07 Radical Functions and Equations

Content Area: **TEMPLATE**
Course(s):
Time Period: **Full Year**
Length: **2 - 3 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

This course is an extension of Algebra 1. Emphasis is upon the development of insights into the structure of algebra as a deductive process. The content includes function foundations, equations and inequalities, polynomial functions and equations, rational functions and equations, radical expressions and equations, exponential and logarithmic functions and equations, trigonometric functions and equations, introductory data analysis, and probability.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

- Solving equations is a process
- Model graphically using radical functions
- Represent functions and relations numerically, graphically, and algebraically.
- Describe and apply properties of functions and relations
- Perform a variety of operations and geometrical transformations on functions and relations
- Use numerical, algebraic, and graphical representations of functions and relations in order to solve real-world problems
- Describe and represent numbers and their relationships.

Essential Questions:

- How do power and radical functions model real-world problems and their solutions?
- How are expressions involving radicals and exponents related?

Enduring Understanding:

- The characteristics of power and radical functions and their representations are useful in solving real-world problems
- Radicals can be combined using properties of real numbers
- Radical expression can be written in an equivalent form using a fractional (rational)
- Radicals can be written with exponent as well as with radical sign
- Solving a square root equation may require that you square each side of the equation and can introduce extraneous solutions.

CONTENT AREA STANDARDS

MA.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MA.F-IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MA.F-LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
MA.F-LE.A.1a	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
MA.F-LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
MA.F-LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MA.A-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MA.A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

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

CS.K-12.4.a	Extract common features from a set of interrelated processes or complex phenomena.
CS.K-12.4.c	Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.
CS.K-12.4.d	Model phenomena and processes and simulate systems to understand and evaluate potential outcomes.
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
PFL.9.1.K12.P.4	Demonstrate creativity and innovation.
PFL.9.1.K12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
PFL.9.1.K12.P.6	Model integrity, ethical leadership and effective management.
PFL.9.1.K12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
PFL.9.1.K12.P.9	Work productively in teams while using cultural/global competence.

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand that:

- the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line)
- The relationship between exponents and radicals
- Properties of radicals and exponents
- The appropriate domain and range of a radical function and how it contributes to its graph and behavior

Procedural Knowledge

Students will be able to:

- Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions expressed symbolically
- Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another
- Recognize situations in which one quantity changes at a constant rate per unit interval relative to another
- Recognize situations in which one quantity changes at a constant rate per unit interval relative to another
- Give examples showing how extraneous solutions may arise when solving simple rational and radical equations in one variable
- Interpret key features of graphs and tables of a function that models a relationship between two quantities
- Sketch graphs showing key features given a verbal description of the relationship
- Write expressions in equivalent forms to solve problems
- Solve radical equations
- Distinguish between linear and exponential functions

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Formative Assessments

- Class Discussion
- Teacher observation
- Exit/Entrance Tickets
- Classwork
- Homework

Summative Assessments

- Quizzes
- Test
- Projects

RESOURCES (Instructional, Supplemental, Intervention Materials)

- Sullivan Algebra and Trigonometry Textbook (Chapter 1, section 4)
- Khan Academy
- Radical Expressions Reference
- Deltamath
- Illustrative Mathematics Tasks by standard
- Illustrative Mathematics Curriculum
- Desmos
- Modeling Population Growth

INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through modeling and application problems whereby students solve and analyze situations such as curvature of population grown and decay, speed, work rate of machines, and gas laws in chemistry. Examples can be found in topic specific textbook problems and digital resources.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.