

Worksheet 4.2

1. $\log_6 36 = 2$	7. $\{3\}$	13. $\{2.833\}$
2. $3^3 = 27$	8. $\{5\}$	14. $\{.685\}$
3. $y = \log_3 x$	9. $\{-2\}$	15. $\{-2.01\}$
4. 1.8295	10. $\{-\frac{2}{3}\}$	16. $\{.616\}$
5. $\ln \frac{x^2 \sqrt{y}}{zw^3}$	11. $\{4\}$	17. $\{2.116\}$
6. a. I, IV b. I, II	12. $\{3\}$	

$y = 3^x$
 $x = 3^y$

$2 \ln x + \frac{1}{2} \ln y - (\ln z + 3 \ln w)$

$2 \ln x + \frac{1}{2} \ln y - \ln z + 3 \ln w$

$2^x : 2^{2(x-1)}$
 $3^x : 2^{x-2}$

Nov 10-4:10 PM

$$(x-3) \log 4 : (1-x) \log 3$$

$$x \log 4 - 3 \log 4 : \log 3 - x \log 3$$

$$x \log 4 + x \log 3 : \log 3 + 3 \log 4$$

$$x(\log 4 + \log 3) :$$

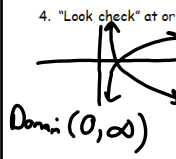
Nov 29-10:04 AM

<u>Logarithmic Form</u> $\log_{\text{base}} \text{argument} = \text{exponent}$ $\log_5 A = E$	$\longleftrightarrow$	<u>Exponential Form</u> $\text{base}^{\text{exponent}} = \text{argument}$ $B^E = A$
---	-----------------------	---

Nov 10-4:04 PM

Steps:

1. Use the laws of logs to combine.
2. a. Log on both sides $\rightarrow$ set arguments equal
b. Log on one side $\rightarrow$ change to exponential form
3. Solve for variable.
4. "Look check" at original equation (Can't take the log of a negative number or 0).

 Domain: $(0, \infty)$

*You can have a negative solution as long as when you take the log of it you are taking the log of a positive number.

Nov 10-4:07 PM

Solve.

1. $\log 3 + \log x = \log 12$
 $\log 3x = \log 12$
 $3x = 12$
 $x = 4$
 $\{4\}$
2. $\log_4 x + \log_4 (x-6) = 2$
 $\log_4 x(x-6) = 2$
 $4^2 = x(x-6)$
 $x^2 - 6x = 16$
 $x^2 - 6x - 16 = 0$
 $(x-8)(x+2) = 0$
 $x-8=0 \quad x+2=0$
 $x=8 \quad x=-2$
 $\{8\}$ (reject $x=-2$)

Nov 10-4:07 PM

3. $2 \log_3 x - \log_3 (x-2) = 2$
 $\log_3 \frac{x^2}{(x-2)} = 2$
 $\frac{x^2}{x-2} = 9$
 $x^2 = 9x - 18$
 $x^2 - 9x + 18 = 0$
 $(x-6)(x-3) = 0$
 $x-6=0 \quad x-3=0$
 $x=6 \quad x=3$
 $\{3, 6\}$
4. $\log(x-2) + \log(2x-3) = 2 \log x$
 $\log(x-2)(2x-3) = \log x^2$
 $(x-2)(2x-3) = x^2$
 $2x^2 - 3x - 4x + 6 = x^2$
 $2x^2 - 7x + 6 = x^2$
 $x^2 - 7x + 6 = 0$
 $(x-1)(x-6) = 0$
 $x-1=0 \quad x-6=0$
 $x=1 \quad x=6$
 $\{6\}$ (reject $x=1$)

Nov 10-4:08 PM

5. $\log(x^2 - 8) = \log 1$

$$\sqrt{x^2 - 8} = 1$$

$$\sqrt{x^2} = \sqrt{9}$$

$$x = \pm 3$$

$$\{\pm 3\}$$

6. $\log_5 5 = -\frac{1}{3}$

$$5^{(-1/3)} = 5^{-3}$$

$$x = \frac{1}{125}$$

Nov 10-4:08 PM

7. $4 \log_2 x + \log_2 5 = \log_2 405$

$$\log_2 5x^4 = \log_2 405$$

$$\frac{5x^4}{5} = \frac{405}{5}$$

$$\sqrt[4]{x^4} = \sqrt[4]{81}$$

$$x = \pm 3$$

$$\{3\}$$

8. $\ln 2 + \ln x = 3$

$$\ln 2x = 3$$

$$\log_e 2x = 3$$

$$\frac{e^3}{2} = \frac{2x}{2}$$

$$x = 10.043$$

$$\{10.043\}$$

Nov 10-4:09 PM

9. $\log(x+3) + \log x = 1$

$$\log_x(x+3) = 1$$

$$x(x+3) = 10$$

$$x^2 + 3x = 10$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2) = 0$$

$$x+5=0 \quad x-2=0$$

$$x=-5 \quad x=2$$

$$\text{reject } x=-5$$

$$x=2$$

$$\{2\}$$

10. $\log_2(4x+10) - \log_2(x+1) = 3$

$$\log_2 \frac{4x+10}{x+1} = 3$$

$$\frac{4x+10}{x+1} = \frac{8}{1}$$

$$\{1/2\}$$

$$4x+10 = 8x+8$$

$$-4x-8 = -4x-8$$

$$2 = \frac{4x}{4}$$

$$x = \frac{1}{2}$$

Nov 10-4:09 PM

Nov 27-7:23 AM