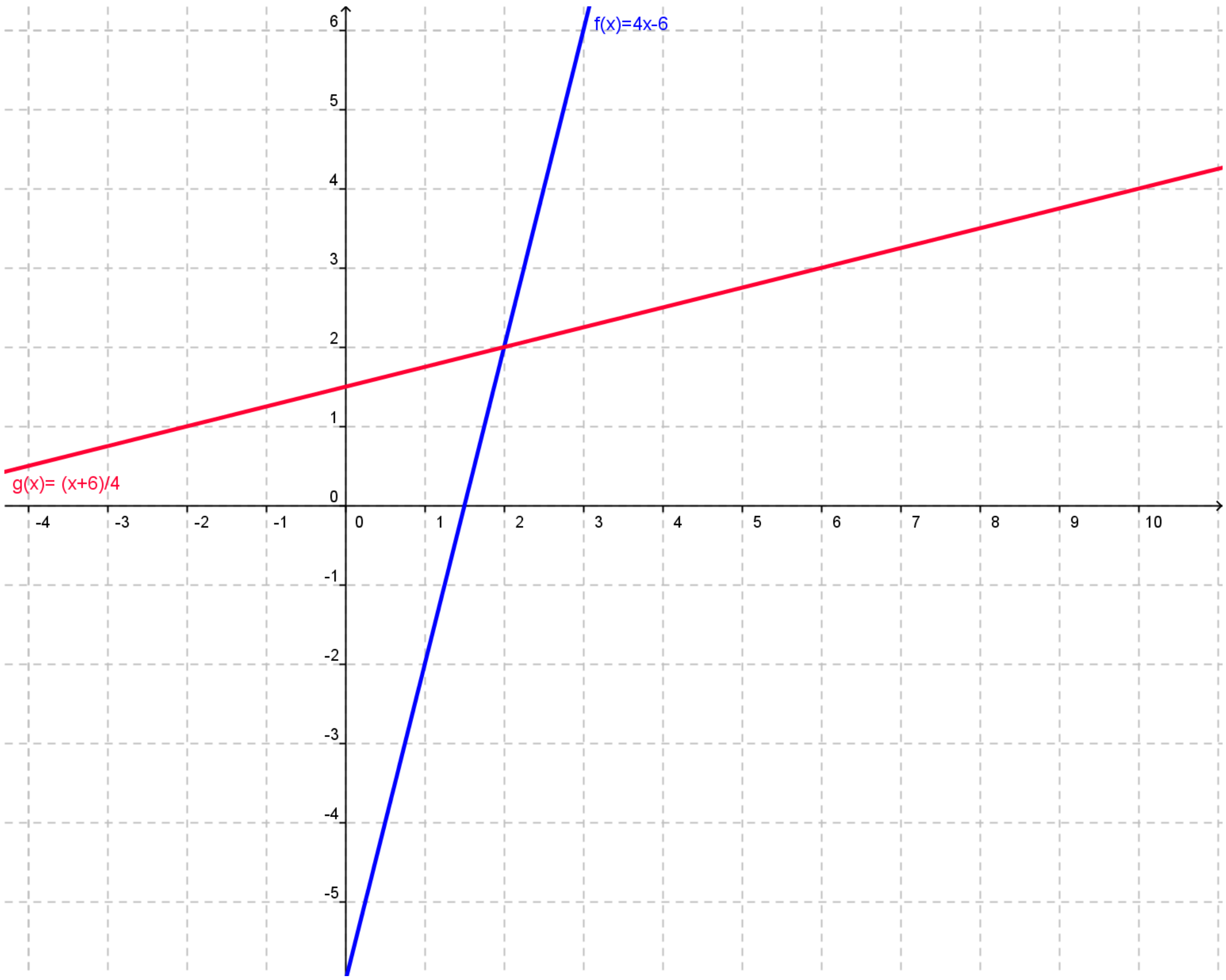
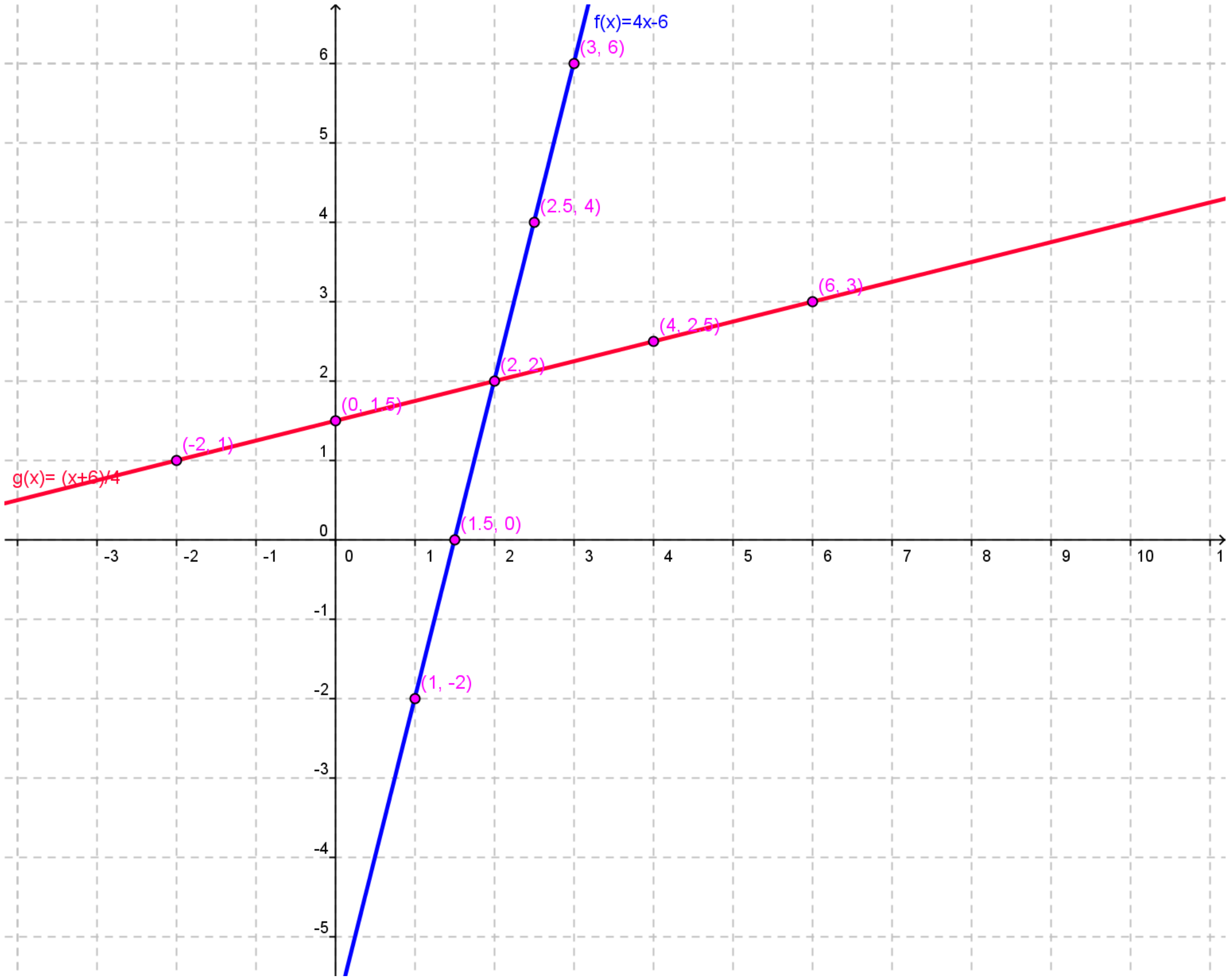
Let's look at a graph from our previous lesson. It includes
$f(x) = 4x - 6$ and $g(x) = \frac{x+6}{4}$.



