AGS 3 Name: _____ Period: ____ Date: _____

Notes 1.1 – Functions & Inverses

Warmup – Solve for x, then complete the statement.

1. $24 = 3x$ Undo multiplication by 3 by dividing by 3

   $x = 8$

2. $\frac{x}{5} = -2$ Undo division by 5 by multiplying by 5

   $x = -10$

3. $x + 17 = 20$ Undo add 17 by subtracting 17

   $x = 3$

4. $\sqrt{x} = 6$ Undo the square root by squaring

   $x = 36$

5. $\sqrt[3]{(x+1)} = 2$ Undo the cube root by cubing then subtracting one

   $x = 7$

6. $x^4 = 81$ Undo raising x to the 4th power by taking the 4th root

   $x = 3$

7. $(x-9)^2 = 49$ Undo squaring by taking the square root then adding nine

List the inverse operations:

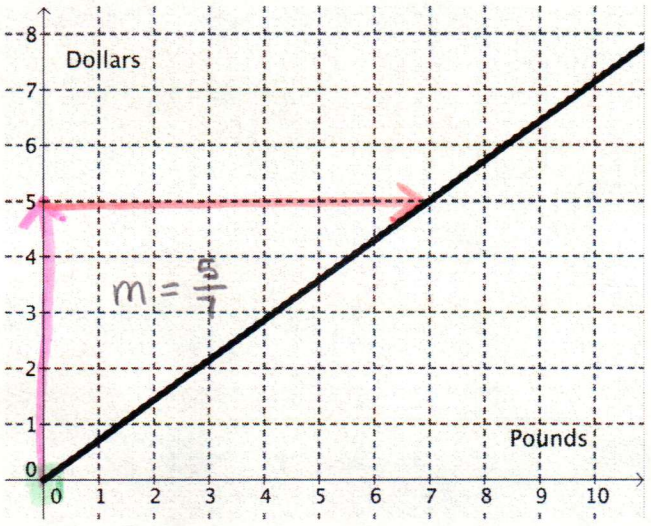
add ⇔ subtract
multiply ⇔ divide
square ⇔ square root

d = dollars spent
p = pounds of food purchased

Investigation

Carlos and Clarita have been searching for a new dog food supplier and have identified two possibilities. The Canine Catering Company, located in their town, sells 7 pounds of food for $5.

Carlos thought about how much they would pay for a given amount of food and drew this graph:



a. Write an equation for the function that Carlos graphed.

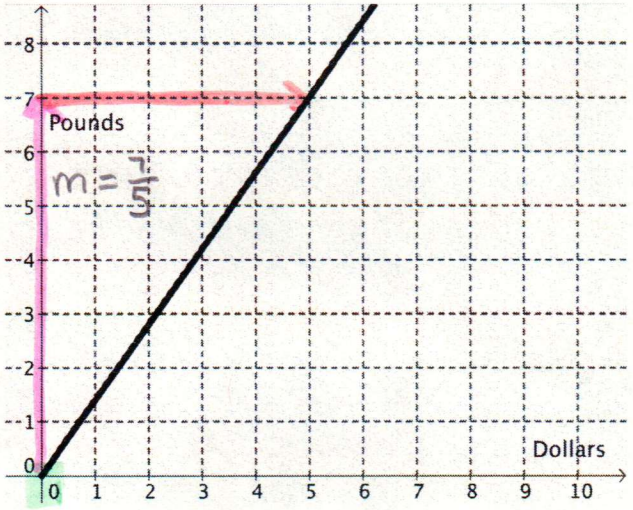
$d = \frac{5}{7}p$

$D(p) = \frac{5}{7}p$

b. Create a table for the given graph

Pounds (p)	0	7	14	21	28	35	42
Dollars (d)	0	5	10	15	20	25	30

Clarita thought about how much food they could buy for a given amount of money and drew this graph:



c. Write an equation for the function that Clarity graphed.

$p = \frac{7}{5}d$

$P(d) = \frac{7}{5}d$

d. Create a table for the given graph

Dollars (d)	0	5	10	15	20	25	30
Pounds (p)	0	7	14	21	28	35	42

e. Write a question that could be answered using Carlos' graph.

