Desmos- online graphing tool**
- **G Suite for Education- Google Classroom, Docs, Drive, Mail, etc.**
- **NJGPA formula sheet**

Calculators:
- **TI-84 Plus graphing calculator**

Students will write:

Students will define and compare/contrast given terms. Students will describe and write about a diagram using mathematical language. Students will relate real world situations in geometric terminology. Students will also prove postulates and theorems.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Opportunities for developing students' understanding in this chapter include: investigative geometric activities, problem solving workshops, modeling examples, using real-life application and construction of models or other hands on activities such as projects, technology such as animated geometry, Smart Board, graphing calculators, and Geometer's Sketchpad will also be explored through the learning experience. Other interests could include, but are not limited to alternative lesson openers, using note-taking strategies, math and history applications, and interdisciplinary applications.

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

Section 11.1 Circumference:

Warm-up/Starting Options	Explorations p. T-593, NJSLA-M Question
Practice and Apply	p. 598-600 #1-5 odd, 9, 11, 13, 24
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Section 11.2 Areas of Circles:

Warm-up/Starting Options	Explorations p. T-601, NJSLA-M Question
Practice and Apply	p. 606-608 # 1-23 odd, 26, 30-32, 42-45
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review Real Life STEM Video: Population Density

Section 11.3 Areas of Polygons:

Warm-up/Starting Options	Explorations p. T-609, NJSLA-M Question
Practice and Apply	p.614-616 #1-29 odd, 33-35, 39, 40, 44, 53-56
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time,

| | Student Journal, and Skills Review Handbook
Advanced: Enrichment and Extension, Cumulative
Review |
| --- | --- |

Section 11.4 Three-Dimensional Figures:

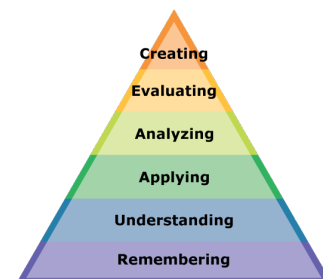| Warm-up/Starting Options	Explorations p. T-617, NJSLA-M Question
Practice and Apply	p. 621-622 #1-27 odd, 37-39, project
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Section 11.5 Volumes of Prisms and Cylinders:

Warm-up/Starting Options	Explorations p. T-625, NJSLA-M Question
Practice and Apply	p. 631-634 #1-33 odd, 44, 51, 55-57, project
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Section 11.6 Volumes of Pyramids:

Warm-up/Starting Options	Explorations p. T-635, NJSLA-M Question
Practice and Apply	p. 639-640 #1-19 odd, 23, 26-29, project
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Section 11.7 Surface Area and Volumes of Cones:

Warm-up/Starting Options	Exploration p. T-641
Practice and Apply	p.645-646 #1-21 odd, 25, 27-30, project

Resources	Online Dynamic Classroom has all resources available.
	Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook
	Advanced: Enrichment and Extension, Cumulative Review

Section 11.8 Surface Area and Volume of Spheres:

Warm-up/Starting Options	Explorations p. T-647
Practice and Apply	p. 652-654 #1-35 odd, 39, 42, 4851, project
Resources	Online Dynamic Classroom has all resources available.
	Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook
	Advanced: Enrichment and Extension, Cumulative Review

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, warm-up/exit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 Geometry curriculum/syllabus at the conclusion of an instructional time period:
- Diagnostic Pre-Test
- Chapter Assessments
- Periodic Benchmark Assessments
- End of Course Assessments
- Standardized Tests

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

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

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

Accommodations/Modifications:

As stated in IEP or 504

- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated
Course Number: 033300

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated/ Geometry Ch 9: Right Triangles and Trigonometry Grade Level(s): 11-12	Unit Summary: In this unit, students will be introduced to right triangle trigonometry. The first lesson on the Pythagorean Theorem will not be completely new to students who will have familiarity with this theorem from idle school. The next three lessons present the tangent, sine, and cosine ratios. The focus of these lessons is to solve for parts of a right triangle. Many real-life applications are presented.
Essential Question(s): ● **How can you prove the Pythagorean Theorem?** • **How is a right triangle used to find the sine, cosine, and tangent of an acute triangle?** • **When you know the lengths of the sides of a right triangle, how can you find the measures of the two acute angles?**	Enduring Understanding(s): **Students will be able to:** • **Find side lengths in right triangles** • **Use relationships among the sides in special right triangles** • **To use trigonometric ratios to solve for side lengths in right triangles** • **Use inverse tangent, sine, and cosine ratios**

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. Use relationships among the sides in special right triangles. - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). **2. Use trigonometry to solve right triangles.** - Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. - Explain and use the relationship between the sine and cosine of complementary angles. - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	**1.** *NJSLS.G-SRT.C.8, NJSLS.G-MG.A.1* **2.** *NJSLS.G-SRT.C.6, NJSLS.G-SRT.C.7, NJSLS.G-SRT.C.8, NJSLS.G-MG.A.1, NJSLS.G-MG.A.3, NJSLS.G-SRT.D.10*

