Name: _____ Hour: _____

# 6-7 Notes

## Inverse Relations and Functions

**Choose the word or phrase from the list that best matches each sentence.**

| inverse relation | inverse functions | one-to-one function | $f^{-1}$ |
|---|---|---|---|

1. In a one-to-one function, each $y$-value in the range corresponds to exactly one $x$-value in the domain.

2. A relation pairs element $a$ of its domain to element $b$ of its range. The inverse relation pairs $b$ with $a$.

3. The inverse of a function $f$ is represented by $f^{-1}$.

4. If a relation and its inverse are functions, then they are inverse functions.

5. Explain each of the steps followed to find $f^{-1}$ of $f(x) = \sqrt{3x-2}$. The first step is done for example.

| | |
|---|---|
| $y = \sqrt{3x - 2}$ | Replace $f(x)$ with $y$. |
| $x = \sqrt{3y - 2}$ | Switch $x$ and $y$. |
| $x^2 = 3y - 2$ | Square both sides. |
| $x^2 + 2 = 3y$ | Add 2 to both sides. |
| $y = \frac{x^2 + 2}{3}$ | Divide both sides by 3 and solve for $y$. |

6. Find $f^{-1}$ for $f(x) = 4x - 8$, and explain the steps.

| | |
|---|---|
| $y = 4x - 8$ | Replace $f(x)$ with $y$. |
| $x = 4y - 8$ | Switch $x$ and $y$. |
| $x + 8 = 4y$ | Add 8 to both sides. |
| $y = \frac{x}{4} + 2$ | Divide both sides by 4 and solve for $y$. |

**In general, summarize the steps above:**

**1 –** Replace f (x) with y.

**2 –** Switch x and y.

(PEMDAS) **3 –** When possible, reverse order of operations until y is alone.

Name: _____ Hour: _____

**Caution:**

**a. You may want to change roots to exponents** $\left(\sqrt[b]{c}\right)^a \rightarrow c^{\frac{a}{b}}$.

**b. Pay attention to what is <u>inside</u> parenthesis and radicals.**

**c. When <u>raising</u> both sides of an equation to** $\frac{\#}{even\#}$**, include** $\pm$ **in your result.**

***Seriously, please pay attention to this stuff.***

Examples – Find the inverse equation.

1.

$$f(x) = \sqrt[3]{x+2} - 4$$

$$x = \sqrt[3]{y+2} - 4$$

$$x = (y+2)^{\frac{1}{3}} - 4$$

$$x + 4 = (y+2)^{\frac{1}{3}}$$

$$(x+4)^3 = y + 2$$

$$(x+4)^3 - 2 = y$$

$$f^{-1}(x) = (x+4)^3 - 2$$

2.

$$y = 3x^4$$

$$x = 3y^4$$

$$x/3 = y^4$$

$$\pm(x/3)^{1/4} = y$$

$$y^{-1} = \pm\sqrt[4]{x/3}$$