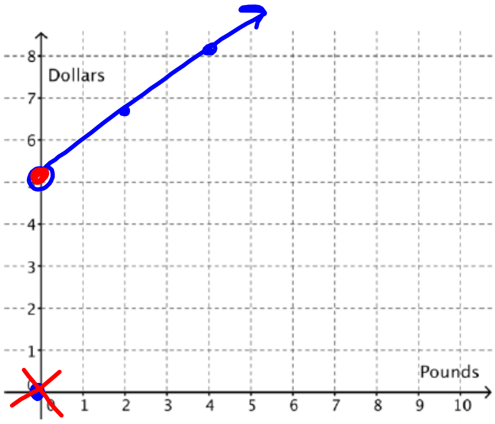
Get out your books and finish #6-10 on 1.1 pgs.5-6. We will also go over any questions you have about 1.1's HW before taking our first quiz!

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.

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



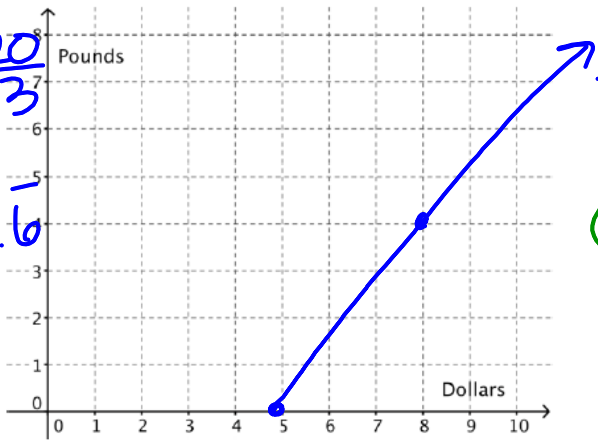
x p	y d
2	6.5 (5+1.5)
4	8 (5+3)
8	11 (5+6)
0	5

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

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

or

$P(d)=1.3d-6.\overline{6}$



x d	y p
11	8
5	0
8	4

$y=mx+b$

$4=\frac{4}{3}(8)+b$

$4=\frac{32}{3}+b$

$-\frac{32}{3} \quad -\frac{32}{3}$

$\frac{12}{3}-\frac{32}{3}=b$

$-\frac{20}{3}=b$

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

$(x,y) \rightarrow (y,x)$

$\underbrace{(2,3)}_{\text{funct.}} \rightarrow \underbrace{(3,2)}_{\text{inverse}}$

funct	inv
domain →	range
range →	domain

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

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

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

5. $\sqrt[3]{(x+1)} = 2$ Undo the cube root by cube both sides then subtract 1

$3 \quad 3$

$x+1=8$

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 ft^2 of space, while dog runs require 24 ft^2. Carlos and Clarita have up to 360 ft^2 available in the storage shed for pens and runs, while still leaving enough room to move around th cages.

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

+4

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

-1

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 $d = f(c)$.)

$m = \frac{-1}{4}$ slope

$d = -\frac{1}{4}c + 15$

$f(c) = -\frac{1}{4}c + 15$

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 $c = g(d)$.)

$g(d) = -4d + 60$

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$f(x) = x$ $\quad g(x) = 5x - 12$ $\quad h(x) = x^2 + 4x - 7$

Calculate the indicated function values.

