Lesson Summary

The graph of a function can be used to help describe the relationship between the quantities it represents.

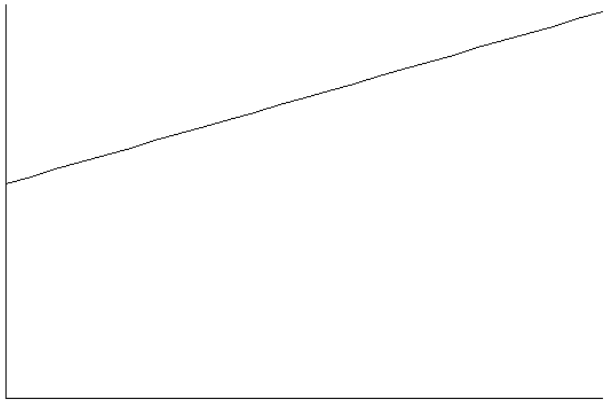
A linear function has a constant rate of change. A nonlinear function does not have a constant rate of change.

- A function whose graph has a positive rate of change is an *increasing function*.
- A function whose graph has a negative rate of change is a *decreasing function*.
- Some functions may increase and decrease over different intervals.

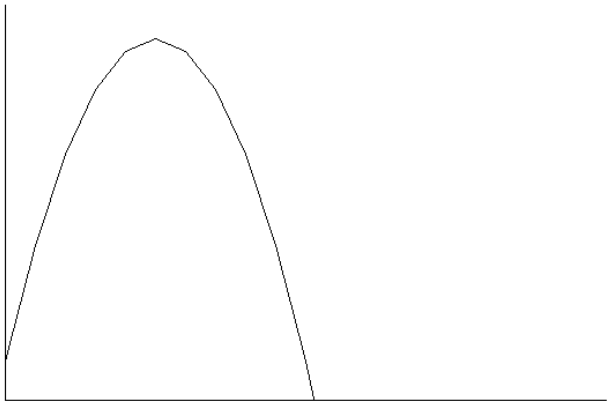
Problem Set

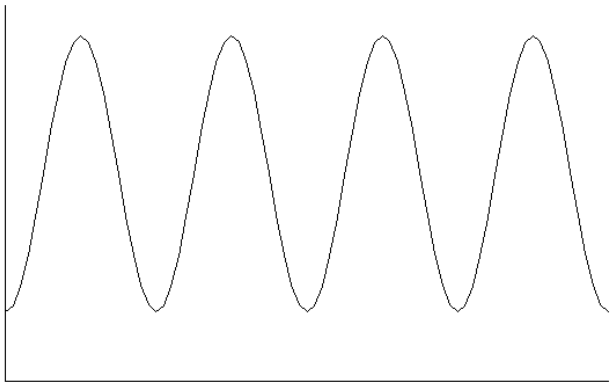
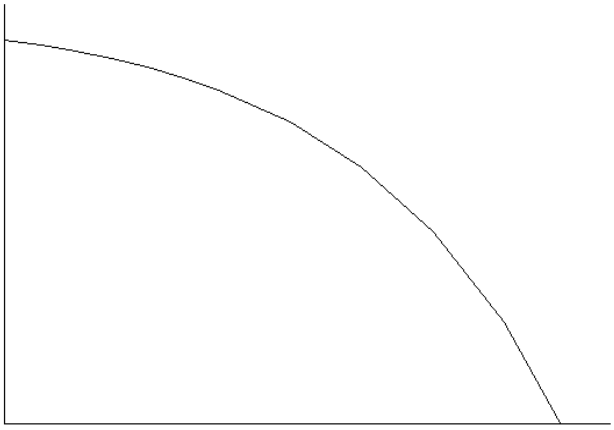
1. Read through the following scenarios, and match each to its graph. Explain the reasoning behind your choice.
   a. This shows the change in a smartphone battery charge as a person uses the phone more frequently.
   b. A child takes a ride on a swing.
   c. A savings account earns simple interest at a constant rate.
   d. A baseball has been hit at a Little League game.

