

ALGEBRA 2 INTEGRATED SYLLABUS
2020 - 2021 Academic School-Year

Marking Period 1

Chapter 4: Transformations (Quiz (only) 4.1-4.3, 4.5)

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

Chapter 10: Properties of Circles (Test 10.1-10.7)

| Section | Title | NJSLS | Problems |
|------------|---|--|--|
| 10.1 | Lines and Segments that Intersect Circles | <i>NJSLS-G-CO.A.1, NJSLS-G-C.A.2, NJSLS-G-C.A.4 (Formulas Given)</i> | Big Ideas Text p. 534-536 #1-35 odd, 39, 45, 49, 50 |
| 10.2, 10.3 | Finding Arc Measures Using Chords | <i>NJSLS-G-C.A.1, NJSLS-G-C.A.2 NJSLS-G-MG.A.3 (Formulas Given)</i> | Big Ideas Text p. 542-544 #1-29 odd, 31, 39-42 Big Ideas Text p. 549-550 #1-17 odd, 26-28 |
| 10.4 | Inscribed Angles and Polygons | <i>NJSLS-G-CO.D.13, NJSLS-G-C.A.2, NJSLS-G-C.A.3 (Formulas Given)</i> | Big Ideas Text p. 558-560 #1-17 odd, 19-21, 34, 43-46 |

| | | | |
|------------|--|---|--|
| 10.5, 10.6 | Angle Relationships in Circles Segment Relationships in Circles | <i>NJSLS-G-C.A.2</i> <i>NJSLS-G-MG.A.1</i> (Formulas Given) | Big Ideas Text p. 566-568 #1-23 odd, 34, 41-43 Big Ideas Text p. 573-574 #1-15 odd, 27-30 |
| 10.7 | Circles in the Coordinate Plane | <i>NJSLS-G-GPE.A.1,</i> <i>NJSLS-G-GPE.B.4</i> | Big Ideas Text p. 579-580 #1-21 odd, 25, 26, 35-40 |

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

| Section | Title | NJSLS | Problems |
|---------------------------|---|---|--|
| 11.1-11.2 | Circumference and Arc Length Areas of Circles and Sectors | <i>NJSLS-G-GMD.A.1,</i> <i>NJSLS-G-C.B.5,</i> <i>NJSLS-G-CO.A.1</i> <i>NJSLS-G-MG.A.2,</i> | Big Ideas Text p. 598-600 #1-5 odd, 9, 11, 13, 24 Big Ideas Text p. 606-608 #1-23 odd, 26, 30-32, 42-45 |
| 11.3, 11.4, 11.7, 11.8 | Areas of Polygons Three-Dimensional Figures Surface Area and Volumes of Cones | <i>NJSLS-G-GMD.A.3</i> <i>NJSLS-G-GMD.B.4</i> <i>NJSLS-G-GMD.A.1,</i> (Formulas Given) | Big Ideas Text p. 614-616 #1-29 odd, 33-35, 39, 40, 44, 53-56 Big Ideas Text p. 621-622 #1-27 odd, 37-39, project Big Ideas Text p. 645-646 #1-21 odd, 25, 27-30, project |
| 11.5, 11.6 | Volumes of Prisms and Cylinders Volumes of Pyramids | <i>NJSLS-G-GMD.A.1,</i> <i>NJSLS-G-GMD.A.2,</i> <i>NJSLS-G-GMD.A.3,</i> <i>NJSLS-G-MG.A.3,</i> <i>NJSLS-G-MG.A.2,</i> <i>NJSLS-G-MG.A.3</i> (Formulas Given) <i>NJSLS-G-GMD.A.1,</i> <i>NJSLS-G-GMD.A.3,</i> <i>NJSLS-G-MG.A.1</i> (Formulas Given) | Big Ideas Text p. 631-634 #1-33 odd, 44, 51, 55-57, project Big Ideas Text p. 639-640 #1-19 odd, 23, 26-29, project |

Chapter 9: Right Triangles and Trigonometry (Test 9.1-9.6)

| Section | Title | NJSLS | Problems |
|---------------|---|---|---|
| 9.1, 9.2, 9.3 | The Pythagorean Theorem Special Right Triangles Similar Right Triangles | <i>NJSLS-G-SRT.B.4,</i> <i>NJSLS-G-SRT.C.8</i> <i>NJSLS-G-SRT.C.8,</i> <i>NJSLS-G-MG.A.1</i> <i>NJSLS-G-SRT.B.5</i> | Big Ideas Text pg. 236 #3-6, 7-25 odd, 38 Big Ideas Text pg. 243 #3, 5-10, 13 Big Ideas Text pg. 249 #3-13 odd, 15-18, 25, 26 |
| 9.4 | The Tangent Ratio | <i>NJSLS-G-SRT.C.6,</i> <i>NJSLS-G-SRT.C.8</i> | Big Ideas Text pg. 256 #7-11, 13- 16, 19, 22, 23 |
| 9.5 | The Sine and Cosine Ratios | <i>NJSLS-G-SRT.C.6,</i> <i>NJSLS-G-SRT.C.7,</i> <i>NJSLS-G-SRT.C.8</i> | Big Ideas Text pg. 266 #2-7, 9, 14, 15 |
| 9.6 | Solving Right Triangles | <i>NJSLS-G-SRT.C.8,</i> <i>NJSLS-G-MG.A.1,</i> <i>NJSLS-G-MG.A.3</i> | Big Ideas Text pg. 274 #3-7, 9, 11, 15, 16 |

Marking Period 2

Chapter 5: Congruent Triangles (Test 5.1-5.7)

| Section | Title | NJSLS | Problems |
|----------|---|--|---|
| 5.1, 5.2 | Angles of Triangles Congruent Polygons | <i>NJSLS-G-CO.C.10,</i> <i>NJSLS-G-MG.A.1</i> <i>NJSLS-G-CO.B.7</i> <i>(Formulas Given)</i> | Big Ideas Text pg. 236 #3-6, 7-25 odd, 38 Big Ideas Text pg. 243 #3, 5-10, 13 |

| | | | |
|----------|---|--|--|
| 5.3 | Prove Triangles Congruent by SAS | <i>NJSLS-G-CO.B.8, NJSLS-G-MG.A.1</i> <i>(Formulas Given)</i> | Big Ideas Text pg. 249 #3-13 odd, 15-18, 25, 26 |
| 5.4 | Equilateral and Isosceles Triangles | <i>NJSLS-G-CO.C.10, NJSLS-G-CO.D.13, NJSLS-G-MG.A.1</i> <i>(Formulas Given)</i> | Big Ideas Text pg. 256 #7-11, 13- 16, 19, 22, 23 |
| 5.5, 5.6 | Prove Triangles Congruent by SSS Proving Triangles Congruent by ASA and AAS | <i>NJSLS-G-CO.B.8, NJSLS-G-MG.A.1, NJSLS-G-MG.A.3</i> <i>(Formulas Given)</i> | Big Ideas Text pg. 266 #2-7, 9, 14, 15 Big Ideas Text pg. 274 #3-7, 9, 11, 15, 16 |
| 5.7 | Using Congruent Triangles | <i>NJSLS-G-SRT.B.5</i> <i>(Formulas Given)</i> | Big Ideas Text pg. 281 #1, 3, 4, 5 |

Chapter 3 – Quadratic Equations and Complex Numbers (Test: Factoring Supplemental & 3.1)

| Section | Title | NJSLS | Problems |
|------------|---------------------------------|---|---|
| Supplement | Factoring Quadratic Expressions | A-SSE.A.2, A-SSE.B.3a | Teacher created worksheet using Kuta software or other supplemental material. <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 263 #1-47 |
| 3.1 | Solving Quadratic Equations | A-SSE.A.2, A-REI.B.4b, F-IF.C.8a, N-RN.A.2 <i>(Formulas Given)</i> | Big Ideas Text pg.99 #3-10, 13-16, 23, 24, 27-34, 35, 47-51, 70, 76-83 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 270 #1-19, 23-31 |

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

| Section | Title | NJSLS | Problems |
|---------|---|---|---|
| 2.1 | Transformations and Quadratic Functions | F-IF.C.7c, F-BF.B.3 | Big Ideas Text pg. 52 - 54, #1 – 18, 35, 37, 38, 39, 40, 43, 46 <i>Supplemental Text:</i> Prentice Hall Algebra 2: pg. 255: #1 - 12 |
| 2.2 | Characteristics of Quadratic Functions | F-IF.B.4, F-IF.C.7.c, F-IF.C.9, A-APR.B.3 | Big Ideas Text pg. 61-64, # 1, 3 - 10, 15-24, 33, 37, 41 – 44, 49 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg248: #1 – 30 & pg. 256: #27 – 30, 34 |
| 2.4 | Modeling with Quadratic Functions | A-CED.A.2 | Big Ideas Text pg. 80, # 2, 4, 6, 17 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg255: #13 – 19 |

