Updated August 2024

Marking Period	Unit 6 Exponential Functions and Sequences	Recommended Instructional Days 10-12
4		10-12 days

Domain: Algebra, Functions

Strand:

Key:

Major Cluster

Supporting Cluster

Additional Cluster

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.SSE.A.1 Interpret expressions that represent a quantity in terms of its context.

Progress Indicator:
Tests ● Quizzes ● Practice problems for homework ● Workbook pages ● Worksheets ● Focus Packet ● Leveled assessments

Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-CLKS within Unit

Essential Question/s:

1. **What are the properties of exponents?**
2. **What is any number raised to the zero power equal?**
3. **How do you change fractional exponents to an nth root?**
4. **What is the difference between exponential growth and decay?**
5. **When is a function a growth? A decay?**
6. **How is the formula for exponential growth similar to the standard form of an exponential function?**

Activity Description:

- **Properties of exponents**
- **Radicals and rational exponents**
- **Exponential Functions**
- **Exponential Growth and Decay**
- **Geometric Sequences**

Interdisciplinary Connections:
Topic 8 Project
Measure a Distance
Trigonometry is a powerful tool for measuring lengths and distances indirectly. You and your classmates will use trigonometry and indirect measurement to find the height of an object that is too tall to measure directly.

a. Interpret parts of an expression, such as terms, factors, and coefficients.
b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.* ★

A.SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
c. Use the properties of exponents to transform expressions for exponential functions. *For example: the expression 1.15^t can be rewritten as $(1.15)^{1/12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* ★

F.IF.A.3 Recognize that sequences are functions,

Career Readiness, Life Literacies and Key Skills **Content: Engineering; Construction. NJSLS#: G.SRT.C.6, G.SRT.C.7, G.SRT.D.11) (Next Generation Science Standards ETS1-2)**

Spot Light On:
Climate
This lesson plan will allow you to teach introductory statistics through a linear regression assignment. The lesson plan includes a hands-on computer-based classroom activity to be conducted on a dataset of Global Temperature Anomalies (1850-2017). This activity includes a set of inquiry-based questions that will enable your students to apply their understanding of scatter plots, regression equations, correlation coefficients, linear regression, and confidence intervals for slopes. Thus, the use of this lesson plan allows you to integrate the teaching of a climate science topic with a core topic in Mathematics.

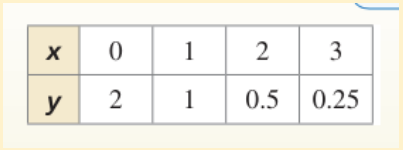
Example Tasks:

Task 1:
The table shows several units of mass.

Unit of mass	kilogram	hectogram	dekagram	decigram	centigram	milligram	microgram	nanogram
Mass (grams)	10^3	10^2	10^1	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}

a. One kilogram is how many times one nanogram? Write your answer using only positive exponents.
b. Which is greater, 10,000 milligrams or 1000 decigrams? Explain your reasoning

Task 2:
Write and graph an exponential function f represented by the table. Then compare the graph to the graph of the parent function.

sometimes defined recursively, whose domain is a subset of the integers. ***For example, the Fibonacci Sequence is defined recursively by f(0) = f(1) = 1, f(n + 1) = f(n) + f(n − 1) for n ≥ 1.*** **F.BF.A.1** Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. ★ **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). N.RN.A.3 Simplify radicals, including algebraic		 **Task 3:** The value of a TV is $1500. It loses 14% of its value every year. (a) Write a function that represents the value y (in dollars) of the TV after t years. (b) Find the approximate monthly percent decrease in value. (c) Use the graph of the function to estimate the value of the TV after 3 years.

x	0	1	2	3
y	2	1	0.5	0.25

radicals (e.g. , simplify).		
Mathematics Practices		
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure.		
Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***	
● Self-Awareness ● Social Awareness ● Self-Management ● Relationship Skills ● Responsible Decision-Making	Recognizing the importance of self-confidence in handling daily tasks and challenges. Demonstrate an awareness of the expectations for social interactions in a variety of ways. Demonstrate an understanding of the need for mutual respect when viewpoints differ. Recognize the skills needed to establish and achieve personal and educational goals.	

	Utilize positive communication and social skills to interact effectively with others. Develop,implement, and model effective problem solving and critical thinking skills.	

Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
<u>Formative Assessments:</u> ● Entry and Exit Slips ● Quizzes ● Self Assessments	**<u>Benchmarks:</u>** ● Chapter Tests ● Projects **<u>Summative Assessments:</u>** ● Unit Assessment ● District assessments ● Standardized test

Differentiated Student Access to Content:
Teaching and Learning *Resources/Materials*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
● Big Ideas ● Achieve the core ● Khan Academy ● Desmos	● Reteaching worksheets ● Skill building workbook ● Math manipulatives ● Leveled practice worksheets ● Differentiation Options	● Dictionary for native language ● Video tutorial in native language ● Success for English Learners ● worksheets	● Enrichment worksheets and activities ● Challenge questions ● Problem Solving Workshop ● Leveled assessments

	• Small group activities	• Leveled Strategies for English • Learners • Linguistic Support	

Supplemental Resources

• Technology: Chromebooks, Graphing Calculators
• Other: Google Meets, Jamboard , whiteboard.fi, Schoology

Differentiated Student Access to Content:
Recommended *Strategies & Techniques*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core**
Deliver instruction utilizing varied learning styles including audio,visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics, repeat	**Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method(repetition, simple explanations,additional examples, modeling, etc.), modify test content and/orformat, allow students to retake test for additional credit, provide additional times and preferential**	**Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.**	**Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related**

	seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.		

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	**Disciplinary Concept: Global and Cultural Awareness**	
	Core Ideas:	**Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.**
	Performance Expectation/s:	**9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).**
	Career Readiness, Life Literacies, & Key Skills Practices	
	Act as a responsible and contributing community member and employee. Attend to financial well-being. Consider the environmental, social and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Model integrity, ethical leadership and effective management. Plan education and career paths aligned to personal goals. Use technology to enhance productivity, increase collaboration and communicate effectively. Work productively in teams while using cultural/global competence.	

New Jersey Legislative Statutes and Administrative Code
(place an "X" before each law/statute if/when present within the curriculum map)

x	Amistad Law: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*		LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*		Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*	X	Standards in Action: *Climate Change*