Solving Logs (logarithmic Functions) with Exponents

1)Do #4-6 on SAT Practice.

2)Let's Go over the hw.

3)Mixed Review

4) Notes on solving Logs

5) little quiz (bigger quiz next class)

6) homework

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A mixed review Date_____ Block____

Simplify. Your answer should contain only positive exponents.

1) $x^0 y^{-5} \cdot (x^3 y^2)^{-1}$

2) $(x^2)^3 \cdot -y^3$

Solve each equation.

3) $2^{3p} = 16$

4) $5^{3b} = 5^4$

Solve each equation. Round your answers to the nearest ten-thousandth.

5) $-4e^{7x-1} - 3 = -11$

Expand each logarithm.

6) $\log_5 (x^4 \cdot y)^5$

7) $\log_6 \left(c\sqrt{a \cdot b}\right)$

Condense each expression to a single logarithm.

8) $5\log_8 w + \dfrac{\log_8 u}{2}$

9) $2\log_6 x - 4\log_6 y$

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Simplify. Your answer should contain only positive exponents.

1) $x^0y^{-5} \cdot (x^3y^2)^{-1}$

$\frac{1}{y^7x^3}$

2) $(x^2)^3 \cdot -y^3$

$-x^6y^3$

Solve each equation.

3) $2^{3p} = 16$

$\{\frac{4}{3}\}$

4) $5^{3b} = 5^4$

$\{\frac{4}{3}\}$

Solve each equation. Round your answers to the nearest ten-thousandth.

5) $-4e^{7x-1} - 3 = -11$

0.2419

Expand each logarithm.

6) $\log_5 (x^4 \cdot y)^5$

$20\log_5 x + 5\log_5 y$

7) $\log_6 (c\sqrt{a \cdot b})$

$\log_6 c + \frac{\log_6 a}{2} + \frac{\log_6 b}{2}$

Condense each expression to a single logarithm.

8) $5\log_8 w + \frac{\log_8 u}{2}$

$\log_8 (w^5\sqrt{u})$

9) $2\log_6 x - 4\log_6 y$

$\log_6 \frac{x^2}{y^4}$

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Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples	
Logarithmic Equations **TYPE I: LOG = LOG**	① **CONDENSE** each logarithm.	
	② **Use the One-to-One Property:** If $\log_b m = \log_b n$, then	
	③ **SOLVE** and **CHECK FOR EXTRANEOUS SOLUTIONS.**	
	1. $\log_5(5x+9) = \log_5(6x)$	**2.** $\log_2(1-4n) = \log_2(2n+43)$
	3. $\log_9(6-3w) = \log_9(-2w)$	**4.** $\log(y+5) + \log 4 = \log 72$
	5. $3 \cdot \log_7 4 = \log_7(4a-8)$	**6.** $\log_4 68 - \log_4 4 = \log_4(3n+11)$
	7. $\frac{1}{2} \cdot \log_6 25 = \log_6(23-4w)$	**8.** $\log_3(2p-5) = 2 \cdot \log_3 6 - \log_3 4$

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Logarithmic Equations **TYPE I: LOG = LOG**	① **CONDENSE** each logarithm. ② **Use the One-to-One Property:** If $\log_b m = \log_b n$, then ③ **SOLVE** and **CHECK FOR EXTRANEOUS SOLUTIONS.**

