MATH 111

1. It starts raining at midnight at a rate of 3 inches every hour.

   (a) How much rain has fallen after 3 hours?

   (3 inches each hour) × (3 hours) = **9 inches**

   (b) What time is it when 4 inches of rain has fallen?

   (3 inches per hour)(t hours) = 4 inches

   $3t = 4 \Rightarrow$ **$t = 4/3$ = 1 hr 20 min**

   (c) Write a formula for a linear function f that models the total amount of rain that has fallen after t hours.

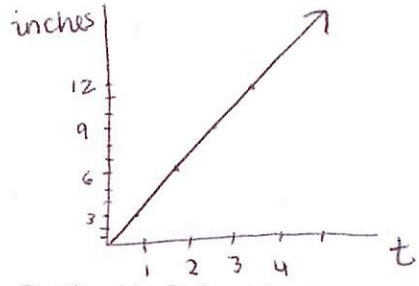
   inches of rain $i = f(t) = 3t$

   (d) Describe what $f(4) = 12$ means in words.

   input is time; output is inches

   In 4 hours it has rained 12 inches.

   (e) Create a graph of the function.

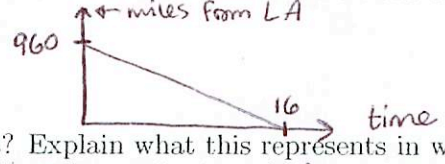


2. Portland is about 960 miles from L.A. Suppose I start driving from Portland to L.A. at a rate of 60 miles per hour.

   (a) How far am I **from** L.A. after 1 hour?

   I have driven 60 miles, so I am 960 miles from L.A.

   (b) Create a graph with the number of hours driven on the x-axis and the distance **from** L.A. on the y-axis.



   (c) What is the x-intercept? Explain what this represents in words.

   How long it takes to get to LA: $\frac{960 \text{ miles}}{60 \text{ miles/hr}} = 16$ hrs.

   (d) What is the y-intercept? Explain what this means in words.

   The y-int is my starting distance from LA, which is 960 miles

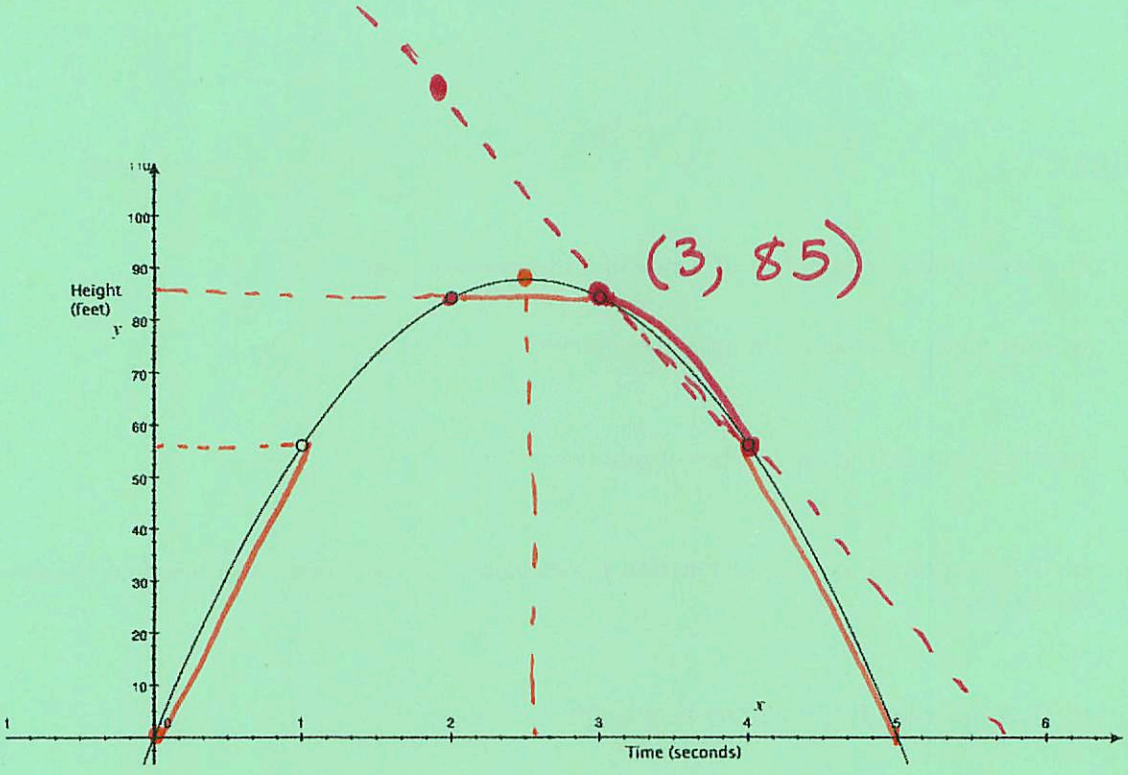
   (e) What is the slope of this line? What are the units on the slope? What does the slope represent?

   Slope: Every hour I get 60 miles closer to L.A.

   $\frac{\Delta y}{\Delta x} = \frac{-60}{1} =$ **-60 m/h (miles per hour)**

   (f) Write a linear equation representing the situation. What is the input? What is the output?

   miles from L.A. $= m$ $\quad m = f(t) = 960 - 60t$



3. Bill is in the circus and has a human cannonball act. Above is the graph of the function $h(t)$ which models Bill's flight through the air, with time in seconds on the x-axis and height in feet on the y-axis.

a) When is Bill highest in the air? 2.5 seconds

b) Evaluate $h(0)$, $h(1)$, $h(2)$, $h(3)$, $h(4)$, and $h(5)$. What do these values represent in this situation? 0" 57" 85" 85" 57" 0"

c) What is Bill's approximate rate of change from

0 seconds to 1 second
1 second to 2 seconds
2 seconds to 3 seconds
3 seconds to 4 seconds
4 seconds to 5 seconds

$\frac{\Delta y}{\Delta x} = \frac{57-0 \text{ ft}}{1-0 \text{ s}} = 57 \text{ ft/sec.}$

d) Over which interval is Bill's rate of change the greatest? Justify your answer. 0 ≤ 1 sec.

e) Over which interval is Bill's rate of change the smallest? Justify your answer. 4 ≤ 5 sec.

2 ≤ 3 sec.

f) Find an approximate linear equation for Bill's height between 3 and 4 seconds. Is this equation a good approximation for the rest of the graph?

Slope: $\frac{85-57}{3-4} = -28$

$y = mx + b$

$y = -28x + b$

$85 = -28(3) + b$

$85 = -84 + b$

$169 = b$

$y = -28x + 169$