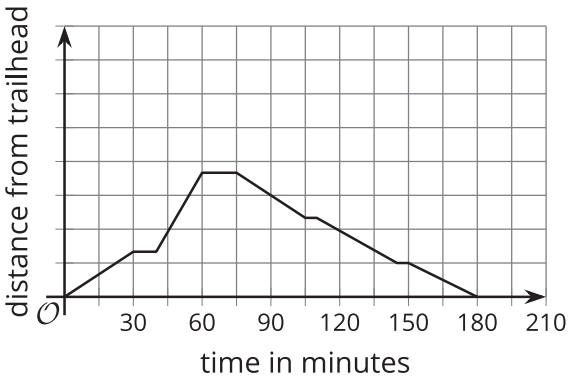
If we are looking at distance from the trailhead (the start of the trail) as a function of time, the graph of the function might look something like this:



It shows the distance increasing as the hiker was walking away from the trailhead, and then decreasing as she was returning to the trailhead.

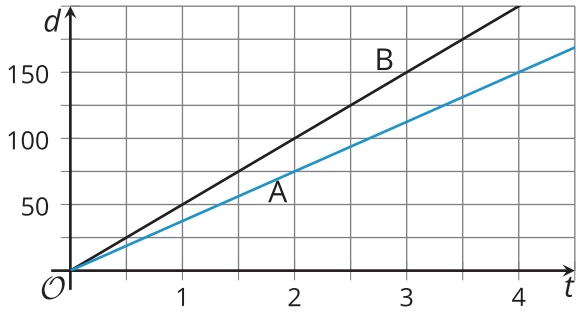
Lesson 8 Practice Problems

Problem 1

Statement

The graphs show the distance, d, traveled by two cars, A and B, over time, t. Distance is measured in miles and time is measured in hours.

Which car traveled slower? Explain how you know.



Solution

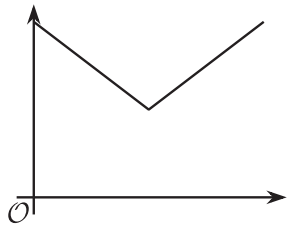
Car A. Sample explanation: Car B traveled 200 miles in 4 hours, but Car A only traveled 150 miles in 4 hours, so Car A traveled slower.

Problem 2

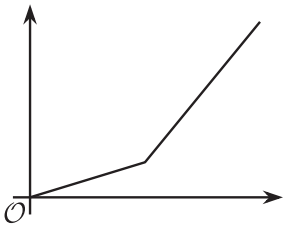
Statement

Here are descriptions of four situations in which the volume of water in a tank is a function of time. Match each description to a corresponding graph.

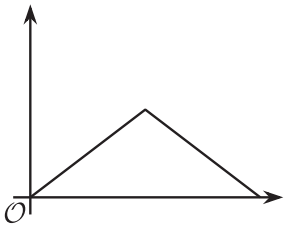
Graph 1



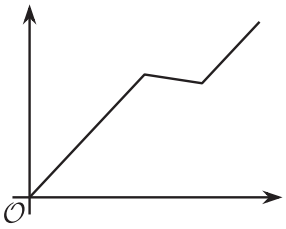
Graph 2



Graph 3



Graph 4



A. An empty 20-gallon water tank is filled at a constant rate for 3 minutes until it is half full. Then, it is emptied at a constant rate for 3 minutes.

B. A full 10-gallon water tank is drained for 30 seconds, until it is half full. Afterwards, it gets refilled.

C. A 2,000-gallon water tank starts out empty. It is being filled for 5 hours, slowly at first, and faster later.

D. An empty 100-gallon water tank is filled in 50 minutes. Then, a dog jumps in and splashes around for 10 minutes, letting 7 gallons of water out. The tank is refilled afterwards.

1. Graph 1
2. Graph 2
3. Graph 3
4. Graph 4

Solution

- A: 3
- B: 1
- C: 2
- D: 4

Problem 3

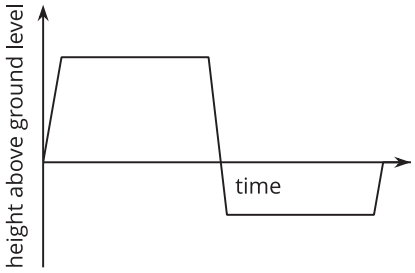
Statement

Clare describes her morning at school yesterday: “I entered the school on the first floor, then walked up to the third floor and stayed for my class for an hour. Afterwards, I had an hour-long class in the basement, and after that I went back to the ground level and sat outside to eat my lunch."

Sketch a possible graph of her height from the ground floor as a function of time.

Solution

Sample graph should include an increase followed by a flat section of the graph, then a decrease to below the starting vertical position, then flat again before increasing to the initial vertical position then flat.



