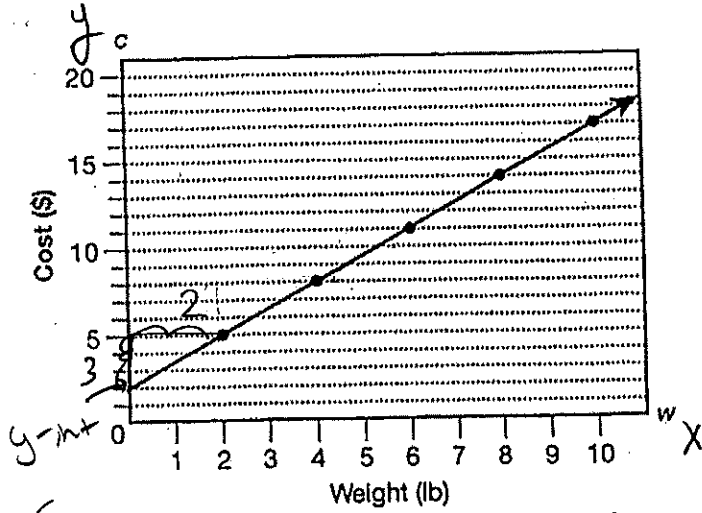


Real World Functions - Day 1

1. A shipping company uses the following graph to show its customers the cost of sending a package based on the weight of the package being sent.



$m = \frac{\text{rise}}{\text{run}}$

$m = \frac{3}{2}$

a) Determine the <sup>(slope)</sup> rate of change for the function.  $\frac{3}{2} = 1.5$

b) Explain what the rate of change means in terms of this scenario.  $\frac{\Delta y}{\Delta x} = \frac{\$3}{1\text{lb}} = \frac{3}{2}$   
It costs \$3 for every 2 lbs or  
\$1.50 for every additional pound of weight

c) Determine the y-intercept for the function. 2

d) Explain what the y-intercept means in terms of this scenario.  
there is a \$2 fee (initial rate)  
regardless of the weight of the package

e) Explain why the graph of the function does not extend to the left side of the y-axis or below the -axis.  
X-axis: You can't have a negative cost to ship a pkg.  
Y-axis: You can't have a negative # of lbs.

B=18 initial value

Rate of change  $m = -2$  ks

2. A water tank that holds 18 gallons leaks two gallons of water every minute. Determine the rate of change and initial value of the situation and use them to write the equation. Then, graph the relationship.

