Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Algebra 2 Integrated
Course Number: 033300

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 4 Transformations	
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.	
Essential Questions	**Learning Targets/Objectives**
1. How do you reflect a figure in the line y = x? 2. How do you rotate a figure 90 degrees, 180 degrees, or 270 degrees about the origin? 3. What is a glide reflection? 4. How can you rotate a figure in a coordinate plane? 5. What does it mean to dilate a figure?	Students will be able to:. ● Use a rule to translate a figure. ● Perform reflections. ● Perform glide reflections. ● Perform rotations ● Perform a composition with rotations. ● Identify and perform dilations.

Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Ordered pair, coordinate, x coordinate, y coordinate, opposite, proportional	Vector, initial point, terminal point, horizontal component, vertical component, component form, transformation, image, preimage, translation, rigid motion, composition of transformations, reflection, line of reflection, glide reflection, line symmetry, line of symmetry, rotation, center of rotation, angle of rotation, rotational symmetry, center of symmetry, dilation, center of dilation, scale factor, enlargement, reduction

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. G-CO.A.2	1. Represent transformations in the plane using, e.g., … 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. translation versus horizontal stretch).
2. G-CO.A.3	2. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the … reflections that carry it onto itself.
3. G-CO.A.4	3. Develop definitions of translations, reflections, rotations, and dilations in terms of angles, … perpendicular lines, parallel lines, and line segments.
4. G-CO.A.5	4. Given a geometric figure and a … translation, reflection, rotation or dilation, draw the transformed figure using, e.g., graph paper, … or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
5. G-CO.B.6	5. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid

6. G-MG.A.3  7. G-SRT.A.1.a 8. G-SRT.A.1.b	motion on a given figure; … 6. 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). Climate Change Example: Students may apply geometric methods to solve design problems such as increasing access to green spaces in cities given physical and cost constraints. 7. 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. 8. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
NJSLS	**Interdisciplinary Connections**
1. SL.PE.9-10.1.D 2. SL.PI.9-10.4	1. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented. 2. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.4.12.CI.1 2. 9.4.5.DC.4 3. 9.4.12.TL.3 4. 9.4.12.CT.2	1. Demonstrate the ability to reflect, analyze, and use creative skills and ideas. 2. Model safe, legal, and ethical behavior when using online or offline technology 3. Analyze the effectiveness of the process and quality of collaborative environments. 4. Explain the potential benefits of collaborating to enhance critical thinking and problem-solving.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.2.CS.1 2. 8.1.2.DA.1 3. 8.1.2.DA.4	1. Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences. 2. Collect and present data, including climate change data, in various visual formats. 3. Make predictions based on data using charts or graphs.

4. 8.1.2.AP.4 5. 8.1.5.DA.5	4. Break down a task into a sequence of steps. 5. Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize

- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools

- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

Geometry, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019

Online Resources

- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- How to Perform Translations: The Mathematical Slide
- GLIDE Reflections - Learn High School Geometry
- Transformations - Composition of a Rotation, Translation, and a Reflection - FishMath.com
- Dilations: Geometry Transformations Explained!

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- ***Big Ideas online program***
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

• Multi-Language Glossary
Gifted & Talented Resources
• Leveled Assessments • Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 4.1 Translations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 4.1**
• Students will perform translations. • Students will perform compositions. • Students will solve real-life problems involving compositions	**Warm-Up:** • Cumulative Practice: finding perimeter in the coordinate plane • Prerequisite Skills Practice: translating a point in a coordinate plane **Starting Options:** Ask for four volunteers. Hand them a piece of yarn or rope at least 12 feet long that has been knotted to form a loop. Have students form the yarn in the shape of a rectangle by holding the vertices. Tell students that you are going to give them instructions to move and that on the word "go" they will all move at the same time. Example: "Take two steps to the front of the classroom. Go." Discuss the results of each instruction. In particular, what happened to the rectangle? The rectangle should have remained the same – congruent. Repeat with four new students and ask them to form a trapezoid. Tap three of the students on the shoulder and tell them to follow your instructions. The remaining student is to ignore your instructions.	**Basic:** 3, 5, 15, 21, 32 **Proficient:** 4, 16, 18, 26, 34 **Advanced:** 16, 26, 28, 35, 41

Section 4.2 Reflections		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 4.2**
• Students will perform reflections. • Students will perform glide reflections. • Students will solve real-life problems involving reflections.	**Warm-Up:** • Cumulative Practice: rewriting a statement in if-then form • Prerequisite Skills Practice: reflecting a point in a coordinate plane **Starting Options:** 60-Second Write: Tell students that they have 60 seconds to make a list of words that can be reflected in a vertical or horizontal line and the result is the same word or a new word. Example: When the word MOM is reflected in a vertical line, it is still MOM. When it is reflected in a horizontal line, it becomes WOW. Share word lists after 60 seconds. The list should contain letters that have line symmetry themselves: A, B, C, D, E, H, I, K, M, O, T, V, W, X, and Y.	**Basic:** 7, 15, 17, 23, 34 **Proficient:** 12, 16, 20, 22, 34 **Advanced:** 12, 16, 20, 32, 34

Section 4.3 Rotations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 4.3**
• Students will perform rotations. • Students will perform compositions with rotations.	**Warm-Up:** • Cumulative Practice: finding a counterexample • Prerequisite Skills Practice: rotating a point in the coordinate plane **Starting Options:** A windshield wiper blade is a useful model in this lesson. The next time you change blades, keep a used blade for the demonstration. Hold the blade at one end of the wiper (point A). Without saying anything, pretend to use the blade for wiping a windshield (rotating about point A). Ask students if all the points on the blade travel the same distance, if any points do not move, and if there is anything that is true about all of the points on the blade. Now tape the blade to a meter stick and ask the students to envision the blade on a car and attached to an arm. Model the movement of the blade now and ask questions similar to before. The difference now is that point A is no longer the center of the rotation, so it is moving.	**Basic:** 2, 7, 13, 17, 25 **Proficient:** 2, 10, 16, 26, 32 **Advanced:** 10, 15, 29, 34, 36

Section 4.5 Dilations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 4.5**
● Students will identify and perform dilations. ● Students will solve real-life problems involving scale factors and dilations.	**Warm-Up:** ● Cumulative Practice: identifying the validity of a statement ● Prerequisite Skills Practice: using a graph to find lengths **Starting Options:** Cut a rectangle out of heavier card stock. Use a flashlight to cast a shadow of the rectangle onto the wall. Ask the students if the angles still appear to be right angles. Then vary the distance between the bulb of the flashlight and the rectangle, and discuss how this changes the shadow. Ask the students if the shadow is always similar to the original figure.	**Basic:** 5, 7, 21, 25, 31 **Proficient:** 14, 19, 24, 26, 39 **Advanced:** 22, 30, 39, 46, 47

PART IV: EVIDENCE OF LEARNING

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

Assessments		
Summative	**Formative**	**Performance**
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 ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

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PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 11 Measuring Length and Area

In this unit, the study of circumference, area, and volume finishes the study of measurement of solids. Students will come to this chapter with knowledge of many formulas for surface area and volume. These will be reviewed and a few new formulas added to the list. Different from middle school is that students now have a greater ability to solve equations. They also know the Pythagorean Theorem and trigonometry, so they are able to solve for measures that previously had to be told to them. 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.

