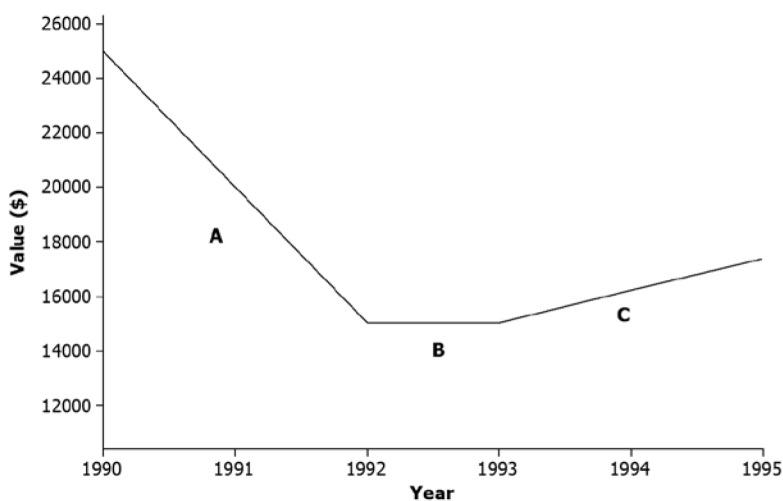


Name \_\_\_\_\_

Date \_\_\_\_\_

## Increasing and Decreasing Functions

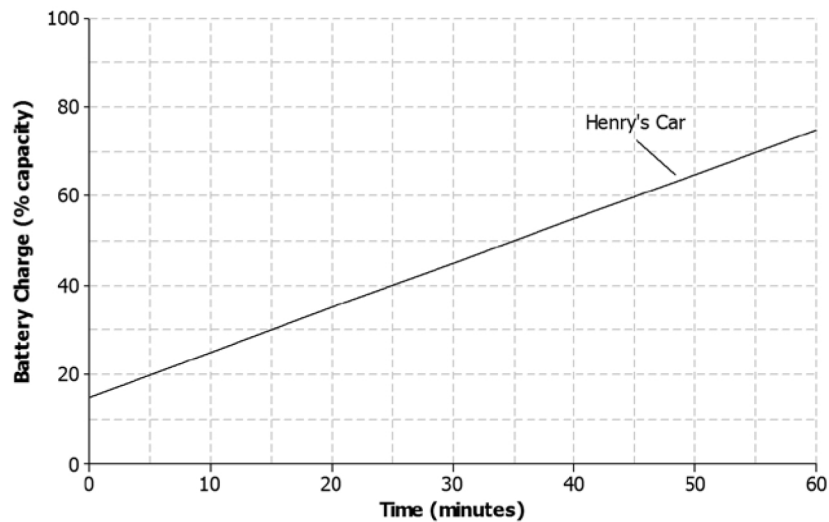
1. The graph below shows the relationship between a car's value and time.



Match each part of the graph (A, B, and C) to its verbal description. Explain the reasoning behind your choice.

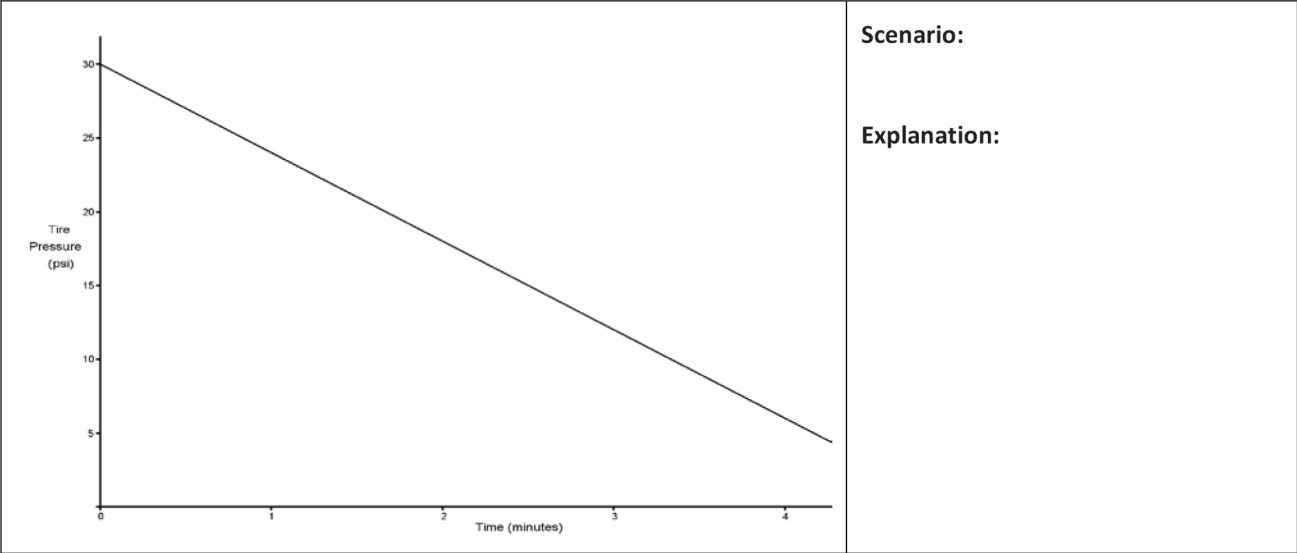
- i. The value of the car holds steady due to a positive consumer report on the same model.
- ii. There is a shortage of used cars on the market, and the value of the car rises at a constant rate.
- iii. The value of the car depreciates at a constant rate.

