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| **INVERSE OF A RELATION** | **INVERSE OF A LINEAR FUNCTION** |
| **INVESTIGATE**:a) Plot the points: A(−4, 2) B(−2, 0), C(0, 5), D(2, 5), E(3, 7) b) Join the points in order, from A to E, using straight line segments.c) State the Domain (D) and Range (R) of this function. **D** =**R** = d) Interchange the Domain and Range and re-plot the points. **A(−4, 2) becomes A' (2, −4)**e) Again, join the points in order from A' to E'.f) State the Domain and Range of the new relation.*This is called the* ***INVERSE*** *relation of the original.***D** =**R** =g) Is the new relation also a function? Why or why not?h) Graph the line **y = x**i) How does the original function and its inverse seem to be related to the line y = x? | **INVESTIGATE:**a) Graph the linear function:  **y = 2x + 4**b) Interchange the x and y in the above equation and rearrange it to solve for **y**.Step 1: x = 2y + 4  c) The result is the inverse equation for the original function: **y = 2x + 4:****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**d) Is the inverse also a function? If so, what type? e) Graph the inverse and state how it is related to the original function and the line y = x.g) State the Domain and Range for both y = 2x + 4 **and** for its inverse.h) Find the inverse equation for the linear function:$y=-\frac{2}{3}x+6$  |

**INVESTIGATE: Inverse of a Quadratic Function**

a) Graph the quadratic function:  **y = x2 + 3**

b) State its Domain and Range.

D =

R =

c) Graph the inverse of this function by interchange x and y values for each point.

d) Is the inverse a function?

e) State the Domain and Range for the Inverse.

D =

R =

f) Find the Inverse Equation by interchanging x and y in the original equation and isolating **y**.

**x = y2 + 3**

g) Sometimes, the inverse of a function is not also a **function**. In these cases, we **restrict** the domain of the **original** function so that its reflection in the line y = x is also a function.

**If a relation is a function, the notation: f(x) may be used. If a function's inverse is also a function, the notation: f−1(x) is used. Note that f-1 is not an exponent; therefore, it is not 1/f**

For **y = x2 + 3** the domain would be: $\{xϵR|x\geq 0\}$. We are restricting the x values that are less than 0 so that the inverse function can pass the VLT test. In other words, when you graph the function, just draw the right arm of the parabola because it is where the x values are greater than or equal to 0.

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| a) Restrict the left arm, then inverse the function$$y=x^{2}+3 D=\{xϵR|x\geq 0\}$$ | a) Restrict the right arm, then inverse the function$$y=x^{2}+3 D=\{xϵR|x\leq 0\}$$ |
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**Practice**

1. Find the inverse for each relation.

a) {(1, -3), (-2, 3), (5, 1), (6, 4)} b) {(-5, 7), (-6, -8), (1, -2), (10, 3)}

2) Find an equation for the inverse for each of the following relations.

a) y = 3x + 2 b) y = -5x - 7 c) $y=\frac{3}{4}x+5$

d) $y=x^{2}-4 $D = {x$ϵR|x\leq 0\}$ e) $y=x^{2}-4 $D = {x$ϵR|x\geq 0\}$ f) $y=\sqrt{x-2}$, $y\geq 0$

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