Welcome Back!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 2/26 Topic: Exponential Project Due!	0 1 2	
Tuesday Date: 2/27 Topic: ACT For Juniors	0 1 2	
Wednesday Date: 2/28 Topic: Power Property of Logarithms	0 1 2	
Thursday Date: _____ Topic: _____	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Warm-ups: Exponential Solving

a) Solve using logarithms

$$-3 + \log_2(-5r - 4) = -3$$

b&c) Solve by finding same base

$$64^{2x} \cdot 16^{3x-1} = 1$$

$$\left(\frac{1}{32}\right)^{-2x+1} = 4^{2x-2}$$

Warm-up: Solve for **r**.

$$-3 + \log_2(-5r - 4) = -3$$

$+3 \qquad +3$

$\log_2(-5r-4) = 0$

$2^x = -5r-4$

$2^0 = 1$

$-5r-4 = 1$

$\frac{-5r}{-5} = \frac{5}{-5}$

$r = -1$

Warm-up: Solve for **r**.

$$-3 + \log_2(-5r - 4) = -3$$

$+3 \qquad +3$

$$\log_2(-5r-4) = 0$$

$$2^0 = -5r - 4$$

$$1 = -5r - 4$$

$+4 \qquad +4$

$$5 = -5r$$

$$-1 = r$$

(From Day 1 Logarithm's HW)

25) $64^{2x} \cdot 16^{3x-1} = 1$

$64 = 4^3$

$16 = 4^2$

$4^{3(2x)} \cdot 4^{2(3x-1)} = 4^0$

$6x + 6x - 2 = 0$

$12x - 2 = 0$

$\frac{12x}{12} = \frac{2}{12}$

$x = \frac{1}{6}$

$4^x = 1$

$x = 0$

(From Day 1 Logarithm's HW)

25) $64^{2x} \cdot 16^{3x-1} = 1$

GOAL: same Base, then Solve!

$2^{6(2x)} \cdot 2^{4(3x-1)} = 2^0$

$2^{12x} \cdot 2^{12x-4} = 2^0$

$2^{12x+12x-4} = 2^0$

Then, $24x - 4 = 0$

$+4 \quad +4$

$\frac{24x}{24} = \frac{4}{24}$

$\boxed{x = \frac{1}{6}}$

Warm-up: Solve for **x**.

$$\left(\frac{1}{32}\right)^{-2x+1} = 4^{2x-2}$$

$4^{2x} \cdot 4^{-2}$

$\frac{1}{32} = 32^{-1} = (2^5)^{-1} = 2^{-5}$

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

$4 = 2^2$

$10x - 5 = 4x - 4$

$6x - 5 = -4$

$6x = 1$

$x = \frac{1}{6}$

Warm-up: Solve for **x**.

One method...

$$\left(\frac{1}{32}\right)^{-2x+1} = 4^{2x-2}$$

$$= \frac{1^{-2x+1}}{32^{-2x+1}} = 4^{2x-2}$$

$$\frac{2^{0(-2x+1)}}{2^{5(-2x+1)}} = 2^{2(2x-2)}$$

$$\Rightarrow \frac{1}{2^{-10x+5}} = 2^{4x-4}$$

$$2^{-(10x-5)}$$

$$2^{10x-5} = 2^{4x-4}$$

Warm-up: Solve for **x**. Another method...

$$\left(\frac{1}{32}\right)^{-2x+1} = 4^{2x-2}$$

$\frac{1}{32} = 32^{-1} = (2^5)^{-1} = 2^{-5}$

$4 = 2^2$

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

$2^{10x-5} = 2^{4x-4}$

$10x - 5 = 4x - 4$

$6x - 5 = -4$

$6x = 1$

$x = \frac{1}{6}$

Class Plan:

1. Warm-up
2. Homework Questions?
3. Trashketball! :)

Practice Applying Properties of logarithms

Recall the Log Properties

Logarithmic Properties	
Product Rule	$\log_a(xy) = \log_a x + \log_a y$
Quotient Rule	$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$
Power Rule	$\log_a x^p = p\log_a x$
Change of Base Rule	$\log_a x = \frac{\log_b x}{\log_b a}$
Equality Rule	If $\log_a x = \log_a y$ then $x = y$

Trashketball

Table 1

Table 2

Table 3

Table 4

Table 5

Table 6

Table 7

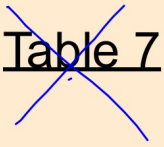

Table 8

Table 9

Trashketball

1. Work together to put 1 solution on your board, **wait** to hold it up until told.

2. Table correct? **1 point.**

3. Every 2 points, a person from the ***table*** gets to shoot for 1, 2 or 3 bonus points

4. Teacher is the judge - if you are taking too long - or losing focus - you lose your shot :) Stay on your game!

Exercises:

Rewrite each equation in logarithmic form.

