Domain Representations

NAME ____________________________

For some functions, any x-value will have a corresponding $f(x)$-value. However, for other functions, certain x-values have no corresponding $f(x)$-values. Any x-value that corresponds to a specific $f(x)$-value is said to be in the *domain* of the function.

In this activity, you will analyze eight functions. You will use five different representations to determine the domain of each of those eight functions. The five different representations are:

- Graphical
- Tabular
- Number Line
- Verbal
- Symbolic

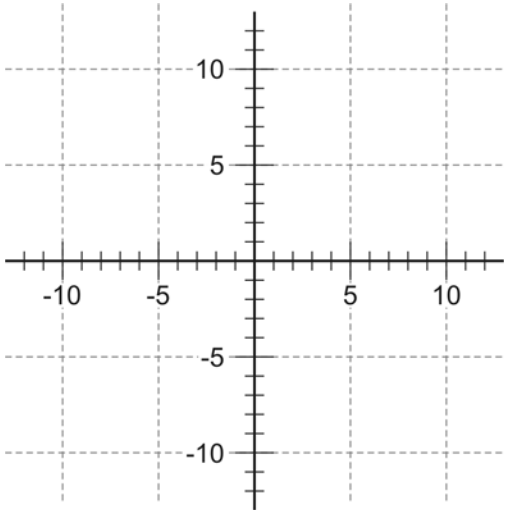
1. Graphical Representation

For each of the functions on the following page, sketch a graph on the grid provided.

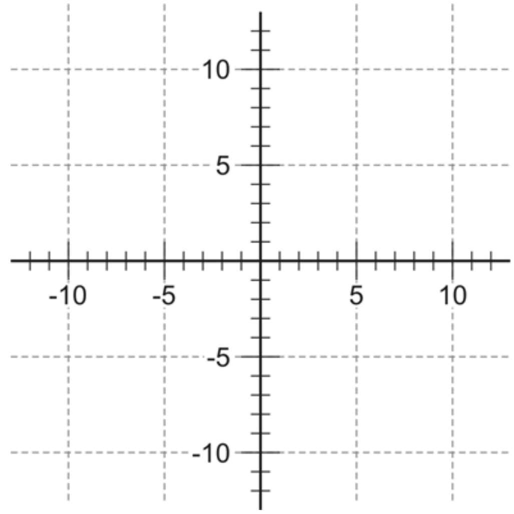
- If you think that the function extends beyond the bounds of the grid, be sure to include arrows to indicate that it continues.

- Make a note if the function includes asymptotes or endpoints. If a function has asymptotes, be sure to indicate where it occurs. If a function has an endpoint, be sure to mark that point on the graph.

