



Topic A:

Introduction to Functions Studied This Year— Graphing Stories

N-Q.A.1, N-Q.A.2, N-Q.A.3, A-CED.A.2

Focus Standard:	N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; and choose and interpret the scale and the origin in graphs and data displays.
	N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
	N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
	A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
Instructional Days: 5		
	Lesson 1:	Graphs of Piecewise Linear Functions (E) ¹
	Lesson 2:	Graphs of Quadratic Functions (E)
	Lesson 3:	Graphs of Exponential Functions (E)
	Lesson 4:	Analyzing Graphs—Water Usage During a Typical Day at School (E)
	Lesson 5:	Two Graphing Stories (E)

Students explore the main functions that they will work with in Algebra I: linear, quadratic, and exponential. The goal is to introduce students to these functions by having them make graphs of a situation (usually based upon time) in which these functions naturally arise. As they graph, they reason quantitatively and use units to solve problems related to the graphs they create.

For example, in Lesson 3 they watch a 20-second video that shows bacteria subdividing every few seconds. The narrator of the video states these bacteria are actually subdividing every 20 minutes. After counting the initial number of bacteria and analyzing the video, students are asked to create the graph to describe the number of bacteria with respect to actual time (not the sped-up time in the video) and to use the graph to approximate the number of bacteria shown at the end of the video.

¹ Lesson Structure Key: **P**-Problem Set Lesson, **M**-Modeling Cycle Lesson, **E**-Exploration Lesson, **S**-Socratic Lesson

Another example of quantitative reasoning occurs in Lesson 4. Students are shown a graph (without labels) of the water usage rate of a high school. The rate remains consistent most of the day but jumps every hour for five minutes, supposedly during the bell breaks between classes. As students interpret the graph, they are asked to choose and interpret the scale and decide on the level of accuracy of the measurements needed to capture the behavior in the graph.

The topic ends with a lesson that introduces the next two topics on expressions and equations. Students are asked to graph two stories that intersect in one point on the same coordinate plane. After students and teachers form linear equations to represent both graphs and use those equations to find the intersection point (**8.EE.C.8**), the question is posed to students: How can we use algebra, in general, to solve problems like this one but for non-linear equations? Topics B and C set the stage for students' understanding of the general procedure for solving equations.