New Mexico Instructional Scope

Algebra 1 Linear, Quadratic, and Exponential Models Guide

The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

The NMIS is a teacher-influenced tool, designed to provide instructional planning support at the programmatic level for districts and instructional level for teachers. Its foundation stems from the vision and mission of the PED and came into existence to assure that students in NM will be engaged in a culturally and linguistically responsive educational system that meets the social, emotional, and academic needs of ALL students. This is also rooted in the belief that all students must have access to on-grade-level standards, focusing on acceleration. The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

Standards are defined as the most critical prerequisite skills and knowledge. This document is color-coded to reflect both anchor and priority standards. Though previous emphasis was placed on priority standards to address lost learning due to COVID-19, New Mexico teachers should note that moving forward, while priority standards allow for acceleration of learning, all standards should be addressed in instruction throughout the school year.

In this guide you will find:

- A breakdown of each of the grade level standards within the cluster, including:
  - Standards of Mathematical Practice
  - Common Misconceptions
  - Identification of Priority Standards, as identified by NMPED.
  - Level of Rigor Identification
- Sample aligned assessment items
- Suggested Student Discourse Guide
- A multilayered system of supports (MLSS) and culturally and linguistically responsive instruction (CLR) guide

New Mexico Instructional Scope

Algebra 1 Linear, Quadratic, and Exponential Models Guide

Key		
	Priority Standard	Priority standards, as identified by NMPED, are denoted with red highlighting. Priority standards are the most critical prerequisite skills and knowledge a student needs. This does not mean that these are only standards required to be taught, just these are the standards that will allow for the acceleration the students of New Mexico need during this time.
	*Conceptual Understanding*	Conceptual Understanding standards help students build a deep understanding of the **how** and **why** of mathematics.
	*Application*	Application standards help students identify the appropriate concepts and skills to tackle **novel real-world problems.**
	*Procedural Skill and Fluency*	Procedural standards help students develop **efficiency** and **accuracy** in computations.

Standards Breakdown

- Construct and compare linear, quadratic, and exponential models and solve problems.
  - HSF.LE.A.1
  - HSF.LE.A.2
  - HSF.LE.A.3
- Interpret expressions for functions in terms of the situation they model.
  - HSF.LE.B.5

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Algebra 1 Linear, Quadratic, and Exponential Models Guide

Grade	*CCSS Domain*	*CCSS Cluster*
A1	**Linear, Quadratic & Exponential Models**	**Construct and compare linear, quadratic, and exponential models and solve problems**

Cluster Standard: HSF.LE.A.1

Standard	Standards for Mathematical Practice
Distinguish between situations that can be modeled with linear functions and with exponential functions. • HSF.LE.A.1.A: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. • HSF.LE.A.1.B: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. • HSF.LE.A.1.C: Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students should be able to differentiate between exponential and linear functions by determining whether given relationships have a common difference or a common ratio. Students have to know the differences between linear functions and exponential functions. In simplest terms, a linear function takes the form $y = mx + b$ and an exponential function is one in which $y = ax$.	• Compare linear and exponential functions in various ways. • Show that linear functions have a common difference and that exponential functions have a common ratio. • Determine when a relationship is growing by a constant difference. • Determine when a relationship grows by a common ratio.
DOK	**Blooms**
1-3	Understand, Apply, Analyze, Evaluate

New Mexico Instructional Scope

Algebra 1 Linear, Quadratic, and Exponential Models Guide

Grade	*CCSS Domain*	*CCSS Cluster*
A1	**Linear, Quadratic & Exponential Models**	**Construct and compare linear, quadratic, and exponential models and solve problems**

Cluster Standard: HSF.LE.A.2

Standard	Standards for Mathematical Practice
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).	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 5:** Use appropriate tools strategically.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• When given a variety of descriptions (whether words, graphs, or tables), students should write linear and exponential functions. Students should determine and explain (orally and in writing) whether relationships—in descriptions, tables, equations, or graphs—are functions. In a table, students should recall that when the difference in interval is constant, we can presume that our equation is most likely linear. In this case it is simply a matter of $f(x) = x + 1$. Students should understand that when graphs are involved, students should plot points. That way, students can assemble a list of input and output values from the graph. As for descriptions, words to watch out for are "exponential," "linear," "multiple," "constant," and "factor."	• Write linear and exponential functions (including arithmetic and geometric sequences) based on a graph. • Write linear and exponential functions (including arithmetic and geometric sequences) based on a description of a relationship. • Write linear and exponential functions (including arithmetic and geometric sequences) based on two ordered pairs (including from a table). • Decide whether a relationship is linear, or exponential given a table, graph or verbal description.
DOK	**Blooms**
1-2	Understand, Apply, Analyze

