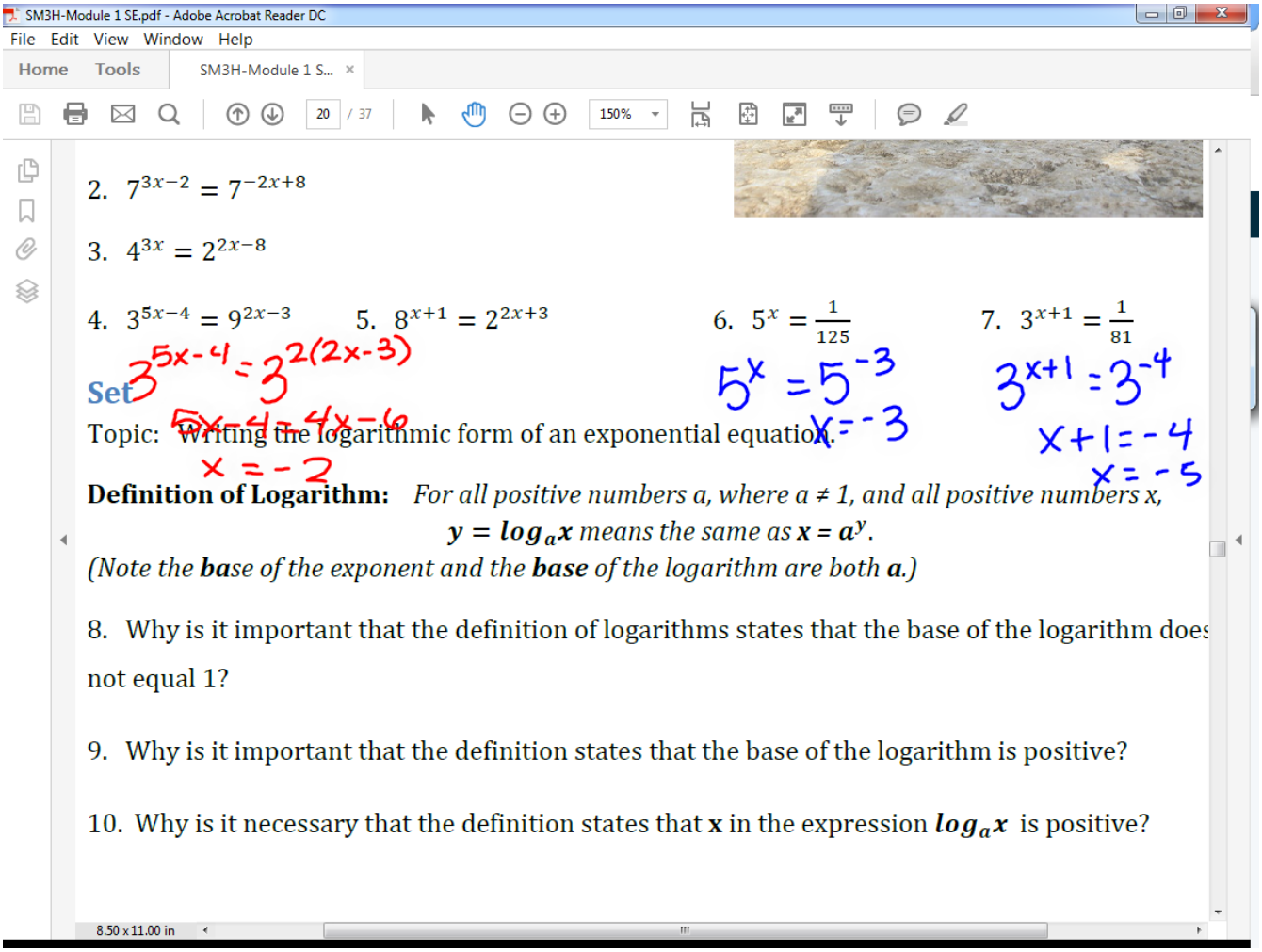
Questions on 1.3? We will take our quiz soon!