Marking Period 3

Chapter 3 – Quadratic Equations and Complex Numbers (Test: 3.2, Supplement, 3.3 & 3.4)

| Section | Title | NJSLS | Problems |
|------------|--|--|---|
| 3.2 | Complex Numbers *Include higher powers of i | N-CN.A.1, N-CN.A.2, N-CN.C.7, A-REI.B.4b | Big Ideas Text pg.108 # 1-12, 23-30, 37-44, 49-60, 68 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 278 #1-18, 29-46 |
| Supplement | Simplify Radicals | N-RN.A.1, N-RN.A.2 | Use Kuta Software |
| 3.3 | Completing the Square | N-CN.C.7, A-REI.B.4b, F-IF.C.8a | Big Ideas Text pg.116 # 3-8, 11-16, 25-28, 66, 69 #55-60 do not use complete the square, use $h = -b/(2a)$ and $k = f(h)$ <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 285 #13-20 #28 & 31 do not use complete the square, use $h = -b/(2a)$ and $k = f(h)$ |
| 3.4 | Using the Quadratic Formula | A-CED.A.3, A-REI.C.7, A-REI.D.11 | Big Ideas Text pg.127 # 15-18, 33, 34, 69 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 293 #1-30 |

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

| Section | Title | NJSLS | Problems |
|------------|--|--|---|
| Supplement | Solving 2x2 linear systems algebraically | A-REI.C.6 | For objectives relating to system of two, teachers should use Kuta or other supplementary materials. Big Ideas Text pg. 28: # 33-38 <i>Supplemental Text Prentice Hall Algebra 2</i> : pg 128 #1-43 |
| 1.4 | Solving Linear | A-CED.A.3, A-REI.C.6 | Big Ideas Text pg. 34: 1, 3-6, 17 <i>Supplemental Text Prentice Hall Algebra 2</i> : pg. 157 #1-21 |
| 3.5 | Solving Nonlinear Systems Graphically | A-CED.A.3, A-REI.C.7, A-REI.D.11 | Big Ideas Text pg.136 # 3-14 |

Chapter 4 – Polynomial Functions (Test: 4.1 - 4.3)

| Section | Title | NJSLS | Problems |
|---------|--|---------------------------------------|--|
| 4.1 | Graphing Polynomial Functions | F-IF.B.4, F-IF.C.7c | Big Ideas Text pg.162 #1, 3-14, 17-20, 25-31, 48 <i>Supplemental Text</i> : Prentice Hall Algebra 2 pg. 309 #1-12 |
| 4.2 | Adding, Subtracting, and Multiplying Polynomials | A-APR.A.1, A-APR.C.4, A-APR.C.5 | Big Ideas Text pg.170 #3-21, 25-30, 36-44, 51 <i>Supplemental Text</i> : Prentice Hall Algebra 2 pg. 310 #33-44 & pg 352 #1, 2, 928, 29, 30, 36, 42 |
| 4.3 | Dividing Polynomials | A-APR.B.2, A-APR.D.6 | Big Ideas Text pg.177 #11-22, 25-32 <i>Supplemental Text</i> : Prentice Hall Algebra 2 pg. 324 #13-22 |

Marking Period 4

Chapter 4 – Polynomial Functions (Test: 4.4 - 4.6 & 4.8)

| Section | Title | NJSLS | Problems |
|---------|------------------------------------|--|---|
| 4.4 | Factoring Polynomials | A-SSE.A.2, A-APR.B.2, A-APR.B.3 | Big Ideas Text pg.184 #5-17, 23-26, 31-34, 39-44, 45-49, 72 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 330 #12-26 |
| 4.5 | Solving Polynomial Equations | A-APR.B.3 | Big Ideas Text pg.194 #3-20, 25-38(<i>must give 1 zero</i>), 41, 42, 56a <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 339 #1-5 (<i>must give 1 zero</i>), 7-10 (<i>must give 1 zero</i>), 13-18, 19, 21, 23 |
| 4.6 | The Fundamental Theorem of Algebra | N-CN.C.8, N-CN.C.9, A-APR.B.3 | Big Ideas Text pg.202 #3-16, 21, 22, 25 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 343 #9-16 |
| 4.8 | Analyzing Graphs of Polynomial | A-APR.B.3, F-IF.B.4, F-IF.C.7c, F-BF.B.3 | Big Ideas Text pg.216 #3-10, 17-22(<i>Use TI84 or Desmos</i>), 23-30 |

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

| Section | Title | NJSLS | Problems |
|---------|---|----------------------|---|
| 5.1 | n th Roots and Rational Exponents | N-RN.A.1, N-RN.A.2 | For objectives relating to simplifying expressions with rational exponents teacher should use Kuta or other supplementary materials. Big Ideas Text pg. 241: #5-10, 21-31, 35-42, 51-54 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 389 #1-49 |
| 5.2 | Properties of Rational Exponents and Radicals | N-RN.A.2 | Big Ideas Text pg. 248: #1-6, 13-16, 37, 41, 42, 44, 49-52, 57, 58, 63, 65, 66, 82-87 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 377 #1-35 and pg382 #1-12 |
| 5.4 | Solving Radical Equations and Inequalities | A-REI.A.1, A-REI.A.2 | Big Ideas Text pg. 266: #1-18, 21, 22, 27-32, 35, 36, 58 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 394: #1-30 |

Chapter 5 – Rational Exponents and Radical Functions (Test: 5.3, 5.5 & 5.6)

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

Course Expectations and Skills

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

Resources

Text Book:

Big Ideas Algebra 2 & Geometry & Algebra 1

Assessment Information

Department of Mathematics - Algebra 2 Integrated

| <u>Marking Period 1</u> | <u>Marking Period 2</u> | <u>Marking Period 3</u> | <u>Marking Period 4</u> |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Major (MAJ): Summative 35% | Major (MAJ): Summative 35% | Major (MAJ): Summative 35% | Major (MAJ): Summative 35% |
| Benchmark (BMK): 20% | Benchmark (BMK): 20% | Benchmark (BMK): 20% | Benchmark (BMK): 20% |
| Project (PRJ): 10% | Project (PRJ): 10% | Project (PRJ): 10% | Project (PRJ): 10% |
| Minor (MIN): Formative 20% | Minor (MIN): Formative 20% | Minor (MIN): Formative 20% | Minor (MIN): Formative 20% |
| Class Participation (CP): 5% | Class Participation (CP): 5% | Class Participation (CP): 5% | Class Participation (CP): 5% |
| Homework (HW): 10% | Homework (HW): 10% | Homework (HW): 10% | Homework (HW): 10% |

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

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|--|--|
| Course/Unit Title: Algebra 2 Integrated/ Geometry Chapter 4: Transformations | Unit Summary: This is a strictly a review of 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. |
| Grade Level(s): 9-12 | |
| Essential Question(s): <ul style="list-style-type: none"> • How do you translate a figure using a vector? • How do you reflect a figure in the line $y = x$? • How do you rotate a figure 90°, 180°, or 270° about the origin? • What is a glide reflection? • When does a figure have line symmetry? | Enduring Understanding(s): Students will be able to: <ul style="list-style-type: none"> • Use a vector to translate a figure. • Reflect a figure in any given line. • Rotate figures about a point. • Perform combinations of two or more transformations. • Identify line and rotational symmetries of a figure. • Use drawing to draw dilations. |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| | |
|---|--|
| Learning Target 1. Experiment with transformations in the plane. <i>- [Standard] - Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).</i> <i>- [Standard] - Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.</i> <i>- [Standard] - Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</i> 2. Perform operations with vectors. | NJSLS: 1. NJSLS-G-CO.A.2, NJSLS-G-CO.A.4, NJSLS-G-CO.A.5 2. NJSLS-N-VM.A.1 3. NJSLS-G-SRT.A.1.a, NJSLS-G-SRT.A.1.b, NJSLS-G-SRT.A.2 |
|---|--|

- [Standard] - Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v , $|v|$, $||v||$, v).

3. Understand similarity in terms of similarity transformations

- [Standard] - Verify experimentally the properties of dilations given by a center and a scale factor:

a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.

b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

- [Standard] - Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

Inter-Disciplinary Connections:

Real-World problem solving examples: Chess (p. 179), Finding a Minimum Distance- Shopping (p. 185), Parking (p. 187), Revolving Doors (p. 195), Kaleidoscope (p. 196), Puzzle (p. 196), Insect (p. 211), Decorations (p. 220), Pizza (p.225), Sign Design (p. 226)

Inter-Disciplinary problem solving examples: Science (p. 179), Graphic Design (p. 180), Art (p. 205), Art (p. 206), Optometry (p. 211), Magnification (p. 213), Photography (p. 213), Architecture (p. 214), Photography (p.225)

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher’s discretion on assignments and assessments.
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Calculators:

- TI – 84 Plus graphing calculator

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

| | |
|--|--|
| 21st Century skills: <ul style="list-style-type: none">• Critical thinking• Creativity• Collaboration• Communication• Information literacy• Technology literacy• Media literacy• Flexibility• Leadership• Initiative• Productivity• Social skills | Mathematical Practices: <ul style="list-style-type: none">• Make sense of problems and persevere in solving them• Reason abstractly and quantitatively• Construct viable arguments and critique the reasoning of others• Model with mathematics• Use appropriate tools strategically• Attend to precision• Look for and make use of structure• Look for and express regularity in repeated reasoning |
|--|--|

Students will write:

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS
DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

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

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

Section 4.1 Translations:

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

Section 4.2 Reflections:

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

Section 4.3 Rotations:

| | |
|---------------------------------|-----------------------------|
| Warm-up/Starting Options | Explorations p. 189 |
| Practice and Apply | p. 194 #7-15 odd, 28 |

| | |
|---------------------------------|---|
| Resources | <p>Online Dynamic Classroom has all resources available.</p> <p>Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook</p> <p>Advanced: Enrichment and Extension, Cumulative Review</p> <p>STEM Video and Performance Task: Rotational Doors</p> |
| Section 4.5 Dilations | |
| Warm-up/Starting Options | Explorations p. 207 |
| Practice and Apply | p. 212 # 3, 5, 15-21 odd, 25, 29 |
| Resources | <p>Online Dynamic Classroom has all resources available.</p> <p>Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook</p> <p>Advanced: Enrichment and Extension, Cumulative Review</p> |

PART IV: EVIDENCE OF LEARNING
IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM’S LEVELS.



