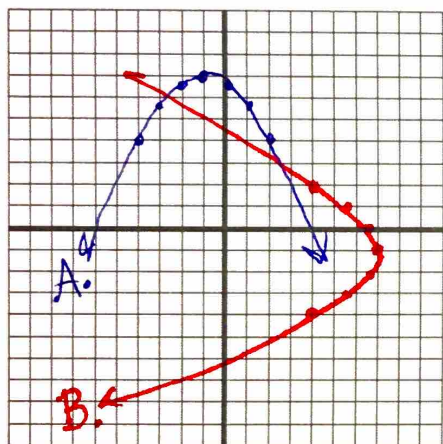# Day 02 Introduction to Graphing Inverse Functions

Name ___Master___
Date _____ Block ___

1-6: Do parts A-D for each function.

A. Graph the function in pencil without a calculator. Show distinct points for each graph.

B. Graph the inverse of the function with a colored pencil. Do this by taking each coordinate (x, y) and plot new coordinates created by switching x and y (y, x).

C. Is the inverse a function? State Yes or No.

D. Write the equation of the inverse of each function. First, rewrite the equation by switching x and y. Then solve your new equation for y.

- If the inverse is a function, write the equation in function notation: $f^{-1}(x) =$ _____.
- If the inverse is not a function, write the equation in inverse notation: $y^{-1} =$ _____.

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1. $f(x) = -\dfrac{1}{3}(x+1)^2 + 7$

C. No

D. $x = -\dfrac{1}{3}(y+1)^2 + 7$

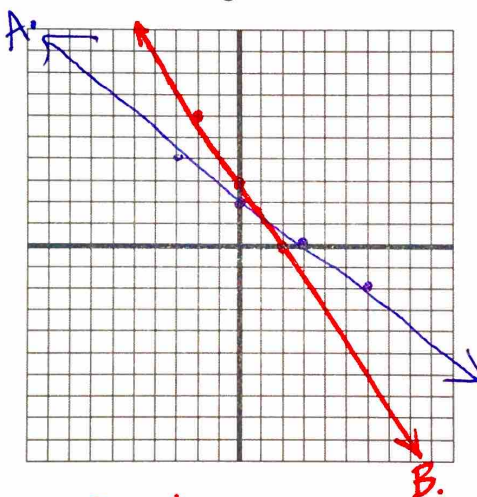$-3(x-7) = \left(-\dfrac{1}{3}(y+1)^2\right)-3$

$\sqrt{-3(x-7)} = \sqrt{(y+1)^2}$

$\pm\sqrt{3(x-7)} = y+1$

$\pm\sqrt{3(x-7)} - 1 = y$

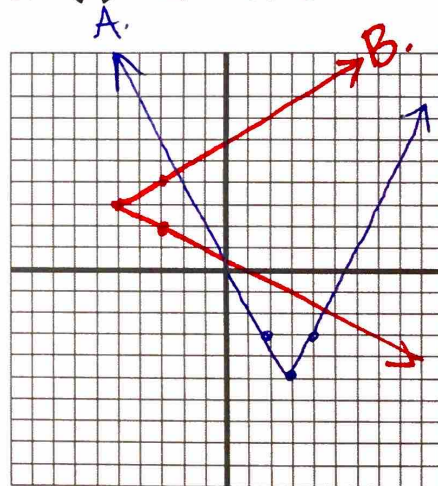$\boxed{y^{-1} = \pm\sqrt{3(x-7)} - 1}$

2. $f(x) = -\dfrac{2}{3}x + 2$

C. Yes

D. $x = -\dfrac{2}{3}y + 2$

$-\dfrac{3}{2}\left(x - 2 = -\dfrac{2}{3}y\right)-\dfrac{3}{2}$

$-\dfrac{3}{2}x + 3 = y$

$\boxed{f^{-1}(x) = -\dfrac{3}{2}x + 3}$

3. $f(x) = 2|x - 3| - 5$

C. NO

D. $x = 2|y-3| - 5$

$x + 5 = 2|y-3|$

$\dfrac{1}{2}(x+5) = |y-3|$

$y - 3 = \dfrac{1}{2}x + \dfrac{5}{2}$ $y - 3 = -\dfrac{1}{2}x - \dfrac{5}{2}$

$y = \dfrac{1}{2}x + \dfrac{5}{2} + 3$ $y = -\dfrac{1}{2}x - \dfrac{5}{2} + 3$

$y = \dfrac{1}{2}x + \dfrac{11}{2}$ $y = -\dfrac{1}{2}x + \dfrac{1}{2}$

$\boxed{y^{-1} = \begin{cases} \dfrac{1}{2}x + \dfrac{11}{2} \\ -\dfrac{1}{2}x + \dfrac{1}{2} \end{cases}, x \geq -5}$