Next, let's look at the same graph with some points on it.

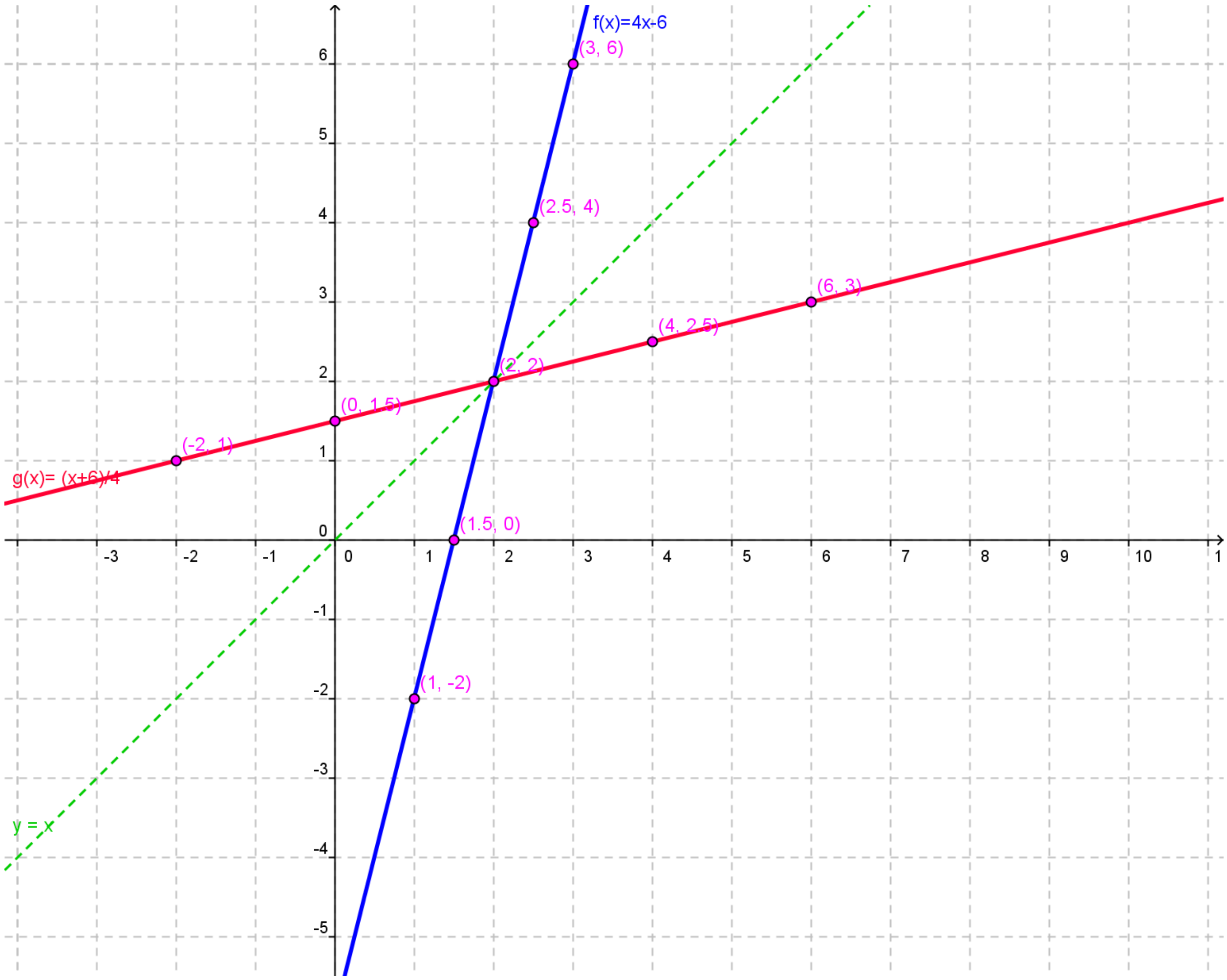


Do you see that if we invert the ordered pairs [switch (x, y) to (y, x)] of $f(x)$, they become the correct ordered pairs of $g(x)$?

Do you see that if we invert the ordered pairs [switch (x, y) to (y, x)] of $g(x)$, they become the correct ordered pairs of $f(x)$?

This is why they are **inverse functions**. But there is something else interesting happening on this graph…