Sep 2-1:59 PM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2. $7^{3x-2} = 7^{-2x+8}$

3. $4^{3x} = 2^{2x-8}$

4. $3^{5x-4} = 9^{2x-3}$ 5. $8^{x+1} = 2^{2x+3}$ 6. $5^{x} = \frac{1}{125}$ 7. $3^{x+1} = \frac{1}{81}$

$3^{5x-4} = 3^{2(2x-3)}$

$5x-4 = 4x-6$

$x = -2$

$5^{x} = 5^{-3}$

$x = -3$

$3^{x+1} = 3^{-4}$

$x+1 = -4$

$x = -5$

Set

Topic: Writing the logarithmic form of an exponential equation.

Definition of Logarithm: *For all positive numbers a, where a ≠ 1, and all positive numbers x,*

$y = \log_a x$ *means the same as* $x = a^y$.

(Note the ***base*** *of the exponent and the* ***base*** *of the logarithm are both* ***a****.)*

8. Why is it important that the definition of logarithms states that the base of the logarithm does not equal 1?

9. Why is it important that the definition states that the base of the logarithm is positive?

10. Why is it necessary that the definition states that **x** in the expression $\log_a x$ is positive?

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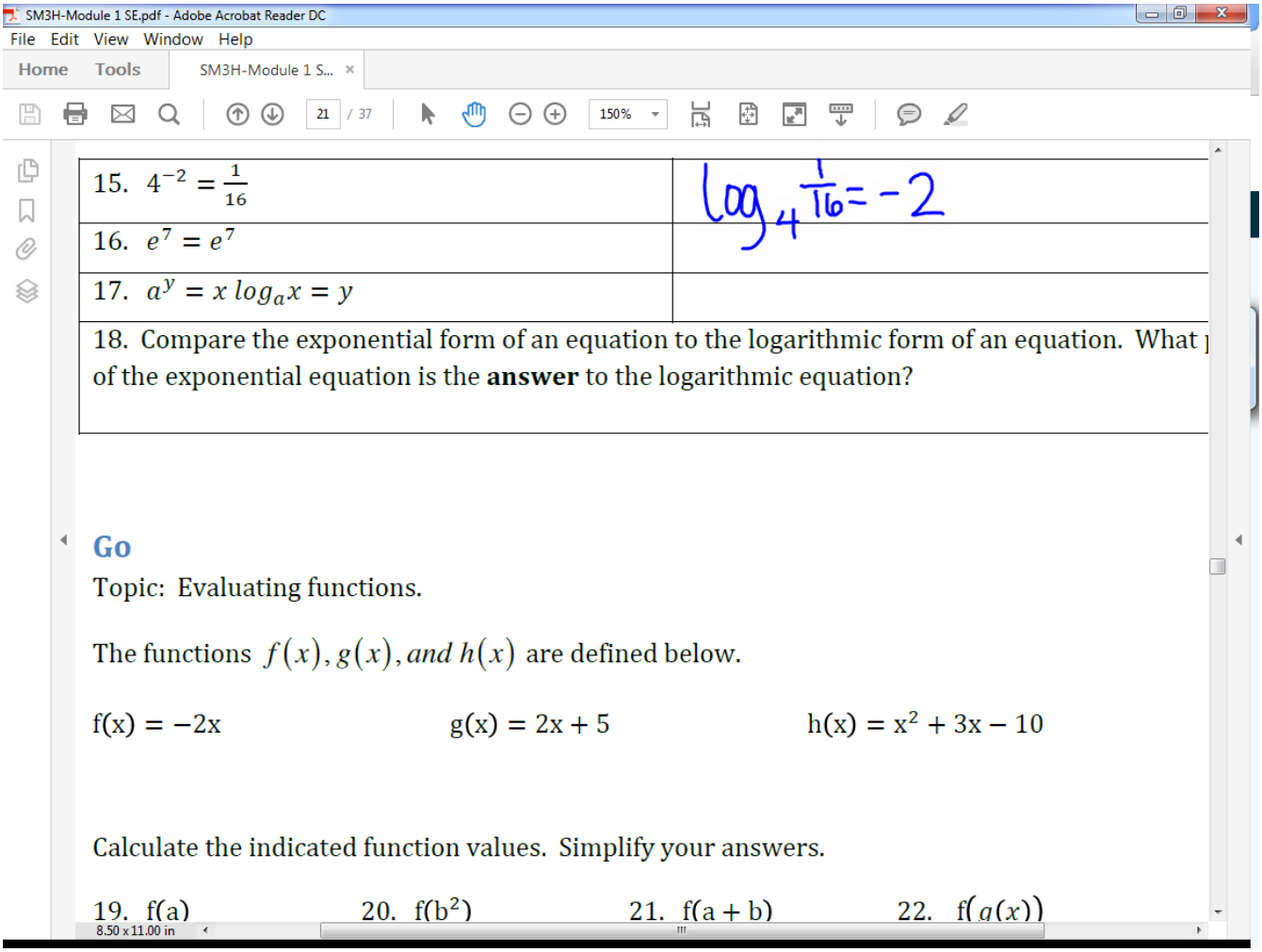
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21 / 37
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15. $4^{-2} = \frac{1}{16}$
$\log_4 \frac{1}{16} = -2$
16. $e^7 = e^7$
17. $a^y = x \log_a x = y$
18. Compare the exponential form of an equation to the logarithmic form of an equation. What
of the exponential equation is the **answer** to the logarithmic equation?
Go
Topic: Evaluating functions.
The functions $f(x), g(x), and\ h(x)$ are defined below.
f(x) = −2x
g(x) = 2x + 5
h(x) = x² + 3x − 10
Calculate the indicated function values. Simplify your answers.
19. f(a)
20. f(b²)
21. f(a + b)
22. f(g(x))
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Sep 6-9:33 AM