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Algebra 1 Linear, Quadratic, and Exponential Models Guide

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Grade	*CCSS Domain*	*CCSS Cluster*
A1	**Linear, Quadratic & Exponential Models**	**Construct and compare linear, quadratic, and exponential models and solve problems**

Cluster Standard: HSF.LE.A.3

Standard	Standards for Mathematical Practice
Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	• **SMP 5:** Use appropriate tools strategically. • **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students should understand that a function growing exponentially will eventually overtake or grow faster than either a linear or quadratic function. Students should be able to compare linear and exponential relationships by performing calculations and by interpreting graphs that show two growth patterns. Students should be able to prove that eventually, as long as the functions are headed in the same direction, a quantity increasing exponentially will "beat" linear, quadratic, and polynomial functions.	• Explore rates of change of different functions using graphs or tables. • Generalize that an exponential growth function will exceed a linear or quadratic function eventually. • Identify situations where this phenomenon is occurring.
DOK	**Blooms**
1-2	Understand, Apply, Analyze

Common Misconceptions

- Students may not realize when a table or set of points increases by an interval other than 1 and not take the effect of this into account when finding the common difference or ratio.
- Students may find it difficult to attend to direction and rates of change, making it hard to then compare the graphs.

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New Mexico Instructional Scope
Algebra 1 Linear, Quadratic, and Exponential Models Guide

Grade	*CCSS Domain*	*CCSS Cluster*
A1	**Linear, Quadratic & Exponential Models**	**Interpret expressions for functions in terms of the situation they model**

Cluster Standard: HSF.LE.B.5

Standard	Standards for Mathematical Practice
Interpret the parameters in a linear or exponential function in terms of a context.	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students should be able to describe parts of linear and exponential functions in terms of a context. They should be able to describe slope and *y*-intercepts or *A* and *B* (when in standard form) for a linear function and describe and/or differentiate between the initial value and growth factor for an exponential function. In more complex problems such as exponentials and polynomials, it may be useful to break down the problem so that it's clearly understood what is changing by how much and by what. Translating the equation into words or vice versa may help understand the equation in terms of the overall context. (For instance, every additional packet of gum sold, denoted by *x,* increases the revenue *y* by 0.95 dollars. That's what the equation $y = 0.95x$ ultimately means.)	• Explain the meanings of inputs and outputs of both exponential ($y=b^x+k$) and linear functions in terms of a given context. • Explain the meaning of parts of functions in terms of context (e.g., if *x* is ice cream cones $5x$ means 5 times the number of ice cream cones). • Identify the parameters of a linear or exponential equation and know the parameters may be different based on the context (parameters include initial values, rate of change or growth factor/rate, etc.).
DOK	**Blooms**
1-2	Understand, Apply, Analyze

Common Misconceptions

- Students often confuse decay factor with the rate of decay.

- Students may be able to identify the slope and y-intercept but not understand their meaning.

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of classroom discourse allows students to activate funds of knowledge and to refine their mathematical understanding. When students have frequent opportunities for discourse they find various paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Linear, Quadratic & Exponential Models**	Strand: **Construct and compare linear, quadratic, and exponential models and solve problems**

Suggested Student Discourse Questions

- How are the graphs of a linear function and exponential function the same? How do they differ? Explain using mathematical vocabulary.
- Explain to your partner your process in graphing this _____ (linear / exponential) function. Then, listen to your partner explain their process. Which is more efficient? Which do you think you will use next time?
- In what ways do the strategies of graphing, creating a table of values, and writing an equation modeling a _____ (linear, exponential) function differ? How are they the same?
- Which function, linear or exponential, would be best to model _____? (population growth over time, growth of a person over time, money earned at a job over time)

Domain: **Linear, Quadratic & Exponential Models**	Strand: **Interpret expressions for functions in terms of the situation they model**

