

Unit 5 Exponents and Exponential Functions

Content Area: **Math**
Course(s): **Accelerated Algebra I**
Time Period: **Marking Period 2**
Length: **6**
Status: **Published**

Unit Overview

This unit allows students to master exponent rules and the real number systems. Students will be prepared to use these rules later when working with exponential functions

Link to optional Desmos Curriculum resource:

<https://teacher.desmos.com/collection/61bcc95700581818dff1d4d7?intro-banner-expanded=true>

Enduring Understandings

- The idea of exponents can be extended to include zero and negative exponents.
- Properties of exponents make it easier to simplify products or quotients of powers with the same base or powers raised to a power or products raised to a power.
- You can use rational exponents to represent radicals.
- The parent of the family of exponential functions is $y = ab^x$. The independent variable is an exponent. This family of functions can model growth or decay of an initial amount.
- In a geometric sequence, the ratio of any term to its preceding term is a constant value.

Essential Questions

How can you represent numbers less than 1 using exponents?

How can you simplify expressions involving exponents?

What are the characteristics of exponential functions?

New Jersey Student Learning Standards (No CCS)

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.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
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.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MA.A-SSE.B.3c	Use the properties of exponents to transform expressions for exponential functions.
MA.F-IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
MA.F-IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
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-CED.A.3	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.
MA.F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, 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.
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.F-LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
MA.F-LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.
MA.A-REI.D.11	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.

Interdisciplinary Connections

LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
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SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.

Technology Standards

TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

21st Century Themes/Careers

CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
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Financial Literacy Integration

PFL.9.1.12.C.1	Compare and contrast the financial benefits of different products and services offered by a variety of financial institutions.
PFL.9.1.12.C.2	Compare and compute interest and compound interest and develop an amortization table using business tools.
PFL.9.1.12.C.3	Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit.

Instructional Strategies & Learning Activities

- Use graphing calculator to explore tables.
- Spend time with modeling problems.
- Use problems and activities from book involving modeling problems.
- ~~Provide access to online book~~
- Provide access to book pages and problems through Canvas
- Provide access to review keys
- Use Pearson Quizzes to review and reinforce.
- ~~Provide access to Pearson Review.~~
- Examview Quizzes to assess HW.
- Desmos
- Delta Math

Formative Assessments

- Examview HW Check
- Quiz
- Chapter Unit Test
- Warm-ups
- Desmos
- Delta Math

Summative Assessment

- Unit Test