Essential Questions	Learning Targets/Objectives
1. How can you find the length of a circular arc? 2. How can you find the area of a sector of a circle? 3. How can you find the area of a regular polygon? 4. What is the relationship between the numbers of vertices V, edges E, and faces F of a polyhedron? 5. How can you find the volume of a prism or cylinder that is not a right prism or right cylinder? 6. How can you find the volume of a pyramid? 7. How can you find the surface area and the volume of a cone? 8. How can you find the surface area and the volume of a sphere?	Students will be able to: ● Use the formula for circumference. ● Use arc lengths to fi nd measures. ● Solve real-life problems. ● Use the formula for the area of a circle. ● Use the formula for population density. ● Find areas of sectors. ● Use areas of sectors ● Find areas of rhombuses and kites. ● Find angle measures in regular polygons. ● Find areas of regular polygons. ● Classify solids. ● Describe cross sections.

	• Sketch and describe solids of revolution. • Find volumes of prisms and cylinders. • Use the formula for density. • Use volumes of prisms and cylinders • Find volumes of pyramids. • Use volumes of pyramids. • Find surface areas of right cones. • Find volumes of cones. • Use volumes of cones. • Find surface areas of spheres. • Find volumes of spheres
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Circumference, arc length, circle, radius, diameter, intercepted arc, rhombus, kite, solid, prism, pyramid, cylinder, cone, sphere, base, prism, cylinder, composite solid, volume, cone	Sector of a circle, center of a regular polygon, radius of a regular polygon, central angle of a regular polygon, apothem of a regular polygon, polyhedron, face, edge, vertex, cross section, solid of revolution, axis of revolution, Cavalieri's Principle, density, similar solids, net, lateral surface of a cone

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. G-C.B.5	1. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector
2. G-CO.A.1	2. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
3. G-GMD.A.1	3. 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 dissection arguments, Cavalieri's principle, and informal limit arguments.
4. G-GMD.A.2	4. Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
5. G-GMD.A.3	5. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
6. G-GMD.B.4	6. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
7. G-MG.A.1	7. Use geometric shapes, their measures, and their properties to describe objects
8. G-MG.A.2	8. Apply concepts of density based on area and volume in modeling situations
9. G-MG.A.3	9. Apply geometric methods to solve design problems
NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
2. SL.PE.9-10.1.D	2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
3. SL.PI.9-10.4	3. Present information, findings, and supporting evidence clearly, concisely, and logically. The content,

	organization, development, and style are appropriate to task, purpose, and audience.
4. HS-PS1-5	4. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
5. HS-PS1-8	5. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
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3. 8.1.2.DA.3	3. Identify and describe patterns in data visualizations.
4. 8.1.2.DA.4	4. Make predictions based on data using charts or graphs.
5. 8.1.2.AP.4	5. Break down a task into a sequence of steps.
6. 8.1.5.DA.5	6. Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

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- Problem Solve

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- Use Operations
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- Reason Abstractly

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- Use Prior Results
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- Build Arguments
- Analyze Conjectures
- Use Counterexamples

- Justify Conclusions
- Compare Arguments
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- Listen and Ask Questions
- Critique Reasoning
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Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

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Resources
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- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Use Chords of Circles to Find Arc Measures
- Geometry: Circles - Special Segments of Chords, Secants, and Tangents
- Arc Measure vs Arc Length
- Circle Equation in Standard Form (How to Graph)

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- ***Big Ideas online program***
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 11.1 Circumference and Arc Length		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 11.1**
• Use the formula for circumference. • Use arc lengths to find measures. • Solve real-life problems.	**Warm-Up:** ● Cumulative Practice: finding tangent ratios of acute angles in right triangles ● Prerequisite Skills Practice: finding the measure of an arc of a circle **Starting Options:** ● A winter sport near where I live that is growing exponentially is fat-tire biking. Given the abundance of mountain bike, cross country, and snowmobile trails and a growing group of summer mountain bike enthusiasts, fat-tire biking is a natural evolution. ● The tires average 4 inches wide versus 2 inches on a mountain bike or 1 inch on a road bike. The diameter of the tires varies. ● Explain to students that in this lesson they will solve problems about tires.	**Basic:** 3, 7, 13, 15, 21 **Proficient:** 6, 10, 14, 16, 22 **Advanced:** 8, 14, 16, 22, 31

Section 11.2 Areas of Circles and Sectors		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 11.2**
• Use the formula for the area of a circle. • Use the formula for population density. • Find areas of sectors. • Use areas of sectors	**Warm-Up:** ● Cumulative Practice: finding the area of a triangle using two sides and an included angle ● Prerequisite Skills Practice: finding the measure of an arc of a circle **Starting Options:** Story Time: When students enter, display this iconic symbol and ask students whether they are familiar with it. Tell them that you were such a fan of this video game that, in college, you had a rug in this shape in your dorm room. Everyone envied you! "How big was this rug you ask? I'll tell you at the end of class!"	**Basic:** 5, 13, 17, 21, 27 **Proficient:** 8, 12, 16, 22, 26 **Advanced:** 10, 14, 18, 28, 30

Section 11.3 Areas of Polygons		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 11.3**
● Find areas of rhombuses and kites. ● Find angle measures in regular polygons. ● Find areas of regular polygons.	**Warm-Up:** ● Cumulative Practice: using properties of tangents ● Prerequisite Skills Practice: using trigonometric ratios to find missing lengths of triangles **Starting Options:** ● When students enter the room, have the stop sign displayed. You could tell them a story about a colleague who failed to notice this sign last week, or you could simply ask them what information they would need in order to find the area of the sign. ● Explain to students that in this lesson they will learn how to find the area of a regular polygon.	**Basic:** 3, 15, 19, 27, 40 **Proficient:** 4, 16, 20, 28, 36 **Advanced:** 12, 20, 28, 34, 37