$f(x) = -2x$ $g(x) = 2x + 5$ $h(x) = x^2 + 3x - 10$

Calculate the indicated function values. Simplify your answers.

19. f(a) 20. $f(b^2)$ 21. f(a + b) 22. $f(g(x))$

23. g(a) 24. $g(b^2)$ 25. g(a + b) 26. $h(f(x))$ $= h(-2x) =$

$(-2x)^2 + 3(-2x) - 10 =$

$4x^2 - 6x - 10$

27. h(a) 28. $h(b^2)$ 29. h(a + b) 30. $h(g(x)) = h(2x+5) =$

$(2x+5)^2 + 3(2x+5) - 10 =$

$(2x+5)(2x+5) + 6x + 15 - 10 =$

$4x^2 + 20x + 25 + 6x + 5 =$

$4x^2 + 26x + 30$

QUIZ #3: Exponential Functions & Their Inverses

$f(x) = 4x + 1$ $g(x) = x^2$

Simplify the following:

1) $f(g(x))$

2) $g(f(x))$

1.4 Pulling a Rabbit Out of a Hat

A Solidify Understanding Task

I have a magic trick for you:

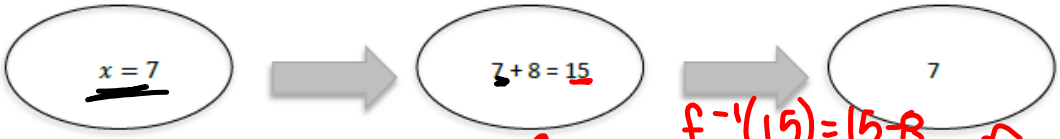
- Pick a number, any number. x
- Add 6 x+6
- Multiply by the result by 2 2(x+6)
- Subtract 12 2(x+6)-12
- Divide by 2 $\frac{2(x+6)-12}{2} = \frac{2x+12-12}{2} = \frac{2x}{2} = x$
- The answer is the number you started with!

