Name: ____________________________________ Date: __________________

5-3 THE METHOD OF COMMON BASES
MATH III HOMEWORK

FLUENCY

1. Solve each of the following exponential equations using the Method of Common Bases. Each equation will result in a linear equation with one solution. Check your answers.

(a) $3^{2x-5}=9$ (b) $2^{3x+7}=16$ (c) $5^{4x-5}=\frac{1}{125}$

(d) $8^{x}=4^{2x+1}$ (e) $216^{x-2}=\left(\frac{1}{1296}\right)^{3x-2}$ (f) $\left(\frac{1}{25}\right)^{x+15}=3125^{\frac{3}{5}x-1}$

2. *Algebraically* determine the intersection point of the two exponential functions shown below. Recall that most systems of equations are solved by substitution.

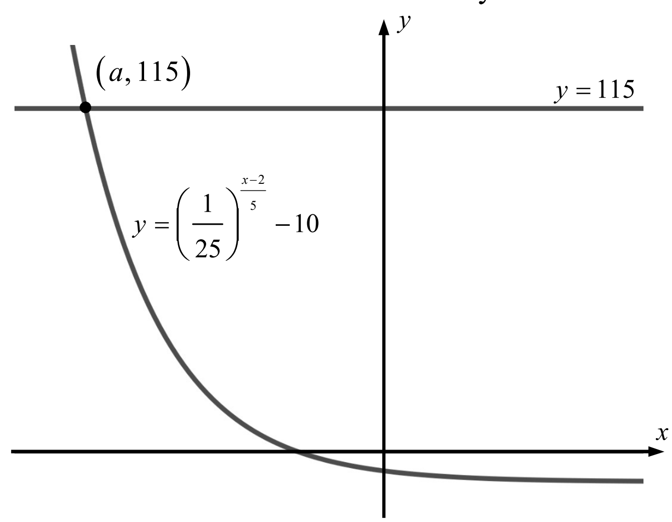
$$y=8^{x-1} \text{ and } y=4^{2x-3}$$

3. *Algebraically* determine the **zeroes** of the exponential function $f(x)=2^{2x-9}-32$. Recall that the reason it is known as a zero is because the **output is zero**.

APPLICATIONS

4. One hundred must be raised to what power in order to be equal to a million cubed? Solve this problem using the Method of Common Bases. Show the algebra you do to find your solution.

5. The exponential function $y=\left(\frac{1}{25}\right)^{\frac{x-2}{5}}-10$ is shown graphed along with the horizontal line $y=115$. Their intersection point is $(a,115)$. Use the Method of Common Bases to find the value of *a*. Show your work.



REASONING

6 The Method of Common Bases works because exponential functions are one-to-one, i.e. if the outputs are the same, then the inputs must also be the same. This is what allows us to say that if $2^x = 2^3$, then *x* must be equal to 3. But it doesn't always work out so easily.

If $x^2 = 5^2$, can we say that *x* must be 5? Could it be anything else? Why does this not work out as easily as the exponential case?