Suggested Student Discourse Questions

- How would you determine the input vs the output of a _____ (linear / exponential)
- How is the ____ (input / output) of this _____ (linear / exponential) function

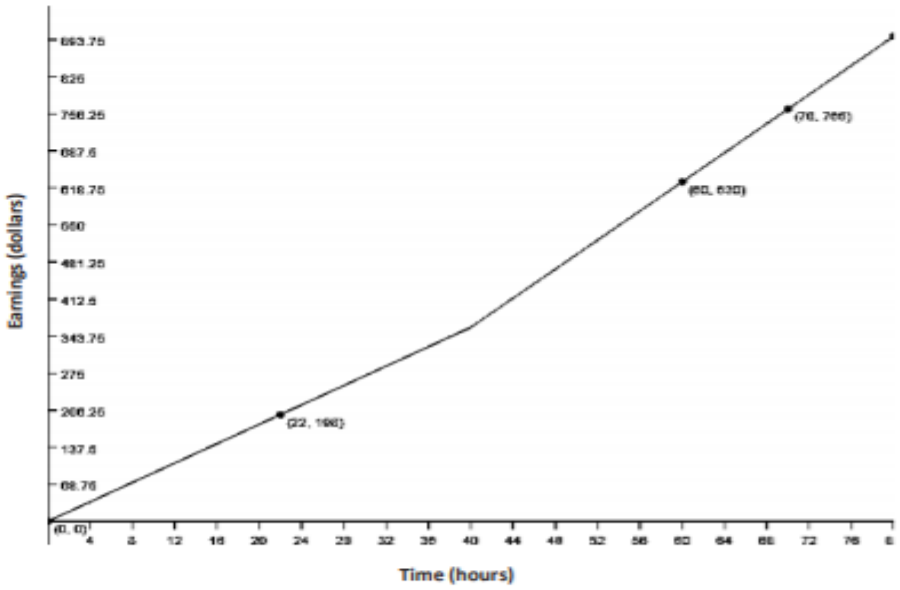
function? Explain your reasoning using mathematical vocabulary. • Turn and talk: Which strategy (graphical, tabular, algebraic) do you find most effective at quickly identifying the input and output of a function? Is your preference different from your partner? In what ways?	represented in this graph? How is it represented in a table of values? In the equation? • Given this function modeling _____ (population growth over time, growth of a person over time, money earned at a job over time), what does the initial value (y-intercept) mean in context? What does the rate of change / growth factor or rate portray in context?

ASSESSMENT GUIDE

- Construct and compare linear, quadratic, and exponential models and solve problems
- Interpret expressions for functions in terms of the situation they model

Grade	*CCSS Domain*	*CCSS Strand*
A1	**Linear, Quadratic, & Exponential Models**	**Construct and compare linear, quadratic, and exponential models and solve problems**
	Sample Task #1 (Constructed Response)	

Eduardo has a summer job that pays him a certain rate for the first 40 hours per week and time and a half for any overtime. The graph below is a representation of how much money he earns as a function of the hours he works in one week.



Eduardo's employers want to make him a salaried employee, which means he does not get overtime. If they want to pay him $480 per week but have him commit to 50 hours a week, should he agree to the salary change? Justify your answer mathematically.

a. Formulate (recall this step from Lesson 1).

   i. What type of function can be represented by a graph like this (e.g., quadratic, linear, exponential, piecewise, square root, or cube root)?

   ii. How would you describe the end behavior of the graph in the context of this problem?

Engage NY - Algebra 1
Module 5 - Student - Lesson 4

Sample Task #2 (Multiple Choice)

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Match each table below to the function and the context, and explain how you made your decision.

A

x	y
1	9
2	18
3	27
4	18
5	9

Equation ____
Context ____

B

x	y
1	12
2	24
3	36
4	48
5	60

Equation ____
Context ____

C

x	y
0	160
1	174
2	156
3	106
4	24

Equation ____
Context ____

D

x	y
1	2
2	4
3	8
4	16
5	32

Equation ____
Context ____

E

x	y
2	8
3	9
4	8
5	5
6	0

Equation ____
Context ____

Equations:

$f(x) = 12x$

$h(x) = -9|x - 3| + 27$

$g(x) = -(x)(x - 6)$

$p(x) = 2^x$

$q(x) = -16x^2 + 30x + 160$

Contexts:

1. The population of bacteria doubled every month, and the total population vs. time was recorded.
2. A ball was launched upward from the top of a building, and the vertical distance of the ball from the ground vs. time was recorded.
3. The height of a certain animal's vertical leap was recorded at regular time intervals of one second; the animal returned to ground level after six seconds.
4. Melvin saves the same amount of money every month. The total amount saved after each month was recorded.
5. Chris ran at a constant rate on a straight-line path and then returned at the same rate. His distance from his starting point was recorded at regular time intervals.