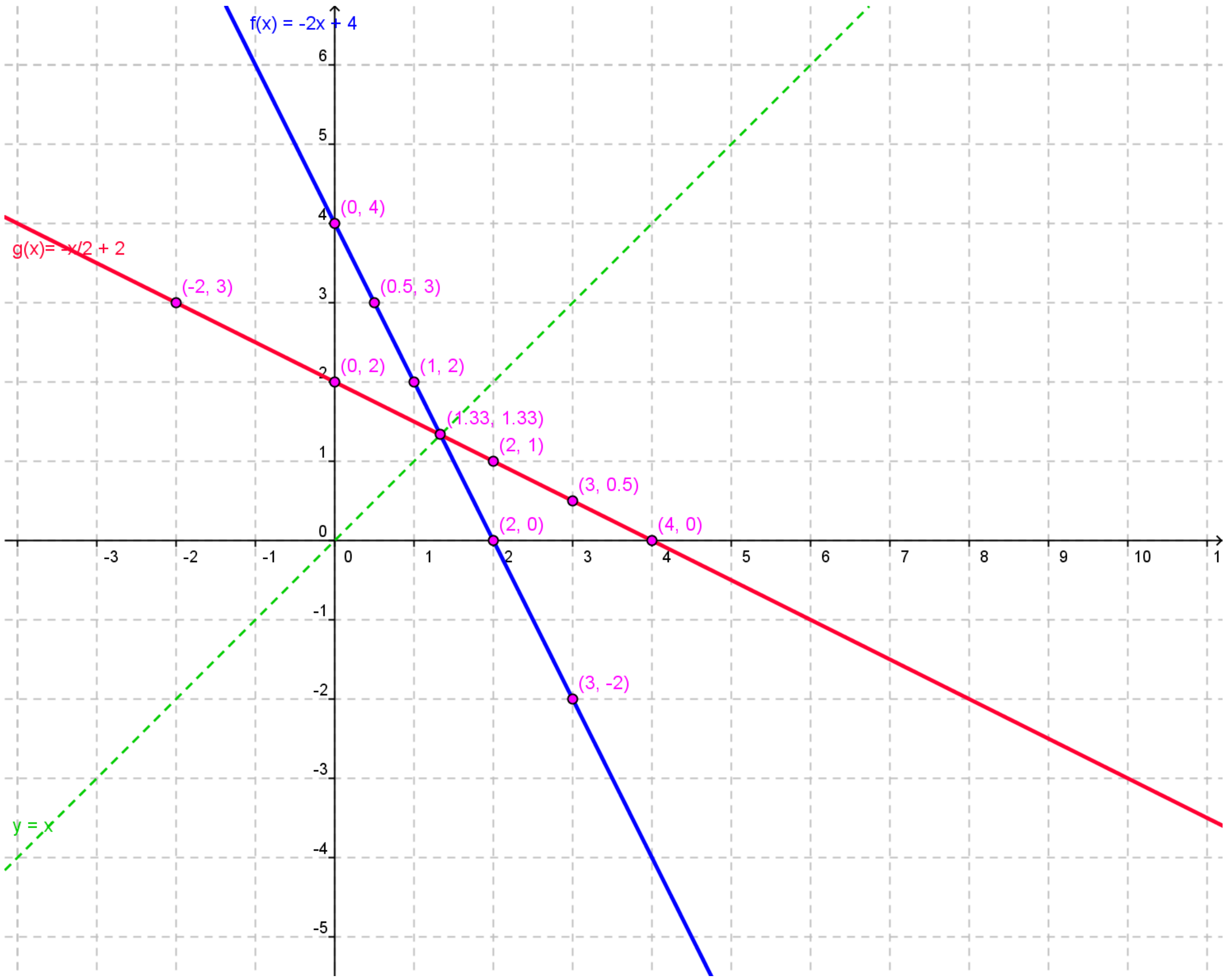
Let's graph the line $y = x$ (it is the dotted line).



Put two of your fingers on the points $(3, 6)$ on $f(x)$ and $(6, 3)$ on $g(x)$. Then simultaneously move your fingers on those lines to the left side of the paper.

What do you notice about the distance between each of your fingers and the green line? That's why the line $y = x$ is an axis of symmetry for inverse functions!

Let's look at one of your problems from the previous assignment. We will graph $f(x) = -2x + 4$ and $g(x) = -\frac{1}{2}x + 2$.



