

1.1 Brutus Bites Back

A Develop Understanding Task

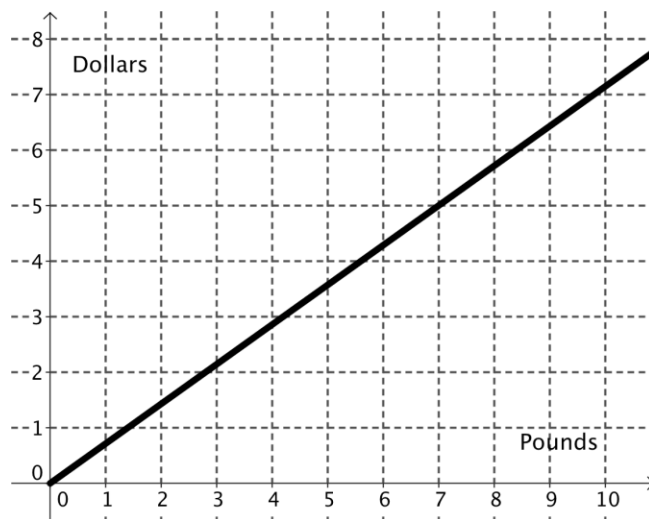
Remember Carlos and Clarita? A couple of years ago, they started earning money by taking care of pets while their owners are away. Due to their amazing mathematical analysis and their loving care of the cats and dogs that they take in, Carlos and Clarita have made their business very successful. To keep the hungry dogs fed, they must regularly buy Brutus Bites, the favorite food of all the dogs.



© 2013 www.flickr.com/photos/rkleine

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.

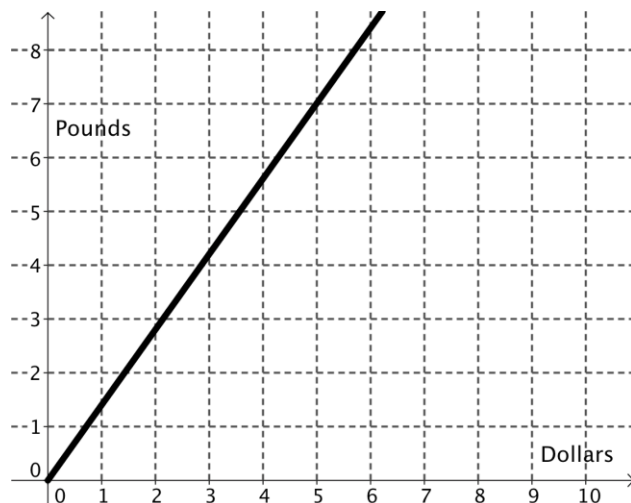
Carlos thought about how much they would pay for a given amount of food and drew this graph:



1. Write the equation of the function that Carlos graphed.



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



2. Write the equation of the function that Clarita graphed.

3. Write a question that would be most easily answered by Carlos' graph. Write a question that would be most easily answered by Clarita's graph. What is the difference between the two questions?

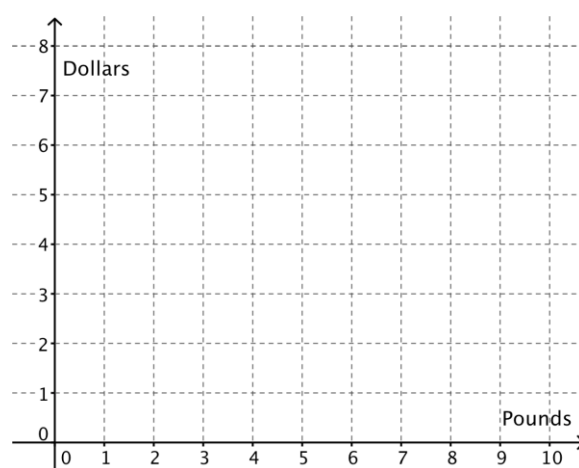
4. What is the relationship between the two functions? How do you know?



