Algebra I   Worksheet #10   Unit 8   Selected Solutions

A rectangular water tank is 8 feet long, 5 feet wide, and 6 feet deep. The tank is **full** initially and water is drained out of the tank at a constant rate of 10 cubic feet per minute until the tank is empty. Let t represent the time that water has been draining out of the tank (in **minutes**). Let f(t) represent the **depth of the water** in the tank (in **inches**). Answer each of the following.
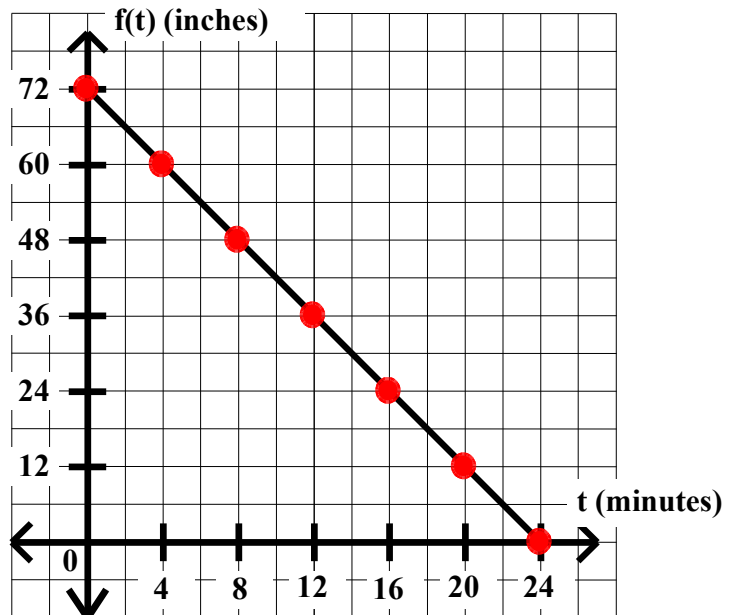
9. How long will it take to empty the tank? __24 minutes__

   $V = LWH = (8 \text{ ft.})(5 \text{ ft.})(6 \text{ ft.}) = 240$ cubic feet The tank is full to start with. Water is drained at 10 cubic feet per minute. The time to empty the tank = (240 cu.ft.)/(10 cu.ft. per minute) = 24 minutes

10. Make a table giving t and f(t) every 4 minutes from t = 0 until the tank is empty.

t minutes	f(t) inches
0	72
4	60
8	48
12	36
16	24
20	12
24	0

11. Graph function f.

12. Write an equation giving f(t) in terms of t.   __f(t) = -3t + 72__

The depth of the water decreases at a constant rate. Since the depth decreases a total of 72 inches in 24 minutes, it decreases at 3 inches per minute. The slope of the graph is -3 (inches per minute). Since the depth is 72 inches initially, the 'y-intercept' is 72. Using the slope-intercept model, the equation is f(t) = -3t + 72.

13. Write an inequality to describe the domain of function f.   **$0 \le t \le 24$**

14. Write an inequality to describe the range of function f.   **$0 \le f(t) \le 72$**

15. Evaluate f(5). What does f(5) represent in terms of the problem?

   f(5) = -3(5) + 72 = **57 inches**
   f(5) represents the depth of the water in the tank after 5 minutes.

16. If f(t) = 15, then find the value of t. Describe what this value of t represents in terms of the problem.

   -3t + 72 = 15
   -3t = -57
   t = **19 minutes**
   This value of t represents the time it takes for the water in the tank to be 15 inches deep.