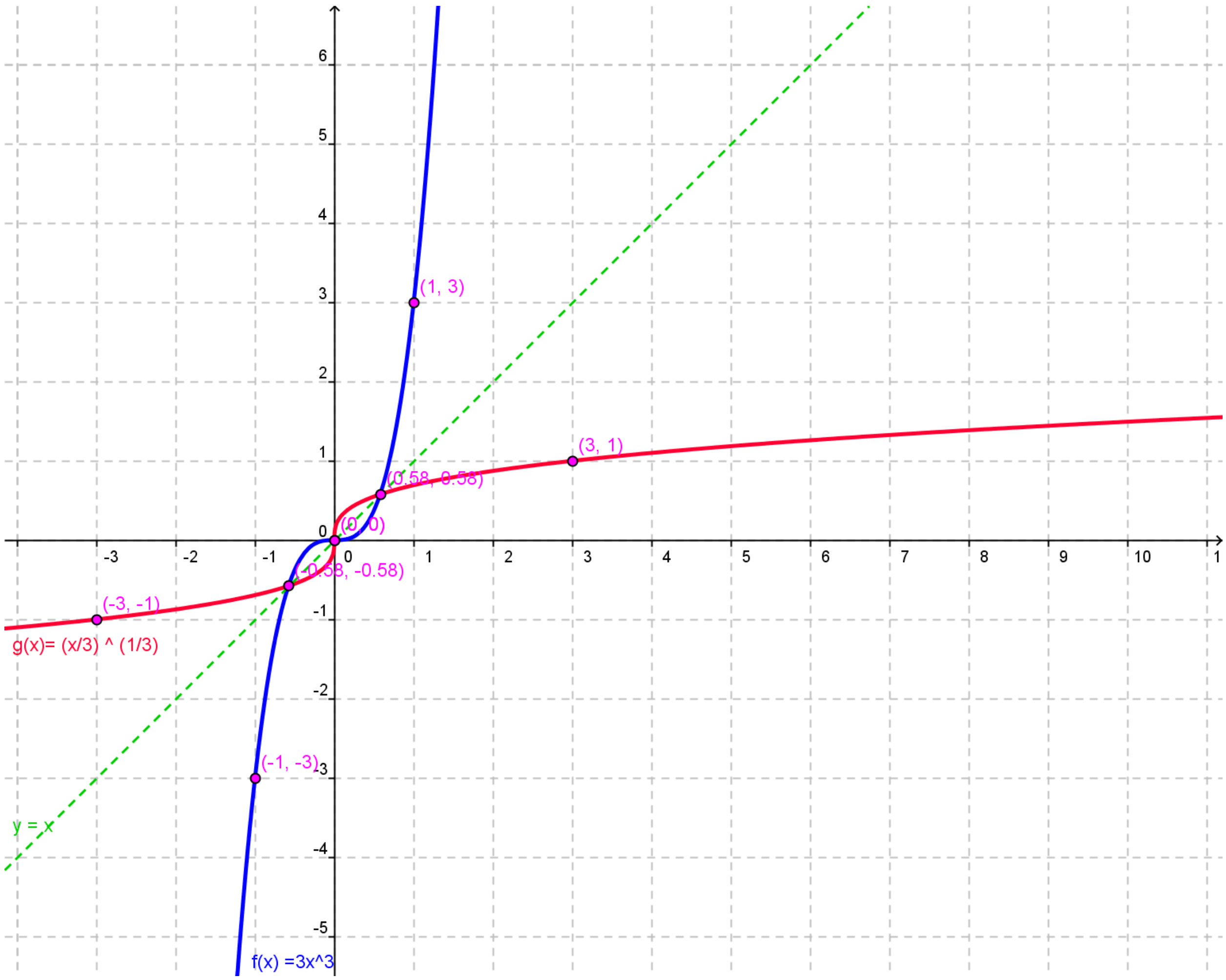
Do you see that if we invert the ordered pairs [switch (x, y) to (y, x)] of $f(x)$, they become the correct ordered pairs of $g(x)$?

Do you see that if we invert the ordered pairs [switch (x, y) to (y, x)] of $g(x)$, they become the correct ordered pairs of $f(x)$?

Do you see that $f(x)$ and $g(x)$ are symmetrical to the line $y = x$?

With inverse functions, this happens every time!

Let's look at some inverse functions with exponents. We will graph $f(x) = 3x^3$ and $g(x) = -\frac{1}{3}x^3$.



Do you see that $f(x)$ and $g(x)$ are symmetrical to the line $y = x$ (even when they cross the line)?

Do you see that if we invert the ordered pairs [switch (x, y) to (y, x)] of $f(x)$, they become the correct ordered pairs of $g(x)$?