Formative Assessments:

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

Accommodations/Modifications:

As per IEP.

Summative Assessments:

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

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

Accommodations/Modifications:

As per IEP.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per IEP.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|---|---|
| <p>Course Title: Algebra 2 Integrated / Geometry Chapter 10: Circles</p> | <p>Unit Summary: In this unit, students will learn about circles. The first three lessons introduce the vocabulary and symbols related to circles. They are followed by a lesson looking at circular arcs that are intercepted by chords. The next lesson introduces all of the angle relationships that occur when two chords, secants, or tangents intersect a circle. An investigation of segment relationships that occur when two chords, secants, or tangents intersect a circle is the focus of the next lesson. In the last lesson, the circle is presented in the coordinate plane where the standard form of the equation is derived.</p> |
| <p>Grade Level(s): 9-12</p> | |
| <p>Essential Question(s):</p> <ul style="list-style-type: none"> • What are the definitions of the lines and segments that intersect a circle? • How are circular arcs measured? • How do you determine when a chord is a diameter of a circle? • How are inscribed angles related to their intercepted arcs? • How are the angles of an inscribed quadrilateral related? • When a chord intersects a tangent line or another chord, what relationships exist among the angles and arcs formed? • What relationships exist among the segments formed by segments of circles? • What is the equation of a circle in the coordinate plane? | <p>Enduring Understanding(s): Students will be able to:</p> <ul style="list-style-type: none"> • Define the lines and segments that intersect a circle. • Measure circular arcs. • Determine when a chord is a diameter of a circle. • Use the relationships of inscribed angles and their intercepted arcs. • Use the relationships of the angles of an inscribed quadrilateral. • Use the relationships of the angles and arcs formed when a chord intersects a tangent line. • Use the relationship of the segments formed by two intersecting chords. • Use the relationship of the segments formed among segments of two secants that intersect outside of a circle. • Use the equation of a circle in the coordinate plane. |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| <u>Learning Target</u> | <u>NJSLS:</u> |
|--|--|
| <p>1. Use the properties of segments that intersect circles.</p> <p>[Standard] - 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.</p> <p>[Standard] - Identify and describe relationships among inscribed angles, radii, and chords.</p> <p>[Standard] - Construct a tangent line from a point outside a given circle to the circle.</p> <p>[Standard] - 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).</p> <p>[Standard] - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).</p> | <p>1. <i>NJSLS.G-CO.A.1, NJSLS.G-C.A.2, NJSLS.G-C.A.4, NJSLS.G-MG.A.3, NJSLS.G-MG.A.1</i></p> |
| <p>2. Apply angle relationships in circles.</p> <p>[Standard] - Prove that all circles are similar.</p> <p>[Standard] - Identify and describe relationships among inscribed angles, radii, and chords.</p> <p>[Standard] - Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.</p> <p>[Standard] - Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</p> | <p>2. <i>NJSLS.G-C.A.1, NJSLS.G-C.A.2, NJSLS.G-C.A.3, NJSLS.G-CO.D.13</i></p> |
| <p>3. Use circles in the coordinate plane.</p> <p>[Standard] - Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.</p> <p>[Standard] - Use coordinates to prove simple geometric theorems algebraically.</p> | <p>3. <i>NJSLS.G-GPE.A.1, NJSLS.G-GPE.B.4</i></p> |

Inter-Disciplinary Connections:

Real-World problem solving examples: bike paths (p. 535), bicycle chain (p. 535), running a survey (p. 539), dartboards (p. 543), placing sprinklers (p. 547), submarine (p. 549), car design (p. 550), movie theatre screening (p. 559), northern lights (p. 565), viewing fireworks (p. 567), television cameras (p. 568), aquariums (p. 572), website design (p. 574), commuter zones (p. 579)

Inter-Disciplinary problem solving examples: time zones (p. 544), archaeologist (p. 549), photography angles (p. 557), carpentry (p. 559), astronomy and moons (p. 559), astronomy (p. 573), seismographs (p. 578)

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher’s discretion on assignments and assessments.

Calculators:

- TI – 84 Plus graphing calculator

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

21st Century skills:

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

Mathematical Practices:

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

Students will write:

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

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

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

Section 10.1 Lines and Segments that Intersect Circles:

| | |
|--------------------------|---|
| Warm-up/Starting Options | Explorations p.T-529 |
| Practice and Apply | p. 534-536 #1-35 odd, 39, 45, 49, 50 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 10.2 Finding Arc Measures:

| | |
|--------------------------|---|
| Warm-up/Starting Options | Explorations p.T-537 |
| Practice and Apply | p. 542-544 #1-29 odd, 31, 39-42 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 10.3 Using Chords:

| | |
|--------------------------|---|
| Warm-up/Starting Options | Explorations p. T-545 |
| Practice and Apply | p. 549-550 #1-17 odd, 26-28 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 10.4 Inscribed Angles and Polygons:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. T-553 |
| Practice and Apply | p. 558-560 #1-17 odd, 19-21, 34, 43-46 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 10.5 Angle Relationships in Circles:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. T-561 |
| Practice and Apply | p. 566-568 #1-23 odd, 34, 41-43 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 10.6 Segment Relationships in Circles:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. T-569 |
| Practice and Apply | p. 573-574 #1-15 odd, 27-30 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 10.7 Circles in the Coordinate Plane:

| | |
|---------------------------------|---|
| Warm-up/Starting Options | Explorations p. T-575 |
| Practice and Apply | p. 579-580 #1-21 odd, 25, 26, 35-40 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review Real Life STEM Video: Seismographs and Earthquake Epicenters |

PART IV: EVIDENCE OF LEARNING

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



Formative Assessments:

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

Accommodations/Modifications:

As per IEP.

Summative Assessments:

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

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

Accommodations/Modifications:

As per IEP.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per IEP.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|---|--|
| <p>Course Title: Algebra 2 Integrated/ Geometry Chapter 11: Circumference, Area, and Volume</p> | <p>Unit Summary: 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.</p> |
| <p>Grade Level(s): 9-12</p> | |
| <p>Essential Question(s):</p> <ul style="list-style-type: none"> • How can you find the length of a circular arc? • How can you find the area of a sector of a circle? • How can you find the area of a regular polygon? • What is the relationship between the numbers of vertices, edges, and faces of a polyhedron? • How can you find the volume of a prism or cylinder? • How can you find the volume of a pyramid? • How can you find the surface area and volume of a cone? • How can you find the surface area and the volume of a sphere? | <p>Enduring Understanding(s): Students will be able to:</p> <ul style="list-style-type: none"> • Find the length of a circular arc. • Find the area of a sector of a circle. • Find the area of a regular polygon. • Use the relationship between the numbers of vertices, edges, and faces of a polyhedron. • Find the volume of a prism or cylinder. • Find the volume of a non-right prism or cylinder. • Find the volume of a pyramid. • Find the surface area and volume of a cone. • Find the surface area and volume of a sphere. |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| Learning Target | NJSLS: |
|---|--|
| <p>1. Use similarity to find the length of an arc or the area of a sector of a circle.</p> <p>[Standard] - Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.</p> <p>[Standard] - 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.</p> <p>[Standard] - 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.</p> <p>[Standard] - Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).</p> | <p>1. <i>NJSLS.G-GMD.A.1, NJSLS.G-C.B.5, NJSLS.G-CO.A.1, NJSLS.G-MG.A.2</i></p> |
| <p>2. Finding surface area of geometric shapes.</p> <p>[Standard] - Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.</p> <p>[Standard] - Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.</p> <p>[Standard] - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).</p> | <p>2. <i>NJSLS.G-GMD.B.4, NJSLS.G-GMD.A.1, NJSLS.G-MG.A.1</i></p> |
| <p>3. Finding volume of geometric shapes.</p> <p>[Standard] - Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.</p> <p>[Standard] - Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.</p> <p>[Standard] - Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.</p> <p>[Standard] - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.</p> <p>[Standard] - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).</p> | <p>3. <i>NJSLS.G-GMD.B.4, NJSLS.G-GMD.A.1, NJSLS.G-GMD.A.2, NJSLS.G-GMD.A.3, NJSLS.G-MG.A.1</i></p> |

Inter-Disciplinary Connections:

Real-World problem solving examples: tire distance (p. 596), circular tracks (p. 596), ferris wheel (p. 599), population density (p. 603), lights from a lighthouse (p. 607), decorating a tabletop (p. 613), watch area (p. 615), swimming pools (p. 622), density of gold (p. 628), building a wooden chest (p. 629), density of metals (p. 631), density of coins (p. 631), making candles (p. 633), comparing costs (p. 633), popcorn containers (p. 646), buying cat food (p. 646), farming (p. 653), size of earth (p. 654)

Inter-Disciplinary problem solving examples: horticulture (p. 599), astronomy (p. 599), irrigation systems (p. 601), construction (p. 608), basaltic columns (p. 615), construction (p. 629), archaeology (p. 637), nautical design (p. 640), chemistry (p. 646), baseball (p. 648), soccer (p. 650)

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher’s discretion on assignments and assessments.