1) $3^5 = 243$

2) $17^{-2} = \frac{1}{289}$

Exercises:

Rewrite each equation in logarithmic form.

3) $v^{-5} = u$

4) $y^{10} = x$

Exercises:

Rewrite each equation in logarithmic form.

5) $\log\left(\frac{3}{5^6}\right)^5$

6) $\log_8\left(5 \cdot 12 \cdot 7^4\right)$

Exercises:

Rewrite each equation in logarithmic form.

7) $\log_8\left(c\sqrt{a \cdot b}\right)$

8) $\log_4\left(z^5\sqrt{x}\right)$

Exercises:

Condense each expression to a single logarithm.

9) $3\log_6 x - 6\log_6 y$

Exercises:

Condense each expression to a single logarithm.

10) $6\log_5 c + \dfrac{\log_5 a}{2}$

Exercises:

Condense each expression to a single logarithm.

11) $36\log_8 10 + 6\log_8 3$

Exercises:

Condense each expression to a single logarithm.

12) $\log_7 11 + \log_7 10 + 5\log_7 3$

Exercises:

Rewrite using an exponential equation, then evaluate each expression.

13) $\log_7 49$

16) $\log_2 64$

Exercises:

Rewrite using an exponential equation, then evaluate each expression.

15) $\log_9 3$

16) $\log_2 64$

Exercises:

Rewrite using an exponential equation. Then use a calculator to approximate each to the nearest thousandth.

17) $\log_3 14$

18) $\log_3 17$

Exercises:

Rewrite using an exponential equation. Then use a calculator to approximate each to the nearest thousandth.

19) $\log_2 2.7$

20) $\log_7 62$

Exercises:

Solve each equation. (**Note, 24 requires solving a quadratic equation.)

21) $\log_9(3n+2) = \log_9(n+7)$

Exercises:

Solve each equation. (**Note, 24 requires solving a quadratic equation.)

22) $\log_{19}(-3k+8) = \log_{19} -4k$

Exercises:

Solve each equation. (**Note, 24 requires solving a quadratic equation.)

23) $\log_7(4a-2) = \log_7 5a$

Exercises:

Solve each equation. (**Note, 24 requires solving a quadratic equation.)

24) $\log_{12}(4x^2 + 4x) = \log_{12}(5 + 3x^2)$

Exercises:

Solutions!

1) $\log_3 243 = 5$

2) $\log_{17} \frac{1}{289} = -2$

3) $\log_v u = -5$

4) $\log_y x = 10$

5) $5\log 3 - 30\log 5$

6) $\log_8 5 + \log_8 12 + 4\log_8 7$

7) $\log_8 c + \frac{\log_8 a}{2} + \frac{\log_8 b}{2}$

8) $5\log_4 z + \frac{\log_4 x}{2}$

9) $\log_6 \frac{x^3}{y^6}$

10) $\log_5 \left(c^6\sqrt{a}\right)$

11) $\log_8 \left(3^6 \cdot 10^{36}\right)$

12) $\log_7 \left(110 \cdot 3^5\right)$

13) 2

14) $-\frac{1}{3}$

15) $\frac{1}{2}$

16) 6

17) 2.402

18) 2.579

19) 1.433

20) 2.121

21) $\left\{\frac{5}{2}\right\}$

22) $\{-8\}$

23) No solution.

24) $\{1, -5\}$

Detailed work of the solutions on the next couple pages...

Exercises:

Solutions!

Rewrite each equation in logarithmic form.

1) $3^5 = 243$

$5 = \log_3(243)$

2) $17^{-2} = \frac{1}{289}$

$-2 = \log_{17}\left(\frac{1}{289}\right)$

3) $v^{-5} = u$

$-5 = \log_v(u)$

4) $y^{10} = x$

$10 = \log_y(x)$

Expand each logarithm.