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Moon Craters (p. 491)	**1. Analyze and interpret data to determine scale properties of objects in the solar system.**	**1. SCI.MS-ESS1-3**
2. Sonar Systems (p. 500)	**2.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**2. SCI.MS-PS2-2**
3. Altitude (p. 497)	**3. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.**	**3. SCI.MS-PS2-2**

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	Mathematical Practices:
• Critical thinking • Creativity • Collaboration • Communication • Information literacy • Technology literacy • Media literacy • Flexibility • Leadership • Initiative • Productivity • Social skills	• Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
• Algebra 2, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
• Algebra 1, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
[Supplement with chapter 8 as needed]

Online Resources incorporated through the year, include but not limited to:
• BigIdeasMath.com – publisher on-line assignments, resources and text
• Desmos – online graphing tool
• IXL – web-based software
• G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:
• TI – 84 Plus graphing calculator

Students will write:

Students will define and compare/contrast given terms. Students will describe and write about a diagram using mathematical language. Students will relate real world situations using geometry terminology. Students will also prove postulates and theorems.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.
How will students uncover content and build skills?

Opportunities for developing students' understanding in this chapter include: investigating geometry activities, problem solving workshops, modeling examples, using real-life application and construction of models or other hands on activities such as projects. Technology such as animated geometry, Smart Board, graphing calculators, and Geometer's Sketchpad will also be explored through the learning experience. Other interests could include, but is not limited to alternative lesson openers, using note-taking strategies, math and history applications, and interdisciplinary applications.

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

Section 9.1 The Pythagorean Theorem:

Warm-up/Starting Options	Explorations p.T-463
Practice and Apply	p. 468-470 #1-33 odd, 36-38, 44-47
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Section 9.4 The Tangent Ratio:

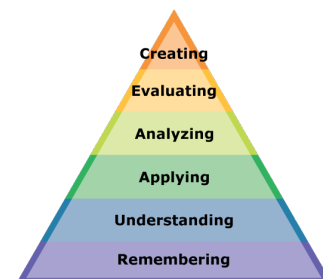| Warm-up/Starting Options	Explorations p. T-487
Practice and Apply	p. 491-492 #1-19 odd, 21, 22, 27-29
Resources	Resources Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Section 9.5 The Sine and Cosine Ratios:

Warm-up/Starting Options	Explorations p. T-493
Practice and Apply	p. 498-500 #1-31 odd, 34-36, 41-44
Resources	Resources Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Section 9.6 Solving Right Triangles:

Warm-up/Starting Options	Explorations p. T-501
Practice and Apply	Practice and Apply p. 505-506 #1-23 odd, 26-28, 33-36
Resources	Resources Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

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.

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering

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, warm-up/exit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 Geometry curriculum/syllabus at the conclusion of an instructional time period:
- Diagnostic Pre-Test
- Chapter Assessments
- Periodic Benchmark Assessments
- End of Course Assessments
- Standardized Tests

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

The following assessments require students to utilize various strands of mathematics:
- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated Algebra 2 Chapter 1.3 and 1.4: Systems of Equations	Unit Summary: Chapter 1 presents topics that were studied in Algebra 1. Students will begin by solving systems of two linear equations and then progress to systems of three equations. Finally, students will use these skills to determine solutions of nonlinear systems graphically.
Grade Level(s): 11-12	
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 graphically?**	Enduring Understanding(s): Students will be able to: • 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 graphically.

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	**1.4**
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.	NJSLS.A-CED.A.3, NJSLS.A-REI.C.6
Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	**3.5** NJSLS.SA-CED.A.3, NJSLS.A-REI.C.7, NJSLS.A-REI.D.11
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.	

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Finance (p. 34)	1. Select and use applications effectively and productively.	1. TECH.8.1.12.A.CS2
2. FInance (p. 34)	2. Select and use applications effectively and productively.	2. TECH.8.1.12.A.CS
3. Finance (p. 36)	3. Select and use applications effectively and productively.	3. TECH.8.1.12.A.CS

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	**Mathematical Practices:**
- Critical thinking - Creativity - Collaboration - Communication - Information literacy - Technology literacy - Media literacy - Flexibility - Leadership - Initiative - Productivity - Social skills	- Make sense of problems and persevere in solving them - Reason abstractly and quantitatively - Construct viable arguments and critique the reasoning of others - Model with mathematics - Use appropriate tools strategically - Attend to precision - Look for and make use of structure - Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:

• Algebra 2, A Common Core Curriculum – Big Ideas Math, *Big Ideas Learning LLC., 2019*

Online Resources incorporated through the year, include but not limited to:

• BigIdeasMath.com – publisher on-line assignments, resources and text

• Desmos – online graphing tool

• IXL – web-based software

• G Suite for education – Google Classroom, Docs, Drive, Mail, etc...

• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:

• TI – 84 Plus graphing calculator

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.

<u>How</u> 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:

Supplement 2x2 Systems:

Warmup/Starting Options	Warm-ups display a graph of two linear systems and discuss what the intersection represents.
Practice and Apply	For objectives relating to system of two, teachers should use Kuta or other supplementary materials. Big Ideas Text pg. 28: # 33-38
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

1.4 Solving Linear Systems

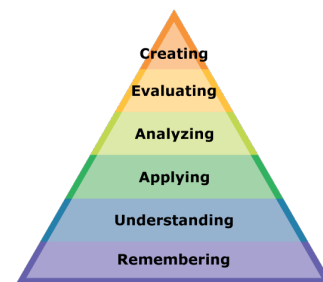|	
Warmup/Starting Options	Warm-ups are available in the Dynamic Classroom Resource (rewriting equations in slope-intercept form)
Practice and Apply	For objectives relating to system of two, teachers should use Kuta or other supplementary materials. Big Ideas Text pg. 34: 1, 3-6, 17 Supplemental Text Prentice Hall Algebra 2: pg. 157 #1-21
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

3.5 Solving Nonlinear Systems:

Warmup/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource. Solve a system using a graphing calculator or software.

Practice and Apply	Big Ideas Text pg.136 # 3-14
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

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

• **Projects**

• **Performance Tasks**

• **Homework**

• **Classwork**

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated Chapter 4 Part 1 (Classifying Polynomials and 4.2 only- no Pascal's Triangle)	Unit Summary: In this unit, students will focus on the beginning knowledge of polynomials, including classifying, adding, subtracting, and multiplying polynomials only. The rest of this chapter will be taught later in the school year.
Grade Level(s): 11-12	
Essential Question(s): ● **How do you write a polynomial in standard form?** ● **How do you add polynomials?** ● **How do you subtract polynomials?** ● **How do you multiply polynomials?** ● **How do you classify polynomials?**	**Enduring Understanding(s):** Students will be able to: ● Write polynomials in standard form ● Classify polynomials by their degree and number of terms ● Add, subtract, and multiply polynomials

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. 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. **2.** Prove polynomial identities and use them to describe numerical relationships.	**1.** *HSA-APR.A.1* **2.** *HSA-APR.C.4*

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Higher Education (p. 170)	**1.** Analyze the relationship between various careers and personal earning goals.	**1.** PFL.9.1.12.A.3
2. Agriculture (p. 170)	**2.** Evaluate competing using a systematic process to determine how well they meet the criteria and constraints of the problem.	**2.** SCI.MS-ETS1-2
3. Natural Resources (p. 163)	**3.** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	**3.** SCI.MS-PS1-3

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	Mathematical Practices:
- Critical thinking - Creativity - Collaboration - Communication - Information literacy - Technology literacy - Media literacy - Flexibility - Leadership - Initiative - Productivity	- Make sense of problems and persevere in solving them - Reason abstractly and quantitatively - Construct viable arguments and critique the reasoning of others - Model with mathematics - Use appropriate tools strategically - Attend to precision - Look for and make use of structure - Look for and express regularity in repeated reasoning

● Social skills	

<u>Students will engage with the following text:</u>

Text:
• Algebra 2, A Common Core Curriculum – *Big Ideas Math, Big Ideas Learning LLC., 2019*

Online Resources incorporated through the year, include but not limited to:
• BigIdeasMath.com – publisher on-line assignments, resources and text
• Desmos – online graphing tool
• IXL – web-based software
• G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:
• TI – 84 Plus graphing calculator

<u>Students will write:</u>

Explain how subtracting polynomials is different from adding.
Explain how to identify multiplication vs addition/subtraction of polynomials.
Explain how to determine the classification of a polynomial.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

<u>How</u> 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 Classifying Polynomial Functions:

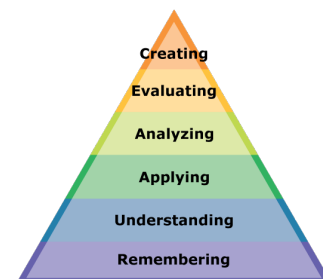| Warmup/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (Evaluate the function for the given value of x.)
Practice and Apply	Big Ideas Text pg.162 # 3-14 Supplemental Text: Prentice Hall Algebra 2 pg. 309 #1-12
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

4.2 Adding, Subtracting, and Multiplying Polynomials:

Warmup/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (Simplify Expressions by distribution and combining like terms)
Practice and Apply	Big Ideas Text pg.170 #3-24, 36-40, 51 Supplemental Text: Prentice Hall Algebra 2 pg. 310 #33- 44 & pg 352 #1, 2, 928, 29, 30, 36, 42
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

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.