Calculators:

- TI – 84 Plus graphing calculator

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

21st Century skills:

- Critical thinking
- Creativity
- Collaboration
- Communication
- Information literacy
- Technology literacy
- Media literacy
- Flexibility
- Leadership
- Initiative
- Productivity

Mathematical Practices:

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

- Social skills

Students will write:

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

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

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

Section 11.1 Circumference and Arc Length:

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

Section 11.2 Areas of Circles and Sectors:

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

Section 11.3 Areas of Polygons:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. T-609 |
| Practice and Apply | p. 614-616 #1-29 odd, 33-35, 39, 40, 44, 53-56 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 11.4 Three-Dimensional Figures:

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

Section 11.5 Volumes of Prisms and Cylinders:

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

Section 11.6 Volumes of Pyramids:

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

Section 11.7 Surface Area and Volumes of Cones:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. T-641 |
| Practice and Apply | p. 645-646 #1-21 odd, 25, 27-30, project |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 11.8 Surface Area and Volumes of Spheres:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. T-647 |
| Practice and Apply | p. 652-654 #1-35 odd, 39, 42, 48-51, project |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

PART IV: EVIDENCE OF LEARNING

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



Formative Assessments:

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

Accommodations/Modifications:

As per IEP.

Summative Assessments:

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

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

Accommodations/Modifications:

As per IEP.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per IEP.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|--|--|
| <p>Course Title: Algebra 2 Integrated/ Geometry Ch 9: Right Triangles and Trigonometry</p> | <p>Unit Summary: In this unit, students will be introduced to right triangle trigonometry. The first lesson on the Pythagorean Theorem will not be completely new to students who will have familiarity with this theorem from idle school. The next 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. The last lesson of the chapter introduces the Law of Sines and the Law of Cosines so that non-right triangles can be solved.</p> |
| <p>Grade Level(s): 9-12</p> | |
| <p>Essential Question(s):</p> <ul style="list-style-type: none"> • How can you prove the Pythagorean Theorem? • What is the relationship among the side lengths of 45°-45°-90° triangles? • What is the relationship amount the side lengths of 30°-60°-90° triangles? • How are altitudes and geometric means of right triangles related? • How is a right triangle used to find the sine, cosine, and tangent of an acute triangle? • When you know the lengths of the sides of a right triangle, how can you find the measures of the two acute angles? • What are the Law of Sines and the Law of Cosines? | <p>Enduring Understanding(s): Students will be able to:</p> <ul style="list-style-type: none"> • Find side lengths in right triangles • Use the converse of the Pythagorean Theorem to determine if a triangle is a right triangle • Use properties of the altitude of a right triangle • Use relationships among the sides in special right triangles • To use trigonometric ratios to solve for side lengths in right triangles • Use inverse tangent, sine, and cosine ratios • To use the Law of Sines and the Law of Cosines to solve non-right triangles |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| Learning Target | NJSLS: |
|--|---|
| <p>1. Use geometric means to solve for side lengths in similar right triangles.</p> <p>[Standard] - Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</p> | <p>1. <i>NJSLS.G-SRT.B.5</i></p> |
| <p>2. Use the relationships among the sides in special right triangles.</p> <p>[Standard] - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.</p> <p>[Standard] - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).</p> | <p>2. <i>NJSLS.G-SRT.C.8,</i> <i>NJSLS.G-MG.A.1</i></p> |
| <p>3. Use trigonometry to solve triangles.</p> <p>[Standard] - 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.</p> <p>[Standard] - Explain and use the relationship between the sine and cosine of complementary angles.</p> <p>[Standard] - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.</p> <p>[Standard] - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).</p> <p>[Standard] - 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).</p> <p>[Standard] - Prove the Laws of Sines and Cosines and use them to solve problems.</p> <p>[Standard] - Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).</p> | <p>3. <i>NJSLS.G-SRT.C.6,</i> <i>NJSLS.G-SRT.C.7,</i> <i>NJSLS.G-SRT.C.8,</i> <i>NJSLS.G-MG.A.1,</i> <i>NJSLS.G-MG.A.3,</i> <i>NJSLS.G-SRT.D.10,</i> <i>NJSLS.G-SRT.D.11</i></p> |

Inter-Disciplinary Connections:

Real-World problem solving examples: support beams (p. 465), platforms of a fire escape (p. 469), road signs (p. 474), ramp height (p. 474), roof height (p. 479), monument height (p. 483), tree height (p. 490), shade and awnings (p. 492), skiing (p. 497), playground slides (p. 499), escalators (p. 499), submarines (p. 500), raked stage (p. 504), unloading a truck (p. 505), wheelchair ramp (p. 506), bridge over a lake (p. 510), distance between buildings (p. 514)

Inter-Disciplinary problem solving examples: basketball (p. 469), frames for artwork (p. 469), craters on the moon in astrophysics (p. 491), aviation (p. 499), paleontology (p. 512), golfing (p. 515)

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
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- Collaboration
- Communication
- Information literacy
- Technology literacy
- Media literacy
- Flexibility
- Leadership
- Initiative
- Productivity
- Social skills

Mathematical Practices:

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

Students will write:

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

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

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

Section 9.1 The Pythagorean Theorem:

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

Section 9.2 Special Right Triangles:

| | |
|--------------------------|---|
| Warm-up/Starting Options | Explorations p.T-471 |
| Practice and Apply | p. 475-476 #1-17 odd, 20, 26, 27 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 9.3 Similar Right Triangles:

| | |
|--------------------------|--|
| Warm-up/Starting Options | Explorations p. T-477 |
| Practice and Apply | p. 482-484 #1-35 odd, 38, 40, 46-49 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review Real Life STEM Video: Height of a Rock Wall |

Section 9.4 The Tangent Ratio:

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

Section 9.5 The Sine and Cosine Ratios:

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

Section 9.6 Solving Right Triangles:

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

PART IV: EVIDENCE OF LEARNING

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



Formative Assessments:

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

Accommodations/Modifications:

As per IEP.

Summative Assessments:

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

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

Accommodations/Modifications:

As per IEP.

Performance Assessments:

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

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

Accommodations/Modifications:

As per IEP.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|---|--|
| <p>Course/Unit Title: Algebra 2 Integrated/ Geometry Ch 5: Congruent Triangles</p> | <p>Unit Summary: In this unit, students will classify triangles and find measures of angles of triangles. Students will work with a variety of proof formats as they identify congruent figures and investigate and prove triangle congruence. They will also use theorems about isosceles and equilateral triangles.</p> |
| <p>Grade Level(s): 9-12</p> | |
| <p>Essential Question(s):</p> <ul style="list-style-type: none"> • How are the angle measures in a triangle related? • Given two congruent triangles, how can you use rigid motion to map one triangle to the other triangle? • What can you conclude about two triangles when you know that two pairs of corresponding sides and the corresponding included angles are congruent? • What conjectures can you make about the side lengths and angles of an isosceles triangle? • What can you conclude about two triangles when you know the corresponding sides are congruent? • What information is sufficient to determine whether two triangles are congruent? • How can you use congruent triangles to make an indirect measurement? | <p>Enduring Understanding(s): Students will be able to:</p> <ul style="list-style-type: none"> • Classify triangles and find measures of their interior and exterior angles. • Identify and use corresponding parts congruent figures. • Use the Third Angles Theorem • Use the Side-Angle-Side (SAS) Congruence Theorem. • Use the Base Angles Theorem • Use isosceles and equilateral triangles • Use the Side-Side-Side (SSS) Congruence Theorem • Use the Hypotenuse-Leg (HL) Congruence Theorem • Use the Angle-Side-Angle (ASA) and Angle-Angle-Side (AAS) Congruence Theorems • Use congruent triangles • Prove Constructions |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| <u>Learning Target</u> | <u>NJSLS</u> |
|---|--|
| <p>1. Classifying triangles by sides and angles <i>NJSLS-G-CO.C.10 [Standard] - Prove theorems about triangles.</i></p> <p><i>NJSLS-G-MG.A.1 [Standard] – Use geometric shapes, their measures, and their properties to describe objects (e.g. modeling a tree trunk or a human torso as a cylinder)</i></p> <p>2. Proving that triangles are congruent <i>NJSLS-G-CO.B.7 [Standard] - Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent</i></p> <p><i>NJSLS-G-CO.B.8 [Standard] - Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.</i></p> <p><i>NJSLS-G-MG.A.1 [Standard] – Use geometric shapes, their measures, and their properties to describe objects (e.g. modeling a tree trunk or a human torso as a cylinder)</i></p> <p><i>NJSLS-G-MG.A.3 [Standard] – 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)</i></p> <p><i>NJSLS-G-SRT.B.5 [Standard] – Use congruence... criteria for triangles to solve problems and to prove relationships in geometric figures</i></p> | <p>1. NJSLS-G-CO.C.10 NJSLS-G-MG.A.1</p> <p>2. NJSLS-G-CO.B.7 NJSLS-G-CO.B.8 NJSLS-G-MG.A.1 NJSLS-G-MG.A.3 NJSLS-G-SRT.B.5</p> |
| <p>3. Using properties of isosceles and equilateral triangles <i>NJSLS-G-CO.C.10 [Standard] – Prove theorems about triangles.</i></p> <p><i>NJSLS-G-CO.D.13 [Standard] – Construct an equilateral triangle</i></p> <p><i>NJSLS-G-MG.A.1 [Standard] – Use geometric shapes, their measures, and their properties to describe objects (e.g. modeling a tree trunk or a human torso as a cylinder)</i></p> | <p>3. NJSLS-G-CO.C.10 NJSLS-G-CO.D.13 NJSLS-G-MG.A.1</p> |