Scenario: ____

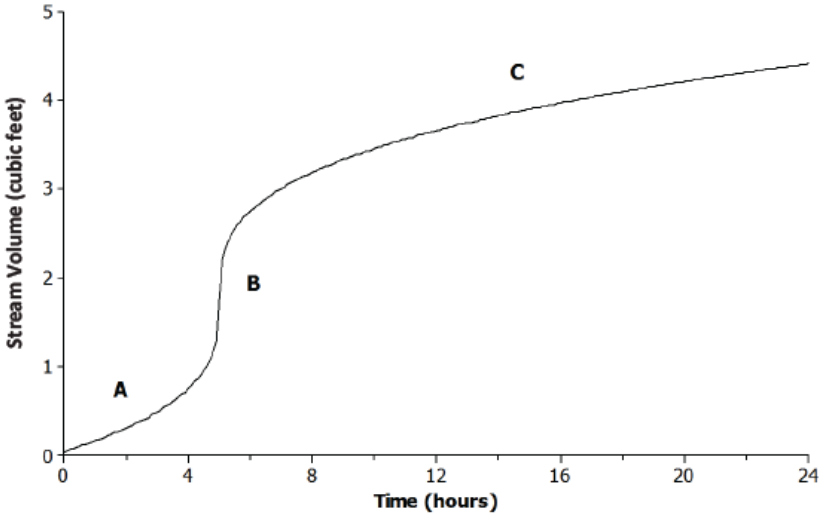


Scenario: ___



Scenario: ___	Scenario: ___
	

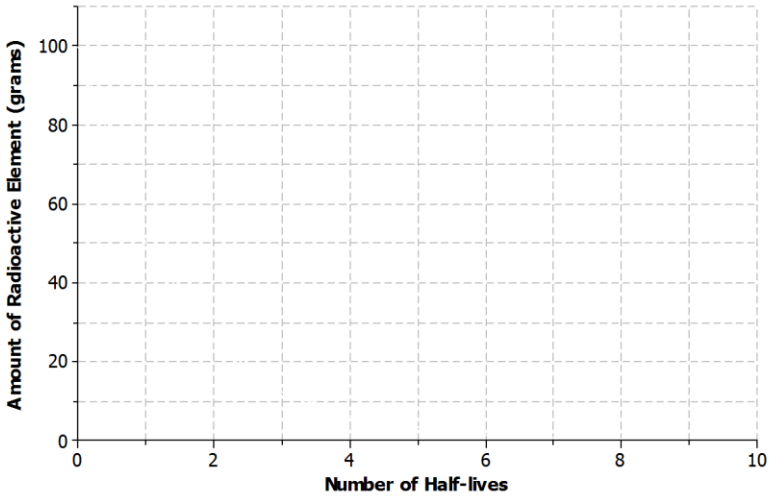
2. The graph below shows the volume of water for a given creek bed during a 24-hour period. On this particular day, there was wet weather with a period of heavy rain.



Describe how each part (A, B, and C) of the graph relates to the scenario.

3. Half-life is the time required for a quantity to fall to half of its value measured at the beginning of the time period. If there are 100 grams of a radioactive element to begin with, there will be 50 grams after the first half-life, 25 grams after the second half-life, and so on.

   a. Sketch a graph that represents the amount of the radioactive element left with respect to the number of half-lives that have passed.