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

The following assessments require students to utilize various strands of mathematics.
• Projects
• Performance Tasks
• Homework
• Classwork

Accommodations/Modifications:

As stated in IEP or 504
- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated/ Algebra 2 Ch 3: Factoring & Quadratic Equations	Unit Summary: The strategies for factoring quadratic expressions will be discovered. This includes factoring the greatest common factor, quadratic trinomials, special cases (perfect square trinomials and difference of two squares). Students will use their ability to factor quadratic expressions in order to solve quadratic expressions by factoring.
Grade Level(s): **11-12**	
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?	**Enduring Understanding(s):** **Students will be able to:** • Factor a variety of expressions by Greatest Common Factor, Difference of two squares as well as factoring trinomials with the following: (level CP = trinomial with being a prime number no larger than 3 and c being prime or composite) • Solve quadratic equations by graphing. • Solve quadratic equations algebraically. • 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:
1. Supplemental Factoring Unit (Algebra 1 Textbook, Chapter 7)	**1.** *NJSLS.A-SSE.A.2, NJSLS.S-SSE.B.3a*
- *Use the structure of an expression to identify ways to rewrite it.*	
- *Factor a quadratic expression to reveal the zeros of the function it defines.*	
	2. *NJSLS.A-SSE.A.2,*
2. Solve Quadratic Equations	*NJSLS.A-REI.B.4b,*
- *Use the structure of an expression to identify ways to rewrite it.*	*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 ± bi for real numbers a and b.*	*NJSLS.N-RN.A.2*
- *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.*	

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Gravity (p. 101)	**1.** Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	**1.** SCI.HS-ESS1-4
2. Air Resistance (p. 98)	**2.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**2.** SCI.MS-PS2-2
3. Gravity (p. 101)	**3.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**3.** SCI.MS-PS2-2

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	Mathematical Practices:
• Critical thinking	• Make sense of problems and persevere in solving them
• Creativity	• Reason abstractly and quantitatively

• Collaboration • Communication • Information literacy • Technology literacy • Media literacy • Flexibility • Leadership • Initiative • Productivity • Social skills	• Construct viable arguments and critique the reasoning of others • Model with mathematics • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
• Algebra 2, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
• Algebra 1, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
[Supplement with chapter 8 as needed]

Online Resources incorporated through the year, include but not limited to:
• BigIdeasMath.com – publisher on-line assignments, resources and text
• Desmos – online graphing tool
• IXL – web-based software
• G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:
• TI – 84 Plus graphing calculator

Students will write:

Students will 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?

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:

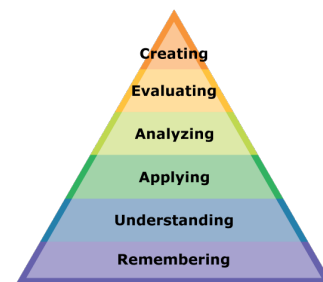| Warm-up/Starting Options	Warm-ups are available in the Dynamic classroom
Practice and Apply	Teacher created worksheet using Kuta software or other supplemental material. *Supplemental Text:* Prentice Hall Algebra 2 pg. 263 #1-47
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

Quadratic Equations

Warm-up/Starting Options	Explorations p. T-487
Practice and Apply	Big Ideas Text pg.99 #3-10, 13-16, 23, 24, 27-34, 35, 47-51, 70, 76-83 *Supplemental Text:* Prentice Hall Algebra 2 pg. 270 #1-19, 23-31

Resources	Resources Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

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.

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering

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, warm-up/exit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

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 Geometry curriculum/syllabus at the conclusion of an instructional time period:

- **Diagnostic Pre-Test**
- **Chapter Assessments**
- **Periodic Benchmark Assessments**
- **End of Course Assessments**
- **Standardized Tests**

Accommodations/Modifications:

As stated in IEP or 504

- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

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

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

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated, Algebra 2 Ch 2: Quadratic Functions	Unit Summary:
	Students have previously studied solving quadratic functions algebraically 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 functions. The first lesson in this chapter introduces the same transformations on quadratic functions. The vertex of a quadratic function is a key point that helps students quickly distinguish the type(s) of transformation(s) displayed in a graph.
Grade Level(s): 11-12	
	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. 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):** Students will be able to: • 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 using interval notation. • Determine intervals of increase and decrease using interval notation. • Solve real-life problems • Write equations of quadratic functions using vertices and 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	**1.** *NJSLS.F-IF.C.7c,*
Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	*NJSLS.F-BF.B.3*
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.** *NJSLS.F-IF.B.4,* *NJSLS.F-IF.C.7.c,* *NJSLS.F-IF.C.9,* *NJSLS.A-APR.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.	**3.** *NJSLS.A.CED.A.2*
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.	
2.4 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.	