5) $\log\left(\frac{3}{5^6}\right)^5$

$5\log 3 - 5\log 5^6$

$= 5\log 3 - 30\log 5$

6) $\log_8(5 \cdot 12 \cdot 7^4)$

$\log_8(5) + \log_8(12) + 4\log_8(7)$

Exercises: Solutions!

7) $\log_8\left(c\sqrt{a\cdot b}\right) = \log_8 c\cdot a^{\frac{1}{2}}\cdot b^{\frac{1}{2}}$

$= \log_8 c + \frac{1}{2}\log_8 a + \frac{1}{2}\log_8 b$

8) $\log_4\left(z^5\sqrt{x}\right) = \log_4\left(z^5 x^{\frac{1}{2}}\right)$

$= 5\log_4(z) + \frac{1}{2}\log_4(x)$

Condense each expression to a single logarithm.

9) $3\log_6 x - 6\log_6 y = \frac{3\log_6(x)}{6\log_6(y)}$

$= \frac{\log_6 x^3}{\log_6 y^6} = \log_6\left(\frac{x^3}{y^6}\right)$

10) $6\log_5 c + \frac{\log_5 a}{2} = 6\log_5 c + \frac{1}{2}\log_5 a$

$= \log_5 c^6 + \log_5 a^{\frac{1}{2}}$ $\left\{a^{\frac{1}{2}} = \sqrt{a}\right\}$

$= \log_5\left(c^6\cdot\sqrt{a}\right)$

11) $36\log_8 10 + 6\log_8 3$

$\log_8\left(10^{36}\cdot 3^6\right)$

12) $\log_7 11 + \log_7 10 + 5\log_7 3$

$\log_7\left(11\cdot 10\cdot 3^5\right) = \log_7\left(110\cdot 3^5\right)$

Exercises: Solutions!

Rewrite using an exponential equation, then evaluate each expression.

13) $\log_7 49$ $7^x = 49$ $\boxed{x = 2}$

14) $\log_{216} \frac{1}{6}$ $216^x = \frac{1}{6}$ $\boxed{x = -\frac{1}{3}}$ $216^{\frac{1}{3}} = 6$ $216^{-\frac{1}{3}} = \frac{1}{6}$

15) $\log_9 3$ $9^x = 3$ $\boxed{x = \frac{1}{2}}$

16) $\log_2 64$ $2^x = 64$ $\boxed{x = 6}$

Rewrite using an exponential equation. Then use a calculator to approximate each to the nearest thousandth.

17) $\log_3 14$ $3^x = 14$ $x \approx 2.402$

18) $\log_3 17$ $3^x = 17$ $x \approx 2.579$

19) $\log_2 2.7$ $2^x = 2.7$ $x \approx 1.433$

20) $\log_7 62$ $7^x = 62$ $x \approx 2.121$

Exercises: **Solutions!**

Solve each equation. (Note, 24 requires solving a quadratic equation.)**

21) $\log_9(3n+2) = \log_9(n+7)$

$3n+2 = n+7$

$2n = 5$

$n = 5/2$

22) $\log_{19}(-3k+8) = \log_{19} -4k$

$-3k+8 = -4k$

$8 = -k$

$-8 = k$

Exercises:

Solutions!

23) $\log_7(4a-2) = \log_7 5a$

$4a-2=5a$

$-2=a$

But $\log_7(5(-2))$

$=\log_7(-10)$

$7^x = -10$

No value will ever make 7 multiply to a negative value.

24) $\log_{12}(4x^2+4x) = \log_{12}(5+3x^2)$

$4x^2+4x = 5+3x^2$

$-3x^2 \quad -3x^2$

$x^2+4x = 5$

$-5 \quad -5$

$x^2+4x-5=0$

$(x+5)(x-1)=0$ {Factoring method}

$x=-5, 1$

$x = \frac{-4 \pm \sqrt{16-4(1)(-5)}}{2(1)}$ {QUAD Formula method}

$x = \frac{-4 \pm \sqrt{36}}{2}$

$x = \frac{-4+6}{2} \quad x = \frac{-4-6}{2}$

$x=1$ and $x=-5$