$x = 10$

14. $f(10)$ 15. $f(-2)$ 16. $f(a)$ 17. $f(a+b)$

$f(10) = 10$

$(10, 10)$

18. $g(10)$ 19. $g(-2)$ 20. $g(a)$ 21. $g(a+b)$

$g(10) = 5 \cdot 10 - 12$

$g(10) = 38$

$(10, 38)$

22. $h(10)$ 23. $h(-2)$ 24. $h(a)$ 25. $h(a+b)$

8.50 x 11.00 in

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

$h(-2) = 4 - 8 - 7$

$h(-2) = -11$

$(-2, -11)$

$h(a+b) = (a+b)^2 + 4(a+b) - 7$

$= (a+b)(a+b) + 4a + 4b - 7$

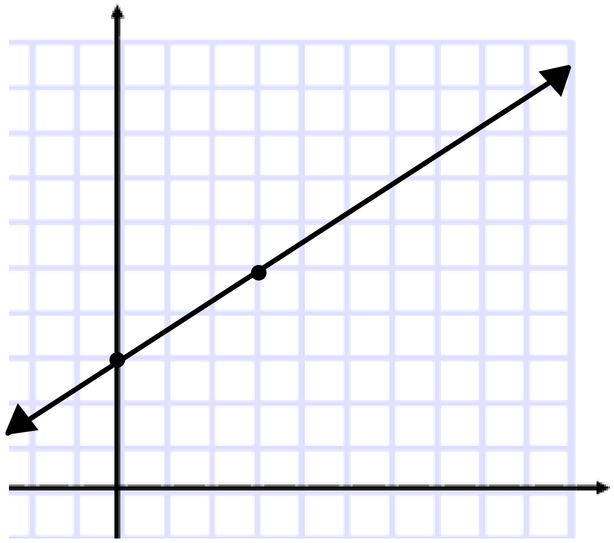
$= a^2 + ab + ab + b^2 + 4a + 4b - 7$

$= a^2 + 2ab + b^2 + 4a + 4b - 7$

$(a+b, a^2 + 2ab + b^2 + 4a + 4b - 7)$

QUIZ #1: Linear Functions & Their Inverses

1) Write an equation for the following linear function.



2) A linear function is shown in the table below. Fill in the table for its inverse.

r	1	2	3	4	5
T	3	7	11	15	19

1.2 Flipping Ferraris

A Solidify Understanding Task

When people first learn to drive, they are often told that the faster they are driving, the longer it will take to stop. So, when you're driving on the freeway, you should leave more space between your car and the car in front of you than when you are driving slowly through a neighborhood. Have you ever wondered about the relationship between how fast you are driving and how far you travel before you stop, after hitting the brakes?

1. Think about it for a minute. What factors do you think might make a difference in how far a car travels after hitting the brakes?

ice, rain, wet weather, tire condition, bad brakes, heavier car,

There has actually been quite a bit of experimental work done (mostly by police departments and insurance companies) to be able to mathematically model the relationship between the speed of a car and the braking distance (how far the car goes until it stops after the driver hits the brakes).

2. Imagine your dream car. Maybe it is a Ferrari 550 Maranello, a super-fast Italian car. Experiments have shown that on smooth, dry roads, the relationship between the braking distance (d) and speed (s) is given by $d(s) = 0.03s^2$. Speed is given in miles/hour and the distance is in feet.

   a) How many feet should you leave between you and the car in front of you if you are driving the Ferrari at 55 mi/hr?

   $d(55) = 0.03(55)^2$

   $d(55) = 90.75$ ft

   BTW: $(55, 90.75)$

b) What distance should you keep between you and the car in front of you if you are driving at 100 mi/hr?

$d(100) = 0.03(100)^2$

$d(100) = 300$ ft.

BTW: (100, 300)

c) If an average car is about 16 feet long, about how many car lengths should you have between you and that car in front of you if you are driving 100 mi/hr?

$\frac{300}{16} = 18.75$ 19 car lengths

d) It makes sense to a lot of people that if the car is moving at some speed and then goes twice as fast, the braking distance will be twice as far. Is that true? Explain why or why not.