1. $\log_5(5x+9) = \log_5(6x)$

$5x+9 = 6x$

$\boxed{9 = x}$ ✓

2. $\log_2(1-4n) = \log_2(2n+43)$

$1-4n = 2n+43$

$1-6n = 43$

$-6n = 42$

$\boxed{n = -7}$ ✓

3. $\log_9(6-3w) = \log_9(-2w)$

$6-3w = -2w$

~~$6 = w$~~

No Solution!
Logs cannot be negative

$\log_9(3-6\cdot3) = \log_9(-2\cdot6)$

$\log_9(-12) = \log_9(-12)$

4. $\log(y+5) + \log 4 = \log 72$

$\log(y+5)\cdot 4 = \log 72$

$4(y+5) = 72$

$4y+20 = 72$

$4y = 52$

$\boxed{y = 13}$ ✓

5. $3\cdot\log_7 4 = \log_7(4a-8)$

$\log_7 4^3 = \log_7(4a-8)$

$64 = 4a-8$

$72 = 4a$

$\boxed{18 = a}$ ✓

6. $\log_4 68 - \log_4 4 = \log_4(3n+11)$

$\log_4 \frac{68}{4} = \log_4(3n+11)$

$17 = 3n+11$

$6 = 3n$

$\boxed{2 = n}$ ✓

7. $\frac{1}{2}\cdot\log_6 25 = \log_6(23-4w)$

$\log_6 25^{1/2} = \log_6(23-4w)$

$5 = 23-4w$

$-18 = -4w$

$\boxed{\frac{9}{2} = w}$ ✓

8. $\log_3(2p-5) = 2\cdot\log_3 6 - \log_3 4$

$\log_3(2p-5) = \log_3 \frac{6^2}{4}$

$2p-5 = 9$

$2p = 14$

$\boxed{p = 7}$ ✓

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	9. $\log_4(m^2) = \log_4(18-7m)$	**10.** $\log 2 + \log(k^2) = \log(k^2+16)$
TYPE 2: LOG = NUMBER	① **CONDENSE** and **ISOLATE** the logarithm. ② Write the equation in **EXPONENTIAL FORM.** ③ **SOLVE** and **CHECK FOR EXTRANEOUS SOLUTIONS.**	
	11. $\log_2(x-4) = 6$	**12.** $\log_3(4x+8) - 7 = -3$
	13. $\log(2x) + \log(x-5) = 2$	**14.** $2 \cdot \log x - \log 4 = 2$
	15. $\log_6(x+9) + \log_6 x = 2$	**16.** $\log(x-3) + \log x = 1$

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9. $\log_4(m^2) = \log_4(18-7m)$

$m^2 = 18-7m$

$m^2+7m-18=0$

$(m+9)(m-2)=0$

$m=-9$ | $m=2$ ✓

10. $\log 2 + \log(k^2) = \log(k^2+16)$

$\log 2k^2 = \log(k^2+16)$

$2k^2 = k^2+16$

$k^2-16=0$

$(k+4)(k-4)=0$

$k=-4$ | $k=4$ ✓

TYPE 2: LOG = NUMBER

1. **CONDENSE** and **ISOLATE** the logarithm.
2. Write the equation in **EXPONENTIAL FORM.**
3. **SOLVE** and **CHECK FOR EXTRANEOUS SOLUTIONS.**

11. $\log_2(x-4)=6$

$2^6 = x-4$

$64 = x-8$

$72 = x$

12. $\log_3(4x+8)-7=-3$

$\log_3(4x+8)=4$

$3^4 = 4x+8$

$81 = 4x+8$

$73 = 4x$

$\frac{73}{4} = x$ ✓

13. $\log(2x)+\log(x-5)=2$

$\log(2x)(x-5)=2$

$10^2 = 2x^2-10x$

$0 = 2x^2-10x-100$

$0 = 2(x^2-5x-50)$

$0 = 2(x-10)(x+5)$

$x=10$ | ~~$x=-5$~~ ✓

14. $2\cdot\log x - \log 4 = 2$

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

$10^2 = \frac{x^2}{4}$

$400 = x^2$

$0 = x^2-400$

$0 = (x+20)(x-20)$

~~$x=-20$~~ | $x=20$ ✓

15. $\log_6(x+9)+\log_6 x = 2$

$\log_6 x^2+9x = 2$

$x^2+9x = 36$

$x^2+9x-36=0$

$(x+12)(x-3)=0$

~~$x=-12$~~ | $x=3$ ✓

16. $\log(x-3)+\log x = 1$

$\log x^2-3x = 1$

$10 = x^2-3x$

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

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

$x=5$ ✓ | ~~$x=-2$~~

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Name: _____ **Unit 7:** Exponential & Logarithmic Functions

Date: _____ **Bell:** _____ **Homework 6:** Solving Logarithmic Equations

**** This is a 2-page document! ****

Directions: Solve each equation. Check for extraneous solutions.

1. $\log_3(3x-11)=\log_3(25-x)$	**2.** $\log_7(4n-7)=\log_7(-3n)$
3. $\log_2 75=\log_2 3+\log_2(2y-1)$	**4.** $2\cdot\log m=\log 36$
5. $\log_4 108-\log_4 9=\log_4(7a-9)$	**6.** $\frac{1}{3}\cdot\log_5 64=\log_5 8+\log_5 p$
7. $\log(w^2+21)=\log(10w)$	**8.** $\log_2(2x)+\log_2(x-7)=\log_2(4x)$

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Name: _____ **Unit 7:** Exponential & Logarithmic Functions

Date: _____ **Bell:** _____ **Homework 6:** Solving Logarithmic Equations

**** This is a 2-page document! ****

Directions: Solve each equation. Check for extraneous solutions.