Inter-Disciplinary Connections:

Real-World problem solving examples: Classify triangle shape of support beams by sides and angles (p. 232), Bending strips of metal into isosceles triangles for a sculpture (p 237), dividing a wall into equal parts for painting (p 241), using congruent triangles to find how much canvas is needed to make a sign (p 248), using congruent triangles to determine placement of fire towers (p 251), use angles of a triangle to find the distance between a boat and the shoreline (p 258), isosceles triangles on a lifeguard tower (p 255), how triangle congruence creates

structural support in architecture (p. 263), using angles/triangles formed by a light ray and the law of reflection to determine effects on reflection (p 276), measuring the width of a river (p 277).

Inter-Disciplinary problem solving examples:

Architecture (p 232), Art - Sculpture (p 237), Fashion design (p 258), Architecture (p 263), Business/Advertising: equilateral triangle, Architecture: isosceles triangle (p 269), Theater Lighting Design (p 268), Science (p 276).

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher’s discretion on assignments and assessments.

Calculators:

- TI – 84 Plus graphing calculator

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

| | |
|---|---|
| <p>21st Century skills:</p> <ul style="list-style-type: none">• Critical thinking• Creativity• Collaboration• Communication• Information literacy | <p>Mathematical Practices:</p> <ul style="list-style-type: none">• Make sense of problems and persevere in solving them• Reason abstractly and quantitatively• Construct viable arguments and critique the reasoning of others |
|---|---|

- Technology literacy
- Media literacy
- Flexibility
- Leadership
- Initiative
- Productivity
- Social skills

- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Students will write:

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

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

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

Section 5.1 Angles of Triangles

| | |
|--------------------------|---|
| Warm-up/Starting Options | Explorations p.231 |
| Practice and Apply | P. 236-238, #3-6, 7-25 odd, 38 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 5.2 Congruent Polygons:

| | |
|--------------------------|---|
| Warm-up/Starting Options | Explorations p.239 |
| Practice and Apply | p. 243-244, #3, 5-10, 13 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 5.3 Proving Triangle Congruence by SAS:

| | |
|--------------------------|---|
| Warm-up/Starting Options | Explorations p. 245 |
| Practice and Apply | p. 249-250, # 3-13 odd, 15-18, 25, 26 |
| Resources | Online Dynamic Classroom has all resources available. Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook Advanced: Enrichment and Extension, Cumulative Review |

Section 5.4 Equilateral and Isosceles Triangles:

| | |
|--------------------------|--------------------------------------|
| Warm-up/Starting Options | Explorations p.251 |
| Practice and Apply | p. 256-258 # 7-11, 13-16, 19, 22, 23 |

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

Section 5.5 Proving Triangle Congruence by SSS:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. 261 |
| Practice and Apply | p. 266-268 #2-7, 9, 14, 15 |
| Resources | <p>Online Dynamic Classroom has all resources available.</p> <p>Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook</p> <p>Advanced: Enrichment and Extension, Cumulative Review</p> |

Section 5.6 Proving Triangle Congruence by ASA and AAS:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. 269 |
| Practice and Apply | p. 274-276 # 3-7, 9, 11, 15, 16 |
| Resources | <p>Online Dynamic Classroom has all resources available.</p> <p>Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook</p> <p>Advanced: Enrichment and Extension, Cumulative Review</p> |

Section 5.7 Using Congruent Triangles:

| | |
|---------------------------------|--|
| Warm-up/Starting Options | Explorations p. 277 |
| Practice and Apply | p. 281-282 # 1, 3, 4, 5 |
| Resources | <p>Online Dynamic Classroom has all resources available.</p> <p>Review: Practice A and Practice B, Puzzle Time, Student Journal, and Skills Review Handbook</p> <p>Advanced: Enrichment and Extension, Cumulative Review</p> <p>STEM Video and Performance Task: Hang Glider Challenge</p> |

PART IV: EVIDENCE OF LEARNING

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

IDENTIFY BLOOM’S LEVELS.



Formative Assessments:

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

Accommodations/Modifications:

As per IEP.

Summative Assessments:

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

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

Accommodations/Modifications:

As per IEP.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per IEP.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|---|--|
| <p>Course/Unit Title: Algebra 2 Integrated/ Algebra 2 Ch 3: Quadratic Equations & Complex Numbers</p> | <p>Unit Summary:</p> <p>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.</p> |
| <p>Grade Level(s): 9 - 12</p> | |
| <p>Essential Question(s):</p> <ul style="list-style-type: none"> • How do we factor by GCF, Difference of two squares and trinomials? • How can you use the graph of a quadratic equation to determine the number of real solutions of the equation? • What are the subsets of the set of complex numbers? • How can you complete the square for a quadratic expression? • How can you derive a general formula for solving a quadratic equation? | <p>Enduring Understanding(s):</p> <p>Students will be able to:</p> <ul style="list-style-type: none"> • Factor a variety of expressions by Greatest Common Factor, Difference of two squares as well as factoring trinomials with the following: (level CP = trinomial with a being a prime number no larger than 3 and c being prime or composite) • Solve quadratic equations by graphing. • Solve quadratic equations algebraically. • Solve real-life problems. • Define and use the imaginary unit i. • Add, subtract, and multiply complex numbers. • Find complex solutions and zeros. • Solve quadratic equations using square roots. • Solve quadratic equations by completing the square. • Write quadratic functions in vertex form. • Solve quadratic equations using the Quadratic Formula. • Solve real-life problems. |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| <u>Learning Target</u> | <u>NJSLS:</u> |
|---|--|
| <p>3 Supplemental [Using Algebra textbook 1 Ch 7] Use the structure of an expression to identify ways to rewrite it.</p> <p>Factor a quadratic expression to reveal the zeros of the function it defines. </p> <p>3.1 Solving Quadratic Equations (Supplement to include higher powers of i.) Use the structure of an expression to identify ways to rewrite it.</p> <p>Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.</p> <p>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.</p> <p>Rewrite expressions involving radicals and rational exponents using the properties of exponents. </p> | <p>3 Supplemental NJSLS.A-SSE.A.2, NJSLS.S-SSE.B.3a </p> <p>3.1 NJSLS.A-SSE.A.2, NJSLS.A-REI.B.4b, NJSLS.F-IF.C.8a NJSLS.N-RN.A.2 </p> |
| <p>3.2 Complex Numbers 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.</p> <p>Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.</p> <p>Solve quadratic equations with real coefficients that have complex solutions.</p> <p>Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.</p> | <p>3.2 NJSLS.N-CN.A.1, NJSLS.N-CN.A.2, NJSLS.N-CN.C.7, NJSLS.A-REI.B.4b </p> |
| <p>3.3 Completing the Square [Supplement Algebra 1 Ch 9] Solve quadratic equations with real coefficients that have complex solutions.</p> <p>Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the</p> | <p>3.3 NJSLS.N-CN.C.7, NJSLS.A-REI.B.4b, NJSLS.F-IF.C.8a </p> |

| | |
|---|--|
| <p>initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.</p> <p>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.</p> <p>3.4 Using the Quadratic Formula [Supplement Algebra 1 Ch 9] [Solve quadratic equations with real coefficients that have complex solutions.</p> <p>Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.</p> | <p>3.4 [NJSLS.N-CN.C.7, NJSLS.A-REI.B.4b]</p> |
|---|--|

Inter-Disciplinary Connections:

| |
|---|
| <p>[Publishing p.97 Ex 5, Business p.100 # 57, Architecture p.101 #60, Sports p.115 #6, Physics p.117 #63, Sports p.128 #61 & 65, Biology p.129 #67,]</p> |
|---|

Students will engage with the following text, resources and tools:

| |
|---|
| <p>Text:</p> <ul style="list-style-type: none"> Algebra 2, A Common Core Curriculum – Big Ideas Math, <i>Big Ideas Learning LLC., 2019</i> Algebra 1, A Common Core Curriculum – Big Ideas Math, <i>Big Ideas Learning LLC., 2019</i> <p>Online Resources incorporated through the year, include but not limited to:</p> <ul style="list-style-type: none"> BigIdeasMath.com – publisher on-line assignments, resources and text Desmos – online graphing tool IXL – web-based software G Suite for education – Google Classroom, Docs, Drive, Mail, etc... For this chapter students will receive formula sheets to be used at the teacher’s discretion on assignments and assessments. <p>Calculators:</p> <ul style="list-style-type: none"> TI – 84 Plus graphing calculator |
|---|

Students will write:

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

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

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

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

How can you complete the square for a quadratic expression?