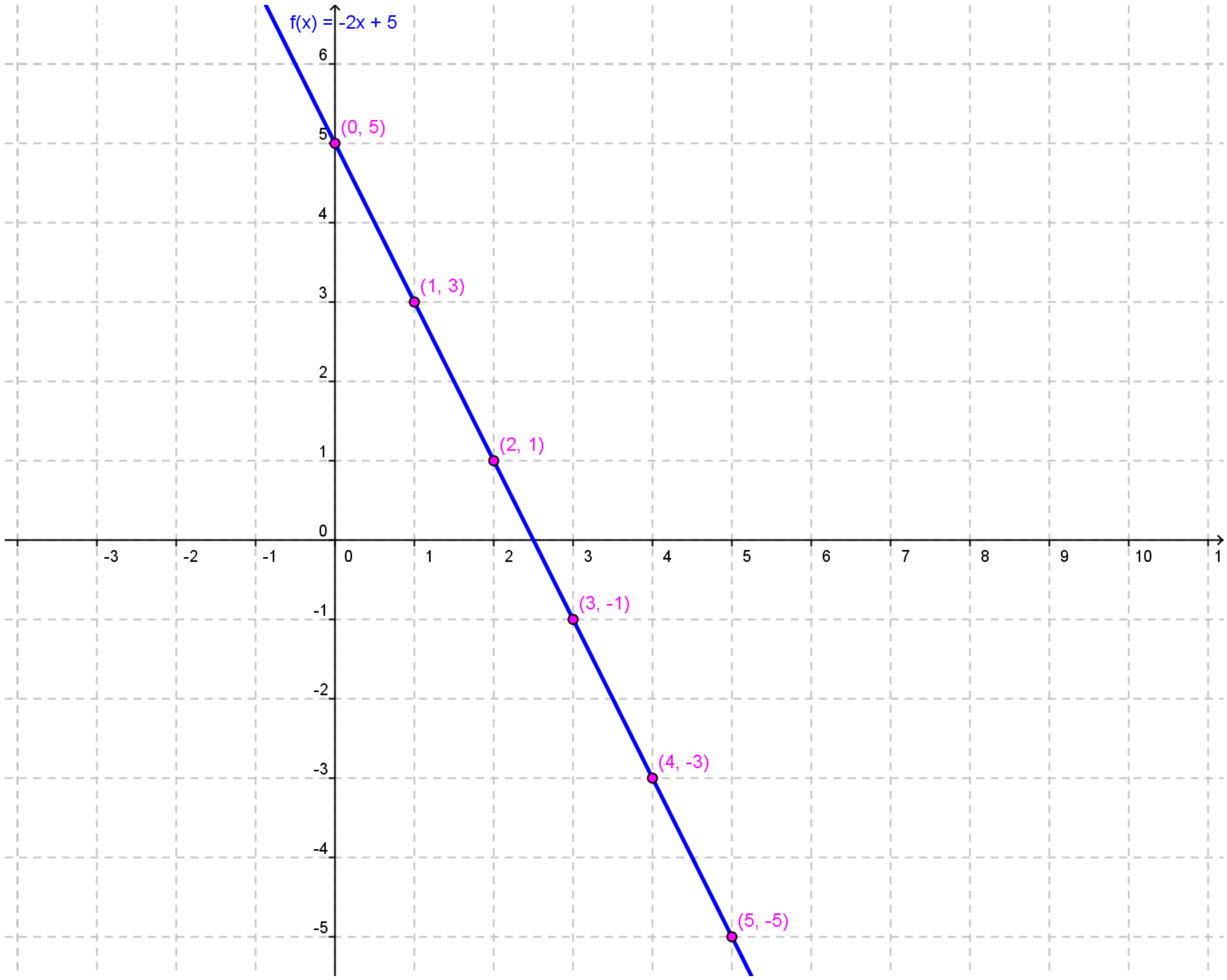
Do you see that if we invert the ordered pairs [switch (x, y) to (y, x)] of $g(x)$, they become the correct ordered pairs of $f(x)$?

If you have the graph of a function [$f(x)$] , and that function has an inverse function [$f^{-1}(x)$] , you can graph the inverse function without doing any algebra work to determine its equation.