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Life Science (p. 53)	**1.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**1.** SCI.MS-PS2-2
2. Distance (p. 60)	**2.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**2.** SCI.MS-PS2-2
3. Engineering (p. 62)	**3.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**3.** SCI.MS-PS2-2

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:
- Critical thinking
- Creativity
- Collaboration
- Communication
- Information literacy
- Technology literacy
- Media literacy
- Flexibility
- Leadership
- Initiative
- Productivity
- Social skills

Mathematical Practices:
- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
• Algebra 2, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
• Algebra 1, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
[Supplement with chapter 8 as needed]

Online Resources incorporated through the year, include but not limited to:
• BigIdeasMath.com – publisher on-line assignments, resources and text
• Desmos – online graphing tool
• IXL – web-based software
• G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:
• TI – 84 Plus graphing calculator

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:

2.1 Transformations and Quadratic Functions

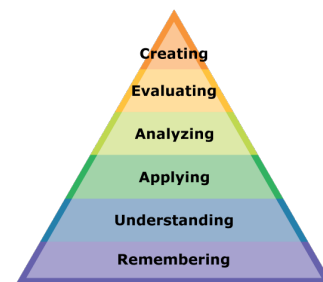|	
Warm up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (multiply polynomials)
Practice and Apply	Big Ideas Text pg. 52 - 54, #1 – 18, 35, 37, 38, 39, 40, 43, 46 Supplemental Text: Prentice Hall Algebra 2: pg. 255: #1 - 12
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

2.2 Characteristics of Quadratic Function

Warm up/Starting Options	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)
Practice and Apply	Big Ideas Text pg. 61-64, # 1, 3 - 10, 15-24, 33, 37, 41 – 44, 49 Supplemental Text: Prentice Hall Algebra 2 pg248: #1 – 30 & pg. 256: #27 – 30, 34
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

2.4 Modeling with Quadratic Functions

Warm up/Starting Options	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)
Practice and Apply	Big Ideas Text pg. 80, # 2, 4, 6, 17 Supplemental Text: Prentice Hall Algebra 2 pg255: #13 – 19
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

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.

Creating
Evaluating
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Remembering

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

 The following assessments require students to utilize various strands of mathematics.
• **Projects**
• **Performance Tasks**
• **Homework**
• **Classwork**

Accommodations/Modifications:

As stated in IEP or 504
- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
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- [Gifted and Talented](#)

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated
Course Number: 033300

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Algebra 2 Integrated/ Algebra 2 Ch 3: Completing the Square & Quadratic Formula	Unit Summary:
	The strategies for solving quadratic equations will be continued in this unit. Students will learn 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.
Grade Level(s): 11-12	
Essential Question(s): ● How can you complete the square for a quadratic expression? ● How can you derive the equation of a circle by completing the square? ● How can you derive a general formula for solving a quadratic equation?	**Enduring Understanding(s):** **Students will be able to:** ● Solve quadratic equations using square roots. ● Solve quadratic equations by completing the square. ● Write the equation of a circle 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:
1. Simplify radicals. (Supplemental text) - *Use the structure of expressions and find ways to rewrite it.* - *Factor a quadratic expression to reveal the zeros of the function it defines.*	**1.** *NJSLS-G-CO.A.2, NJSLS-G-CO.A.4, NJSLS-G-CO.A.5*
2. Complete the square. - *Use the structure of an expression to identify ways to rewrite it.* - *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.* - *Derive the equation of a circle given a center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.*	**2.** *NJSLS.A-SSE.A.2, NJSLS.A-REI.B.4b, NJSLS.F-IF.C.8a NJSLS.N-RN.A.2, NJSLS.G-GPE.A.1* **3.** *NJSLS.A-SSE.A.2, NJSLS.A-REI.B.4b, NJSLS.F-IF.C.8a, NJSLS.N-RN.A.2*
3. Use the Quadratic Formula. - *Use the structure of an expression to identify ways to rewrite it.* - *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.*	

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Sports (p. 115)	**1. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.**	**1. SCI.MS-PS2-2**
2. Gravity (p. 126)	**2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.**	**2. SCI.MS-PS2-2**

3. Physical Science (p. 129)	**3.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**3.** SCI.MS-PS2-2

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	Mathematical Practices:
• Critical thinking • Creativity • Collaboration • Communication • Information literacy • Technology literacy • Media literacy • Flexibility • Leadership • Initiative • Productivity • Social skills	• Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
• Algebra 2, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
• Algebra 1, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019
[Supplement with chapter 8 as needed]

Online Resources incorporated through the year, include but not limited to:
• BigIdeasMath.com – publisher on-line assignments, resources and text
• Desmos – online graphing tool
• IXL – web-based software
• G Suite for education – Google Classroom, Docs, Drive, Mail, etc…
• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:
• TI – 84 Plus graphing calculator

Students will write:

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:

Supplemental: Simplify Radicals

Warm-up/Starting Options	Suggestions include but not limited to: Warm-ups have students simplify perfect square roots
Practice and Apply	Use Kuta Software
Resources	Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review

3.3 Completing the Square:
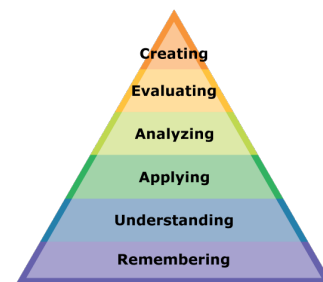
Supplemental: Simplify Radicals

Warm-up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource. (Practice factoring the difference of two squares.)
Practice and Apply	Big Ideas Text pg.116 # 3-8, 11-16, 25-28, 66, 69 #55-60 do not use complete the square, use Supplemental Text: Prentice Hall Algebra 2 pg. 285 #13-20 , 28 & 31 do not use complete the square use h = -b/(2a) and k = f(a)
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

3.4 Using the Quadratic Formula

Warm-up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource. (Substitute for a variable and simplify the expression.)
Practice and Apply	Big Ideas Text pg.127 # 15-18, 33, 34, 69 Supplemental Text: Prentice Hall Algebra 2 pg. 293 #1-30
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

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.

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering

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, warm-up/exit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

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 Geometry curriculum/syllabus at the conclusion of an instructional time period:
- **Diagnostic Pre-Test**
- **Chapter Assessments**
- **Periodic Benchmark Assessments**
- **End of Course Assessments**
- **Standardized Tests**

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

The following assessments require students to utilize various strands of mathematics:
- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title:	Unit Summary:
Algebra 2 Integrated/ Algebra 2 4.1 Graphing Polynomial Functions. 4.8 Analyzing Graphs of Polynomial Functions	In this unit, polynomial functions are defined and graphed. End behavior of even and odd functions are explored. This chapter is broken up into two sections for assessment in class as it is a long chapter. Graphs of polynomial functions will be explored. Students will be able to analyze graphs to find x- and y-intercepts, minimum and maximum values, intervals of increase and decrease, and domain and range of functions.
Grade Level(s): 11-12	
Essential Question(s): ● What are some common characteristics of the graphs of cubic and quartic polynomial functions? ● How do the ends of the graphs of polynomial functions behave? ● How many turning points can the graph of a polynomial have?	**Enduring Understanding(s):** Students will be able to: ● Identify polynomial functions ● graph polynomial functions using tables and end behavior ● Use x-intercepts to graph polynomial functions ● Identify turning points and identify local maximums and local minimums of graphs of polynomial functions ● Identify intervals of increase and decrease ● Identify domain and range ● Identify x-and y-intercepts graphically

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. 4.1 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. **2. 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.	**1.** *NJSLS.F-IF.B.4, NJSLS.F-IF.C.7c* **2.** *NJSLS.A-APR.B.3, NJSLS.F-IF.B.4, NJSLS.F-IF.C.7c,*

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Natural Resources (p. 163)	**1. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.**	**1. SCI.MS-PS1-3**
2. Sports and Fitness (p. 217)	**2. Analyze application of force and motion (weight transfer, power, speed, agility, range of motion) and modify movement to impact performance.**	**2. HPE.2.5.12.A.2**
3. Business (p. 161)	**3. Assess the impact of products and systems.**	**3. TECH.8.2.12.D.CS3**

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:
- Critical thinking
- Creativity
- Collaboration
- Communication
- Information literacy
- Technology literacy
- Media literacy
- Flexibility
- Leadership
- Initiative
- Productivity
- Social skills

Mathematical Practices:
- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
• Algebra 2, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019

Online Resources incorporated through the year, include but not limited to:
• BigIdeasMath.com – publisher on-line assignments, resources and text
• Desmos – online graphing tool
• IXL – web-based software
• G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:
• TI – 84 Plus graphing calculator

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 $(a + b)(a − b) = a2 − b2$ 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 a 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.
<u>How </u>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:
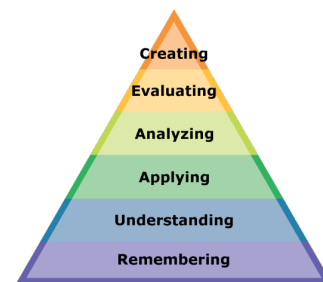
Warm up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (Evaluate the function for the given value of x.)
Practice and Apply	Big Ideas Text pg.162 #1, 3-14, 17-20, 25-31, 48 Supplemental Text: Prentice Hall Algebra 2 pg. 309 #1-12
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

4.8 Analyzing Graphs of Polynomial Functions:

Warm up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource. (Find the vertex of the function.)
Practice and Apply	Big Ideas Text pg.216 #3-10, 17-22(Use TI84 or Desmos), 23-30
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