Section 11.4 Three-Dimensional Figures		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 11.4**
• Classify solids. • Describe cross sections. • Sketch and describe solids of revolution.	**Warm-Up:** • Cumulative Practice: modeling using a right triangle • Prerequisite Skills Practice: finding the area of circles **Starting Options:** • Hold a cube in your hand. A clear plastic one is best. Use a rubber band stretched around the center of the cube. "If I sliced right through the cube where the rubber band is, what would the new exposed surface look like—meaning, what is the cross section?" a square "How many cross-sectional shapes can be made when you slice through a cube?" Answers will vary. • Tell students that you are not looking for the answer now, but you will return to this question at the end of the class.	**Basic:** 5, 9, 13, 15, 20 **Proficient:** 10, 14, 18, 20 **Advanced:** 14, 18, 24, 28, 32

Section 11.5 Volumes of Prisms and Cylinders		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 11.5**
• Find volumes of prisms and cylinders. • Use the formula for density. • Use volumes of prisms and cylinders.	**Warm-Up:** • Cumulative Practice: using congruent chords to find arc measures • Prerequisite Skills Practice: using similar polygons to find areas **Starting Options:** • "What do you think the capacity is of one of the largest farm grain silos in the country?" Answers will vary. • Share information about a silo located in Berks County, Pennsylvania. • It is equipped with an elevated floor that has a 12-foot clearance so that a feed truck can drive through and be quickly loaded. • It is equipped with an unloader, making the system capable of	**Basic:** 5, 9, 19, 25, 29 **Proficient:** 10, 14, 18, 26, 30 **Advanced:** 14, 18, 28, 32, 38

	loading 50-plus tons of grain per hour and unloading 800 to 1200 pounds of grain per minute. ● The silo has more than 94,000 cubic feet of storage capacity and should hold more than 4000 tons of corn silage. ● Share a picture of the silo, which you can find with an online search for “largest farm silo.” ● Explain to students that in this lesson they will be finding volumes of prisms and cylinders.	

Section 11.6 Volumes of Pyramids		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 11.6**
● Find volumes of pyramids. ● Use volumes of pyramids.	**Warm-Up:** ● Cumulative Practice: using inscribed angles ● Prerequisite Skills Practice: finding the volume of prisms **Starting Options:** ● Ask whether anyone has visited the famed Louvre Museum in Paris. ● The Louvre Pyramid is a large glass and metal pyramid, surrounded by three smaller pyramids, in the main courtyard. The large pyramid serves as the main entrance to the Louvre Museum. ● The Louvre Pyramid was designed by I. M. Pei, who also designed the Rock and Roll Hall of Fame in Cleveland, Ohio. ● Students will find the volume of the glass pyramid at the end of the lesson.	**Basic:** 3, 5, 7, 11, 17 **Proficient:** 6, 12, 16, 20, 21 **Advanced:** 12, 20, 21, 23, 24

Section 11.7 Surface Areas and Volumes of Cones

Specific Learning Objective	Warm-Up/Starting Options	Practice & Apply Exercises 11.6
• Find surface areas of right cones. • Find volumes of cones. • Use volumes of cones.	**Warm-Up:** • Cumulative Practice: using the Inscribed Quadrilateral Theorem • Prerequisite Skills Practice: finding the areas of sectors **Starting Options:** • "What does the net for a cone look like? Sketch it." Ask students to share their sketches. Many will have the lateral portion incorrect. Students will work with the net in the first exploration.	**Basic:** 3, 7, 11, 13, 15 **Proficient:** 6, 12, 14, 16, 20 **Advanced:** 14, 16, 20, 24, 26

Section 11.8 Surface Areas and Volumes of Spheres

Specific Learning Objective	Warm-Up/Starting Options	Practice & Apply Exercises 11.6
• Find surface areas of spheres. • Find volumes of spheres	**Warm-Up:** • Cumulative Practice: using the Tangent and Intersecting Chord Theorem to find angle and arc measures • Prerequisite Skills Practice: finding volumes of cylinders and cones **Starting Options:** • Have students describe the surface of a half sphere, and ask them how they might calculate its surface area. • Discuss with students that the surface area consists of the flat, circular base, for which they can use the area formula $A = \pi r^2$ and half a ball-shaped surface. • Tell students that in this lesson they will learn and apply formulas for the surface area and volume of a sphere.	**Basic:** 7, 11, 15, 23, 27 **Proficient:** 8, 20, 26, 34, 36 **Advanced:** 8, 20, 26, 36, 46

PART IV: EVIDENCE OF LEARNING

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

Assessments		
Summative	**Formative**	**Performance**
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 ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Algebra 2 Integrated
Course Number: 033300

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Unit Title: Chapter 9 Right Triangles and Trigonometry	
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 two lessons use knowledge of similar triangles to investigate relationships in special right triangles (30°-60°-90° and 45°-45°-90°) as well as similar triangles that are formed when the altitude to the hypotenuse is drawn in a right triangle. Being familiar with these relationships and solving for segment lengths in triangles will be helpful in subsequent lessons. 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 Questions	**Learning Targets/Objectives**
1. How can you prove the Pythagorean Theorem? 2. How is a right triangle used to find the sine, cosine, and tangent of an acute triangle? 3. When you know the lengths of the sides of a right triangle, how can you find the measures of the two acute angles?	Students will be able to: ● Use the Pythagorean Theorem ● Classify Triangles ● Use the tangent ratio ● Solve real-life problems involving the tangent ratio. ● Use the sine and cosine ratios ● Find the sine and cosine of angle measures in special right triangles ● Solve real-life problems involving sine and cosine ratios ● Use inverse trigonometric ratios ● Solve right triangles

Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Right triangle, legs of a right triangle, hypotenuse, acute triangle, obtuse triangle, isosceles triangle, altitude of a triangle, similar figures,	The Pythagorean Theorem, Pythagorean Triple, Converse of Pythagorean Theorem, trigonometric ratio, tangent, sine, cosine, angle of elevation, angle of depression, inverse tangent, inverse sine, inverse cosine, solve a right triangle

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-RN.A.3	1. Simplify radical expressions.
2. G-SRT.B.4	2. Prove theorems about triangles.
3. G-SRT.C.6	3. 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.
4. G-SRT.C.7	4. Explain and use the relationship between the sine and cosine of complementary angles.
5. G-SRT.C.8	5. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
6. G-MG.A.1 	6. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).  Climate Change Example: Students may use circles, their measures, and their properties to describe the cross-section of a tree and compare changes in radial diameter or circumference variations of tree trunks when considering changes in seasonal weather patterns over time.
7. G-MG.A.3 	7. 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).  Climate Change Example: Students may apply geometric methods to solve design problems such as increasing access to green spaces in cities given physical and cost constraints.

NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
2. SL.PE.9-10.1.D	2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
3. SL.PI.9-10.4	3. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
4. HS-PS1-5	4. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
5. HS-PS1-8	5. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.3.12.AG-PST.1	1. Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems.
2. 9.4.12.CI.1	2. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
3. 9.4.5.DC.4	3. Model safe, legal, and ethical behavior when using online or offline technology
4. 9.4.12.TL.3	4. Analyze the effectiveness of the process and quality of collaborative environments.
5. 9.4.12.CT.2	5. Explain the potential benefits of collaborating to enhance critical thinking and problem-solving.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.2.CS.1	1. Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
2. 8.1.2.DA.1	2. Collect and present data, including climate change data, in various visual formats.
3. 8.1.2.DA.3	3. Identify and describe patterns in data visualizations.

4. 8.1.2.DA.4 5. 8.1.2.AP.4 6. 8.1.5.DA.5	4. Make predictions based on data using charts or graphs. 5. Break down a task into a sequence of steps. 6. Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations

- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools

- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

Geometry, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019

Online Resources

- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Pythagorean Theorem
- The Tangent Ratio - Intro to Trigonometry (Learn it Fast and Easy)
- Intro to the trigonometric ratios

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- ***Big Ideas online program***
- Devices:
    - Chromebooks
    - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 9.1 The Pythagorean Theorem		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 9.1**
• Students will use the Pythagorean Theorem.. • Students will classify triangles.	**Warm-Up:** ● Cumulative Practice: finding the number of sides of polygons ● Prerequisite Skills Practice: using square roots to solve for x **Starting Options:** Share information about Pythagoras, who was born in Greece in 569 B.C. He is known as the Father of Numbers. He traveled extensively in Egypt, learning math, astronomy, and music. Pythagoras undertook a reform of the cultural life of Cretona, urging the citizens to follow his religious, political, and philosophical goals. He created a school where his followers, known as Pythagoreans, lived and worked. They observed a rule of silence called echemythia, the breaking of which was punishable by death. One had to remain silent for five years before being allowed to contribute to the group. Over the years, many mathematicians and non-mathematicians have given various proofs of the Pythagorean Theorem. One of our former presidents, President James Garfield, is credited with a proof.	**Basic:** 7, 11, 13, 15, 25 **Proficient:** 6, 10, 18, 28, 32 **Advanced:** 9, 18, 28, 34, 40

Section 9.4 The Tangent Ratio		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 9.4**
• Students will use the tangent ratio. • Students will solve real-life problems involving the tangent ratio.	**Warm-Up:** • Cumulative Practice: finding side lengths of parallelograms • Prerequisite Skills Practice: finding side lengths of triangles **Starting Options:** Draw a right triangle and label the sides a, b, and c. Ask students how many different ratios can be written using the sides a, b, and c, and have them explain. Explain to students that today they will learn about the tangent of an angle, one of the six trigonometric ratios. Share a bit of history of trigonometry if time permits.	**Basic:** 3, 9, 11, 15, 22 **Proficient:** 6, 10, 12, 16, 20 **Advanced:** 6, 10, 16, 20, 24

Section 9.5 The Sine and Cosine Ratios		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 9.5**
• Students will use the sine and cosine ratios. • Students will find the sine and cosine of angle measures in special right triangles. • Students will solve real-life problems involving sine and cosine ratios.	**Warm-Up:** • Cumulative Practice: finding an unknown exterior angle measure • Prerequisite Skills Practice: using trigonometric functions to find missing side lengths of triangles **Starting Options:** Share information with your students about a spring ski trip you (or your friends) are planning to Tuckerman Ravine, on the east side of Mt. Washington in the White Mountain Forest of New Hampshire. Tuckerman Ravine is famous for its spectacular scenery, deep snow, and challenging terrain. Thousands of motivated skiers make the six-mile round trip to the floor of the Tuckerman Ravine every year. There are no ski lifts – you hike in and hike out, thus you need to be motivated! To decide whether the hike is worth it, skiers want to know the length of the trail. Explain to students that in this lesson they will find a way to determine the length of a ski trail.	**Basic:** 7, 9, 13, 21, 27 **Proficient:** 8, 12, 20, 23, 30 **Advanced:** 8, 16, 22, 30, 40

Section 9.6 Solving Right Triangles		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises 9.6**
• Students will use inverse trigonometric ratios. • Students will solve right triangles.	**Warm-Up:** ● Cumulative Practice: finding possible side lengths of triangles ● Prerequisite Skills Practice: finding the value of the three trigonometric functions given a triangle **Starting Options:** Show the Table of Trigonometric Ratios available at BigIdeasMath.com. Explain that before scientific calculators were readily available, tables such as these were included in textbooks. Also printed in textbooks were tables of square roots and cube roots.	**Basic:** 5, 13, 15, 21, 26 **Proficient:** 6, 18, 20, 26, 28 **Advanced:** 6, 16, 20, 26, 30

PART IV: EVIDENCE OF LEARNING

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

Assessments		
Summative	**Formative**	**Performance**
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 ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

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PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 1 & 3.5 - Linear & Nonlinear Systems

Chapter 1 presents topics that were studied in Algebra 1. Students will begin by solving systems of two linear equations, and progress to systems of three equations. Finally, students will use these skills (substitution, eliminations, and graphing) to determine solutions of nonlinear systems.