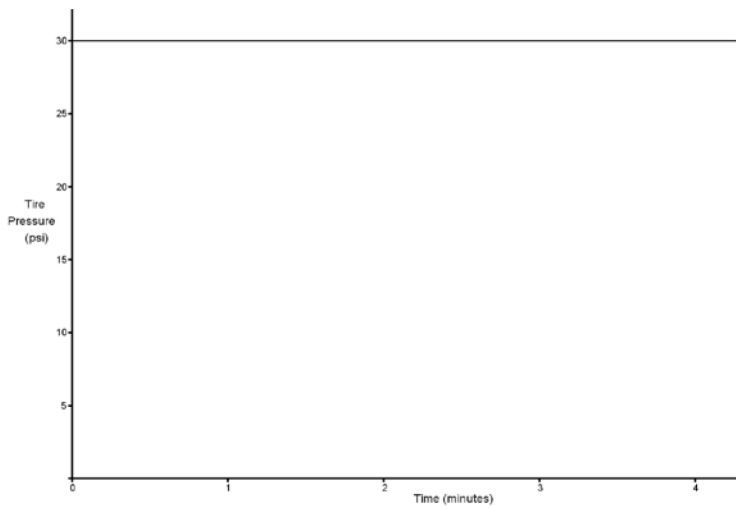
2. Henry and Roxy both drive electric cars that need to be recharged before use. Henry uses a standard charger at his home to recharge his car. The graph below represents the relationship between the battery charge and the amount of time it has been connected to the power source for Henry's car.



- a. Describe how Henry's car battery is being recharged with respect to time.
- b. Roxy has a supercharger at her home that can charge about half of the battery in 20 minutes. There is no remaining charge left when she begins recharging the battery. Sketch a graph that represents the relationship between the battery charge and the amount of time on the axes above. Assume the relationship is linear.
- c. Which person's car will be recharged to full capacity first? Explain.

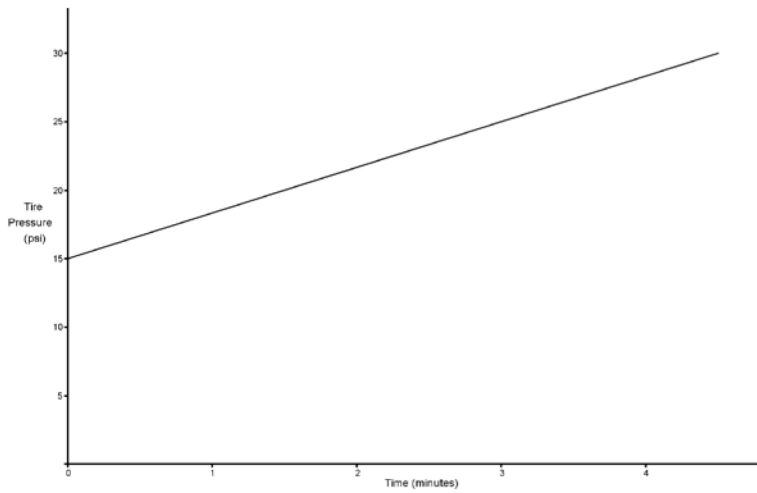
1. Read through each of the scenarios, and choose the graph of the function that best matches the situation. Explain the reason behind each choice.
- a. The tire pressure on Regina’s car remains at 30 psi.
  - b. Carlita inflates her tire at a constant rate for 4 minutes.
  - c. Air is leaking from Courtney’s tire at a constant rate.





