

3.1-3.4 Worksheet

Name: Key

1. Find the domain and range:

a) $y = \sqrt{5-x}$
 $x \leq 5$
 $y \geq 0$

b) $y = -\sqrt{x+1} - 5$
 $x \geq -1$
 $y \leq -5$

c) $y = \sqrt{-2x-5} + 1$
 $x \leq -\frac{5}{2}$
 $y \geq 1$

2. Solve each equation:

a) $\sqrt{x-1} + 3 - x = 0$
 $\sqrt{x-1} = x-3$
 $x-1 = x^2 - 6x + 9$
 $0 = x^2 - 7x + 10$
 $0 = (x-5)(x-2)$
 $x = 5$
 $x = 2$

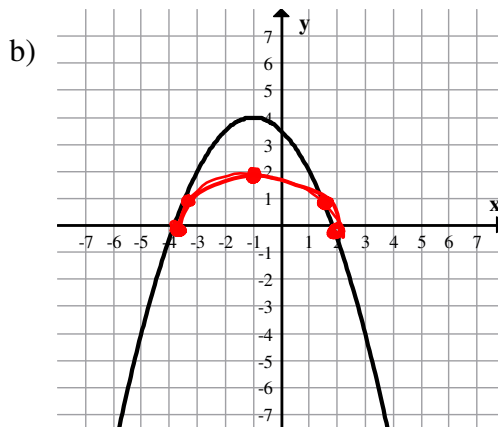
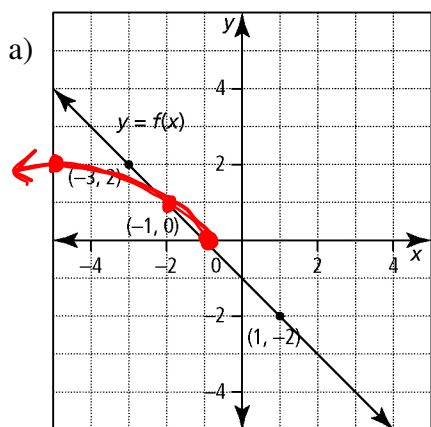
b) $\sqrt{x} + \sqrt{x-2} = 2$
 $\sqrt{x-2} = 4-x$
 $x-2 = 16 - 8x + x^2$
 $0 = x^2 - 9x + 18$
 $0 = (x-6)(x-3)$
 $x = 6$, $x = 3$

3. Write the equation of a radical function that would result by applying each set of transformations to the graph of $y = \sqrt{x}$.a) horizontal reflection in the y -axis, translation up 3 units and translation left 2 units

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

b) vertical reflection in the x -axis, horizontal stretch by a factor of $\frac{1}{3}$, and translation down 7 units

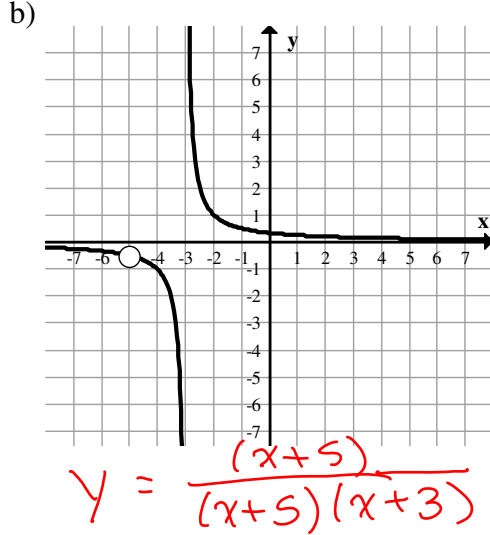
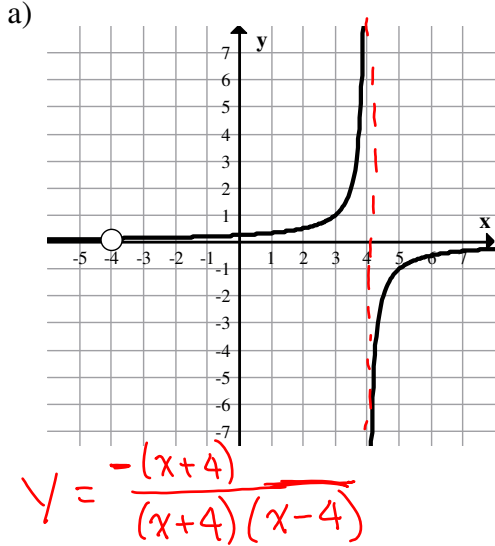
$$y = -\sqrt{3x} - 7$$

4. Explain how to transform the graph of $y = \sqrt{x}$ to obtain the graph of $y = -\sqrt{\frac{1}{4}(x-1)}$.horiz. exp by 4, reflect in x -axis,
Right 15. Using the graph of $y = f(x)$, sketch the graph of $y = \sqrt{f(x)}$.6. Write the equation of a radical function with domain of $x \geq 6$ and range of $y \leq -9$.

$$y = -\sqrt{x-6} - 9$$

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7. Write the equation for each rational function graphed below.