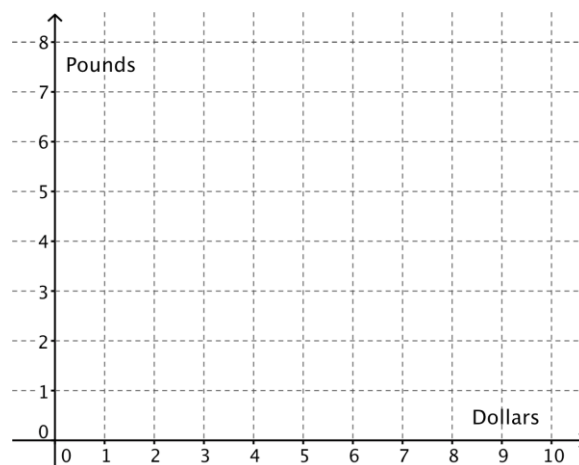
5. Use function notation to write the relationship between the functions.

Looking online, Carlos found a company that will sell 8 pounds of Brutus Bites 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.

6. Model the relationship between the price and the amount of food using Carlos' approach.



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



8. What is the relationship between these two functions? How do you know?

9. Use function notation to write the relationship between the functions.

10. Which company should Clarita and Carlos buy their Brutus Bites from? Why?



Ready, Set, Go!**Ready**

Topic: inverse operations

Inverse operations “undo” each other. For instance, addition and subtraction are inverse operations. So are multiplication and division. In mathematics, it is often convenient to *undo* several operations in order to solve for a variable.



© 2013 www.flickr.com/photos/rkleine

Solve for x, in the following problems. Then complete the statement by identifying the operation you used to “undo” the equation.

1. $24 = 3x$ Undo multiplication by 3 by _____
2. $\frac{x}{5} = -2$ Undo division by 5 by _____
3. $x + 17 = 20$ Undo add 17 by _____
4. $\sqrt{x} = 6$ Undo the square root by _____
5. $\sqrt[3]{(x+1)} = 2$ Undo the cube root by _____ then _____
6. $x^4 = 81$ Undo raising x to the 4th power by _____
7. $(x-9)^2 = 49$ Undo squaring by _____ then _____

Set Topic: Linear functions and their inverses

Carlos and Clarita have a pet sitting business. When they were trying to decide how many each of dogs and cats they could fit into their yard, they made a table based on the following information. Cat pens require 6 ft² of space, while dog runs require 24 ft². Carlos and Clarita have up to 360 ft² available in the storage shed for pens and runs, while still leaving enough room to move around the cages.



They quickly realized that they could have 4 cats for each dog, so they counted the number of cats by 4.

cats	0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
dogs	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

8. Use the information in the table to write 5 ordered pairs that have cats as the input value and dogs as the output value.
9. Write an explicit equation that shows how many dogs they can accommodate based on how many cats they have. (The number of dogs “ d ” will be a function of the number of cats “ c ” or $d = f(c)$.)
10. Use the information in the table to write 5 ordered pairs that have dogs as the input value and cats as the output value.
11. Write an explicit equation that shows how many cats they can accommodate based on how many dogs they have. (The number of cats “ c ” will be a function of the number of dogs “ d ” or $c = g(d)$.)
12. Look back at problem 8 and problem 10. Describe how the ordered pairs are different.
13. Look back at the equations you wrote in problems 9 and 11. What relationships do you see between them? (Consider the numbers in the equations. Also, define the domain and range for each equation.)



Name _____

Functions and their Inverses | 1.1

Go

Topic: Using function notation to evaluate a function.

The functions $f(x)$, $g(x)$, and $h(x)$ are defined below. Simplify your answers.

$$f(x) = x$$

$$g(x) = 5x - 12$$

$$h(x) = x^2 + 4x - 7$$

Calculate the indicated function values.

14. $f(10)$

15. $f(-2)$

16. $f(a)$

17. $f(a+b)$

18. $g(10)$

19. $g(-2)$

20. $g(a)$

21. $g(a+b)$

22. $h(10)$

23. $h(-2)$

24. $h(a)$

25. $h(a+b)$