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

• **Projects**

• **Performance Tasks**

• **Homework**

• **Classwork**

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title:	Unit Summary:
Algebra 2 Integrated/Section 3.2 and Chapter 4 Polynomial Functions	Students will first be introduced to complex numbers via section 3.2 as this section was skipped when Chapter 3 was completed. Following section 3.2, we will shift into Chapter 4 to complete the remaining sections that have not been covered. Connections to earlier work are usually made easily, as linear and quadratic functions are both polynomial functions. The notation and vocabulary can be overwhelming for students, though some of the vocabulary was used in Algebra 1. 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 > 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.
Grade Level(s): 11-12	
Essential Question(s): - How can you use the factors of a cubic polynomial to solve a division problem involving the polynomial? - How can you factor a polynomial? - How can you determine whether a polynomial equation has a repeated solution? - How can you determine whether a polynomial equation has imaginary solutions?	**Enduring Understanding(s):** Students will be able to: • Use synthetic division to divide polynomials by binomials of the form x – k. • Use the Remainder Theorem • Factor polynomials. • Use the Factor Theorem • Find solutions of polynomial equations and zeros of polynomial functions. • Use the Irrational Conjugates Theorem. • Use the Fundamental Theorem of Algebra • Find conjugate pairs of complex zeros 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:
1. 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).	**1.** NJSLS.A-APR.B.2, NJSLS.A-APR.D.6
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.	**2.** NJSLS.A-SSE.A.2, NJSLS.A-APR.B.2, NJSLS.A-APR.B.3
2. 4.4 Factoring Polynomials Use the structure of an expression to identify ways to rewrite it.	**3.** *NJSLS.A-APR.B.3*
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) = 0 if and only if (x-a) is a factor of p(x).	**4.** *NJSLS.N-CN.C.8, NJSLS.N-CN.C.9, NJSLS.A-APR.B.3*
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.	
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. 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.	

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. Physics (p. 183)	**1. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.**	**1. SCI.MS-PS3-5**
2. Business (p. 195)	**2. Analyze how personal and cultural values impact spending and other financial decisions.**	**2. PFL.9.1.12.A.9**

3. Physics (p. 201)	3. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	3. SCI.MS-PS3-5

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	Mathematical Practices:
● Critical thinking ● Creativity ● Collaboration ● Communication ● Information literacy ● Technology literacy ● Media literacy ● Flexibility ● Leadership ● Initiative ● Productivity ● Social skills	● Make sense of problems and persevere in solving them ● Reason abstractly and quantitatively ● Construct viable arguments and critique the reasoning of others ● Model with mathematics ● Use appropriate tools strategically ● Attend to precision ● Look for and make use of structure ● Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:
• Algebra 2, A Common Core Curriculum – Big Ideas Math, *Big Ideas Learning LLC., 2019*

Online Resources incorporated through the year, include but not limited to:
• BigIdeasMath.com – publisher on-line assignments, resources and text
• Desmos – online graphing tool
• IXL – web-based software
• G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:
• TI – 84 Plus graphing calculator

Students will write:

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.

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:

4.3 Dividing Polynomials:

Warm up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (Simplify Expressions by distribution and combining like terms)
Practice and Apply	Big Ideas Text pg.177 #11-22, 25-32 Supplemental Text: Prentice Hall Algebra 2 pg. 324 #13-22
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

4.4 Factoring Polynomials:

Warm Up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource. (Find the greatest common factor of the polynomial.)
Practice and Apply	Big Ideas Text pg.184 #5-17, 23-26, 31-34, 39-44, 45-49, 72 Supplemental Text: Prentice Hall Algebra 2 pg. 330 #12-26
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

4.5 Solving Polynomial Equations:

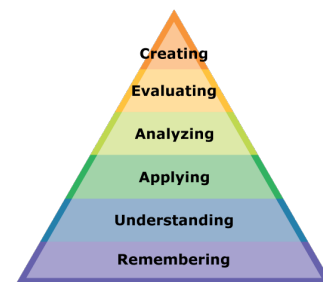| Warm up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource. (Solve linear functions for a single variable)
Practice and Apply	Big Ideas Text pg.194 #3-20, 25-38(must give 1 zero), 41, 42, 56a Supplemental Text: Prentice Hall Algebra 2 pg. 339 #1-5 (must give 1 zero), 7-10(must give 1 zero), 13-18, 19,21, 23
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

4.6 The Fundamental Theorem of Algebra:

Warm up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource. (Identify the degree of the polynomial.)
Practice and Apply	Big Ideas Text pg.202 #3-16, 21, 22, 25 Supplemental Text: Prentice Hall Algebra 2 pg. 343 #9-16
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

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 stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

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

• **Projects**

• **Performance Tasks**

• **Homework**

• **Classwork**

Accommodations/Modifications:

As stated in IEP or 504
- [Special Education](#)
- [504 Students](#)
- [At Risk Students](#)
- [ELL](#)
- [Gifted and Talented](#)

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title:	Unit Summary:
Algebra 2 Integrated/ Algebra 2 Ch 5: Rational Exponents and Radical Functions	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.
Grade Level(s): 11-12	

Essential Question(s):	Enduring Understanding(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**	**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.