Engage NY - Algebra 1
Module 5 - Student - Lesson 2
*Convert to MC

Grade	*CCSS Domain*	*CCSS Strand*

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A1	Linear, Quadratic, & Exponential Models	Interpret expressions for functions in terms of the situation they model

Sample Task #2 (Multiple Choice)

The average number of students per classroom at Central High School from 2000 to 2010 can be modeled by the equation $y = 0.56x + 27.2$, where x represents the number of years since 2000, and y represents the average number of students per classroom. Which of the following best describes the meaning of the number 0.56 in the equation?

A. The total number of students at the school in 2000
B. The average number of students per classroom in 2000
C. The estimated increase in the average number of students per classroom each year
D.The estimated difference between the average number of students per classroom in 2010 and in 2000

Rationale

Choice C is correct. In the equation $y = 0.56x + 27.2$, the value of x increases by 1 for each year that passes. Each time x increases by 1, y increases by 0.56 since 0.56 is the slope of the graph of this equation. Since y represents the average number of students per classroom in the year represented by x, it follows that, according to the model, the estimated increase each year in the average number of students per classroom at Central High School is 0.56.

Choice A is incorrect because the total number of students in the school in 2000 is the product of the average number of students per classroom and the total number of classrooms, which would appropriately be approximated by the y-intercept (27.2) times the total number of classrooms, which is not given. Choice B is incorrect because the average number of students per classroom in 2000 is given by the y-intercept of the graph of the equation, but the question is asking for the meaning of the number 0.56, which is the slope. Choice D is incorrect because 0.56 represents the estimated yearly change in the average number of students per classroom. The estimated difference between the average number of students per classroom in 2010 and 2000 is 0.56 times the number of years that have passed between 2000 and 2010, that is, $0.56 \times 10 = 5.6$.

SAT, #19789

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New Mexico Instructional Scope

Algebra 1 Linear, Quadratic, and Exponential Models Guide

MLSS AND CLR GUIDE

- Construct and compare linear, quadratic, and exponential models and solve problems
- Interpret expressions for functions in terms of the situation they model

CCSS Domain	*CCSS Cluster*
Linear, Quadratic, and Exponential Models	**Construct and compare linear, quadratic, and exponential models and solve problems**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on constructing and comparing linear, quadratic, and exponential models and solving problems, consider options for learning from your families and communities the cultural and linguistic ways mathematics exists outside of school to create stronger home to school connections for students. For example, while looking at the current events that are occurring in your community or in the world, create a model and determine the type of model it represents. This will create a strong connection on math tasks and current events that affect your life.	
Cross-Curricular Connections	Science: Exponential functions can model population growth. However, they will ultimately be limited by resource availability. Consider providing a connection where students track and/or predict when and why this will happen for a given population.	
Validate/Affirm/Build/Bridge	• *How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and languages of students and reverse the negative stereotypes regarding the mathematical abilities of students of marginalized cultures and languages?* • *How can you create connections between the cultural and linguistic*	• Tasks: The type of mathematical tasks and instruction students receive provides the foundation for students' mathematical learning and their mathematical identity. Tasks and instruction that provide greater access to mathematics and convey the creativity of mathematics by allowing for multiple solution strategies and development of the standards for mathematical practice lead to more students viewing themselves as capable mathematicians. For example, when constructing and comparing linear, quadratic, and exponential models and solving problems the types of mathematical tasks are critical because the tasks need to be engaging and allow students to use multiple solution strategies which will give the students opportunities to make

