

08-Radicals

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **3 weeks (10-12 blocks)**
Status: **Published**

General Overview, Course Description or Course Philosophy

In this unit, students will extend their knowledge of operations with monomials to simplify, add, subtract, multiply, and divide radicals. Students will learn how to graph square root functions. Students will solve simple radical equations in one variable and give examples showing how extraneous solutions may arise.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Students will understand that:

- Some arithmetic rules apply to radical expressions and some do not
- Square root functions can be used to represent real-world situations

Essential Questions:

- Explain why the sum of a rational number and an irrational number is irrational.
- How would you define the characteristics of a radical?
- How is the distance formula related to the Pythagorean Theorem?
- How do you know if a radical expression is in simplest form?

CONTENT AREA STANDARDS

A.CED

A. Create equations that describe numbers or relationships

A.REI

A. Understand solving equations as a process of reasoning and explain the reasoning

B. Solve equations and inequalities in one variable

C. Solve systems of equations

D. Represent and solve equations and inequalities graphically

A.SSE

A. Interpret the structure of expressions

B. Write expressions in equivalent forms to solve problems

MA.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MA.F-IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MA.N-RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
MA.N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MA.N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

9.1.8.PB.3: Explain how to create budget that aligns with financial goals.

CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
TECH.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Rational numbers are numbers that can be written as a fraction with integers as the numerator and denominator
- Operations with rational and irrational numbers can yield rational or irrational solutions
- Pythagorean theorem can be applied to find the missing side of a right triangle
- The distance formula can be derived from the Pythagorean theorem and is used to find the distance between two points on a grid
- Extraneous solutions can arise when solving radical equations

Procedural Knowledge

Students will be able to:

- Classify rational and irrational numbers
- Simplify expressions involving square roots
- Perform operations with radical expressions
- Solve simple radical equations
- Identify extraneous solutions when solving radical equations
- Apply the distance formula to solve problems
- Apply the Pythagorean theorem to solve problems
- Create and manipulate graphs of square root functions

EVIDENCE OF LEARNING

Benchmark Assessments

Benchmark Assessments conducted three times per year, using Pear Assessment (Standards Based Assessments)

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)

- Multiple choice
- Modified Rubrics
- Performance Based Assessments

Formative Assessments

- Class Discussion/Exit Cards
- Homework/practice problems (assigned from textbook or various web resources, such as Khan Academy, Albert, Quizizz, or Desmos)

Summative Assessments

- Lesson quizzes
- Teacher-generated unit test
- Performance tasks

RESOURCES (Instructional, Supplemental, Intervention Materials)

Core Instructional Resources

- *Algebra 1: Common Core*, Chapter 10

Supplemental Instructional Resources

- [Illustrative Math Tasks](#)
- [Arlington Algebra Project \(Roots and Irrational Numbers\)](#)
- Desmos Activity:
 - [Radical Graph Investigation](#)

INTERDISCIPLINARY CONNECTIONS

Radicals are used in many real-life applications. Some of these include velocity, frequency, energy, right triangle applications, densities and fluid flow through a membrane.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.