Unit #11: Exponential Growth and Decay

Content Area: **Math**
Course(s):
Time Period:
Length: **8 days**
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Exponential Growth and Decay

Learning Objectives

• Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

• Create equations and inequalities in one variable and use them to solve problems.

• Experiment with cases and illustrate an explanation of the effects on the graph using technology.

• 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.

• 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.

• Include recognizing even and odd functions from their graphs and algebraic expressions for them.

• Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

• 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.

• Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

Essential Skills

• Essential Skill 1 - Artists will be able to write a function shown as an expression in equivalent forms.

• Essential Skill 10 - Artists will be able to recognize even and odd functions given an algebraic expression.

• Essential Skill 11 - Artists will be able to sketch a graph using the key features of a function.

- Essential Skill 12 - Artists 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 13 - Artists will be able to create and solve equations.

- Essential Skill 14 - Artists will be able to create and solve inequalities.

- Essential Skill 2 - Artists will be able to reveal different properties of a function by expressing it in different forms.

- Essential Skill 3 - Artists will be able to use the properties of exponents to interpret exponential functions.

- Essential Skill 4 - Artists will be able to identify the percent rate of change in an exponential function.

- Essential Skill 5 - Artists will be able to classify exponential functions as exponential growth or decay.

- Essential Skill 6 - Artists 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 7 - Artists will be able to find the values of k given a graph.

- Essential Skill 8 - Artists will be able to experiment with cases using technology.

- Essential Skill 9 - Artists will be able to recognize even and odd functions from their graphs.

Standards

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.
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.

Instructional Tasks/Activities

- Academic games
- Independent practice
- Ladder Activity
- Notes
- Ti-Nspire activities,
- Worksheets

Assessment Procedure

- Assessment review

- Class discussions
- Classroom Total Participation Technique
- Classwork/homework
- DBQ
- Electronic active repsonders
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Identify the error problems
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Quizzes/tests
- Response and analysis questions
- Rubric
- Teacher Collected Data
- Teacher observations
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI

- Other- Specified in Lesson
- PowerPoint
- Quiziz
- Screencastify
- TI-Nspire CX-Cas activities throughout the unit as appropriate

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.

Special Education

Modifications and accommodations to this unit will be based on individual IEP needs and through the collaboration of the classroom teacher and the special education teacher under the direction of the Supervisor of Special Education.

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
- 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

- https://curriculum.newvisions.org/math/course/algebra-ii/
- www.Khanacademy.com