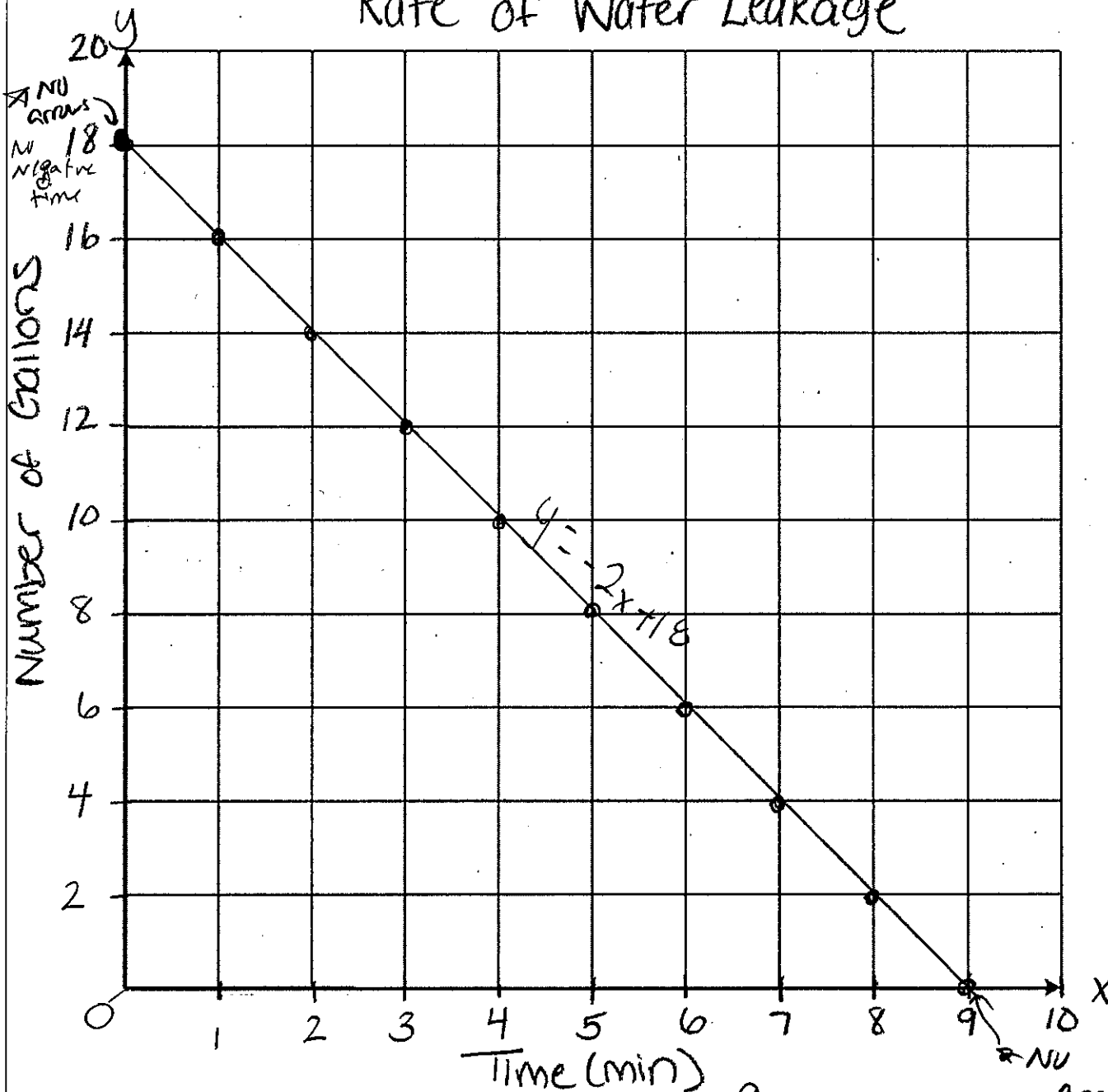
a) Equation:  $y = -2x + 18$

$m = -\frac{2}{1}$  → really just 1 box down

b) Graph:

B = 18

### Rate of Water Leakage



c) How long does it take for the tank to empty? 9 minutes

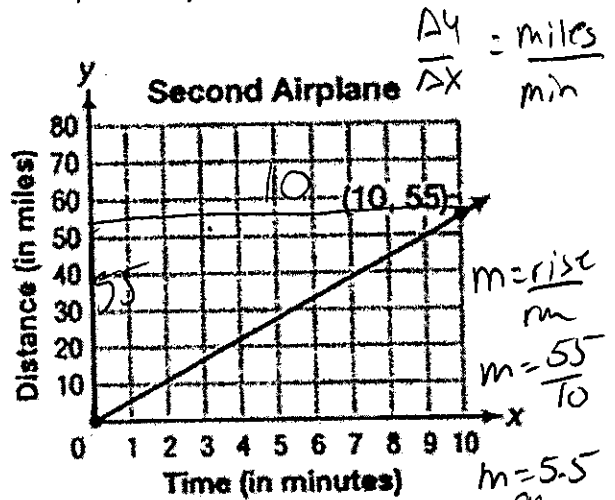
NU arrows  
NU neg gallons

3. Two airplanes leave an airport and travel at steady speeds. The first plane's distance from the airport in miles,  $d$ , over time in minutes,  $t$ , is given by the equation below:

$$y = mx$$

First airplane:  $d = 4.9t$

The second plane's distance from the airport over time is given by the graph on the right.



- a) Find the speed of each airplane with the proper units.

First airplane: 4.9 miles per minute

Second airplane: 5.5 miles per minute

- b) Which plane travels at the faster rate, and by how much? The 2nd

airplane by .6 mi/min

A faster rate = bigger #

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{55 - 0}{10 - 0} = 5.5$$

$$m = \frac{55}{10} = 5.5$$

4. Compare the two linear functions listed below:

Function 1: Pocket Money - Mike has \$25. His mother gives him \$5 per week. Let  $y$  be the amount of money he earns as a function of the number of weeks,  $x$ . Write an equation to represent the function.

$x$  is zero

x	y
0	25
1	30
2	35
3	40

$(0, 25)$   $(1, 30)$   
 $x_1, y_1$   $x_2, y_2$   
 $m = \frac{y_2 - y_1}{x_2 - x_1}$   
 $m = \frac{30 - 25}{1 - 0}$   
 $m = 5$

$$y = mx + b$$

$$m = 5$$

R.O.C. I.V.  
 $b = 25$   
 $y = 5x + 25$

Function 2: Burger - Ronny has \$20 at the start of the day. He spends \$2 on a burger. Write the rule for the total cost,  $c$ , to purchase a burger as a function of the number of days,  $d$ .

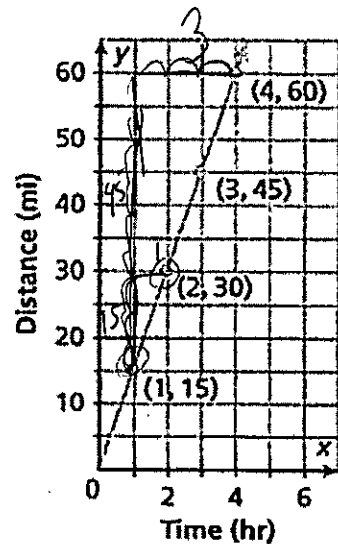
$m = -2$   
 $B = 20$   
 $y = -2x + 20$   
 $c(d) = -2d + 20$   
 R.O.C. I.V.

- a) Which function has a greater rate of change? Function 1 has a greater rate of change  
 $5 > -2$

5. The graph shows the distance Nathan bicycled over time.

a) Find the rate of change from 1 hour to 2 hours. 15mph

$$m = \frac{\text{rise}}{\text{run}} \quad m = \frac{15}{1} = m = 15$$



b) Find the rate of change from 1 hour to 4 hours. 15mph

$$m = \frac{\text{rise}}{\text{run}} \quad m = \frac{45}{3} = m = 15$$

c) Recall that the graph of a proportional relationship is a straight line and passes through the origin. Explain whether the relationship between Nathan's time and distance appears to be a proportional relationship. Yes! B/c ① it goes through the origin, ② is linear + ③ has a constant ratio (rate of change)

d) Find Nathan's unit rate. per 1 hour 15 miles per hour

e) Compare the rate of change to the unit rate. They are the same.  
they are both 15mph

f) Does it matter what interval you use when you find the rate of change of a proportional relationship? Explain. NO B/c they are all proportional (constant/same)

g) Do you think that the value of r in the point (1, r) is always the unit rate for any situation? Explain. yes! B/c the unit rate will always have an x-value of 1