People are often mystified by such tricks but those of us who have studied inverse operations and inverse functions can easily figure out how they work and even create our own number tricks. Let's get started by figuring out how inverse functions work together.

For each of the following function machines, decide what function can be used to make the output the same as the input number. Describe the operation in words and then write it symbolically.

Here's an example:

Input Output



$f(x) = x + 8 = 15$

$f(7) = 7 + 8$

$f^{-1}(15) = 15 - 8$

$f^{-1}(x) = x - 8$ *

In words: Subtract 8 from the result

$f^{-1}(15) = 15 - 8 = 7$

To find the inverse of any function:

1- switch x & y.

2- solve for y.

$f(x) = x + 8$

$x = y + 8$

$-8 \quad -8$

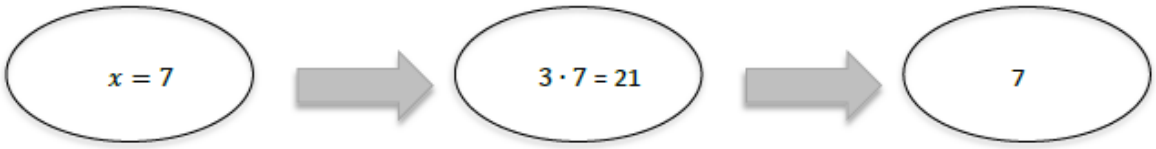
$x - 8 = y$

$f^{-1}(x) = x - 8$ *

Mar 16-9:16 AM

1.

Input Output



$f(x) = 3x$

$\frac{x}{3} = \frac{3y}{3}$

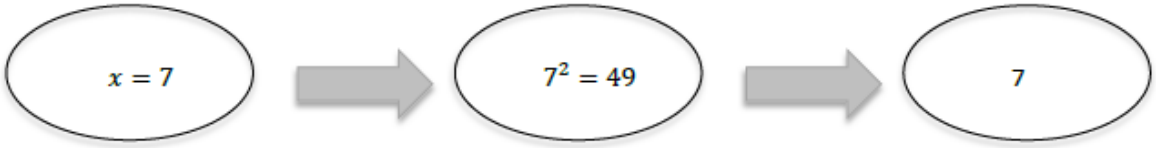
$\frac{x}{3} = y$

$f^{-1}(x) = \frac{x}{3}$

In words: ÷ by 3

2.

Input Output



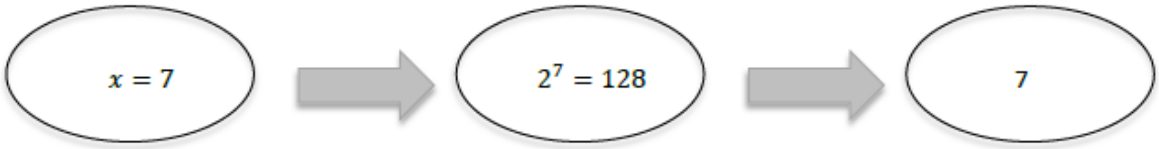
$f(x) = x^2$

$f^{-1}(x) = \pm\sqrt{x}$

In words: square root

Input Output

3.