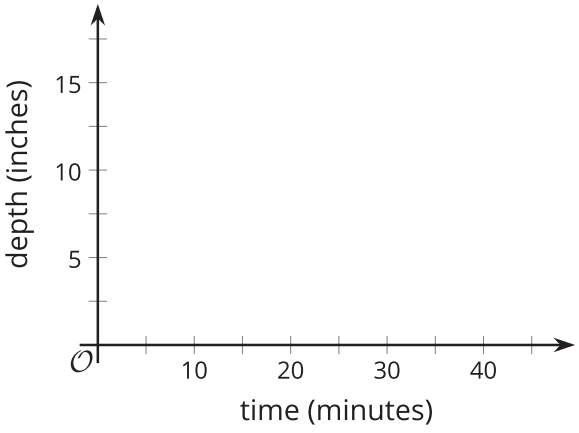
Problem 4

Statement

Tyler filled up his bathtub, took a bath, and then drained the tub. The function gives the depth of the water, in inches, t minutes after Tyler began to fill the bathtub.

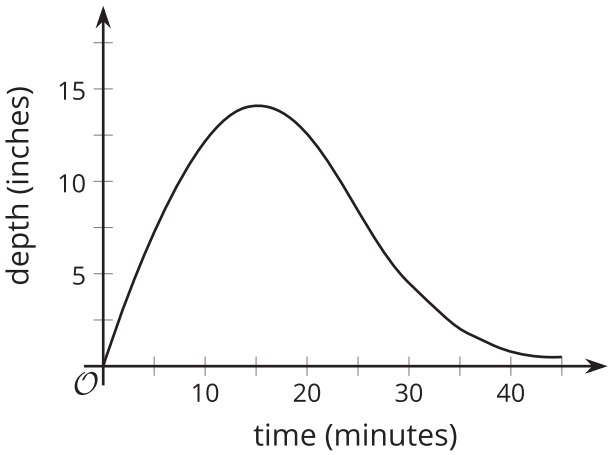
These statements describe how the water level in the tub was changing over time. Use the statements to sketch an approximate graph of function.

- $B(0) = 0$
- $B(1) < B(7)$
- $B(9) = 11$
- $B(10) = B(23)$
- $B(20) > B(40)$



Solution

Sample response:



Problem 5

Statement

Two functions are defined by these equations:

$f(x) = 5.1 + 0.8x$ $g(x) = 3.4 + 1.2x$

Which function has a greater value when x is 3.9? How much greater?

Solution

Function f. It is greater by 0.14.

(From Unit 4, Lesson 5.)

Problem 6

Statement

Function f is defined by the equation $f(x) = 3x - 7$. Find the value of c so that $f(c) = 20$ is true.

Solution

Solving $3c - 7 = 20$ gives $c = 9$.

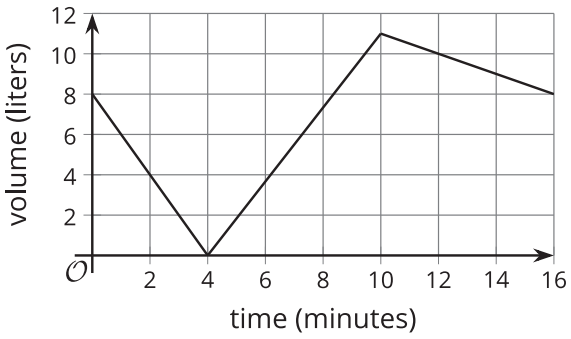
(From Unit 4, Lesson 5.)

Problem 7

Statement

Function V gives the volume of water (liters) in a water cooler as a function of time, t (minutes).

This graph represents function V.



a. What is the greatest water volume in the cooler?

b. Find the value or values of t that make $V(t) = 4$ true. Explain what the value or values tell us about the volume of the water in the cooler.

c. Identify the horizontal intercept of the graph. What does it tell you about the situation?

Solution

a. Approximately 11 liters

b. $t = 2$ and $t = 6.1$. At 2 and 6.1 minutes the water volume in the cooler was 4 liters.

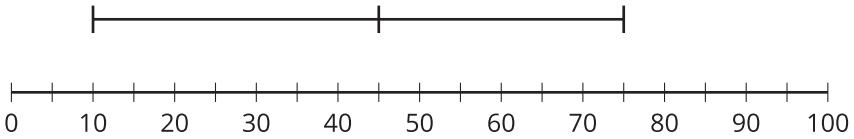
c. $(4, 0)$. The cooler was empty at 4 minutes.

(From Unit 4, Lesson 6.)

Problem 8

Statement

Noah draws this box plot for data that has measure of variability 0.



Explain why the box plot is complete even though there do not appear to be any boxes.

Solution

Sample response: Since the measure of variability is 0, this means that the first and third quartile values are the same as the median (about 45). The boxes between the first quartile and median and between the median and third quartile become reduced to the vertical line at the median value.

(From Unit 1, Lesson 15.)