Unit 5: Radical Equations and Expressions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 19**
Length: **4 Weeks**
Status: **Published**

Unit Overview

In this unit, students use properties to simplify radical expressions, including rationalizing the denominator. They add, subtract, and multiply radicals. Students solve radical equations, including those with extraneous solutions. They apply the Pythagorean Theorem and its converse to find missing lengths and to determine whether triangles are right triangles. They apply the distance and midpoint formulas between two points to find missing coordinates. Students will graph square root functions and compare them with linear and non-linear functions.

Standards

MA.8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
MA.8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.A-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MA.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
MA.8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
MA.8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Essential Questions

1. How are radical expressions used in the real world?
2. How do geometric relationships help to solve problems and/or make sense of phenomena?
3. How can geometric/algebraic relationships best be represented and verified?

Application of Knowledge and Skills...

Students will know that...

- 1. the number or expression inside a radical symbol is the radicand
- 2. a radicand cannot be negative under the real numbers
- 3. a conjugate is a binomial in which the operational sign has been changed to its opposite
- 4. the product of two conjugates does not contain a radical
- 5. radical equations can have extraneous solutions
- 6. the Pythagorean Theorem states the relationship among the lengths of the sides of right triangles
- 7. the distance formula can be used to find the distance between two points on the coordinate plane
- 8. the midpoint formula can be used to find the midpoint of a line on the coordinate plane
- 9. the graph of a square root function is non-linear

Students will be able to:

- a. simplify radical expressions
- b. solve radical equations
- c. apply the Pythagorean Theorem and its converse
- d. use the distance and midpoint formulas
- e. graph square root functions and compare them with linear and non-linear functions

Assessments

- Communicator Practice Diagnostic: Other written assessments Students will solve practice problems on communicators to receive immediate feedback
- Daily Warm-Up Problems Diagnostic: Other written assessments Students will complete daily warm-up problems to assess readiness
- Radicals Quiz Formative: Written Test Students will take a quiz on simplifying radical expressions (including those involving multiplying by the conjugate to rationalize the denominator) and solving radical equations
- Ticket to Leave Problems Formative: Other written assessments Students will complete one or two problems to assess knowledge and skills learned during the class period
- Unit Test Summative: Written Test Students will take a test on all topics covered in the unit

Activities

Properties of Radicals Activity

Students will use patterns to simplify products and quotients of square roots. They will check their answers using a calculator.

Exploring Solutions to Radical Equations
Students will explore the relationship between the distance an object drops and the reaction time needed to catch the object. They will check their answers using a calculator.

Graph Square Root Functions
Students will graph square root functions by hand and with the graphing calculator.

Pythagorean Theorem Investigation

Distance on the Coordinate Plane Investigation
Students will create a puzzle using the distance and midpoint formula.

Enrichment Project: Puzzling Distances

Radical Equations Activity
Finding Midpoint and Distance

Activities to Differentiate Instruction

Mixed-ability grouping

Interactive Smart Board activities

Multi-Step Problem Solving

Math stations

Cooperative learning

Study guides (teacher and student completed)

Modify tests and homework as needed

Modified grading rubrics

Graphic organizers

Communicator response boards

Extended response questions

Challenge and enrichment homework assignments, worksheets, and enrichment project

Optional weekly challenge problems

Integrated/Cross-Disciplinary Instruction

Resources

McDougal Littell Algebra 1 textbook and resource materials

Website: www.classzone.com (see link)

Kuta Software

Algebra with Pizzazz

Punchline Algebra

Smart Exchange Website (see link)

Grade 8 Ask Math

American Diploma Project Algebra 1 End-of-Course Exam Workbook

- www.classzone.com
- http://exchange.smarttech.com/#tab=0

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use

	effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.