Name:_____   Date:_____

M12P HW Section 7.3 Solving Exponential Equations and Basic Logarithm

$$a^x \times a^y = a^{x+y} \qquad a^m \div a^n = a^{m-n} \qquad \left(a^m\right)^n = a^{m \times n} \qquad a^y \times b^y = \left(ab\right)^y$$

1. When you multiply two powers with the same base, do you "add" or "multiply" their exponents? Explain

2. What is the difference between: $\left(-a\right)^4$ vs $-a^4$

3. What is the purpose of logarithm? How would you use logarithms to find the value of "x": $a^x = b$

4. How would you use logarithm to find the value of "x"? $6^x = 120$. Show your work:

5. Is there a solution to the equation? Explain: $3^x = -1$

6. How would you solve this problem? Can you use logarithm? Explain: $\left(-2\right)^x = -131072$

7. How about his next problem, how would you solve it using logarithm? $\left(-2\right)^x = -1048576$

8. Solve the following equations using basic exponential rules: Show all your work and steps:

a) $3^{x+1} = 81$	b) $4^{x-2} = 64$	c) $9^{x+1} = 2173$
d) $16^x = 65536$	e) $8 \times 2^5 = 2^x$	f) $\dfrac{27}{3^2} = 3^x$
g) $\left(\dfrac{512}{2^5}\right)^2 = 2^x$	h) $243 = \dfrac{3^x}{27}$	i) $12^x = 2^6 3^3$
j) $\dfrac{64}{2^x} = 1024$	k) $\left(27\right)^3 = 3^x$	L) $3^{2x} = 729$
m) $4^{3x} = 128$	n) $729^x = 81$	O) $4^{x+1} = 65536$

p) $25^{2x} = 78125$	q) $36^{x+3} = 7776$	r) $4^x (16) = 64$
s) $\left(3^{2x}\right)^3 = 81$	t) $\dfrac{16^x}{2^{3x}} = 128$	u) $\left(4^{x+1}\right)\left(2^5\right) = 65536$
v) $\dfrac{\left(729^x\right)}{9^{x-3}} = 3$	w) $\left(\dfrac{8^{-1} + 2^{-3}}{4^{-3}}\right)^3 = 32^{-x+1}$	x) $12^4 = 2^x 3^y$
y) $\left(\dfrac{81^{x+4}}{9^5}\right)^4 = \left(\dfrac{1}{3}\right)^x$	z) $\left(\dfrac{16^{-x}}{32^2}\right)^4 = 64^{x+1}$	ii) $\left(\dfrac{\left(81^2\right)9^x}{729^3}\right)^{-1} = \dfrac{\left(3^{3x+1}\right)}{9^x}$

9. Solve the following equations by factoring:

a) $9^x - 30(3^x) + 81 = 0$	b) $16^x - 12(4^x) + 32 = 0$
c) $(8)^{2x} - 18(8)^x + 32 = 0$	d) $16^x - 10(2^{2x+2}) + 256 = 0$
e) $12(9^x) - 17(3^x) + 6 = 0$	f) $15(25^x) - 41(5^x) = -14$
g) $56(4^{x-1}) - 6(2^{x-1}) = 5$	h) $3(9^{x+1}) - 8(3^{x+1}) + 4 = 0$