Main Ideas/Questions	Notes/Examples

WARM-UP
Using a common base to solve an exponential equation.

Directions: Solve the equations below using a common base.

1. $5^{n+10} = 25$

$5^{n+10} = 5^2$

$n+10 = 2$

$-10 \quad -10$

$n = -8$

2. $9^{a+2} = 27^{4a-2}$

$3^{2(a+2)} = 3^{3(4a-2)}$

$2a+4 = 12a-6$

$-12a \quad -12a$

$-10a+4 = -6$

$-4 \quad -4$

$-10a = -10$

$a = 1$

What if a common base is NOT possible?

1	**ISOLATE** the exponential expression.
2	**TAKE THE LOG** of **both sides**.
3	You may need to **EXPAND** the log. (Use the Power Rule)
4	**SOLVE** and **CHECK FOR EXTRANEOUS SOLUTIONS**.

*Rounded answers may not produce the exact same answer, but will be very close.

Examples

3. $2^x = 61$

$\log 2^x = \log 61$

$x \log 2 = \log 61$

$\frac{x \log 2}{\log 2} = \frac{\log 61}{\log 2}$

$x \approx 5.9$

4. $8^{m-7} = 92$

$\log 8^{m-7} = \log 92$

$(m-7)\log 8 = \log 92$

$\frac{(m-7)\log 8}{\log 8} = \frac{\log 92}{\log 8}$

$m-7 = 2.2$

$+7 \quad +7$

$m \approx 9.2$

5. $4 \cdot 7^n = 148$

$\frac{4 \cdot 7^n}{4} = \frac{148}{4}$

$7^n = 37$

$\log 7^n = \log 37$

$n \log 7 = \log 37$

$n = \frac{\log 37}{\log 7}$

$n \approx 1.9$

6. $4^{3w} - 5 = 3$

$+5 \quad +5$

$4^{3w} = 8$

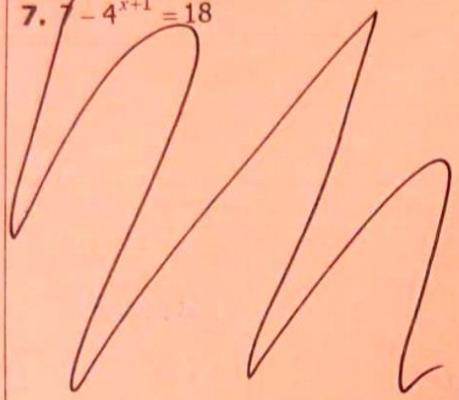
$\log 4^{3w} = \log 8$

$3w = \frac{\log 8}{\log 4}$

$\frac{3w}{3} = \frac{1.5}{3}$

$w \approx .5$

7. $7 - 4^{x+1} = 18$



8. $\frac{10 \cdot 5^{3k-3}}{10} = \frac{40}{10}$

$5^{3k-3} = 4$

$\log 5^{3k-3} = \log 4$

$3k - 3 = \frac{\log 4}{\log 5}$

$3k - 3 = .9$

$+3 \quad +3$

$\frac{3k}{3} = \frac{6.9}{3}$

$k \approx 1.3$

9. $4 \cdot 3^n + 15 = 359$

$-15 \quad -15$

$\frac{4 \cdot 3^n}{4} = \frac{344}{4}$

$3^n = 86$

$n \log 3 = \log 86$

$n = \frac{\log 86}{\log 3}$

$n \approx 4.1$

10. $-2 \cdot 5^p + 7 = -63$

$-7 \quad -7$

$\frac{-2 \cdot 5^p}{-2} = \frac{-70}{-2}$

$5^p = 35$

$p \log 5 = \log 35$

$p = \frac{\log 35}{\log 5}$

$p \approx 2.2$

11. $5 \cdot 9^{v-1} + 1 = 181$

$-1 \quad -1$

$\frac{5 \cdot 9^{v-1}}{5} = \frac{180}{5}$

$9^{v-1} = 36$

$v - 1 (\log 9) = \log 36$

$v - 1 = \frac{\log 36}{\log 9}$

$v - 1 = 1.6$

$+1 \quad +1$

$v \approx 2.6$

12. $8 \cdot 11^{7k} - 3 = 213$

$+3 \quad +3$

$\frac{8 \cdot 11^{7k}}{8} = \frac{216}{8}$

$11^{7k} = 27$

$7k \log 11 = \log 27$

$7k = \frac{\log 27}{\log 11}$

$7k = 1.4$

$k \approx .2$

13. $6 \cdot 16^{7y+2} - 2 = 82$

$+2 \quad +2$

$\frac{6 \cdot 16^{7y+2}}{6} = \frac{84}{6}$

$16^{7y+2} = 14$

$(7y+2) \log 16 = \log 14$

$7y + 2 = \frac{\log 14}{\log 16}$

$7y + 2 = .95$

$-2 \quad -2$

$\frac{7y}{7} = \frac{-1.05}{7}$

$y = -.15$

14. $3 \cdot 8^{3-7n} + 10 = 94$

$-10 \quad -10$

$\frac{3 \cdot 8^{3-7n}}{3} = \frac{84}{3}$

$8^{3-7n} = 28$

$3 - 7n = \frac{\log 28}{\log 8}$

$3 - 7n = 1.6$

$-7n = -1.4$

$n \approx .2$