Core Content

Cluster Title: Construct and compare linear~~, quadratic,~~ and exponential models and solve problems.
Standard: F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals; exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
Concepts and Skills to Master
• Justify the fact that linear functions grow by equal difference over equal intervals using tables and graphs. • Justify the fact that exponential functions grow by equal factors over equal intervals using tables and graphs. • Recognize situations that can be modeled linearly or exponentially and describe the rate of change per unit as constant or the growth factor as a constant percent.

Supports for Teachers

Critical Background Knowledge	
• Knowledge of percent	
Academic Vocabulary	
• interval, rate, factors, constant rate of change, percent rate per unit	
Suggested Instructional Strategies	**Resources**
• Model and explore a variety of linear and exponential functions, analyzing what makes them change.	• *Focus on Functions* professional development
Sample Formative Assessment Tasks	
Skill-based Task An accountant has two ways of depreciating equipment. One way is to depreciate by a fixed amount each year. The other way is to depreciate by a fixed percentage each year. Which depreciation method is linear? Which depreciation method is exponential?	**Problem Task** Create a story that demonstrates one quantity changing at a constant rate per unit interval relative to another.

Core Content

Cluster Title: Construct and compare linear~~, quadratic,~~ and exponential models and solve problems.
Standard: F.LE.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).
Concepts and Skills to Master
• Construct linear and exponential functions including arithmetic and geometric sequences given a graph. • Construct linear and exponential functions including arithmetic and geometric sequences given the description of a relationship. • Construct linear functions, including arithmetic sequences, given input-output pairs, including those in a table.

Supports for Teachers

Critical Background Knowledge	
• Arithmetic and geometric sequences • Function notation	
Academic Vocabulary	
• Exponential, linear, arithmetic, geometric, sequences, relationship, input-output, function	
Suggested Instructional Strategies	**Resources**
• Match various representations of the same function.	• Exponential functions: www.regentsprep.org/regents/math/algtrig/ATP8b/examplesexponentialfunction.htm
Sample Formative Assessment Tasks	
Skill-based Task • Write a linear function that passes through (1,5) and (2,15). • Write an exponential function that passes through (1,5) and (2,15).	**Problem Task** Write a function that models the population of Smithville, a town that in 2003 was estimated to have 35,000 people that increases by 2.4% every year. Describe a reasonable way to use your function to predict future population in Smithville.

Core Content

Cluster Title: Construct and compare linear~~, quadratic,~~ and exponential models and solve problems.
Standard: F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly~~, quadratically, or (more generally) as a polynomial function.~~
Concepts and Skills to Master
• Observe that a quantity increasing exponentially eventually exceeds a quantity increasing linearly using graphs and tables.

Supports for Teachers

Critical Background Knowledge	
• Identify linear and exponential functions • Graph linear and exponential functions • Rate of change	
Academic Vocabulary	
• Linear, exponential, factor, difference	
Suggested Instructional Strategies	**Resources**
• This standard should be taught in conjunction with others in this cluster.	*Making It Happen* (NCTM)
Sample Formative Assessment Tasks	
Skill-based Task Which increases faster, $f(x)=3x$ or $g(x)=3^x$? Justify your answer.	**Problem Task** What's the better deal, earning $1000 a day for the rest of your life or earning $.01 the first day, and doubling it every day for the rest of your life? How do you know? Do you think an 80 year old would make the same choice? Should she?