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

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

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

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

3 Supplemental:

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (Make a chart to show the number of x-intercepts of each equation, along with the corresponding point(s) of the x-intercept(s). Are there any patterns you notice? What are they? How can you tell when the vertex will be the minimum of the graph? The maximum?) |
| Teaching Objectives | <ul style="list-style-type: none"> Factor a variety of expressions by Greatest Common Factor, Difference of two squares as well as factoring trinomials with the following: (level CP = trinomial with a being a prime number no larger than 3 and c being prime or composite) |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets (teacher made supplement) Inquire Formative Assessment |
| Practice and Apply Assigning Homework | Teacher created worksheet using Kuta software or other supplemental material. <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 263 #1-47 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

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

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (Use a graphing calculator to find the solution to the system of equations, if possible.) |
| Teaching Objectives | <ul style="list-style-type: none"> • Solve quadratic equations by graphing. • Solve quadratic equations algebraically. • Solve real-life problems. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 98 Inquiry Formative Assessment (Mini assessment TE pg. 102) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.99 #3-10, 13-16, 23, 24, 27-34, 35, 47-51, 70, 76-83 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 270 #1-19, 23-31 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

3.2 Complex Numbers:

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Simplify a given algebraic expression.) |
| Teaching Objectives | <ul style="list-style-type: none"> • Define and use the imaginary unit i. • Add, subtract, and multiply complex numbers. • Find complex solutions and zeros. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 107 Inquiry Formative Assessment (Mini assessment TE pg. 110) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.108 # 1-12, 23-30, 37-44, 49-60, 68 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 278 #1-18, 29-46 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

Supplemental: Simplify Radicals

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups have students simplify perfect square roots |
| Teaching Objectives | <ul style="list-style-type: none"> Simplify square roots |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Inquiry |
| Practice and Apply Assigning Homework | Use Kuta Software |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

3.3 Completing the Square:

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Practice factoring the difference of two squares.) |
| Teaching Objectives | <ul style="list-style-type: none"> Solve quadratic equations using square roots. Solve quadratic equations by completing the square. Write quadratic functions in vertex form. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 115 Inquire Formative Assessment (Mini assessment TE pg. 118) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.116 # 3-8, 11-16, 25-28, 66, 69 #55-60 do not use complete the square, use $h = -b/(2a)$ and $k = f(h)$ <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 285 #13-20 #28 & 31 do not use complete the square, use $h = -b/(2a)$ and $k = f(h)$ |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

3.4 Using the Quadratic Formula:

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Substitute for a variable and simplify the expression.) |
| Teaching Objectives | <ul style="list-style-type: none">• Solve quadratic equations using the Quadratic Formula.• Solve real-life problems. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 126 Inquire Formative Assessment (Mini assessment TE pg. 130) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.127 # 15-18, 33, 34, 69 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 293 #1-30 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

PART IV: EVIDENCE OF LEARNING

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

IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

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

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|--|---|
| <p>Course/Unit Title: Algebra 2 Integrated/ Algebra 2 Ch 2: Quadratic Functions</p> | <p>Unit Summary: Students have studied quadratic functions in Algebra 1. Their background should include factoring quadratic expressions, graphing quadratic equations written in three forms, and solving quadratic equations using a variety of approaches. Students will extend their knowledge of quadratic functions in this chapter. In the previous chapter, students looked at the transformations of linear and absolute value functions. The first lesson in this chapter introduces the same transformations on quadratic functions. The vertex of the absolute value function and the vertex of a quadratic function are key points that help students distinguish quickly the type(s) of transformation(s) displayed in a graph. The second and third lessons look at characteristics of quadratic functions. Where is the function increasing or decreasing? Where is the line of symmetry? What is the maximum/ minimum value of the function? The last lesson of the chapter looks at modeling with quadratic functions. 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.</p> |
| <p>Grade Level(s): 9 – 12</p> | <p>Essential Question(s):</p> <ul style="list-style-type: none"> • How do the constants a, h, and k affect the graph of the quadratic function $g(x) = a(x - h)^2 + k$? • What type of symmetry does the graph of $f(x) = a(x - h)^2 + k$ have and how can you describe the symmetry? • How can you use a quadratic function to model a real-life situation? <p>Enduring Understanding(s): Students will be able to:</p> <ul style="list-style-type: none"> • Describe transformations of quadratic functions. • Write transformations of quadratic functions. • Explore properties of parabolas. • Find maximum and minimum values of quadratic functions. • Determine domain and range using interval notation. • Determine intervals of increase and decrease using interval notation. • Solve real-life problems • Write equations of quadratic functions using vertices and points. |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| <u>Learning Target</u> | <u>NJSLS:</u> |
|---|--|
| <p>2.1 Transformations OF Quadratic Functions</p> <p> Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.</p> <p>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.</p> <p>2.2 Characteristics of Quadratic Functions</p> <p> 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.</p> <p>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.</p> <p>Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).</p> <p>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.</p> <p> </p> | <p>2.1</p> <p> NJSLS.F-IF.C.7c, NJSLS.F-BF.B.3</p> <p> </p> <p>2.2</p> <p> NJSLS.F-IF.B.4, NJSLS.F-IF.C.7.c, NJSLS.F-IF.C.9, NJSLS.A-APR.B.3</p> |
| <p>2.4 Modeling with Quadratic Functions</p> <p> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.</p> <p> </p> | <p>2.4</p> <p> NJSLS.A.CED.A.2</p> <p> </p> |

Inter-Disciplinary Connections:

Real-World and Inter-Disciplinary problem solving examples:

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

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:

- TI – 84 Plus graphing calculator

Students will write:

Students will describe the constants a , h , and k affect the graph of the quadratic function $g(x) = a(x - h)^2 + k$.

Students will write the equation of a quadratic function given a graph and explain their reasoning.

Students will describe what type of symmetry does the graph of $f(x) = a(x - h)^2 + k$ have.

Students will describe the symmetry of each graph of a function given its equation.

Students will write the equation of a translated parabola.

Students will write an equation of a parabola using a vertex and a given point.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

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

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

2.1 Transformations and Quadratic Functions

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (multiply polynomials) |
| Teaching Objectives | <ul style="list-style-type: none">• Describe transformations of quadratic functions.• Write transformations of quadratic functions. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 51 Inquiry Formative Assessment (Mini assessment TE pg. 54) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 52 - 54, #1 – 18, 35, 37, 38, 39, 40, 43, 46 <i>Supplemental Text:</i> Prentice Hall Algebra 2: pg. 255: #1 - 12 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

2.2 Characteristics of Quadratic Functions

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (give the coordinates of the image of a point after a reflection) |
| Teaching Objectives | <ul style="list-style-type: none"> • Explore properties of parabolas. • Find maximum and minimum values of quadratic functions. • Determine domain and range using interval notation. • Determine intervals of increase and decrease using interval notation. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 60 Inquiry Formative Assessment (Mini assessment TE pg. 64) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 61-64, # 1, 3 - 10, 15-24, 33, 37, 41 – 44, 49 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg248: #1 – 30 & pg. 256: #27 – 30, 34 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

2.4 Modeling with Quadratic Functions

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (write the equation of a line in point slope form given a point and the slope) |
| Teaching Objectives | <ul style="list-style-type: none"> • Write equations of quadratic functions using vertices, and points. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 79 Inquiry Formative Assessment (Mini assessment TE pg. 82) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 80, # 2, 4, 6, 17 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg255: #13 – 19 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

PART IV: EVIDENCE OF LEARNING

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



Formative Assessments:

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

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

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|---|---|
| Course/Unit Title: Algebra 2 Integrated Algebra 2 Ch 1.3 & 4.5: Systems of Equations | Unit Summary: Chapter 1 presents topics that were studied in Algebra 1. Students will begin by solving systems of two linear equations and then progress to systems of three equations. Finally, students will use these skills (substitution, elimination and graphing) to determine solutions of non-linear systems. |
| Grade Level(s): 9 – 12 | |
| Essential Question(s): <ul style="list-style-type: none"> • How can you determine the number of solutions of a linear system? • How can you solve a linear system in two variables? • How can you solve a linear system in three variables? • How can you solve a nonlinear system of equations? | Enduring Understanding(s): Students will be able to: <ul style="list-style-type: none"> • Solve systems of linear equations by substitution and elimination. • Use systems of linear equations to solve real-life problems • Visualize solutions of systems of linear equations in three variables. • Solve systems of linear equations in three variables algebraically. • Solve real life problems. • Solve systems of nonlinear equations. |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| <u>Learning Target</u> | <u>NJSLS:</u> |
|---|--|
| <p>1.4 Solving Linear Systems</p> <p>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.</p> <p>Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</p> <p>3.5 Solving Nonlinear Systems</p> <p>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.</p> <p>Solve quadratic equations with real coefficients that have complex solutions.</p> <p>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.</p> | <p>1.4</p> <p>NJSLS.A-CED.A.3, NJSLS.A-REI.C.6</p> <p>3.5</p> <p>NJSLS.SA-CED.A.3, NJSLS.A-REI.C.7, NJSLS.A-REI.D.11</p> |

Inter-Disciplinary Connections:

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

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher’s discretion on assignments and assessments.

