Unit 8: Exponential Functions, Expressions and Equations

Content Area: **Math**
Course(s):
Time Period:
Length: **8 classes (CP) 7 classes (Honors)**
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Exponential Functions, Expressions and Equations

Learning Objectives

- Objective 1 - Define quantities for descriptive modeling problems. (Incorporate appropriate units).
- Objective 10 - Identify the percent rate of change in an exponential function.
- Objective 11 - Classify exponential functions as exponential growth or decay.
- Objective 12 - Identify the effect on a graph of f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k.
- Objective 13 - Find the values of k given a graph.
- Objective 14 - Experiment with cases using technology.
- Objective 15 - Recognize even and odd functions from their graphs.
- Objective 16 - Recognize even and odd functions given an algebraic expression.
- Objective 2 - Create and solve equations.
- Objective 3 - Create and solve inequalities.
- Objective 4 - Sketch a graph using the key features of a function.
- Objective 5 - Interpret key features from a graph or a table of values.
- Objective 6 - Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
- Objective 7 - Write a function shown as an expression in equivalent forms.
- Objective 8 - Reveal different properties of a function by expressing it in different forms.
- Objective 9 - Use the properties of exponents to interpret exponential functions.

Essential Skills

- Essential Skill 1 - The artist will be able to define quantities for descriptive modeling problems. (Incorporate appropriate units)
- Essential Skill 10 - The artist will be able to classify exponential functions as exponential growth or decay.
- Essential Skill 11 - The artist will be able to identify the effect on a graph of f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k
- Essential Skill 12 - The artist will be able to find the values of k given a graph.
- Essential Skill 13 - The artist will be able to experiment with cases using technology.
- Essential Skill 14 - The artist will be able to recognize even and odd functions from their graphs.
- Essential Skill 15 - The artist will be able to recognize even and odd functions given an algebraic expression.
- Essential Skill 2 - The artist will be able to create and solve equations.
- Essential Skill 3 - The artist will be able to create and solve inequalities.
- Essential Skill 4 - The artist will be able to sketch a graph using the key features of a function.
- Essential Skill 5 - The artist will be able to interpret key features from a graph or a table of values. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
- Essential Skill 6 - The artist will be able to write a function shown as an expression in equivalent forms.
- Essential Skill 7 - The artist will be able to reveal different properties of a function by expressing it in different forms.
- Essential Skill 8 - The artist will be able to use the properties of exponents to interpret exponential functions.
- Essential Skill 9 - The artist will be able to identify the percent rate of change in an exponential function.

Standards

MATH.9-12.N.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MATH.9-12.F.BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\ f(x)$, $f(kx)$, 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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
MATH.9-12.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.
MATH.9-12.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.
MATH.9-12.F.IF.C.8.b	Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.

Instructional Tasks/Activities

- Academic games & Competitions
- Arts inspired projects
- Formative Assessments
- Ladder Activity
- Notes
- Worksheets

Assessment Procedure

- Assessment Review
- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot

- MagicSchool AI
- Other- Specified in Lesson
- PowerPoint
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions

- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- Resource 1