	behaviors of your students' home culture and language, the culture and language of school mathematics to support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?	comparisons.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Connect to determining the growth of a linear expression by taking the ratio of rise over run for any two distinct points on the same line. **(8.EE.6)** • Connect to relating the information gathered by the ratio of rise over run to the linear equation in terms of input and output. **(8.F.4)**	• Connect to examining contextual information and distinguishing if the solution can be modeled with linear or exponential functions. **(HSA.CED.3)** • Connect to writing arithmetic and geometric sequences both recursively and with an explicit formula to model situations. **(HSF.BF.1)** • Connect to relating the knowledge of linear functions to exponential and polynomial functions and comparing their behaviors. **(HSF.If.9)**	• Connect to extending their knowledge of linear, quadratic and exponential situations to different types of functions and making comparisons. **(HSF.IF.7-9)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	*Essential Question*	*Examples*
Targeted	*What pre-teaching will*	Some learners may benefit from targeted pre-teaching

	prepare students to productively struggle with the mathematics for this cluster within your HQIM?	that focuses on comparing and constructing linear, quadratic, and exponential models and solving problems because this allows students to go over what they previously learned and think about the process and skills needed to construct models of functions.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	8.F.A.2 This standard provides a foundation for work with comparing linear, quadratic, and exponential models, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). This sets up the concept they will need for this cluster. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.

Universal Support Framework

		Potential Scaffolds

• A function is a special relationship between two sets in which each domain value corresponds to one and only one range number.
• The similarities and differences of linear, quadratic, and exponential functions.
• That an arithmetic recursive formula is addition of a repeated constant and a geometric recursive formula is multiplication of a repeated constant.
• Over time, a quadratic function will grow faster
	• Use multiple representations (including graphs, tables, and symbols) to determine the domain and range and describe important behaviors of functions.
	• Graph linear, quadratic, and exponential by hand and using technology and identify and label key features.
	• Create and translate between recursive and explicit definitions of arithmetic and geometric sequences.
	• Identify when a
		• Build on students' experience with the following skills:
		  ○ Graphing on the coordinate plane (6.NS.C.8)
		  ○ Know and recognize linear functions (8.EE.C.A.7)
		  ○ Calculate arithmetic sequence (7.EE.B.4)
		  ○ Apply properties of exponents (8.EE.A)
		• Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		• Encourage students to use alternative tools to better access the grade level content. Examples include:
		  ○ Graphing calculator

than a linear function, and an exponential function will grow faster than both a linear and a quadratic function.	table, graph, equation, and/or verbal description exhibits a linear or exponential relationship.	○ Desmos ○ Graphic organizers ○ Sketch a graph ○ Create a table of values

Re-Teach

Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on constructing and comparing linear, quadratic, and exponential models and solving problems by critiquing student approaches/solutions to make connections through a short mini lesson because students will be given an opportunity to hear vocabulary and revisit concepts and skills needed to construct various models.
Intensive	What assessment data will help identify content needing to be revisited for intensive interventions?	For example, some students may benefit from intensive extra time during and after a unit on constructing and comparing linear, quadratic, and exponential models and solving problems offering opportunities to understand and explore different strategies because when students are able to have various opportunities to understand and explore different strategies then they are able to think of the different models that they have learned about and use that connection to solve the problem by choosing the strategy that they understand the best.

Extension

Essential Question	***Examples***
What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?	Some learners may benefit from an extension such as in-depth, self-directed exploration of self-selected topics when constructing and comparing linear, quadratic, and exponential models and solving problems because students can design their own learning path and select

	the resources, guides and information they will need to discover new information and think critically about it.

CCSS Domain	*CCSS Cluster*
Linear, Quadratic, and Exponential Models	**Interpret expressions for functions in terms of the situation they model**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on interpreting expressions for functions in terms of the situation they model, consider options for learning from your families and communities the cultural and linguistic ways mathematics exists outside of school to create stronger home to school connections for students. For example, think of a special event or activity that you have done. How would you represent it as a function and how would you model the event or activity? Using mathematics, you will create a stronger connection between your personal life and mathematics.	
Cross-Curricular Connections	Science: Colony Collapse Disorder refers to the drastic loss of honeybees and honeybee colonies, such as what has been observed around the world in recent decades. Consider providing a connection where students construct models based on the data and then use those models to describe factors affecting the bee colony populations.	
Validate/Affirm/Build/Bridge	• *How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and languages of students*	• Eliciting and Using Evidence of Student Thinking: Eliciting and using student thinking can promote a classroom culture in which mistakes or errors are viewed as opportunities for learning. When student thinking is at the center of the classroom activity, "it is more likely that students who have felt evaluated or judged in their past mathematical experiences will

