Domain of Radical Functions NAME:

Domain of radical functions: The domain of a function is the set of x values that work, or that when inputted, give you a value (real number) out for y.

1. Consider finding the domain of the function $f(x) = \sqrt{x+4}$. Since you cannot take the square root of a negative number, we would have to exclude the x values that would make us do that. So we have to figure out where the radicand, here $x + 4$, is non-negative.

meaning positive or zero

Solve $x + 4 \geq 0$ to find the domain of this function.

So the domain of $f(x) = \sqrt{x+4}$ is "all real numbers greater than or equal to -4" or $x \geq -4$. The book will write this in interval notation as [-4, ∞). There is a brief review of interval notation in the section notes.

2. Use your calculator to graph $f(x) = \sqrt{x+4}$ below. Notice how the graph only appears for the x values that are greater than or equal to -4. Draw the left endpoint (x-intercept) as a solid point.

This is true for any even root function. The radicand must be non-negative so you have to solve "radicand $\geq$ 0" to find its domain. **The domain of any even root function is all real numbers where the radicand is non-negative.**

But for odd root functions, this restriction does not exist. **So the domain of any odd root function is "all real numbers".** We will see that later in this worksheet.

Graph radical functions on the calculator: We want to get used to how the graphs of radical functions look. This will help us graph them by hand if needed.

3. Graph the following functions on your calculator. Use the standard window. Notice their general shapes are similar but their x-intercepts vary. Copy the graphs here, recreating the shape and x-intercepts as accurately as you can.

$y = \sqrt{x}$

$y = \sqrt{x+5}$

$y = \sqrt{2x-6}$

Draw the left endpoint (x-intercept) as a solid point; there are **not** arrows on the left ends of the graphs. Notice the gentle curves of the functions. They are **not** straight lines like linear functions.

4. Algebraically find the domain of $y = \sqrt{2x-6}$ below. Take a moment to think about the domains of all three of these functions and how the graphs portray the domains.

5. Use the TRACE button to follow the graph of $y = \sqrt{x}$ towards the left end. Why does it **not** display any y-values for negative x-values? For instance, what is wrong with $y = \sqrt{-10}$? Does this explain why -10 is not in the domain?

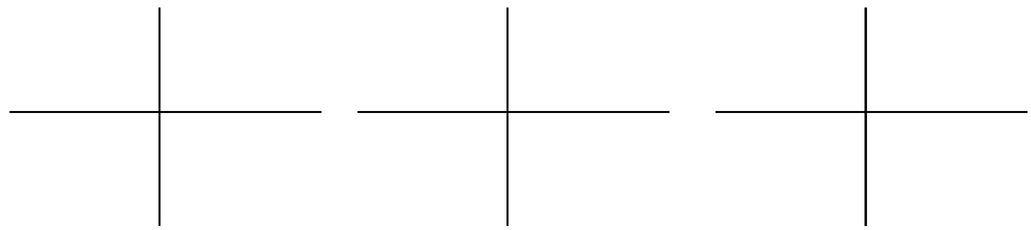
6. The graphs do **not** dip below the x-axis. Why? In other words, why must y be non-negative? Can you square root a number and get a negative number, like -3, **out**? [This is a question about the **range** of the function.]

7. Graph the following functions on your calculator. Use the standard window. Notice their general shapes are similar but their x-intercepts vary. Copy the graphs here, recreating the shape and x-intercepts as accurately as you can.

$y=\sqrt[3]{x}$

$y=\sqrt[3]{x+5}$

$y=\sqrt[3]{2x-6}$



Take a moment to think about the domains of these functions (all are “all real numbers”) and how the graphs portray the domains. Every x-value gives you a point on the graph. Do you see that in your pictures?

Notice the gentle curves of the functions. They are **not** straight lines like linear functions. But their shapes are quite different from the square root functions in question 3.

8. They do dip below the x-axis. The y value can be negative in these graphs. Why? Give an example for the function $y=\sqrt[3]{x}$. [This is a question about the **range** of the function.]