

Algebra I Worksheet #9 Unit 8 Selected Solutions

A rectangular water tank is 10 feet long, 3 feet wide, and 5 feet deep. The tank is empty initially and water is pumped into the tank at 7.5 cubic feet per minute until the tank is full.

Let t represent the time that water has been pumped into the tank (in **minutes**). Let $f(t)$ represent the **depth of the water** in the tank (in **inches**). Answer each of the following.

1. How long will it take to fill the tank? **20 minutes**

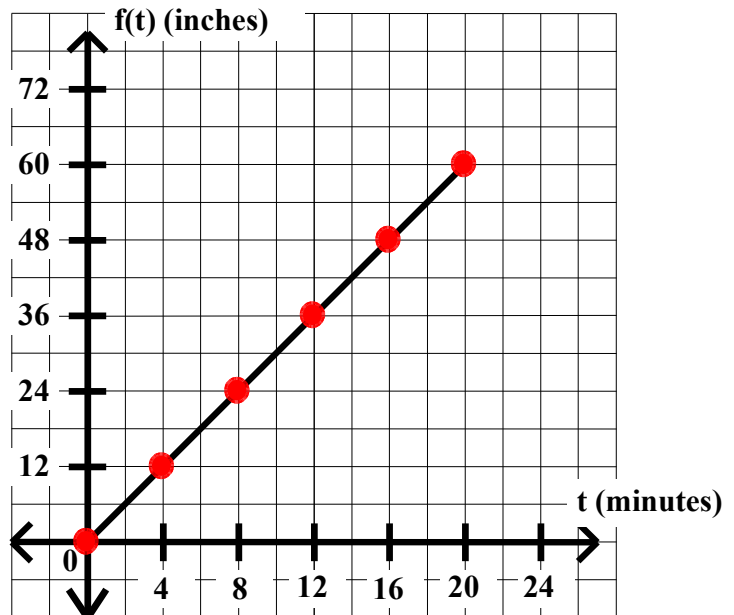
$V = LWH = (10 \text{ ft.})(3 \text{ ft.})(5 \text{ ft.}) = 150$ cubic feet The tank is empty to start with. Water is pumped in at 7.5 cubic feet per minute.

The time to fill the tank = $(150 \text{ cu.ft.}) / (7.5 \text{ cu.ft. per minute}) = 20$ minutes

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

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

3. Graph function f .



4. Write an equation giving $f(t)$ in terms of t .

$f(t) = 3t$

The depth of the water increases at a constant rate. Since the depth increases a total of 60 inches in 20 minutes, it increases at 3 inches per minute. This is the slope of the graph. Since the depth is 0 initially, the 'y-intercept' is 0.

Using the slope-intercept model, the equation is $f(t) = 3t + 0$.

5. Write an inequality to describe the domain of function f . **$0 \leq t \leq 20$**

6. Write an inequality to describe the range of function f . **$0 \leq f(t) \leq 60$**

7. Evaluate $f(6)$. What does $f(6)$ represent in terms of the problem?

$f(6) = 3(6) = 18$ inches

$f(6)$ represents the depth of the water in the tank after 6 minutes.

8. If $f(t) = 45$, then find the value of t . Describe what this value of t represents

$3t = 45$

$t = 15$ minutes

This value of t represents the time it takes for the water in the tank to be 45 inches deep.