	and reverse the negative stereotypes regarding the mathematical abilities of students of marginalized cultures and languages? • *How can you create connections between the cultural and linguistic behaviors of your students' home culture and language, the culture and language of school mathematics to support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?*	make meaningful contributions to the classroom over time." For example, when interpreting expressions for functions in terms of the situation they model, eliciting and using student thinking is critical because students need to feel comfortable that their peers will validate their thinking so they can share what they did. Sharing is an opportunity to learn from our mistakes and from others.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Connect to understanding slope is a rate of change expressed as the ratio of rise over run for any two distinct points on the same line. **(8.EE.6)** • Connect to relating the information gathered by the ratio of rise over run to the linear equation and understand that a change in slope will cause the steepness of the line to change. **(8.F.2)**	• Connect to using paper and pencil, graphing calculators, graphing programs, spreadsheets, or other graphing technologies to model and interpret parameters in linear, quadratic, or exponential functions. Parameters may include slope, *y*-intercept, base value, and vertical shifts. **(HSF.IF.7, HSF.BF.3)** • Connect to studying functions	• Connect to extending analysis to different types of functions and interpreting the key features in modeling situations. **(HSF.IF.4-6, 7)** •

• Connect to simplifying exponential expressions using the Rules of Exponents. **(8.EE.1)**	to develop contextual understanding on parameter changes in linear and exponential function situations. **(HSF.LE.1-3)**	

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
Targeted	*What pre-teaching will prepare students to productively struggle with the mathematics for this cluster within your HQIM?*	Some learners may benefit from targeted pre-teaching that analyzes common misconceptions when interpreting expressions for functions in terms of the situation. Modeling allows students to go over what they previously learned and think about the misconceptions they had about the process and skills needed to construct models of functions. This will benefit students when interpreting expressions.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	*8.F.B.4: This standard provides a foundation for working with interpreting expressions for functions in terms of the situation they model. Students learn to read values from a table or from a graph and interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.*

Universal Support Framework

		Potential Scaffolds
• A function is a special relationship between two sets in which each domain value corresponds to one and only one range number.	• Use multiple representations (including graphs, tables, and symbols) to determine the domain and range	• Build on students' experience with the following skills: ○ Graphing on the coordinate plane (6.NS.C.8) ○ Know and recognize linear functions (8.EE.C.A.7) ○ Calculate arithmetic sequence (7.EE.B.4)

• The similarities and differences of linear, quadratic, and exponential functions. • That an arithmetic recursive formula is addition of a repeated constant and a geometric recursive formula is multiplication of a repeated constant. • Over time, a quadratic function will grow faster than a linear function, and an exponential function will grow faster than both a linear and a quadratic function.	and describe important behaviors of functions. • Graph linear, quadratic, and exponential by hand and using technology and identify and label key features. • Create and translate between recursive and explicit definitions of arithmetic and geometric sequences. • Identify when a table, graph, equation, and/or verbal description exhibits a linear or exponential relationship.	○ Apply properties of exponents (8.EE.A) • Cognitive Strategies ○ Repeatedly model the strategies ○ Monitor the students' use of the strategies ○ Provide feedback to students ○ Teach self-questioning and self-monitoring strategies ○ Introduce multiple means of representation for mathematical ideas • Encourage students to use alternative tools to better access the grade level content. Examples include: ○ Graphing calculator ○ Desmos ○ Graphic organizers ○ Sketch a graph ○ Create a table of values

Re-Teach

Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on interpreting expressions for functions in terms of the situation they model. By providing specific feedback to students on their work through a short mini-lesson, misconceptions can be addressed immediately.
Intensive	What assessment data will help identify content needing to be revisited for intensive interventions?	For example, some students may benefit from intensive extra time during and after a unit interpreting expressions for functions in terms of the situation they model by confronting student misconceptions because

		students will be aware of them and avoid them next time they are exposed to the same task.
Extension		
Essential Question		***Examples***
What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?		Some learners may benefit from an extension such as the opportunity to interpret expressions for functions in terms of the situation they model because this allows students to make connections not only with mathematics but to other topics.