Essential Questions	Learning Targets/Objectives
1. How can you determine the number of solutions of a linear system? 2. How can you solve a linear system in two variables? 3. How can you solve a linear system in three variables? 4. How can you solve a nonlinear system of equations?	Students will be able to: • Solve systems of two linear equations by substitution and elimination. • Use systems of linear equations to solve real-life problems • Visualize solutions of systems of linear equations in three variables. • Solve systems of linear equations in three variables algebraically. • Solve real-life problems • Solve systems of nonlinear equations. • Solve quadratic equations by graphing.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
linear equation in two variables, system of two linear equations, solution of a system of two linear equations, ordered pair, substitution method, elimination method, linear equation, quadratic equation, factor	linear equation in three variables, system of three linear equations, solution of a system of three linear equations, ordered triple, system of nonlinear equations

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. A-CED.A.3	1. 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. Climate Change Example: Students may represent constraints describing the economic impact of climate change by equations, inequalities, and/or by systems of inequalities, and interpret solutions as viable or nonviable options.
2. A-REI.C.5	2. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
3. A-REI.C.6	3. Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
4. A-REI.C.7	4. Solve a simple system consisting of a linear equation and a quadratic equation in two variables, algebraically and graphically.
5. A-REI.D.11	5. 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
NJSLS	**Interdisciplinary Connections**
1. HS-PS2-1	1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration
2. HS-PS2-2	2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system
3. L.KL.9-10.2.A	3. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
4. W.IW.9–10.2	4. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

5. SL.PE.9-10.1.D	5. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
6. SL.PI.9-10.4	6. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.1.12.CDM.1	1. Identify the purposes, advantages, and disadvantages of debt.
2. 9.1.12.CDM.8	2. Compare and compute interest and compound interest and develop an amortization table using business tools.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
4. 9.4.12.CI.1	4. Demonstrate the ability to reflect, analyze, and use creative skills and ideas
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.2	2. Describe the trade-offs in how and where data is organized and stored.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples

- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

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

Online Resources

- BigIdeas Math
- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Solve systems of two equations using elimination
- Solve systems of three equations
- Nonlinear systems of equations

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources
• Multi-Language Glossary
Gifted & Talented Resources
• Leveled Assessments • Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Solving 2x2 Linear Systems Algebraically		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve systems of two linear equations by substitution and elimination. • Use systems of linear equations to solve real-life problems	**Cumulative Practice**: Graph two linear equations on the same coordinate plane **Prerequisite Skills Practice:** Solve quadratic equations	Teacher created worksheet

Section 1.4 - Solving Linear Systems		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Visualize solutions of systems of linear equations in three variables. • Solve systems of linear equations in three variables algebraically. • Solve real-life problems	**Cumulative Practice**: solving nonlinear systems by graphing **Prerequisite Skills Practice:** verifying solutions to linear equations	**Basic:** 7, 11, 15, 19, 23 **Proficient:** 8, 12, 14, 24, 30 **Advanced:** 8, 12, 18, 30, 36

Section 3.5 - Solving Nonlinear Systems		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve systems of nonlinear equations. • Solve quadratic equations by graphing.	**Cumulative Practice**: graphing a quadratic function in standard form **Prerequisite Skills Practice:** solving systems of linear equations by substitution	**Basic:** 5, 15, 17, 29, 45 **Proficient:** 6, 18, 22, 28, 44 **Advanced:** 10, 18, 22, 30, 46

PART IV: EVIDENCE OF LEARNING

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

<table>
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● Diagnostic Pre-Test
● Chapter Tests
● Periodic Benchmark Tests
● Standardized Tests</td>
<td>The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to:

● Teacher observations
● Self-Assessments
● Student record-keeping
● Quizzes
● Warm-ups
● Exit Tickets
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● 504 Students
● At Risk Students
● MLL
● Gifted and Talented</td>
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State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Algebra 2 Integrated
Course Number: 033300

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 2 - Quadratic Functions

Students have studied quadratic functions in Algebra 1. Their background should include factoring quadratic expressions, graphing quadratic equations written in three forms, and solving quadratic equations using a variety of approaches. Students will extend their knowledge of quadratic functions in this chapter. In the previous chapter, students looked at the transformations of linear and absolute value functions. The first lesson in this chapter introduces the same transformations on quadratic functions. The vertex of the absolute value function and the vertex of a quadratic function are key points that help students distinguish quickly the type(s) of transformation(s) displayed in a graph. The second and third lessons look at characteristics of quadratic functions. Where is the function increasing or decreasing? Where is the line of symmetry? What is the maximum/ minimum value of the function? The last lesson of the chapter looks at modeling with quadratic functions. The technique of solving systems from Chapter 1 is extended to a 3-by-3 system. There are four common forms in which quadratics are written, and each gives information about the graph and the behavior of the function. Understanding the connection between the characteristics of a quadratic and its equation can help students apply their knowledge when working with a real-life application.

Essential Questions	Learning Targets/Objectives
1. How do the constants a, h, and k affect the graph of the quadratic function $g(x) = a(x - h)^2 + k$? 2. What type of symmetry does the graph of $f(x) = a(x - h)^2 + k$ have and how can you describe this symmetry? 3. How can you use a quadratic function to model a real-life	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. • Graph quadratic functions using x-intercepts. • Solve real-life problems.

situation?	• Write equations of quadratic functions using vertices, points, and x-intercepts. • Write quadratic equations to model data sets.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Transformations, quadratic function, parabola, vertex of a parabola, x-intercept, axis of symmetry, average rate of change	vertex form, standard form, minimum value, maximum value, intercept form

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. A-APR.B.3	1. 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. A-CED.A.2	2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
3. F-BF.B.3	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.
4. F-IF.B.4	4. 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
5. F-IF.B.6	5. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

	Climate Change Example: Students may calculate the average rate of change of a function c(m) presented symbolically or as a table, where c(m) represents the amount of carbon dioxide produced by burning a given number of molecules of ethane (gasoline).
6. F-IF.C.7c	6. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
7. F-IF.C.9	7. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
NJSLS	**Interdisciplinary Connections**
1. HS-PS2-1	1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration
2. HS-PS2-2	2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system
3. L.KL.9-10.2.A	3. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
4. W.IW.9–10.2	4. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
5. SL.PE.9-10.1.D	5. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
6. SL.PI.9-10.4	6. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.1.12.CDM.1	1. Identify the purposes, advantages, and disadvantages of debt.
2. 9.1.12.CDM.8	2. Compare and compute interest and compound interest and develop an amortization table using business tools.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
4. 9.4.12.CI.1	4. Demonstrate the ability to reflect, analyze, and use creative skills and ideas

2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.2	2. Describe the trade-offs in how and where data is organized and stored.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations

- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools

- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

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

Online Resources

- BigIdeas Math
- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Finding features of quadratic equations
- Transformations of parabolas

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
    - Chromebooks
    - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

• Multi-Language Glossary
Gifted & Talented Resources
• Leveled Assessments • Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 2.1 - Transformations and Quadratic Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Write linear inequalities. • Sketch the graphs of linear inequalities. • Write linear inequalities from graphs	**Cumulative Practice**: graphing transformations of square root functions **Prerequisite Skills Practice:** graphing horizontal and vertical stretches and shrinks of linear functions	**Basic:** 9, 17, 33, 41 **Proficient:** 10, 16, 32, 44 **Advanced:** 12, 24, 36, 44

Section 2.2 - Characteristics of Quadratic Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
● Solve inequalities using addition. ● Solve inequalities using subtraction. ● Use inequalities to solve real-life problems.	**Cumulative Practice**: factoring polynomials **Prerequisite Skills Practice:** reflecting points over lines in the coordinate plane	**Basic:** : 5, 7, 13, 25 **Proficient:** 8, 18, 22, 26 **Advanced:** 16, 17, 24, 25

Section 2.4 - Modeling with Quadratic Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
● Solve multi-step inequalities. ● Use multi-step inequalities to solve real-life problems.	**Cumulative Practice**: finding minimum and maximum values of a quadratic function **Prerequisite Skills Practice:**writing equations in point-slope form	**Basic:** 7, 13, 17, 19, 31 **Proficient:** 8, 14, 18, 20, 32 **Advanced:** 14, 16, 22, 28, 32

PART IV: EVIDENCE OF LEARNING

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

Assessments		
Summative	**Formative**	**Performance**
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 ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Algebra 2 Integrated
Course Number: 033300

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 3 - Quadratic Equations and Complex Numbers

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

Essential Questions	Learning Targets/Objectives
1. How can you rewrite quadratic equations in factored form? 2. How can you use the graph of a quadratic equation to determine the number of real solutions of the equation? 3. What are the subsets of the set of complex numbers? 4. How can you complete the square for a quadratic expression? 5. How can you derive a general formula for solving a quadratic equation?	Students will be able to: • Factor GCFs out of quadratic equations. • Factor a difference of two squares • Factor a quadratic equation in the form of $ax^2 + bx + c$ • Solve quadratic equations by graphing. • Solve quadratic equations algebraically. • Solve real-life problems. • Define and use the imaginary unit i. • Add, subtract, and multiply complex numbers. • Find complex solutions and zeros • Simplify square-roots

	• Solve quadratic equations using square roots. • Solve quadratic equations by completing the square. • Solve quadratic equations using the Quadratic Formula. • Solve real-life problems.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
quadratic equation in one variable, properties of square roots, factoring, real number, radical, radicand, perfect square trinomial, vertex form	root of an equation, zero of a function, rationalizing the denominator, imaginary unit i, complex number, imaginary number, pure imaginary number, completing the square, Quadratic Formula, discriminant

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-CN.A.1	1. Know there is a complex number i such that i^2 = –1, and every complex number has the form a + bi with a and b real.
2. N-CN.A.2	2. Use the relation i^2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
3. N-CN.C.7	3. Solve quadratic equations with real coefficients that have complex solutions.
4. N-RN.A.3	4. Simplify radicals, including algebraic radicals
5. A-REI.B.4b	5. Solve quadratic equations by inspection (e.g., for x2 = 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.
6. A-SSE.A.2	6. Use the structure of an expression to identify ways to rewrite it. For example, see x^4 – y^4 as (x^2)^2 – (y^2)^2, thus recognizing it as a difference of squares that can be factored as (x^2 – y^2)(x^2 + y^2).

7. A-SSE.B.3a	7. Factor a quadratic expression to reveal the zeros of the function it defines.
8. F-IF.C.8a	8. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
NJSLS	**Interdisciplinary Connections**
1. HS-PS2-1	1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration
2. HS-PS2-2	2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system
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4. 9.4.12.CI.1	4. Demonstrate the ability to reflect, analyze, and use creative skills and ideas
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	

1. 8.1.12.DA.1 2. 8.1.12.DA.2	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change. 2. Describe the trade-offs in how and where data is organized and stored.

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- Find Entry Points
- Analyze Givens
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- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize

- Relationships
- Reason Abstractly

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- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

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- Choose Tools
- Recognize Usefulness of Tools

- Use Other Resources
- Use Technology to Explore

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- Specify Units
- Label Axes
- Calculate Accurately
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- Repeat Calculations
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- Maintain Oversight
- Evaluate Results

Resources

Textbook

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

Online Resources

- BigIdeas Math
- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Solving Quadratic Equations by Factoring
- Completing the Square
- Quadratic Formula

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
    - Chromebooks
    - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources
• Multi-Language Glossary
Gifted & Talented Resources
• Leveled Assessments • Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Supplement - Factoring Quadratic Expressions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Factor GCFs out of quadratic equations. • Factor a difference of two squares • Factor a quadratic equation in the form of $ax^2 + bx + c$	**Cumulative Practice:** using exponent rules to simplify expressions **Prerequisite Skills Practice:** multiplying two binomials	Teacher created worksheet on factoring GCFs, Difference of two squares, and trinomials in the form of $ax^2 + bx + c$

Section 3.1 - Solving Quadratic Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve quadratic equations by graphing. • Solve quadratic equations algebraically. • Solve real-life problems.	**Cumulative Practice**: identifying a function family **Prerequisite Skills Practice:** factor quadratic expression	**Basic:** 3, 15, 27, 51, 57 **Proficient:** 10, 16, 30, 52, 70 **Advanced:** 12, 20, 30, 52, 70

Section 3.2 - Complex Numbers		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Define and use the imaginary unit i. • Add, subtract, and multiply complex numbers. • Find complex solutions and zeros	**Cumulative Practice**: writing translations of functions **Prerequisite Skills Practice:** simplifying using the distributive property	**Basic:** 7, 15, 21, 41, 51 **Proficient:** 16, 26, 42, 52, 58 **Advanced:** 20, 30, 44, 52, 58

Supplement - Simplify Radicals		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Simplify square-roots	**Cumulative Practice**: use the Pythagorean Theorem **Prerequisite Skills Practice:** evaluating square roots	Teacher created worksheet involving simplifying square roots.

