Algebra I   Worksheet #11   Unit 8   Selected Solutions

A rectangular water tank is 10 feet long, 6 feet wide, and 4 feet deep. The tank is **half-full** initially and water is pumped into the tank at 10 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. Show your process neatly organized.

V = LWH = (10 ft.)(6 ft.)(4 ft.) = 240 cubic feet.   The tank is half-full to start with.   Therefore, 120 cubic feet of water must be added to fill the tank. Water is added at 10 cubic feet per minute.
The time to fill the tank = (120 cu.ft.)/(10 cu.ft. per minute) = 12 minutes

15. Make a table giving t and f(t) every 3 minutes from t = 0 until the tank is full.

t minutes	f(t) inches	
0	24	← tank half full
3	30	
6	36	
9	42	
12	48	← tank full

16. Graph function f.
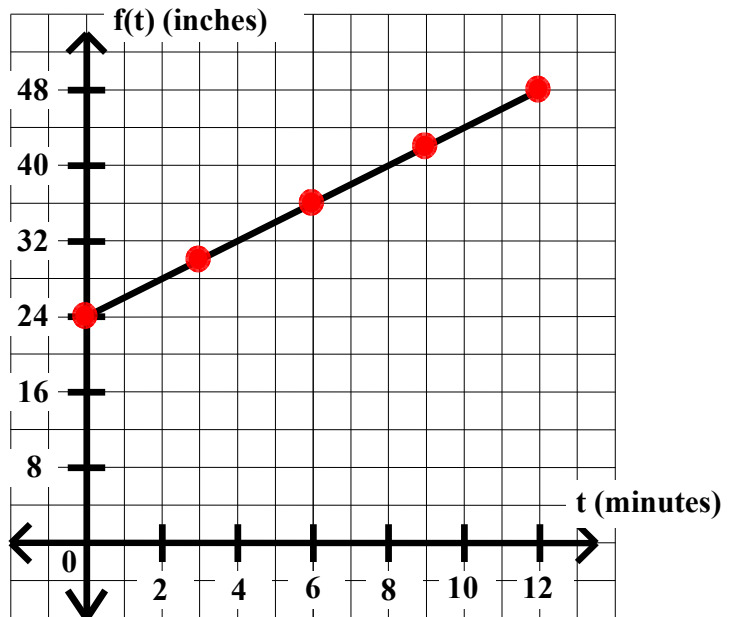
17. Write an equation giving f(t) in terms of t.   **f(t) = 2t + 24**

The depth of the water increases at a constant rate. Since the tank was half full initially, the depth was 24 inches. The depth increased from 24 inches to 48 inches in 12 minutes. Therefore, the depth increased at 2 inch per minute. This is the slope of the graph. Since the depth is 24 inches initially, the 'y-intercept' is 24. Using the slope-intercept model, the equation is f(t) = 2t + 24.

18. Write an inequality to describe
     the domain of function f.   **$0 \le t \le 12$**

19. Write an inequality to describe
     the range of function f.   **$24 \le f(t) \le 48$**

20. Evaluate f(4). What does f(4) represent in terms of the problem?

   f(4) = 2(4) + 24 = **32 inches**
f(4) represents the depth of the water in the tank after 4 minutes.

21. If f(t) = 40, then find the value of t. Describe what this value of t represents in terms of the problem.

   2t + 24 = 40
      2t = 16
      t = **8 minutes**
This value of t represents the time it takes for the water in the tank to be 40 inches deep.