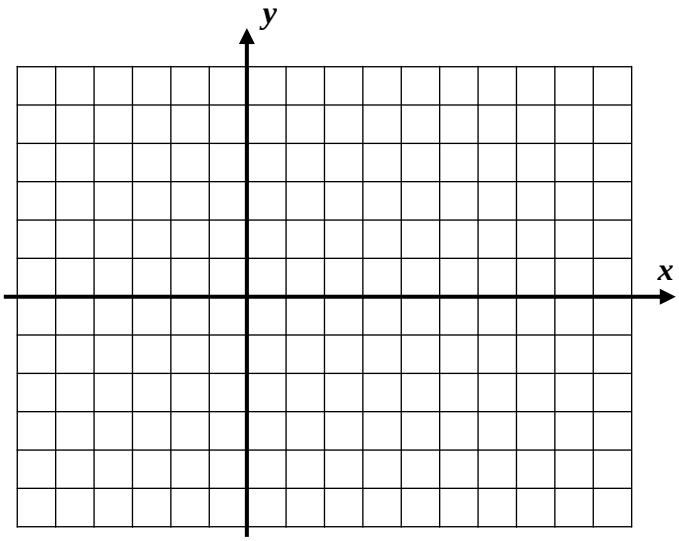
Name: _____ Date: _____

SQUARE ROOT FUNCTIONS AND THEIR GRAPHS
ALGEBRA 2 WITH TRIGONOMETRY

Square roots are the natural inverses of squaring. In other words, finding numbers that when squared give the input. Because of their important role in higher-level mathematics, it is important to understand their graphs, as well as their domains and ranges. In this lesson we will explore all of these facets of this common function.

***Exercise* #1:** Consider the two functions $f(x)=\sqrt{x}$ and $g(x)=\sqrt{x+3}-2$.

(a) Graph $y=f(x)$ without the use of you calculator on the grid shown. Label its equation.



(b) Using your calculator to generate a table of values, graph $y=g(x)$ on the same grid and label its equation. Start your table at $x=-10$ to see certain *x*-values not in the domain of this function.

(c) State the domain and range of each function below using set-builder notation.

$f(x)=\sqrt{x}$

Domain:

Range:

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

Domain:

Range:

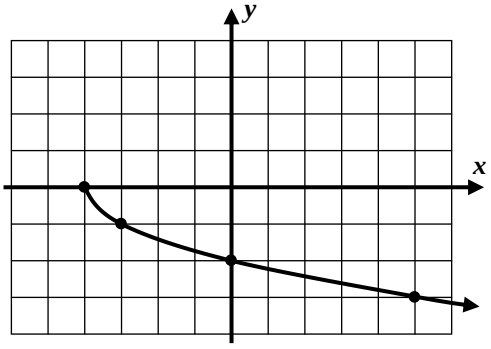
***Exercise* #2:** Which of the following equations would represent the graph shown below?

(1) $y=-\sqrt{x+4}$

(2) $y=4-\sqrt{x}$

(3) $y=\sqrt{x-4}$

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



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As we saw in the first exercise, the domains of square root functions are oftentimes limited due to the fact that square roots of negative numbers do not exist in the Real Number System. We shall see in Unit #5 how these square roots can be defined if a new type of number is introduced. For now, though, we are only working with real numbers.

***Exercise* #3:** Which of the following values of *x* does *not* lie in the domain of the function $y = \sqrt{x-5}$?

(1) $x = 6$ (3) $x = 5$

(2) $x = 2$ (4) $x = 7$

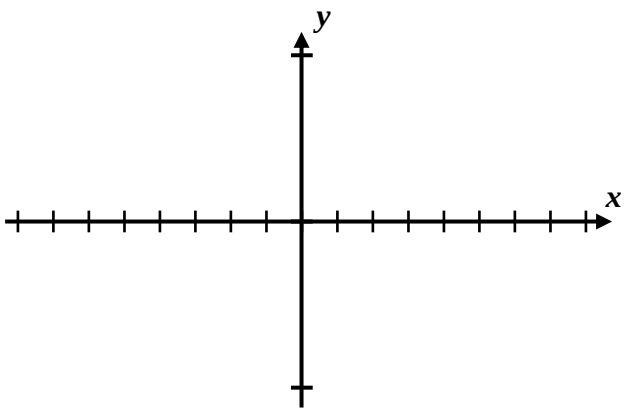
_____

***Exercise* #4:** Determine the domain for each of the following square root functions. Express your answer using interval notation.

(a) $y = \sqrt{x+2}$ (b) $y = \sqrt{3x-2}$ (c) $y = \sqrt{8-2x}$

***Exercise* #5:** Consider the function $f(x) = \sqrt{x^2+4x-12}$.

(a) Using your calculator to sketch the function on the axes given.



(b) Set up and solve a quadratic inequality that yields the domain of $f(x)$.

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SQUARE ROOT FUNCTIONS AND THEIR GRAPHS
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Which of the following represents the domain and range of $y = \sqrt{x-5}+7$. Solve this either by considering the shifting that has occurred to $y = \sqrt{x}$ or by producing a graph on your calculator.

   (1) Domain: $[-5, \infty)$ Range: $[7, \infty)$

   (2) Domain: $[5, \infty)$ Range: $[7, \infty)$

   (3) Domain: $(-7, \infty)$ Range: $(5, \infty)$

   (4) Domain: $[7, \infty)$ Range: $[5, \infty)$

   _____

2. Which of the following values of *x* is *not* in the domain of $y = \sqrt{1-3x}$?

   (1) $x = 1/3$

   (2) $x = -1$

   (3) $x = 0$

   (4) $x = 4$

   _____

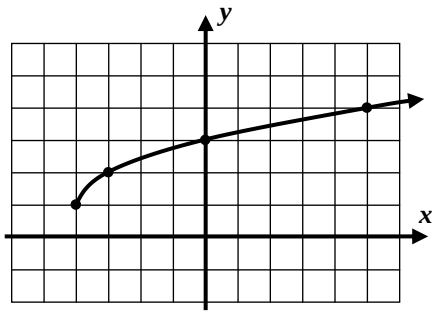
3. Which of the following equations describes the graph shown below?

   (1) $y = \sqrt{x+4}+1$

   (2) $y = \sqrt{x-4}-1$

   (3) $y = \sqrt{x+4}-1$

   (4) $y = \sqrt{x-4}+1$



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4. Which equation below represents the graph shown?

   (1) $y = \sqrt{x-2}-5$

   (2) $y = -\sqrt{x+2}+5$

   (3) $y = -\sqrt{x-2}+5$

   (4) $y = \sqrt{x+2}+5$

   _____

5. Determine the domains of each of the following functions. State your answers in set-builder notation.

(a) $y=\sqrt{x+10}$ (b) $y=\sqrt{3x-5}$ (c) $y=\sqrt{7-2x}$

6. Set up and *algebraically* solve a quadratic inequality that results in the domain of each of the following. Verify your answers by graphing the function in a standard viewing window.

(a) $y=\sqrt{x^2-4x-5}$ (b) $y=\sqrt{9-x^2}$

7. Consider the function $g(x)=-\sqrt{x+5}+3$.

(a) Graph the function $y=g(x)$ on the grid shown.

(b) Describe the transformations that have occurred to the graph of $y=\sqrt{x}$ to produce the graph of $y=g(x)$. Specify both the transformations and their order.