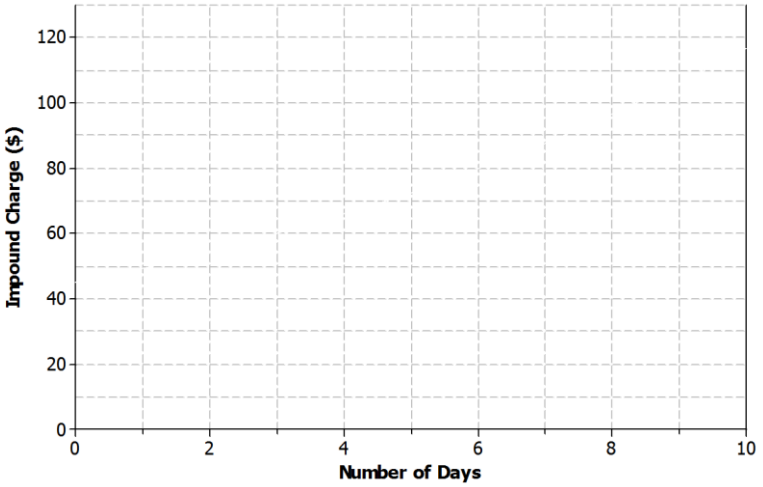


   b. Is the function represented by the graph linear or nonlinear? Explain.

   c. Is the function represented by the graph increasing or decreasing?

4. Lanae parked her car in a no-parking zone. Consequently, her car was towed to an impound lot. In order to release her car, she needs to pay the impound lot charges. There is an initial charge on the day the car is brought to the lot. However, 10% of the previous day's charges will be added to the total charge for every day the car remains in the lot.

   a. Sketch a graph that represents the total charges with respect to the number of days a car remains in the impound lot.

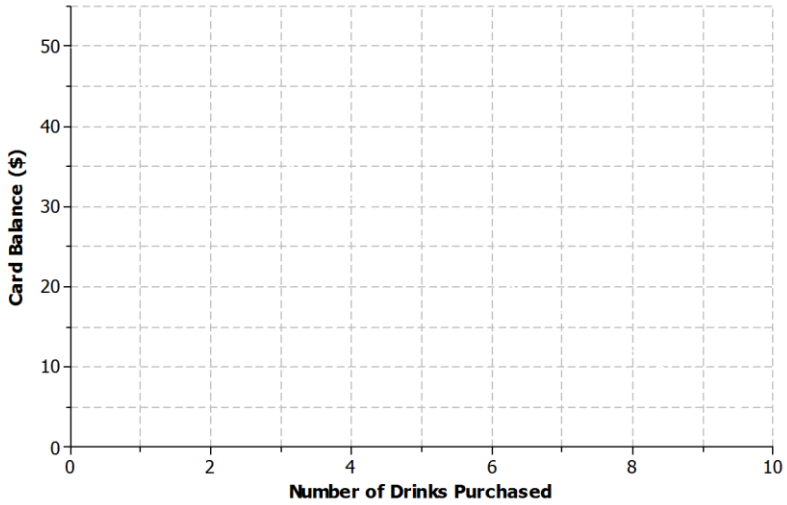


b. Is the function represented by the graph linear or nonlinear? Explain.

c. Is the function represented by the graph increasing or decreasing? Explain.

5. Kern won a $50 gift card to his favorite coffee shop. Every time he visits the shop, he purchases the same coffee drink.

a. Sketch a graph of a function that can be used to represent the amount of money that remains on the gift card with respect to the number of drinks purchased.



b. Is the function represented by the graph linear or nonlinear? Explain.

c. Is the function represented by the graph increasing or decreasing? Explain.

6. Jay and Brooke are racing on bikes to a park 8 miles away. The tables below display the total distance each person biked with respect to time.

Jay

Time (minutes)	Distance (miles)
0	0
5	0.84
10	1.86
15	3.00
20	4.27
25	5.67

Brooke

Time (minutes)	Distance (miles)
0	0
5	1.2
10	2.4
15	3.6
20	4.8
25	6.0

a. Which person's biking distance could be modeled by a nonlinear function? Explain.

b. Who would you expect to win the race? Explain.

7. Using the axes in Problem 7(b), create a story about the relationship between two quantities.
   a. Write a story about the relationship between two quantities. Any quantities can be used (e.g., distance and time, money and hours, age and growth). Be creative! Include keywords in your story such as *increase* and *decrease* to describe the relationship.
   b. Label each axis with the quantities of your choice, and sketch a graph of the function that models the relationship described in the story.