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?** **• 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?**	• Graph radical functions. • Write transformations of radical functions. • Solve equations containing radicals and rational exponents. • Add, subtract, multiply, and divide functions. • Find composition of functions. • 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 nth 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.	**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**

Cross-Curricular Standards:

Realworld problem-solving examples	Learning Target	NJSLS:
1. **Physics (p. 254)**	1. **Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.**	1. **SCI.MS-PS2-2**
2. **Aviation (p. 257)**	2. **Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.**	2. **SCI.MS-PS2-2**
3. **Physical Health/Exercise**	3. **Developing and maintaining wellness requires ongoing evaluation of factors impacting health and modifying lifestyle behaviors accordingly.**	3. **HPE.2.1.12.A.CS1**

The following 21st century skills and the 8 mathematical practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments and projects:

21st Century skills:	Mathematical Practices:
• Critical thinking • Creativity • Collaboration	• Make sense of problems and persevere in solving them • Reason abstractly and quantitatively

• Communication • Information literacy • Technology literacy • Media literacy • Flexibility • Leadership • Initiative • Productivity • Social skills	• Construct viable arguments and critique the reasoning of others • Model with mathematics • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning

Students will engage with the following text:

Text:

• Algebra 2, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019

Online Resources incorporated through the year, include but not limited to:

• BigIdeasMath.com – publisher on-line assignments, resources and text

• Desmos – online graphing tool

• IXL – web-based software

• G Suite for education – Google Classroom, Docs, Drive, Mail, etc…

• For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:

• TI – 84 Plus graphing calculator

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:

5.1 nth Roots and Rational Exponents

Warm-up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (using properties of integer exponents to simplify expressions)
Practice and Apply	For objectives relating to simplifying expressions with rational exponents teacher should use Kuta or other supplementary materials. Big Ideas Text pg. 241: #5-10, 21-3135-42, 51-54 Supplemental Text: Prentice Hall Algebra 2 pg. 389 #1-49
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

5.2 Properties of Rational Exponents and Radicals

Warm-up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (using properties of integer exponents to simplify expressions)
Practice and Apply	Big Ideas Text pg. 248: #1-6, 13-16, 37, 41, 42, 44, 49-52, 57, 58, 63, 65, 66, 82-87 Supplemental Text: Prentice Hall Algebra 2 pg. 377 #1-35 and pg382 #1-12
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

5.3 Graphing Radical Functions

Warm-up/Starting Options	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.
Practice and Apply	Big Ideas Text pg. 256: #1-11, 19, 21, 22, 27, 64 Supplemental Text: Prentice Hall Algebra 2 pg. 417: #1-8, 12, 15, 18-21
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

5.4 Solving Radical Equations and Inequalities

Warm-up/Starting Options	Suggestions include but not limited to: Use Exploration 1 Solving Radical Equations pg. 261
Practice and Apply	Big Ideas Text pg. 266: #1-18, 21, 22, 27-32, 35, 36, 58 Supplemental Text: Prentice Hall Algebra 2 pg. 394: #1-30
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

5.5 Performing Function Operations

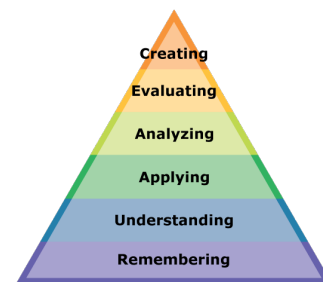| Warm-up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (Simplify expressions)
Practice and Apply	Big Ideas Text pg. 273: #5, 6, 19, 20, 28-31 Supplement Composition of functions using Kuta Software Supplemental Text: Prentice Hall Algebra 2 pg. 400: #1-44
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

5.6 Inverse of a Function

Warm-up/Starting Options	Suggestions include but not limited to: Warm-ups are available in the Dynamic Classroom Resource (Solve equations for y)
Practice and Apply	Big Ideas Text pg. 281: #5 – 8, 13-20, 22, 29, 30, 73-79 Supplemental Text: Prentice Hall Algebra 2 pg. 410: #1-34
Resources	All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc...

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.

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering

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, warm-up/exit assignments, peer/self-assessments, learning/response logs, discussions and practice presentations.

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 Geometry curriculum/syllabus at the conclusion of an instructional time period:

- **Diagnostic Pre-Test**
- **Chapter Assessments**
- **Periodic Benchmark Assessments**
- **End of Course Assessments**
- **Standardized Tests**

Accommodations/Modifications:

As stated in IEP or 504
- Special Education
- 504 Students
- At Risk Students
- ELL
- Gifted and Talented

Performance Assessments:

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

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