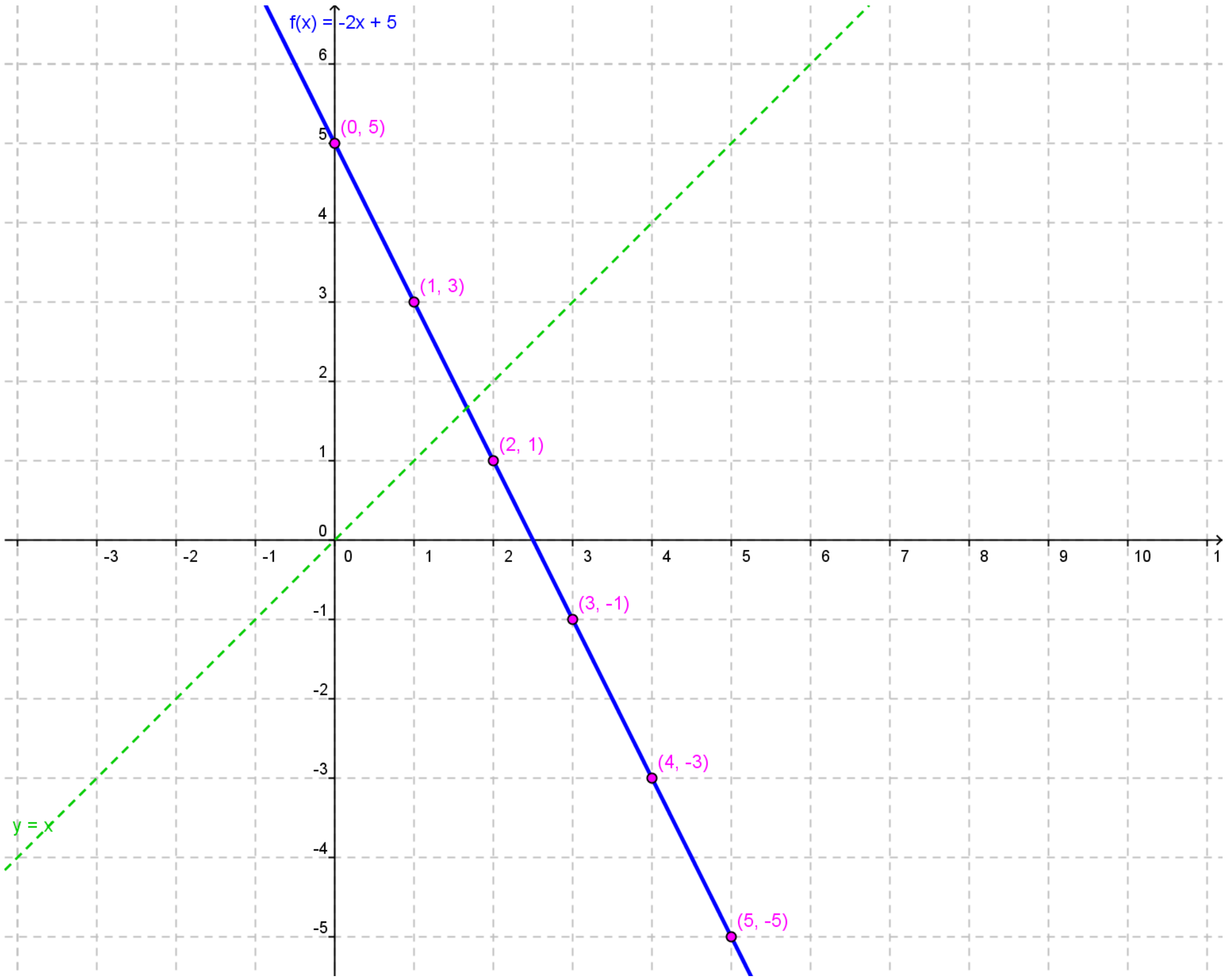
1. Draw the axis of symmetry ($y = x$) for inverse functions.
2. Make a chart of (x, y) ordered pairs from the graph of (x) .
3. Invert the ordered pairs from Step 2 - (x, y) becomes (y, x) - and use the new ordered pairs as (x, y) values for $f^{-1}(x)$. Put these new points on the graph.
4. Use the axis of symmetry ($y = x$) to help you see how to connect the points for $f^{-1}(x)$, especially if your graph has curves.

Let's try these steps out on the next page…

Graph the inverse function of (x) .



