Name:_____ Date:_____

Math 12 Honours: Section 5.1 Solving Exponential Functions

1. Solve for all values of "x" :

a) $8^{x+1}(32)=128$	b) $\left(27^{2x}\right)^{3}=\frac{1}{729}$
c) $\frac{8^{-1}+2^{-3}}{64^{x}}=\left(2^{2x-3}\right)$	d) $\frac{256^{x}}{4^{2x-6}}=\left(2^{2x}\right)^{x}$
e) $\left(8^{x+4}\right)^{x}=128^{2x+3}$	f) $\frac{\left(729^{x}\right)}{3\times 9^{2x-3}}=\left(27^{2x+3}\right)^{x}$

2. Use Logarithms to solve for "x":

a) $4^{x-3} = 10$	b) $6^{2x+1} = 14$
c) $9^{x^2} = 20$	d) $10^{3-x} = 21$
e) $\left(2^{2x}\right)3^{x} = 8000$	f) $6^{x^3} = 20$

3. Rewrite each of the following in logarithm form:

$a)\ e^5 = y$	$b)\ 2a^b = c$	$c)\ 2\left(3x\right)^{15} = y$

4. Evaluate each of the following without a calculator:

$a)\log_5 125$	$b)\log_2 128$	$c)\log_9 2183$
$d)\log_{16} 64$	$e)\log_7 \sqrt{343}$	$f)\left(\log_{128} 1024\right)^{-1}$
$g)\log_8\left(\frac{1}{4}\right)$	$h)-\log_{2.5}\left(\frac{125}{8}\right)$	$i)\left(\log_{0.125} 64^{\frac{2}{3}}\right)^{-2}$

5. Simplify each of the following logarithms without using a calculator:

a) $\log_6 24 + \log_6 9$	b) $\log_5 100 - \log_5 4$	c) $\log_4 8 + \log_4 64$

d) $\log_3 324 - \log_3 4$	e) $\log_4 12 + \log_4\left(\frac{2}{3}\right) + 3\log_4 2$	f) $\log_8 24 + 2\log_8 2 - \log_8 3$
g) $\log_3 \sqrt{45} - 0.5\log_3 5 + \log_3 9$	h) $\log_3 5! - \log_3 4 - 1$	i) $\log_{x+1}\left(x^3 + 3x^2 + 3x + 1\right)$

6. Solve for all possible values of "x" : Euclid : $3^{x-1}\left(9^{\frac{3}{2x^2}}\right) = 27$

7. Suppose you have the equation $2^{5x-3} = -1$, is it possible to have a solution? Explain and justify your answer:

8. Given the equation, $m^x = m^y$, how many cases are there such that the equation is true?

9. Find all values of "x" such that: $6^2\left(6^x\right)^x = \left(6^x\right)\left(6^x\right)\left(6^x\right)$

10. Solve for all possible values of "x": $4\times 9^{x}-21=25\times 3^{x}$

11. Solve for "x": $2^{x+1}+2^{x}=2^{3}+2^{5}+2^{7-x}$

12. Suppose that $P=2^{m}$ and $Q=3^{n}$. Which of the following is equal to 12^{mn} for every pair of integers (m,n)?
    a) $P^{2}Q$ b) $P^{n}Q^{m}$ c) $P^{n}Q^{2m}$ d) $P^{2m}Q^{n}$ e) $P^{2n}Q^{m}$ (AMC)

13. Solve the equation for "y" in terms of "x". For hat values of "x" is there no value of "y" that satisfies the equation: $\left(x+2\right)^{2y}-x^{2}=3$

14. Suppose that $60^{a}=3$ and $60^{b}=5$. What is the value of $12^{\frac{1-a-b}{2-2b}}$?AMC12

15. Suppose "a", "b", "c" and "d" are positive integers, then what is the smallest possible value of $a+b+c+d$?

$4^{a}+4^{b}+4^{c}+4^{d}=4^{1023}$

16. Given the equations below, find all the ordered triples of real values (a,b,c) that satisfy the them:

$$c^a = b^{2a}, \quad 2^c = 2\left(4^a\right), \quad a+b+c=10$$