8. Find the domain and range, intercepts, and asymptotes:

a) $y = \frac{3}{x} + 2$

$x \neq 0$ $asy: x=0$
 $y \neq 2$ $y=2$

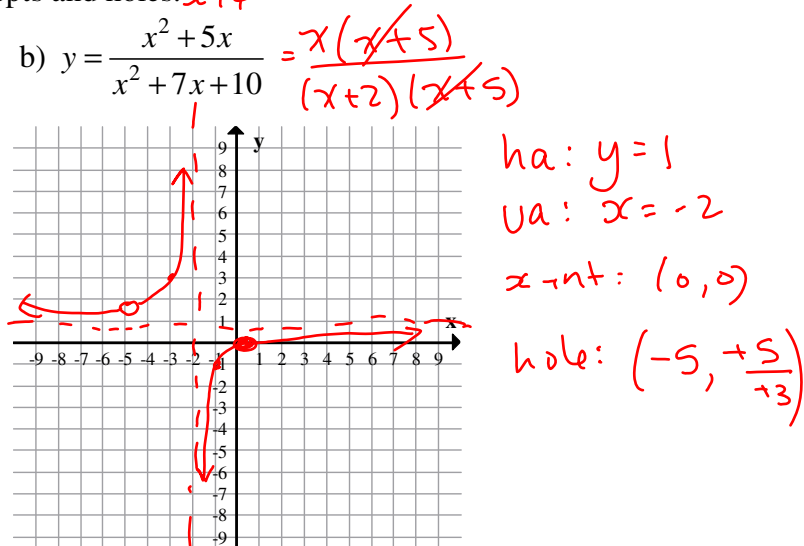
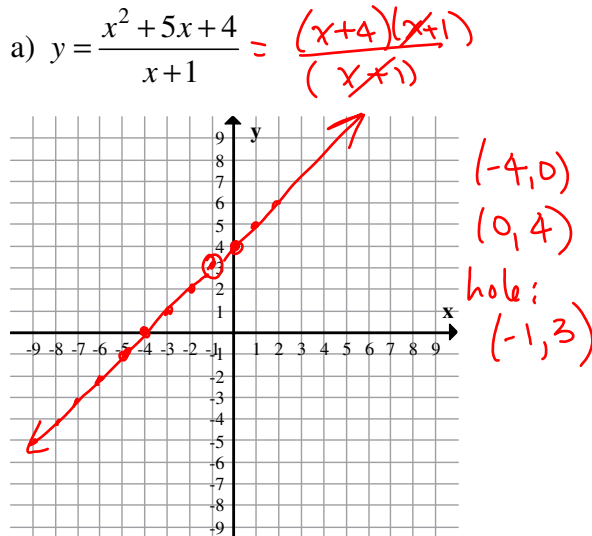
$y = \frac{3+2x}{x}$
 $x\text{-int: none}$
 $y\text{-int: none}$

b) $y = -\frac{12}{x+4} - 5$

$x \neq -4$ $asy: x=-4$
 $y \neq -5$ $y=-5$

$y = \frac{-12-5x-20}{x+4}$
 $x\text{-int: } (-\frac{32}{5}, 0)$
 $y\text{-int: } (0, -8)$

9. Sketch the following. Label asymptotes, intercepts and holes.



10. Determine the equation of a rational function that has a vertical asymptote at $x=6$, a horizontal asymptote at $y=-4$ and an x -intercept of -1 .

$$y = \frac{-4x-4}{x-6}$$

11. Consider the graphs of $f(x) = \frac{x}{x^2-9}$ and $g(x) = \frac{x^2-x-6}{x^2-9}$. Use your knowledge of rational functions to outline the similarities and differences between these two graphs.

$f(x):$ va at $x = \pm 3$
 ha @ $y = 0$
 $x\text{-int: } (0, 0)$

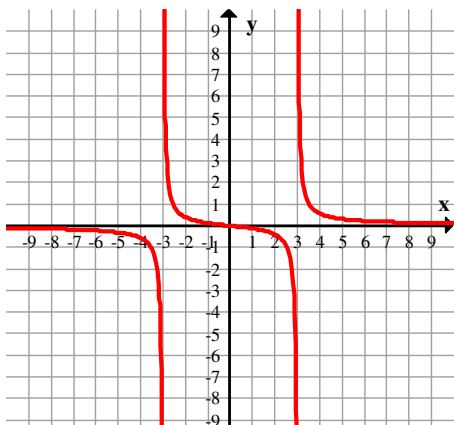
$g(x):$ $va: x = -3$
 $ha: y = 1$
 $hole: (3, \frac{5}{6})$

$x\text{-int: } (-2, 0)$
 $y\text{-int: } (0, \frac{2}{3})$

Same: Domain, $va: @ x = -3$

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$$f(x) = \frac{x}{x^2 - 9}$$



$$g(x) = \frac{x^2 - x - 6}{x^2 - 9}$$