Section 3.3 - Completing the Square		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve quadratic equations using square roots. • Solve quadratic equations by completing the square.	**Cumulative Practice**: using symmetry to graph quadratic functions **Prerequisite Skills Practice:** factoring polynomials	**Basic:** 5, 15, 27, 45, 61 **Proficient:** 8, 18, 30, 46, 62 **Advanced:** 8, 18, 34, 62, 64

Section 3.4 - Using the Quadratic Formula		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve quadratic equations using the Quadratic Formula. • Solve real-life problems. .	**Cumulative Practice**: transformations of quadratic functions **Prerequisite Skills Practice:** completing the square	**Basic:** 7, 15, 17, 21, 39 **Proficient:** 10, 16, 18, 22, 36 **Advanced:** 16, 18, 26, 38, 65

PART IV: EVIDENCE OF LEARNING

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

Assessments		
Summative	**Formative**	**Performance**
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 ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Algebra 2 Integrated
Course Number: 033300

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 4 - Polynomial Functions

Polynomial functions are defined and graphed. End behavior of even and odd. This is the longest chapter in the book, with nine lessons about polynomial functions. Linear and quadratic functions are two types of polynomials, so connections to earlier work are easily made. In the first lesson, polynomial functions are defined and graphed. The notation and vocabulary can be overwhelming for students, though some of the vocabulary was used in Algebra 1. End behavior of even- and odd-degree polynomials is explored. Operations on polynomial expressions are presented so that polynomial expressions can be factored. Prior work with factoring is extended to third- and fourth-degree expressions. Synthetic division is used to efficiently check for possible rational roots when rewriting polynomials in factored form in order to solve polynomial equations. All of the work with operations on polynomials, factoring, and solving leads to the Fundamental Theorem of Algebra in the middle of the chapter: If f(x) is a polynomial of degree n, where n < t; 0, then the equation f(x) = 0 has at least one solution in the set of complex numbers. The corollary to the theorem, namely that an nth-degree polynomial function has exactly n zeros, is the focus of the lesson. The last third of the chapter deals with polynomial functions, in particular the graphs of these functions Concepts that are foundational for work in calculus are presented. Certainly a great deal of content in this chapter is calculator dependent. In fact, symbolic manipulators can perform much of the work presented in the early part of the chapter, and graphing calculators can be used to quickly solve polynomial equations.

Essential Questions	Learning Targets/Objectives
1. What are some common characteristics of the graphs of cubic and quartic polynomial functions? 2. How can you cube a binomial? 3. How can you use the factors of a cubic polynomial to solve a	Students will be able to: • Identify polynomial functions. • Graph polynomial functions using tables and end behavior. • Add and subtract polynomials. • Multiply polynomials.

division problem involving the polynomial? 4. How can you determine whether a polynomial equation has imaginary solutions? 5. How many turning points can the graph of a polynomial function have?	• Use Pascal's Triangle to expand binomials. • Use synthetic division to divide polynomials by binomials of the form $x - k$. • Factor polynomials. • Find solutions of polynomial equations and zeros of polynomial functions. • Use the Fundamental Theorem of Algebra. • Find conjugate pairs of complex zeros of polynomial functions. • Use x-intercepts to graph polynomial functions. • Find turning points and identify local maximums and local minimums of graphs of polynomial functions.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
monomial, linear function, quadratic function, like terms, remainder, factor by grouping, quadratic form, roots of an equation, real numbers, conjugates, imaginary number, complex solution, solution of an equation, zero of a function, degree of a polynomial, increasing, decreasing, symmetric about the y-axis, local maximum, local minimum	polynomial, polynomial function, end behavior, Pascal's Triangle, polynomial long division, synthetic division, complex conjugates, repeated solution, even function, odd function

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-CN.C.8	1. Extend polynomial identities to the complex numbers.
2. N-CN.C.9	2. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
3. A-APR.A.1	3. 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.
4. A-APR.B.2	4. 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).
5. A-APR.B.3	5. 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.
6. A-APR.C.4	6. Prove polynomial identities and use them to describe numerical relationships.
7. A-APR.C.5	7. Know and apply the Binomial Theorem for the expansion of (x + y)n in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.
8. A-APR.D.6	8. 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.
9. A-SSE.A.2	9. Use the structure of an expression to identify ways to rewrite it.
10. F-BF.B.3	10. 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.
11. F-IF.B.4	11. 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.
12. F-IF.C.7c	12. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
NJSLS	**Interdisciplinary Connections**
1. HS-PS2-1	1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration
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3. L.KL.9-10.2.A	3. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
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5. SL.PE.9-10.1.D	5. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
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1. 9.1.12.CDM.1	1. Identify the purposes, advantages, and disadvantages of debt.
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3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
4. 9.4.12.CI.1	4. Demonstrate the ability to reflect, analyze, and use creative skills and ideas
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The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

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- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments

- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

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- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

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- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes

- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

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- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

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Resources

Textbook

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

Online Resources

- BigIdeas Math
- Desmos Activities

- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Pascal's Triangle
- Dividing polynomials using Synthetic Division
- Possible number of real roots for polynomials

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 4.1 - Graphing Polynomial Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Identify polynomial functions. • Graph polynomial functions using tables and end behavior	**Cumulative Practice**: graphing transformations of quadratic functions **Prerequisite Skills Practice:** evaluating functions	**Basic:** 5, 13, 19, 27, 41 **Proficient:** 6, 14, 20, 30, 41 **Advanced:** 8, 16, 20, 32, 41

Section 4.2 - Adding, Subtracting, and Multiplying Polynomials		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Add and subtract polynomials. • Multiply polynomials. • Use Pascal's Triangle to expand binomials.	**Cumulative Practice**: writing equations of parabolas **Prerequisite Skills Practice:** simplifying expressions	**Basic:** 5, 11, 19, 37, 43 **Proficient:** 8, 12, 22, 40, 44 **Advanced:** 8, 12, 34, 40, 48

Section 4.3 - Dividing Polynomials		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use synthetic division to divide polynomials by binomials of the form x − k.	**Cumulative Practice**: solving three variable systems of equations **Prerequisite Skills Practice:** factoring trinomials	**Basic:** 7, 11, 13, 25, 31 **Proficient:** 8, 12, 14, 28, 32 **Advanced:** 10, 16, 18, 32, 36

Section 4.5 - Solving Polynomial Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Find solutions of polynomial equations and zeros of polynomial functions. • Use the Irrational Conjugates Theorem.	**Cumulative Practice**: solving equations by factoring **Prerequisite Skills Practice:** solving two-step linear equations	**Basic:** 5, 13, 25, 37, 41 **Proficient:** 12, 18, 30, 38, 44 **Advanced:** 12, 20, 32, 38, 46