Calculators:

- TI – 84 Plus graphing calculator

Students will write:

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

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

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

How can you solve a nonlinear system of equations?

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

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

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

Supplement 2x2 Systems

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups display a graph of two linear systems and discuss what the intersection represents. |
| Teaching Objectives | <ul style="list-style-type: none"> • Solve systems of linear equations by substitution and elimination. • Use systems of linear equations to solve real-life problems • Solve real life problems. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Inquiry Formative Assessment |
| Practice and Apply Assigning Homework | For objectives relating to system of two, teachers should use Kuta or other supplementary materials. Big Ideas Text pg. 28: # 33-38 <i>Supplemental Text Prentice Hall Algebra 2: pg 128 #1-43</i> |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

1.4 Solving Linear Systems

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (rewriting equations in slope-intercept form) |
| Teaching Objectives | <ul style="list-style-type: none"> • Solve systems of linear equations by substitution and elimination. • Use systems of linear equations to solve real-life problems • Visualize solutions of systems of linear equations in three variables. • Solve systems of linear equations in three variables algebraically. • Solve real life problems. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 15 Inquiry Formative Assessment (Mini assessment TE pg. 36) |
| Practice and Apply Assigning Homework | For objectives relating to system of two, teachers should use Kuta or other supplementary materials. Big Ideas Text pg. 34: 1, 3-6, 17 <i>Supplemental Text Prentice Hall Algebra 2: pg. 157 #1-21</i> |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

3.5 Solving Nonlinear Systems:

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. Solve a system using a graphing calculator or software. |
| Teaching Objectives | <ul style="list-style-type: none"> • Solve systems of nonlinear equations. • Solve quadratic equations by graphing |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 135 Inquire Formative Assessment (Mini assessment TE pg. 138) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.136 # 3-14 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

PART IV: EVIDENCE OF LEARNING

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



Formative Assessments:

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

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

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|---|---|
| <p>Course/Unit Title: Algebra 2 Integrated/ Algebra 2 Ch 4: Polynomial Functions</p> | <p>Unit Summary: Polynomial functions are defined and graphed. End behavior of even- and odd- This is the longest chapter in the book, with nine lessons about polynomial functions. Linear and quadratic functions are two types of polynomials, so connections to earlier work are easily made. In the first lesson, polynomial functions are defined and graphed. The notation and vocabulary can be overwhelming for students, though some of the vocabulary was used in Algebra 1. End behavior of even- and odd-degree polynomials is explored. Operations on polynomial expressions are presented so that polynomial expressions can be factored. Prior work with factoring is extended to third- and fourth-degree expressions. Synthetic division is used to efficiently check for possible rational roots when rewriting polynomials in factored form in order to solve polynomial equations. All of the work with operations on polynomials, factoring, and solving leads to the Fundamental Theorem of Algebra in the middle of the chapter: If $f(x)$ is a polynomial of degree n, where $n > 0$, 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.</p> |
| <p>Grade Level(s): 9 - 12</p> | <p>Enduring Understanding(s): Students will be able to:</p> <ul style="list-style-type: none"> • Identify polynomial functions. • Graph polynomial functions using tables and end behavior • Add and subtract polynomials. • Multiply polynomials. • Use Pascal's Triangle to expand binomials • Use synthetic division to divide polynomials by binomials of the form $x - k$. • Use the Remainder Theorem • Factor polynomials. • Use the Factor Theorem • Find solutions of polynomial equations and zeros of polynomial functions. • Use the Irrational Conjugates Theorem. • Use the Fundamental Theorem of Algebra. |
| <p>Essential Question(s):</p> <ul style="list-style-type: none"> • What are some common characteristics of the graphs of cubic and quartic polynomial functions? • How can you cube a binomial? • How can you use the factors of a cubic polynomial to solve a division problem | |

involving the polynomial?

- How can you factor a polynomial?
- How can you determine whether a polynomial equation has a repeated solution?
- How can you determine whether a polynomial equation has imaginary solutions?
- How many turning points can the graph of a polynomial function have?

- 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.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| <u>Learning Target</u> | <u>NJSLS:</u> |
|---|--|
| <p>4.1 Graphing Polynomial Functions</p> <p>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. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i></p> <p>Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.</p> | <p>4.1</p> <p>NJSLS.F-IF.B.4, NJSLS.F-IF.C.7c</p> |
| <p>4.2 Adding, Subtracting, and Multiplying Polynomials</p> <p>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.</p> <p>Prove polynomial identities and use them to describe numerical relationships.</p> <p>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.</p> | <p>4.2</p> <p>NJSLS.A-APR.A.1, NJSLS.A-APR.C.4, NJSLSA-APR.C.5</p> |
| <p>4.3 Dividing Polynomials</p> <p>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 $p(x)$.</p> <p>Rewrite simple rational expressions in different forms; write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.</p> | <p>4.3</p> <p>NJSLS.A-APR.B.2, NJSLS.A-APR.D.6</p> |
| <p>4.4 Factoring Polynomials</p> <p>Use the structure of an expression to identify ways to rewrite it.</p> <p>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 $p(x)$.</p> <p>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.</p> | <p>4.4</p> <p>NJSLS.A-SSE.A.2, NJSLS.A-APR.B.2, NJSLS.A-APR.B.3</p> |

4.5 Solving Polynomial Equations

Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

4.6 The Fundamental Theorem of Algebra

Extend polynomial identities to the complex numbers.

Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

4.8 Analyzing Graphs of Polynomial Functions

Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

4.5

NJSLS.A-APR.B.3

4.6

NJSLS.N-CN.C.8,
NJSLS.N-CN.C.9,
NJSLS.A-APR.B.3

4.8

NJSLS.A-APR.B.3,
NJSLS.F-IF.B.4,
NJSLS.F-IF.C.7c,

Inter-Disciplinary Connections:

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

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher's discretion on assignments and assessments.

Calculators:

- TI – 84 Plus graphing calculator

Students will write:

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

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

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

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

How do you know when a polynomial is factored completely?

Explain what a complex conjugate is.

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

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

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

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

4.1 Graphing Polynomial Functions:

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (Evaluate the function for the given value of x.) |
| Teaching Objectives | <ul style="list-style-type: none"> • Identify polynomial functions. • Graph polynomial functions using tables and end behavior |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 161 Inquiry Formative Assessment (Mini assessment TE pg. 164) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.162 #1, 3-14, 17-20, 25-31, 48 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 309 #1-12 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

4.2 Adding, Subtracting, and Multiplying Polynomials:

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (Simplify Expressions by distribution and combining like terms) |
| Teaching Objectives | <ul style="list-style-type: none"> • Add and subtract polynomials. • Multiply polynomials. • Use Pascal's Triangle to expand binomials |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 169 Inquiry Formative Assessment (Mini assessment TE pg. 172) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.170 #3-21, 25-30, 36-44, 51 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 310 #33-44 & pg 352 #1, 2, 928, 29, 30, 36, 42 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

4.3 Dividing Polynomials:

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Factor the expression completely.) |
| Teaching Objectives | <ul style="list-style-type: none"> • Use synthetic division to divide polynomials by binomials of the form $x - k$. • Use the Remainder Theorem |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 176 Inquiry Formative Assessment (Mini assessment TE pg. 178) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.177 #11-22, 25-32 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 324 #13-22 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

4.4 Factoring Polynomials:

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Find the greatest common factor of the polynomial.) |
| Teaching Objectives | <ul style="list-style-type: none"> • Factor polynomials. • Use the Factor Theorem |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 183 Inquire Formative Assessment (Mini assessment TE pg. 186) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.184 #5-17, 23-26, 31-34, 39-44, 45-49, 72 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 330 #12-26 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

4.5 Solving Polynomial Equations:

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Solve linear functions for a single variable) |
| Teaching Objectives | <ul style="list-style-type: none"> • Find solutions of polynomial equations and zeros of polynomial functions. • Use the Irrational Conjugates Theorem. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 193 Inquire Formative Assessment (Mini assessment TE pg. 196) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.194 #3-20, 25-38(<i>must give 1 zero</i>), 41, 42, 56a <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 339 #1-5 (<i>must give 1 zero</i>), 7-10(<i>must give 1 zero</i>), 13-18, 19, 21, 23 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