**Scenario:**

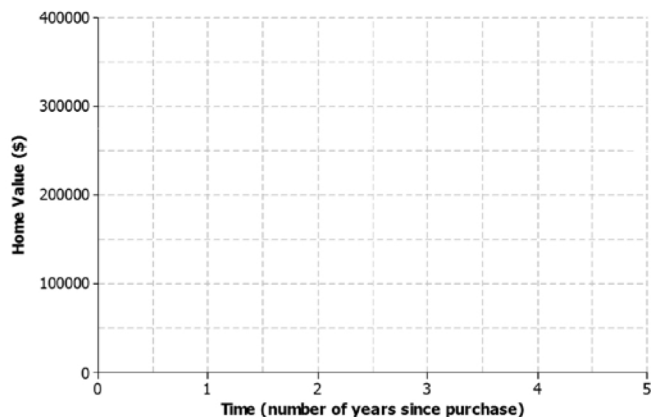
**Explanation:**



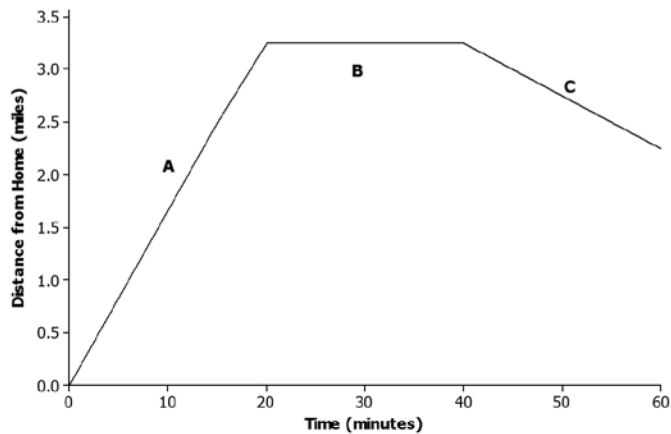
**Scenario:**

**Explanation:**

2. A home was purchased for \$275,000. Due to a recession, the value of the home fell at a constant rate over the next 5 years.
- a. Sketch a graph of a function that models the situation.



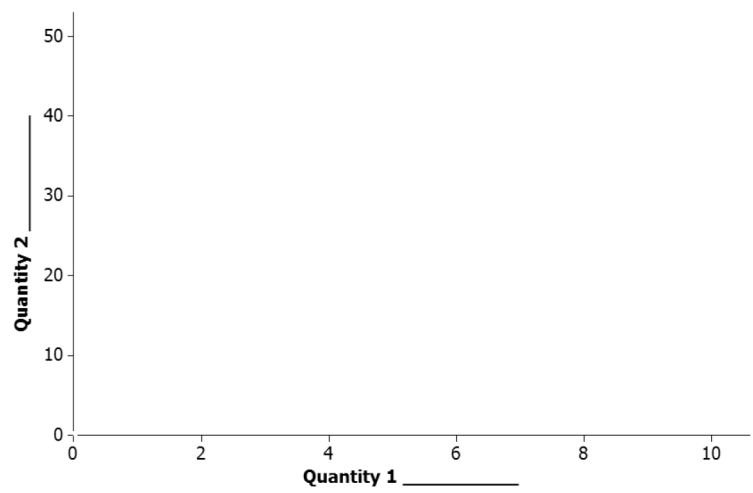
- b. Based on your graph, how is the home value changing with respect to time?
3. The graph below displays the first hour of Sam’s bike ride.



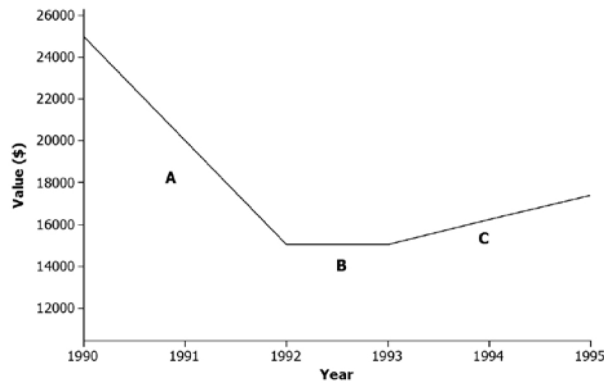
Match each part of the graph (A, B, and C) to its verbal description. Explain the reasoning behind your choice.

