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Lesson 1: Brutus Bites Back
Ready, Set, Go

Ready

Inverse operations "undo" each other. For instance, addition and subtraction are inverse operations. In mathematics, it is often necessary to undo several operations in order to solve for a variable.

Complete the statement by identifying the operation you used to "undo" the equation.

1. $24 = 3x$

Undo multiplication by 3 by

2. $\dfrac{x}{5} = -2$

Undo division by 5 by

3. $x + 17 = 20$

Undo addition 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

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7. $(x-9)^2 = 49$

Undo squaring by _____, then _____.

Set

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 using 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 the cages. They made a table of all of the combinations of cats and dogs they could use to fill the space. They quickly realized that they could fit 4 cats in the same space as one dog.

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 $c = g(d)$.

Base your answers in #12 and #13 on the table.

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12. Look back at problem 8 and problem 10. Describe how the ordered pairs are different.

13.   **a.** Look back at the equation you wrote in problem 9 . Describe the domain for $d = f(c)$.

      b. Describe the domain for the equation $c = g(d)$ that you wrote in problem 11.

      c. What is the relationship between them?

Go

The functions $f(x)$, $g(x)$, and $h(x)$ are defined:

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

Calculate the indicated function values in the following problems.

14. $f(10)$

15. $f(-2)$

16. $f(a)$

17. $f(a + b)$

18. $g(10)$

19. $g(-2)$

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20. $g(a)$

21. $g(a + b)$

22. $h(10)$

23. $h(-2)$

24. $h(a)$

25. $h(a + b)$