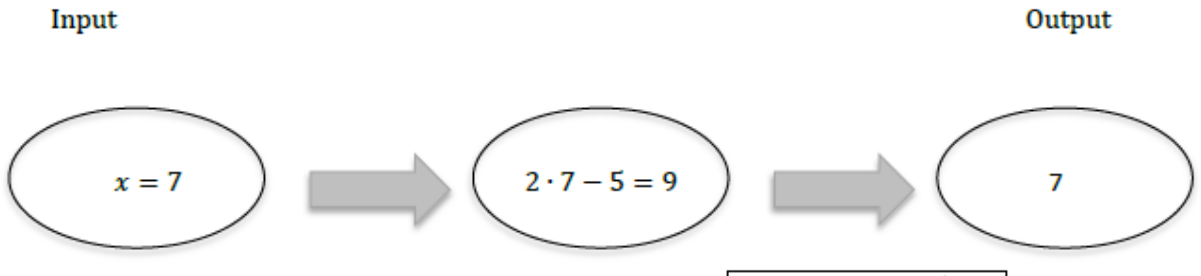


$f(x) = 2^x$

$f^{-1}(x) = \log_2 x$

In words: take the logarithm of x.

4.



$f(x) = 2x - 5$

$f^{-1}(x) = \frac{x+5}{2}$

In words: + 5 and ÷ by 2

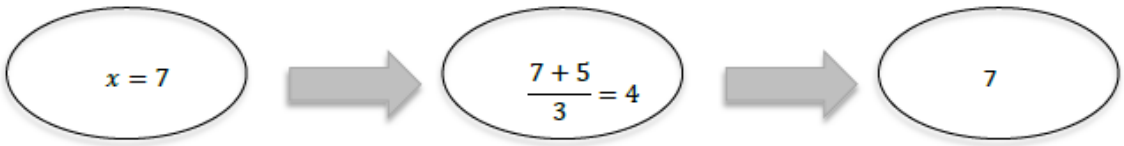
$x = 2y - 5$

$+5 \quad +5$

$x + 5 = 2y$

$\frac{x+5}{2} = y$

5.



$f(x) = \frac{x+5}{3}$

$f^{-1}(x) = 3x - 5$

In words: mult. by 3 & subtract 5

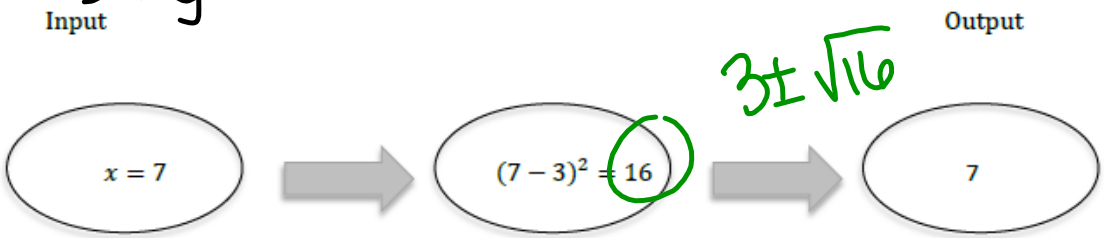
$3 \cdot x = \frac{y+5}{3} \cdot 3$

$3x = y + 5$

$-5 \quad -5$

$3x - 5 = y$

6.