4.6 The Fundamental Theorem of Algebra:

| | College Prep |
|--|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Identify the degree of the polynomial.) |
| Teaching Objectives | <ul style="list-style-type: none"> • Use the Fundamental Theorem of Algebra. • Find conjugate pairs of complex zeros of polynomial functions. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 201 Inquire Formative Assessment (Mini assessment TE pg. 204) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.202 #3-16, 21, 22, 25 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 343 #9-16 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

4.8 Analyzing Graphs of Polynomial Functions:

| | College Prep |
|--|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource. (Find the vertex of the function.) |
| Teaching Objectives | <ul style="list-style-type: none"> • Use x-intercepts to graph polynomial functions. • Find turning points and identify local maximums and local minimums of graphs of polynomial functions. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 215 Inquire Formative Assessment (Mini assessment TE pg. 218) |
| Practice and Apply Assigning Homework | Big Ideas Text pg.216 #3-10, 17-22(Use TI84 or Desmos), 23-30 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

PART IV: EVIDENCE OF LEARNING

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



Formative Assessments:

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

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

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Black Horse Pike Regional School District Curriculum Template

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

Course Name: Algebra 2 Integrated

Course Number: 033300

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| | |
|--|---|
| <p>Course/Unit Title: Algebra 2 Integrated/ Algebra 2 Ch 5: Rational Exponents and Radical Functions</p> | <p>Unit Summary: In this unit (Chapter 5) the first part introduces radicals and nth roots and how these may be written as rational exponents. A connection is made to the properties of exponents studied in Algebra 1, noting that now exponents can be rational numbers and are no longer restricted to being nonzero integers. In the middle portion of the chapter, radical expressions, also written in rational exponent form, are represented as functions and are graphed. This leads to a look at what the domains are for each function type. The graphs of radical functions are used to help students think about solutions of radical equations and inequalities. Certainly, one goal is for students to recognize that solving radical equations is an extension of solving other types of functions. The difference, however, is that sometimes extraneous solutions are introduced when solving radical equations, so it is necessary to check apparent solutions. The last lessons in the chapter involve performing the four basic operations on functions and doing so from multiple approaches: symbolic, numerical, and graphical. The last lesson introduces inverse functions—finding the inverse of linear, simple polynomial, and radical functions, and noting that the graphs of inverse functions are reflections in the line $y = x$.</p> |
| <p>Grade Level(s): 9 - 12</p> | <p>Enduring Understanding(s): Students will be able to:</p> <ul style="list-style-type: none"> • Find nth roots of numbers. • Evaluate expressions with rational exponents. • Solve equations using nth roots. • To simplify expressions with rational exponents. • Use properties of rational exponents to simplify expressions with rational exponents. • Use properties of radicals to simplify and write radical expressions in simplest form. • Graph radical functions. • Write transformations of radical functions. • Solve equations containing radicals and rational exponents. • Add, subtract, multiply, and divide functions. • Find composition of functions. • Explore inverses of functions. • Find and verify inverses of nonlinear functions. • Solve real-life problems using inverse functions. |
| <p>Essential Question(s):</p> <ul style="list-style-type: none"> • How can you use a rational exponent to represent a power involving a radical? • How to simplify expressions with rational exponents? • How can you use properties of exponents to simplify products and quotients of radicals? • How can you identify the domain and range of a radical function? • How can you solve a radical equation? | |

- How can you use the graphs of two functions to sketch the graph of an arithmetic combination of the two functions?
- How can you sketch the graph of the inverse of a function? |

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

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

| <u>Learning Target</u> | <u>NJSLS:</u> |
|---|---|
| <p>5.1 <i>n</i>th Roots and Rational Exponents</p> <p>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.</p> <p>Rewrite expressions involving radicals and rational exponents using the properties of exponents.</p> | <p>5.1</p> <p>NJSLS.N-RN.A.1, NJSLS.N-RN.A.2</p> |
| <p>5.2 Properties of Rational Exponents and Radicals</p> <p>Rewrite expressions involving radicals and rational exponents using the properties of exponents.</p> | <p>5.2</p> <p>NJSLS.N-RN.A.2</p> |
| <p>5.3 Graphing Radical Functions</p> <p>Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.</p> | <p>5.3</p> <p>NJSLS.F-IF.C.7b, NJSLS.F-BF.B.3</p> |
| <p>5.4 Solving Radical Equations and Inequalities</p> <p>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.</p> <p>Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.</p> | <p>5.4</p> <p>NJSLS.A-REI.A.1, NJSLS.A-REI.A.2</p> |
| <p>5.5 Performing Function Operations</p> <p>Combine standard function types using arithmetic operations.</p> <p>Compose functions</p> | <p>5.5</p> <p>NJSLS.F-BF.A.1b NJSLS.f-BF.A.1c</p> |
| <p>5.6 Inverse of a Function</p> <p>Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</p> <p>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.</p> | <p>5.6</p> <p>NJSLS.A-CED.A.4, NJSLS.F-BF.B.4a</p> |

Inter-Disciplinary Connections:

Real World and Inter-disciplinary problems:

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

Students will engage with the following text, resources and tools:

Text:

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

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

- BigIdeasMath.com – publisher on-line assignments, resources and text
- Desmos – online graphing tool
- IXL – web-based software
- G Suite for education – Google Classroom, Docs, Drive, Mail, etc...
- For this chapter students will receive formula sheets to be used at the teacher’s discretion on assignments and assessments.

Calculators:

- TI – 84 Plus graphing calculator

Students will write:

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

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

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

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

5.1 n th Roots and Rational Exponents

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (using properties of integer exponents to simplify expressions) |
| Teaching Objectives | <ul style="list-style-type: none"> • Find nth roots of numbers. • Evaluate expressions with rational exponents. • Solve equations using nth roots. • To simplify expressions with rational exponents. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 240 Inquiry Formative Assessment (Mini assessment TE pg. 242) |
| Practice and Apply Assigning Homework | For objectives relating to simplifying expressions with rational exponents teacher should use Kuta or other supplementary materials. Big Ideas Text pg. 241: #5-10, 21-3135-42, 51-54 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 389 #1-49 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per students' IEPs or 504 plans. |

5.2 Properties of Rational Exponents and Radicals

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (using properties of integer exponents to simplify expressions) |
| Teaching Objectives | <ul style="list-style-type: none"> • Use properties of rational exponents to simplify expressions with rational exponents. • Use properties of radicals to simplify and write radical expressions in simplest form. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 247 Inquiry Formative Assessment (Mini assessment TE pg. 250) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 248: #1-6, 13-16, 37, 41, 42, 44, 49-52, 57, 58, 63, 65, 66, 82-87 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 377 #1-35 and pg382 #1-12 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

5.3 Graphing Radical Functions

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (describe the transformations of the parent function $f(x) = x^2$ represented by g .) |
| Teaching Objectives | <ul style="list-style-type: none"> • Graph radical functions. • Write transformations of radical functions. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 255 Inquiry Formative Assessment (Mini assessment TE pg. 258) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 256: #1-11, 19, 21, 22, 27, 64 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 417: #1-8, 12, 15, 18-21 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

5.4 Solving Radical Equations and Inequalities

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Use Exploration 1 Solving Radical Equations pg. 261 |
| Teaching Objectives | <ul style="list-style-type: none"> Solve equations containing radicals and rational exponents |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 265 Inquiry Formative Assessment (Mini assessment TE pg. 268) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 266: #1-18, 21, 22, 27-32, 35, 36, 58 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 394: #1-30 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

5.5 Performing Function Operations

| | College Prep |
|---|--|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (Simplify expressions) |
| Teaching Objectives | <ul style="list-style-type: none"> Add, subtract, multiply, and divide functions Find composition of functions |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 272 Inquiry Formative Assessment (Mini assessment TE pg. 274) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 273: #5, 6, 19, 20, 28-31 <i>Supplement Composition of functions using Kuta Software</i> <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 400: #1-44 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

5.6 Inverse of a Function

| | College Prep |
|---|---|
| Focus and Motivate Starting Options (Lesson Warm Up) | <i>Suggestions include but not limited to:</i> Warm-ups are available in the Dynamic Classroom Resource (Solve equations for y) |
| Teaching Objectives | <ul style="list-style-type: none">• Explore inverses of functions.• Find and verify inverses of nonlinear functions.• Solve real-life problems using inverse functions. |
| Checking for Understanding | <i>Suggestions include but not limited to:</i> Exit Tickets Closure TE p. 280 Inquiry Formative Assessment (Mini assessment TE pg. 284) |
| Practice and Apply Assigning Homework | Big Ideas Text pg. 281: #5 – 8, 13-20, 22, 29, 30, 73-79 <i>Supplemental Text:</i> Prentice Hall Algebra 2 pg. 410: #1-34 |
| Assess and Reteach Differentiating Instruction | All resources are available electronically; i.e. Kuta Software, Textbook website platform, Desmos, etc... |
| Accommodations/Modifications: | As per individual students' IEP or 504 plan. |

PART IV: EVIDENCE OF LEARNING

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



Formative Assessments:

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Summative Assessments:

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

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

Accommodations/Modifications:

As per individual students' IEP or 504 plan.

Performance Assessments:

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

- Projects
- Performance Tasks
- Homework
- Classwork

Accommodations/Modifications:

As per individual students' IEP or 504 plan.