- i. Sam rides his bike to his friend’s house at a constant rate.
- ii. Sam and his friend bike together to an ice cream shop that is between their houses.
- iii. Sam plays at his friend’s house.

4. Using the axes below, 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.



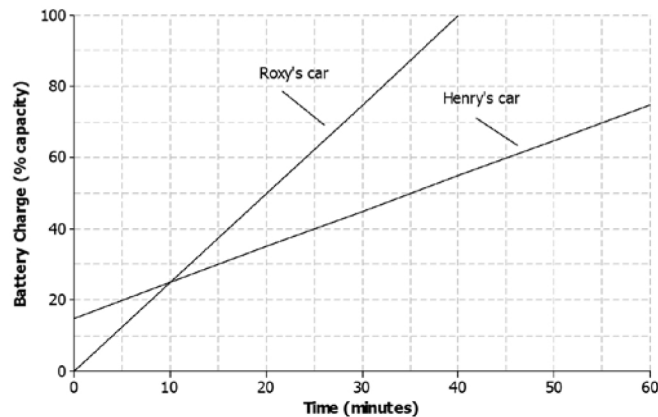
1. The graph below shows the relationship between a car's value and time.



Match each part of the graph (A, B, and C) to its verbal description. Explain the reasoning behind your choice.

- The value of the car holds steady due to a positive consumer report on the same model.  
*B; if the value is holding steady, there is no change in the car's value between years.*
- There is a shortage of used cars on the market, and the value of the car rises at a constant rate.  
*C; if the value of the car is rising, it represents an increasing function.*
- The value of the car depreciates at a constant rate.  
*A; if the value depreciates, it represents a decreasing function.*

2. Henry and Roxy both drive electric cars that need to be recharged before use. Henry uses a standard charger at his home to recharge his car. The graph below represents the relationship between the battery charge and the amount of time it has been connected to the power source for Henry's car.



- Describe how Henry's car battery is being recharged with respect to time.  
*The battery charge is increasing at a constant rate of 10% every 10 minutes.*

- b. Roxy has a supercharger at her home that can charge about half of the battery in 20 minutes. There is no remaining charge left when she begins recharging the battery. Sketch a graph that represents the relationship between the battery charge and the amount of time on the axes above. Assume the relationship is linear.

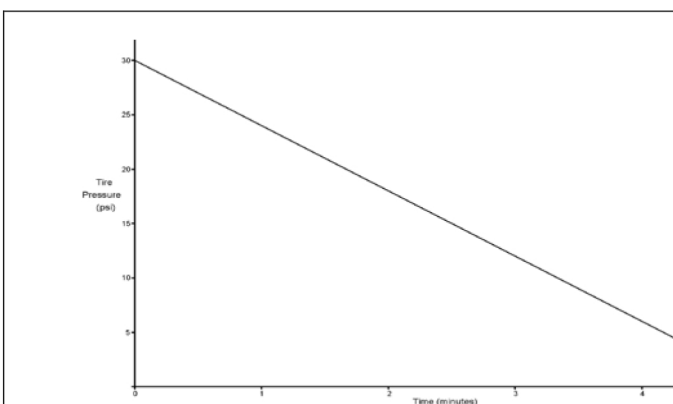
*See graph above.*

- c. Which person's car will be recharged to full capacity first? Explain.

*Roxy's car will be completely recharged first. Her supercharger has a greater rate of change compared to Henry's charger.*

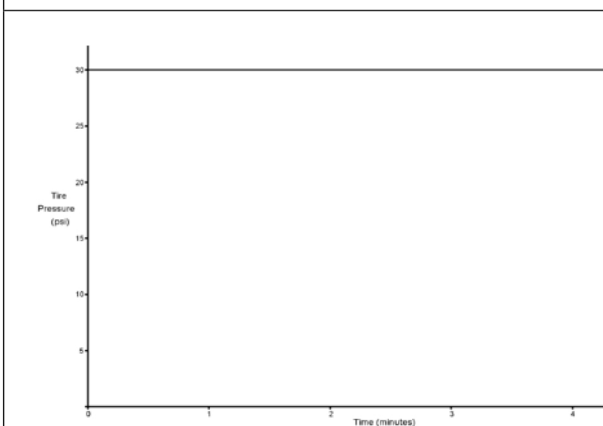
1. Read through each of the scenarios, and choose the graph of the function that best matches the situation. Explain the reason behind each choice.

