(Alg 1) Unit 10: Radical Functions & Equations

Content Area: **Math**
Course(s): **Math**
Time Period: **May**
Length: **3 weeks**
Status: **Published**

Unit Overview

In this unit, students will learn about the following topics:

- Graphing square root functions

- Graphing cube root functions

- Solving radical equations

- Inverse of a function

Enduring Understandings

SWBAT:

- Graph square root functions

- Graph cube root functions

- Find the domain & range of square root and cube root functions

- Perform transformations from the parent function (be it square root or cube root)

- Solve real-world problems that can be modeled by square root and cube root functions

- Solve radical equations with one or more radical expressions (either side of the equation)

- Determine whether a solution to a radical equation is extraneous or not

- Find the inverse of a relation, be it from ordered pairs, mapping diagrams, or tables

- Find the inverse of a function using substitution x and y and solving for y

- Use the horizontal line test to see if the inverse of a function is also a function

Essential Questions

How can we:

- graph square root functions using a table of inputs & outputs?
- graph cube root functions using a table of inputs & outputs?
- graph radical equations using transformations of the parent function?
- find the domain & range of the graph of a square root or cube root function?
- determine the domain of a square root function using the equation only?
- solve real-world problems that can be modeled by square root or cube root functions?
- recognize squaring and cubing as the inverse operations for taking the square or cube root?
- solve radical equations?
- identify extraneous solutions to radical equations?
- find the inverse of a relation?
- find the inverse of a function?
- relate the inverse of a function to its reflection in the line y=x?

Instructional Strategies & Learning Activities

- Guided Practice
- Daily Do Now
- Extra Practice & Puzzle Time (Resources)
- Scavenger Hunts
- Coloring Activities
- Task Cards (Around the World)
- Maze Activities
- Quizizz Online Assignments
- Kahoot! Online Games
- GimKit Online Games

Integration of 21st Century Themes and Skills

9.1.K12.P.4	Demonstrate creativity and innovation.
9.1.K12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
9.1.K12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
9.2.8.CAP.6	Compare the costs of post-secondary education with the potential increase in income from a career of choice.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).
9.4.8.CT.3	Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.
9.4.8.TL.2	Gather data and digitally represent information to communicate a real-world problem

	(e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
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.
PFL.9.1.8.E.6	Compare the value of goods or services from different sellers when purchasing large quantities and small quantities.

Technology & Design Integration

8.1.8.DA.5	Test, analyze, and refine computational models.
8.1.8.AP.2	Create clearly named variables that represent different data types and perform operations on their values.
8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
8.1.8.AP.8	Systematically test and refine programs using a range of test cases and users.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.2.8.A.CS2	The core concepts of technology.
TECH.8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
TECH.8.2.8.D.CS1	Apply the design process.

Interdisciplinary Connections

L.KL.8.2.A	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases.

L.KL.8.2.B	Gather vocabulary knowledge when selecting a word or phrase important to comprehension or expression.
L.VL.8.3.A	Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
L.VL.8.3.C	Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., precede, recede, secede).
L.VL.8.3.D	Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.
L.VI.8.4.B	Use the relationship between particular words to better understand each of the words.
VPA.1.3.8.D.1	Incorporate various art elements and the principles of balance, harmony, unity, emphasis, proportion, and rhythm/movement in the creation of two- and three- dimensional artworks, using a broad array of art media and art mediums to enhance the expression of creative ideas (e.g., perspective, implied space, illusionary depth, value, and pattern).

Differentiation

Definitions of Differentiation Components:

- Content – the specific information that is to be taught in the lesson/unit/course of instruction.
- Process – how the student will acquire the content information.
- Product – how the student will demonstrate understanding of the content.
- Learning Environment – the environment where learning is taking place including physical location and/or student grouping

Differentiation occurring in this unit:

- High-achieving students will assist low-achieving students in mixed ability groupings for games and activities.
- High-achieving students can complete sudoku puzzles and logic puzzles as extension activities.
- Limit number/difficulty of problems for low-achieving students to demonstrate mastery.
- Narrow down problem choice to core concepts for low-achieving students.
- Leveled group-based activities, determined by formative assessment.

Modifications & Accommodations

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Benchmark Assessments

Schoolwide Benchmark assessments:

- Linkit Benchmarks (Form A in September, Form B in January, Form C in June): Linked to NJSLA standards

Additional Benchmarks used in this unit:

- IXL Diagnostic + continued practice during IXL periods

Formative Assessments

Formative Assessments used in this unit:

- Kahoot! Games
- Quizizz Games
- Homework
- Q & A
- Scavenger Hunts
- Coloring Activities
- Task Cards
- Partner Activities

Summative Assessments

Summative assessments for this unit:

- Chapter Test
- Quizzes

Instructional Materials

1. Big Ideas Math: Math & You 6th Grade Textbook
2. Quizizz
3. Kahoot!
4. Scavenger Hunts
5. Task Cards
6. Coloring Activities
7. GimKit

Standards

F.BF.B.4.a	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.
A.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
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.
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.
F.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
F.IF.C.7.b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
F.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).