Section 4.6 - The Fundamental Theorem of Algebra		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use the Fundamental Theorem of Algebra. • Find conjugate pairs of complex zeros of polynomial functions	**Cumulative Practice**: writing quadratic equations in vertex form **Prerequisite Skills Practice:** identifying the degree of polynomials	**Basic:** 7, 9, 15, 21, 33 **Proficient:** 8, 14, 20, 26, 36 **Advanced:** 8, 16, 28, 40, 44

Section 4.8 - Analyzing Graphs of Polynomial Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use x-intercepts to graph polynomial functions. • Find turning points and identify local maximums and local minimums of graphs of polynomial functions.	**Cumulative Practice**: solving quadratic equations by completing the square **Prerequisite Skills Practice:** finding the vertex of a quadratic function	**Basic:** 3, 7, 19, 27, 41 **Proficient:** 4, 12, 20, 28, 44 **Advanced:** 6, 14, 20, 30, 46

PART IV: EVIDENCE OF LEARNING

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

Assessments		
Summative	**Formative**	**Performance**
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 ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
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Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Course Name: Algebra 2 Integrated
Course Number: 033300

Updated: June 2024

PART I: UNIT RATIONALE

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

Chapter 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.

Essential Questions	Learning Targets/Objectives
1. How can you use a rational exponent to represent a power involving a radical? 2. How can you use properties of exponents to simplify products and quotients of radicals? 3. How can you identify the domain and range of a radical function?	Students will be able to: • Find nth roots of numbers. • Evaluate expressions with rational exponents. • Solve equations using nth roots. • Use properties of rational exponents to simplify expressions with rational exponents. • Use properties of radicals to simplify and write radical expressions in simplest form.

4. How can you solve a radical equation? 5. How can you use the graphs of two functions to sketch the graph of an arithmetic combination of the two functions? 6. How do you compose functions? 7. How can you sketch the graph of the inverse of a function?	• Graph radical functions. • Write transformations of radical functions. • Graph parabolas and circles. • Solve equations containing radicals and rational exponents. • Solve radical inequalities. • Add, subtract, multiply, and divide functions • Composition of functions • Explore inverses of functions. • Find and verify inverses of nonlinear functions. • Solve real-life problems using inverse functions
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Product of Powers Property, Quotient of Powers Property, Power of a Power Property, Power of a Quotient Property, square root, cube root, exponent, properties of integer exponents, absolute value, transformations, parabola, circle, radical expressions, solving quadratic equations, domain, scientific notation, combining like terms, substitution, input, output, inverse operations, reflection, line of reflection	nth root of a, index of a radical, rationalizing the denominator, simplest form of a radical, conjugate, like radicals, radical function, radical equation, extraneous solutions, rational exponents, composition of functions, inverse functions

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-RN.A.1	1. 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.
2. N-RN.A.2	2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
3. N-RN.A.3	3. Simplify radicals, including algebraic radicals

4. A-CED.A.4	4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
5. A-REI.A.1	5. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
6. A-REI.A.2	6. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
7. F-BF.A.1b	7. Combine standard function types using arithmetic operations.
8. F-BF.A.1c	8. Compose functions.
9. F-BF.B.3	9. 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.
10. F-BF.4a	10. 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.
11. F-IF.C.7b	11. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
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- New Jersey Climate Education Hub

Videos

- Rational Exponents
- Solving radical equations: One solution
- Solving radical equations: Two solutions
- Solving radical equations: No solution
- Finding Composition of Functions

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 5.1 - nth Roots and Rational Exponents		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Find nth roots of numbers. • Evaluate expressions with rational exponents. • Solve equations using nth roots.	**Cumulative Practice**: writing equations of parabolas **Prerequisite Skills Practice:** writing equations of parabolas	**Basic:** 7, 13, 29, 31, 41 **Proficient:** 8, 16, 30, 42, 46 **Advanced:** 10, 18, 32, 44, 46

Section 5.2 - Properties of Rational Exponents and Radicals		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use properties of rational exponents to simplify expressions with rational exponents. • Use properties of radicals to simplify and write radical expressions in simplest form	**Cumulative Practice**: using the Quadratic Formula to solve equations **Prerequisite Skills Practice:** using the quotient of powers property to simplify expressions	**Basic:** 5, 15, 31, 59, 65 **Proficient:** 8, 18, 34, 60, 68 **Advanced:** 12, 20, 36, 62, 70

Section 5.3 - Graphing Radical Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Graph radical functions. • Write transformations of radical functions. • Graph parabolas and circles	**Cumulative Practice**: solving a nonlinear system by graphing **Prerequisite Skills Practice:** graphing transformations of quadratic functions	**Basic:** 11, 19, 39, 41, 51 **Proficient:** 14, 22, 39, 42, 58 **Advanced:** 16, 26, 39, 44, 62

Section 5.4 - Solving Radical Equations and Inequalities		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve equations containing radicals and rational exponents. • Solve radical inequalities.	**Cumulative Practice**: solving quadratic inequalities **Prerequisite Skills Practice:** using the Triangle Inequality Theorem	**Basic:** 5, 13, 17, 27, 41 **Proficient:** 6, 14, 22, 32, 42 **Advanced:** 10, 13, 26, 34, 44

Section 5.5 - Performing Function Operations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Add, subtract, multiply, and divide functions	**Cumulative Practice**: writing a quadratic equation in vertex form **Prerequisite Skills Practice:** simplifying exponential expressions	**Basic:** 5, 7, 9, 13, 19 **Proficient:** 6, 8, 10, 14, 20 **Advanced:** 6, 10, 12, 16, 20

Supplement - Composition of Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Perform a composition of functions	**Cumulative Practice**: expand a binomial using Pascals Triangle **Prerequisite Skills Practice:** simplifying exponential expressions	Teacher created worksheet

Section 5.6 - Inverse of a Function		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Explore inverses of functions. • Find and verify inverses of nonlinear functions. • Solve real-life problems using inverse functions.	**Cumulative Practice**: solving quadratic equations using square roots **Prerequisite Skills Practice:** graphing transformations of square root functions	**Basic:** 9, 13, 23, 37, 49 **Proficient:** 10, 18, 26, 44, 50 **Advanced:** 12, 20, 28, 46, 52

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