How much will it cost to buy 10 pounds of dog food?

Write a question that could be answered using Clarita's graph.

How many pounds of food could they buy for $20?

What is different between the two questions?

What you know and what you are finding.

f. What is the relationship between the two functions?

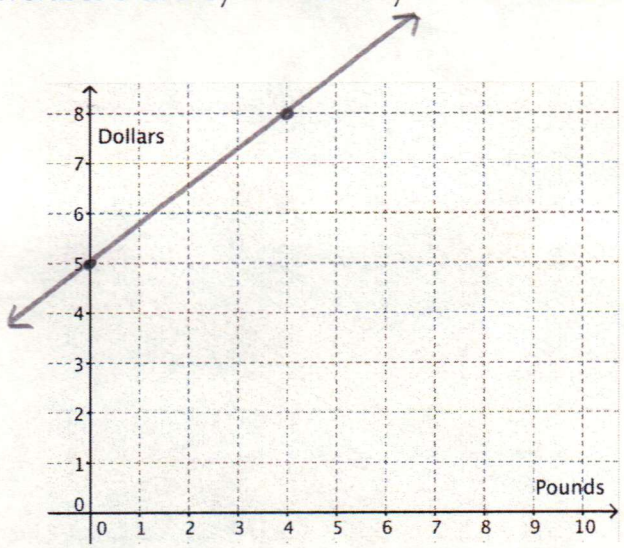
The input and outputs are the opposite but the data is the same, making them inverse functions

Looking online, Carlos found a company that will sell 8 pounds of food for $6 plus a flat $5 shipping charge for each order. The company advertises that they will sell any amount of food at the same price per pound.

g. Model (graph, table, equation) the relationship between the price and the amount of food using Carlos' approach.

$D(p) = \frac{3}{4}p + 5$

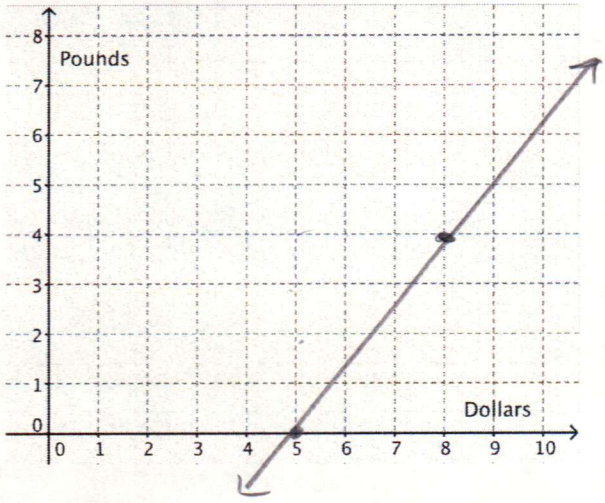
pounds	$
0	5
8	11
16	17
24	23
4	8
12	14



h. Model the relationship between the price and the amount of food using Clarita's approach.

$P(d) = \frac{4}{3}d - \frac{20}{3}$

$	pounds
5	0
11	8
17	16
23	24
8	4
14	12



$p = \frac{4}{3}(d-5) + 0$

i. What is the relationship between the two functions?

They are inverses (their inputs & outputs are swapped)

j. Which company should they buy food from? Why?

$\frac{5}{7} \approx 71¢/\text{pound}$ ← Canine Catering has a lower price per pound and there is no shipping charge.

$\frac{3}{4} = 75¢/\text{pound}$

Vocabulary

Word	Meaning/Notation	Example
inverse	a function or operation that undoes the action of another function or operation $f^{-1}(x) =$	$y = 2x+1$ and $y = \frac{1}{2}x - \frac{1}{2}$ x | -1 | 0 | 1 ; y | -1 | 1 | 3 x | -1 | 1 | 3 ; y | -1 | 0 | 1

Inverse Function Notation:

Canine Catering $D(p) = P^{-1}$ and Online company $P(d) = D^{-1}$