- a. The tire pressure on Regina's car remains at 30 psi.  
b. Carlita inflates her tire at a constant rate for 4 minutes.  
c. Air is leaking from Courtney's tire at a constant rate.



**Scenario: c**

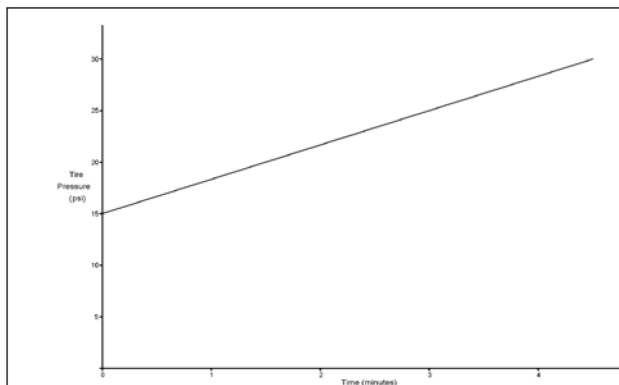
**Explanation:** *The tire pressure decreases each minute at a constant rate.*



**Scenario: a**

**Explanation:** *The tire pressure remains the same.*



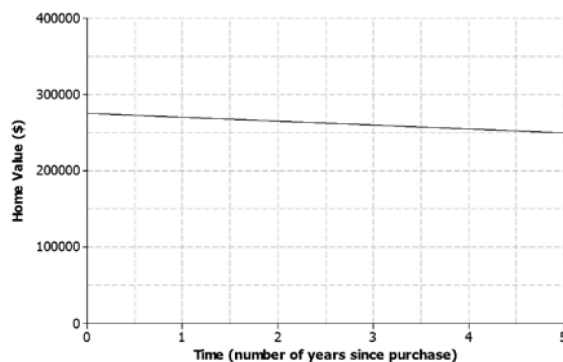


Scenario: *b*

Explanation: *The tire pressure is increasing each minute at a constant rate.*

2. A home was purchased for \$275,000. Due to a recession, the value of the home fell at a constant rate over the next 5 years.

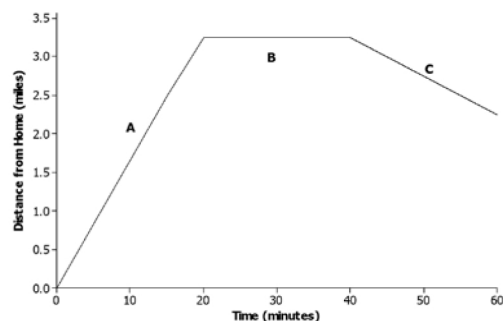
a. Sketch a graph of a function that models the situation.



b. Based on your graph, how is the home value changing with respect to time?

*The value is decreasing by \$25,000 over 5 years or at a constant rate of \$5,000 per year.*

3. The graph below displays the first hour of Sam's bike ride.



Match each part of the graph (A, B, and C) to its verbal description. Explain the reasoning behind your choice.

i. Sam rides his bike to his friend's house at a constant rate.

*A; the distance from home should be increasing as Sam is riding toward his friend's house.*

- ii. Sam and his friend bike together to an ice cream shop that is between their houses.

*C; Sam was at his friend's house, but as they start biking to the ice cream shop, the distance from Sam's home begins to decrease.*

- iii. Sam plays at his friend's house.

*B; Sam remains at the same distance from home while he is at his friend's house.*

4. Using the axes below, 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.

*Answers will vary. Give students the freedom to write a basic linear story or a piecewise story.*

*A rock climber begins his descent from a height of 50 feet. He slowly descends at a constant rate for 4 minutes. He takes a break for 1 minute; he then realizes he left some of his gear on top of the rock and climbs more quickly back to the top at a constant rate.*

- 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.

*Answers will vary based on story from part (a).*