1. $\log_3(3x-11) = \log_3(25-x)$

$3x-11 = 25-x$

$4x-11 = 25$

$4x = 36$

$\boxed{x=9}$ ✓

2. $\log_7(4n-7) = \log_7(-3n)$

$4n-7 = -3n$

$-7 = -7n$

~~$1 = n$~~

No Solution!

3. $\log_2 75 = \log_2 3 + \log_2(2y-1)$

$\log_2 75 = \log_2(3(2y-1))$

$75 = 6y-3$

$78 = 6y$

$13 = y$

4. $2 \cdot \log m = \log 36$

$\log m^2 = \log 36$

$m^2 = 36$

$m^2 - 36 = 0$

$(m+6)(m-6) = 0$

~~$m=-6$~~ | $\boxed{m=6}$ ✓

5. $\log_4 108 - \log_4 9 = \log_4(7a-9)$

$\log_4 \frac{108}{9} = \log_4(7a-9)$

$12 = 7a-9$

$21 = 7a$

$\boxed{3=a}$ ✓

6. $\frac{1}{3} \cdot \log_5 64 = \log_5 8 + \log_5 p$

$\log_5 64^{1/3} = \log_5 8 \cdot p$

$4 = 8p$

$\boxed{\frac{1}{2} = p}$ ✓

7. $\log(w^2+21) = \log(10w)$

$w^2+21 = 10w$

$w^2-10w+21 = 0$

$(w-7)(w-3) = 0$

✓ $\boxed{w=7}$ | $\boxed{w=3}$ ✓

8. $\log_2(2x) + \log_2(x-7) = \log_2(4x)$

$\log_2(2x(x-7)) = \log_2(4x)$

$2x^2-14x = 4x$

$2x^2-18x = 0$

$2x(x-9) = 0$

~~$x=0$~~ | $\boxed{x=9}$ ✓

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9. $\log_4(2m^3 - 14m^2) - \log_4(2m) = \log_4 8$	**10.** $2 \cdot \log(x - 3) = \log 25$
11. $\log_3(2x - 7) = 4$	**12.** $\log_8(28k - 20) + 15 = 18$
13. $\log_9(15 - 4n) = \frac{1}{2}$	**14.** $\log_2 4 + \log_2(c - 9) = 5$
15. $2 \cdot \log_4 k = 4$	**16.** $\log_8(p^2 + 15) = 2$

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9. $\log_4(2m^3-14m^2)-\log_4(2m)=\log_4 8$

$\log_4\left(\frac{2m^3-14m^2}{2m}\right)=\log_4 8$

$m^2-7m=8$

$m^2-7m-8=0$

$(m-8)(m+1)=0$

✓ $m=8$ | ~~$m=-1$~~

10. $2\cdot\log(x-3)=\log 25$

$\log(x-3)^2=\log 25$

$x^2-6x+9=25$

$x^2-6x-16=0$

$(x-8)(x+2)=0$

✓ $x=8$ | ~~$x=-2$~~

11. $\log_3(2x-7)=4$

$3^4=2x-7$

$81=2x-7$

$88=2x$

$44=x$ ✓

12. $\log_8(28k-20)+15=18$

$\log_8(28k-20)=3$

$8^3=28k-20$

$512=28k-20$

$532=28k$

$19=k$ ✓

12. $\log_9(15-4n)=\frac{1}{2}$

$9^{1/2}=15-4n$

$3=15-4n$

$-12=-4n$

$3=n$ ✓

14. $\log_2 4+\log_2(c-9)=5$

$\log_2(4(c-9))=5$

$2^5=4c-36$

$32=4c-36$

$68=4c$

$17=c$ ✓

15. $2\cdot\log_4 k=4$

$\log_4 k^2=4$

$4^4=k^2$

$256=k^2$

$0=k^2-256$

$0=(k+16)(k-16)$

~~$k=-16$~~ | $k=16$ ✓

16. $\log_8(p^2+15)=2$

$8^2=p^2+15$

$64=p^2+15$

$49=p^2$

$0=p^2-49$

$0=(p+7)(p-7)$

✓ $p=-7$ | $p=7$ ✓

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quiz: On the little piece of paper

1) condense: $\log_{12} 18 + 3 \cdot \log_{12} 2$

2) Solve for m: $2 \cdot \log m = \log 36$