$f(x) = (x-3)^2$

$f^{-1}(x) = 3 \pm \sqrt{x}$

In words: square root x & add 3

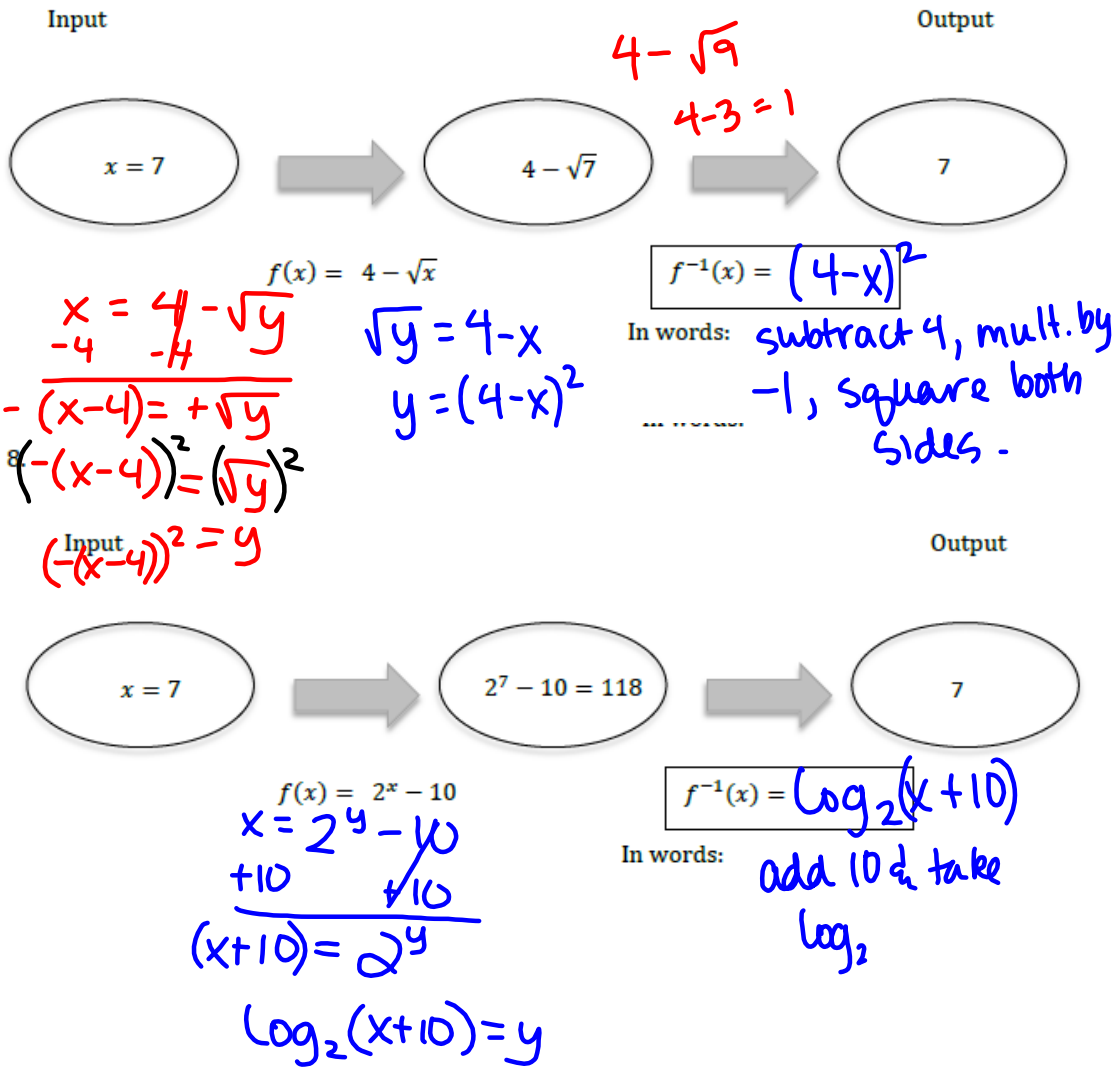
$\sqrt{x} = \sqrt{(y-3)^2}$

$\pm\sqrt{x} = y - 3$

$+3 \quad +3$

$3 \pm \sqrt{x} = y$

7.



9. Each of these problems began with $x = 7$. What is the difference between the x used in $f(x)$ and the x used in $f^{-1}(x)$?

The x in $f^{-1}(x)$ is the output (or y) of our $f(x)$.

$f(7) = 15$

$f^{-1}(15) = 7$

10. In #6, could any value of x be used in $f(x)$ and still give the same output from $f^{-1}(x)$? Explain. What about #7?

For #6, we cannot use any value of x because $f^{-1}(x)$ has a $\pm\sqrt{x}$, which would give us 2 outputs for $f^{-1}(x)$.

#7 is ok...

11. Based on your work in this task and the other tasks in this module what relationships do you see between functions and their inverses?

Homework/Classwork

Finish 1.4

Oct 21-8:47 AM