College Review Math

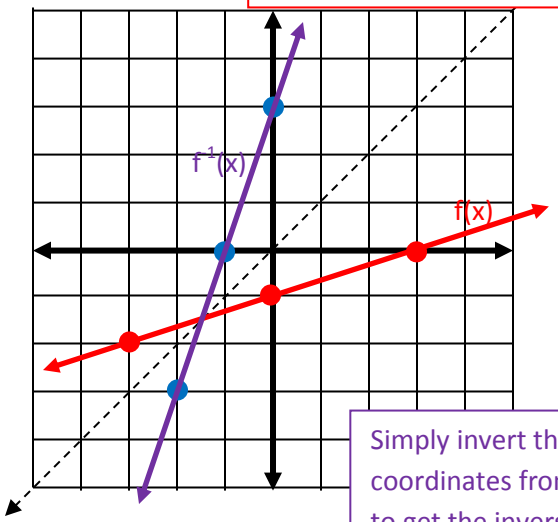
Notes Section 4C (Reflections on the line y=x)

Graph each equation; list the coordinates you used in the first x/y-chart. Then, list the inverse coordinates in the second x/y-chart, and graph them on the same x/y-axis as the first one. Lastly, give an equation for the reflected graph.

Work for the inverse equations is on the next page.

1) $y = \frac{1}{3}x - 1$

Graph as you normally would using y = mx + b, then list the coordinates



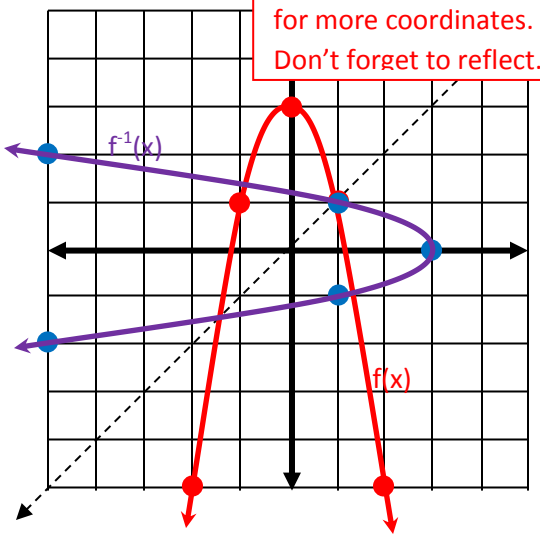
x	y
0	-1
3	0
-3	-2

x	y
-1	0
0	3
-2	-3

Simply invert the coordinates from above to get the inverse

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

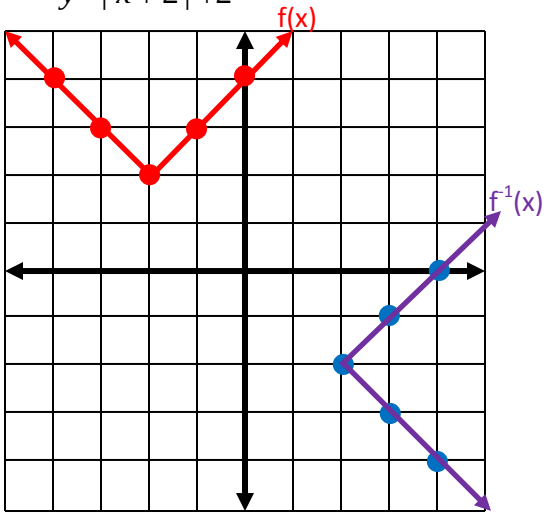
Use x = -b/2a to find the vertex, then plug #'s in for more coordinates. Don't forget to reflect.



x	y
0	3
1	1
2	-5
-1	1
-2	-5

x	y
3	0
1	1
-5	2
1	-1
-5	-2

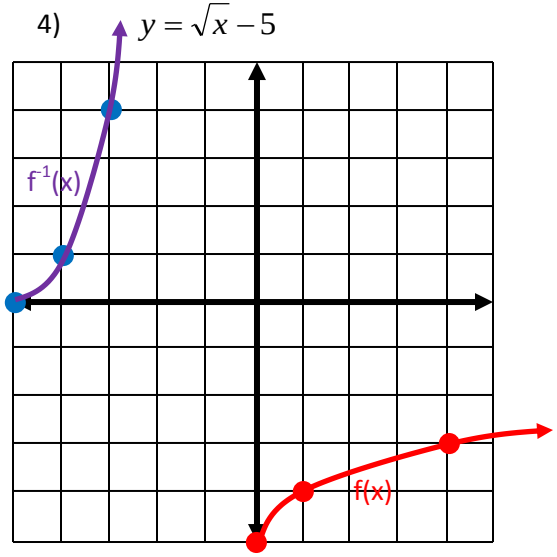
3) $y = |x + 2| + 2$



x	y
-2	2
-1	3
0	4
-3	2
-4	3

x	y
2	-2
3	-1
4	0
2	-3
3	-4

4) $y = \sqrt{x} - 5$



x	y
0	-5
1	-4
4	-3

x	y
-5	0
-4	1
-3	4

Inverse *equations*.

While it is possible to use the newly found inverse graph to write the inverse equation that it corresponds to, this won't always be the case, so…

1) $y = \frac{1}{3}x - 1$

a) attempt to write the equation using the graph

b) write the equation by using the inverse

The y-intercept is 3, and the slope is 3/1, so using y=mx + b, the equation must be y = 3x + 3. However, what if the intercept occurs between grid marks?

Original equation $y = \frac{1}{3}x - 1$

Switch x & y, then get y by itself. $x = \frac{1}{3}y - 1$

$x + 1 = \frac{1}{3}y$

$3x + 3 = y$

Inverse notation: $f^{-1}(x) = 3x + 3$

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

$x = -2y^2 + 3$

$x - 3 = -2y^2$

$\frac{x-3}{-2} = y^2$

$\pm\sqrt{\frac{x-3}{-2}} = y \quad f^{-1} = \pm\sqrt{\frac{x-3}{-2}}, \quad x \le 3$

x must be less than or equal to 3 since plugging in numbers greater than 3 will yield an imaginary number, which cannot be graphed.

3) $y = |x + 2| + 2$

Sometimes there's good news!

$x = |y + 2| + 2$ Since it is impossible to move a number out of an absolute value, it is also impossible to get "y" by itself. Therefore the equation ***is*** in inverse notation (done).

4) $y = \sqrt{x} - 5$

Sometimes there's bad news!

Since the original problem does not include the ± symbol, we will need to specify certain values for "x" once we have found the inverse equation.

$x = \sqrt{y} - 5$

$x + 5 = \sqrt{y}$

$(x + 5)^2 = y$

$f^{-1}(x) = (x + 5)^2, x \ge -5$

Since $y = (x + 5)^2$ when graphed creates a parabola, we need to consider are we using the left or right side of the drawing. The vertex is (-5, 0), so our x-values must be either $\ge$ -5 or $\le$ -5. It is then helpful to look at the graph we've already drawn on the previous page. Since the inverse graph is the "right" side of the parabola, then $x \ge -5$ is the correct choice.