Step 1 – Let's add the axis of symmetry ($y = x$) on the next page…



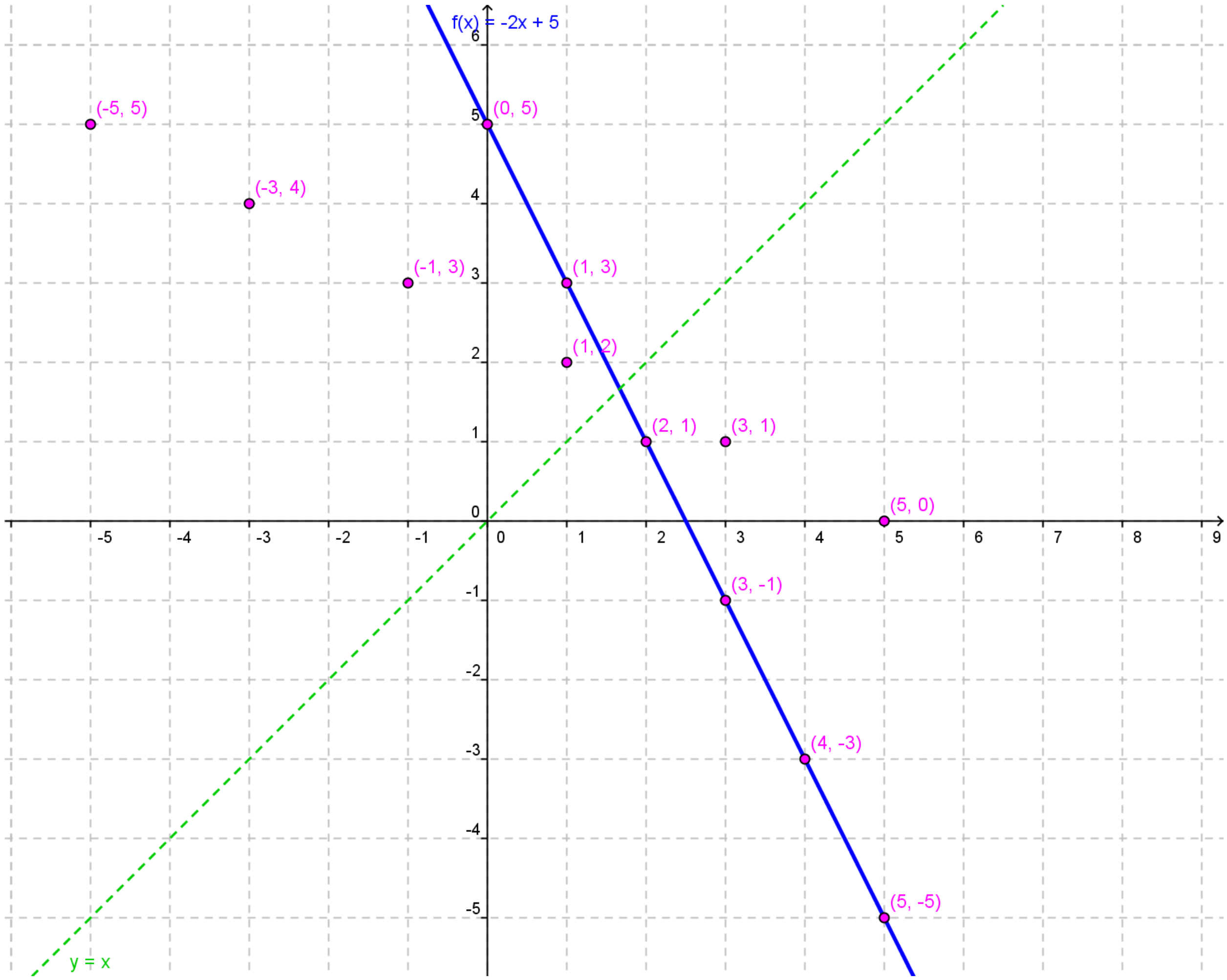
Step 2 – Let's make a chart of (x, y) ordered pairs from the graph of (x) .

$\boldsymbol{x}$	0	1	2	3	4	5
$\boldsymbol{y}$	5	3	1	-1	-3	-5

Step 3 – Let's invert them to get the ordered pairs for the new graph of $f^{-1}(x)$.

$\boldsymbol{x}$	5	3	1	-1	-3	-5
$\boldsymbol{y}$	0	1	2	3	4	5

Let's put these new points on the graph…



Step 4- Connect the points to make the graph of the inverse function $f^{-1}(x)$.