s

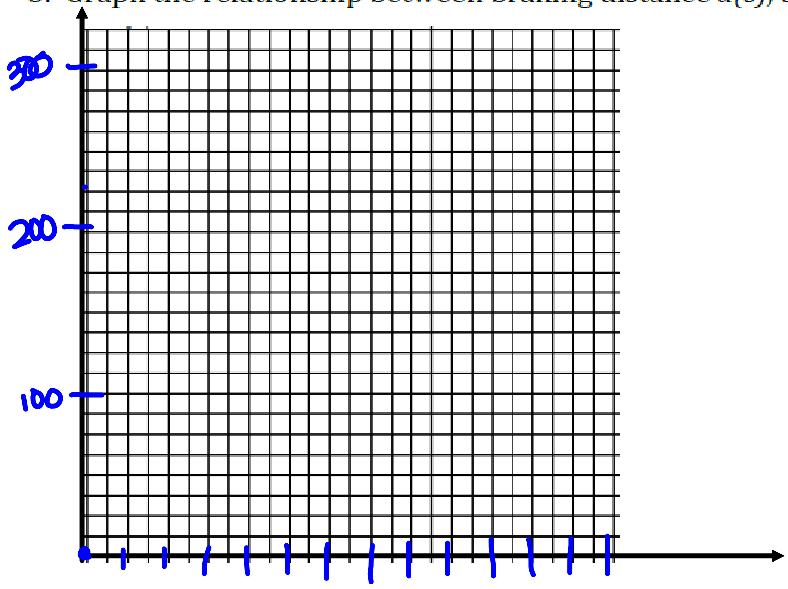
$d(s) = 0.03s^2$

2s

$d(2s) = 0.03(2s)^2$

$d(2s) = 0.03(4)s^2$

3. Graph the relationship between braking distance *d(s)*, and speed *(s)*, below.



4. Describe all the mathematical features of the relationship between braking distance and speed for the Ferrari modeled by $d(s) = 0.03s^2$. continuous, increasing

domain:

range:

5. What if the driver of the Ferrari 550 was cruising along and suddenly hit the brakes to stop because she saw a cat in the road? She skidded to a stop, and fortunately, missed the cat. When she got out of the car she measured the skid marks left by the car so that she knew that her braking distance was 31 ft.

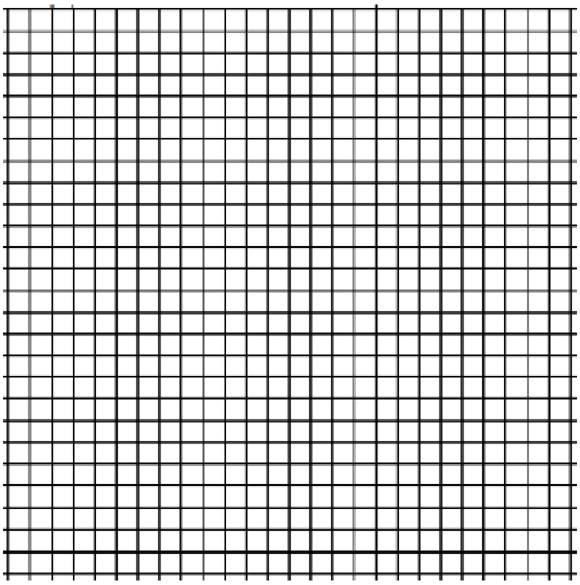
a) How fast was she going when she hit the brakes?

c) If she didn't see the cat until she was 15 feet away, what is the fastest speed she could be traveling before she hit the brakes if she wants to avoid hitting the cat?

6. Part of the job of police officers is to investigate traffic accidents to determine what caused the accident and which driver was at fault. They measure the braking distance using skid marks and calculate speeds using the mathematical relationships just like we have here, although they often use different formulas to account for various factors such as road conditions. Let's go back to the Ferrari on a smooth, dry road since we know the relationship. Create a table that shows the speed the car was traveling based upon the braking distance.

7. Write an equation of the function *s(d)* that gives the speed the car was traveling for a given braking distance.

8. Graph the function *s(d)* and describe its features.



9. What do you notice about the graph of *s(d)* compared to the graph of *d(s)*? What is the relationship between the functions *d(s)* and *s(d)*?

10. Consider the function $d(s) = 0.03s^2$ over the domain of all real numbers, not just the domain of this problem situation. How does the graph change from the graph of *d(s)* in question #3?

11. How does changing the domain of *d(s)* change the graph of the inverse of *d(s)*?

12. Is the inverse of *d(s)* a function? Justify your answer.

Homework/Classwork

Finish 1.2

Oct 21-8:47 AM