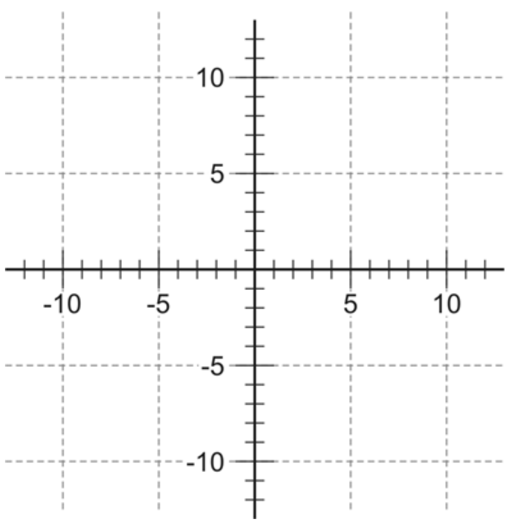
$$f(x) = 3x - 2$$



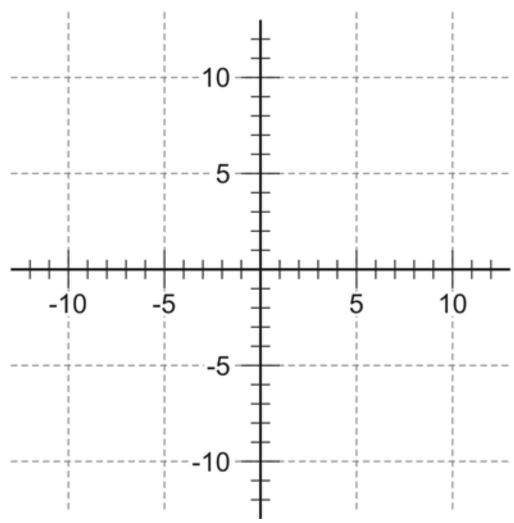
$$f(x) = 4 - x^2$$



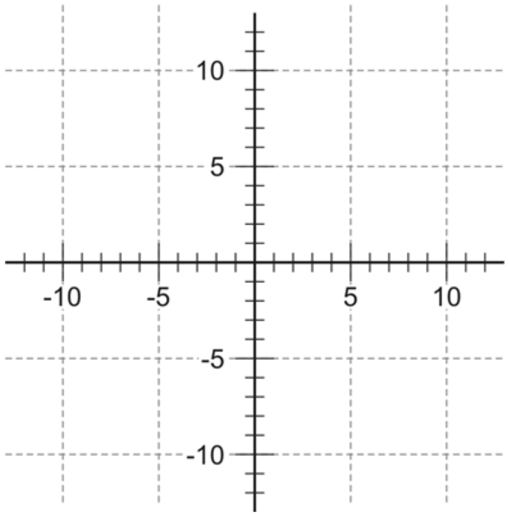
$$f(x) = x^3 - 2x - 1$$



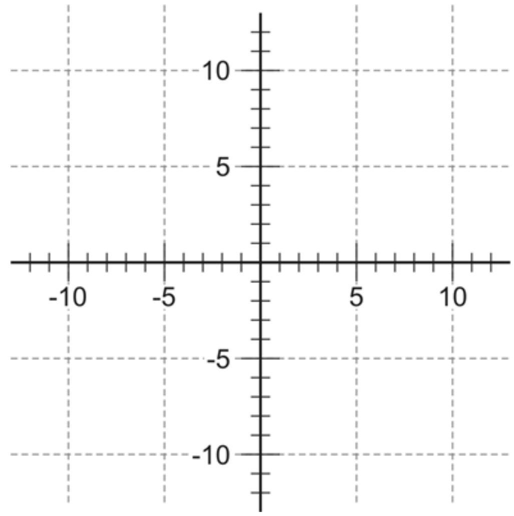
$$f(x) = 1 + \frac{1}{x}$$



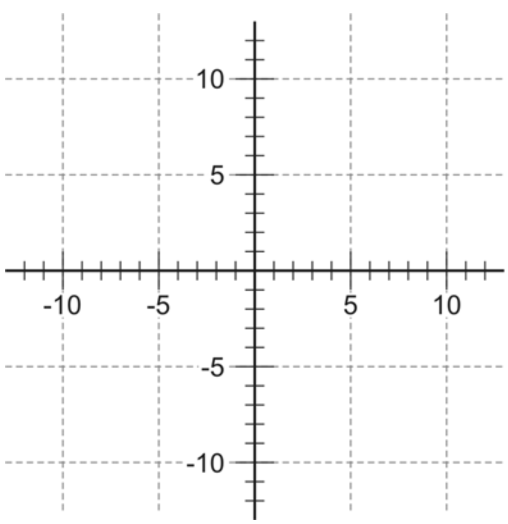
$f(x)=\sqrt{x+2}$



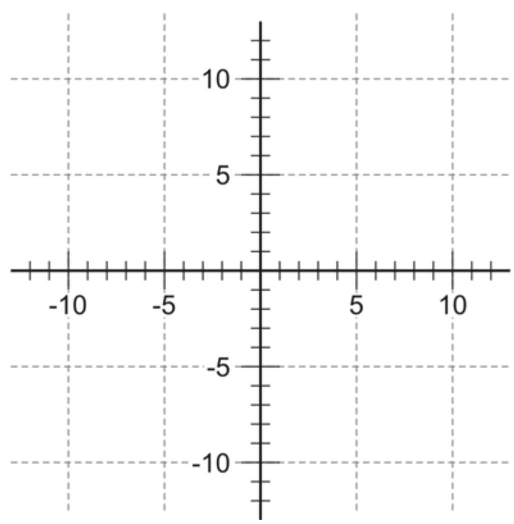
$f(x)=\dfrac{1}{x-3}$



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



$f(x)=\dfrac{1}{x^2-x-6}$



2. Tabular Representation

- Complete the table of values for each function.
- If a value of x produces an error for $f(x)$, indicate the error with an **E** in the table.

$f(x) = 3x - 2$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

$f(x) = 4 - x^2$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

$f(x) = x^3 - 2x - 1$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

$f(x) = 1 + \frac{1}{x}$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

$f(x) = \sqrt{x+2}$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

$f(x) = \frac{1}{x-3}$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

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

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

$f(x) = \frac{1}{x^2-x-6}$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$											

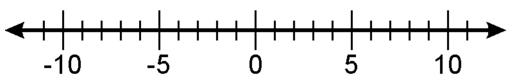
3. Number Line Representation

The set of all *x*-values for which there is a corresponding $f(x)$-value is called the **domain** of the function.

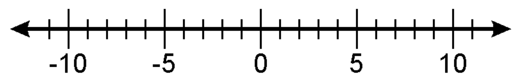
Whenever an *x*-value produces an error for an $f(x)$-value on the table, that *x*-value is not in the domain of the function.

- Use the number lines below to plot *x*-values that are in the domain of each function.
- If an *x*-value has a corresponding $f(x)$-value, place a solid dot (●) on the number line.
- If an *x*-value produces an error for an $f(x)$-value, place an open dot (○) on the number line.

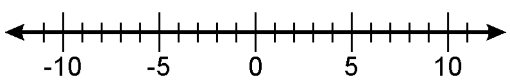
$f(x) = 3x - 2$



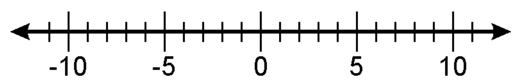
$f(x) = \sqrt{x+2}$



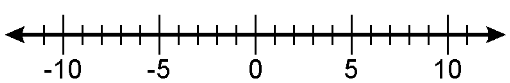
$f(x) = 4 - x^2$



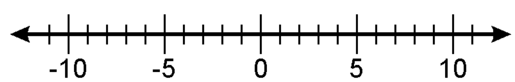
$f(x) = \dfrac{1}{x-3}$



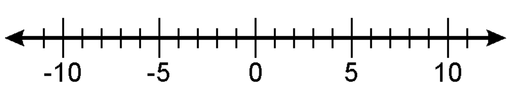
$f(x) = x^3 - 2x - 1$



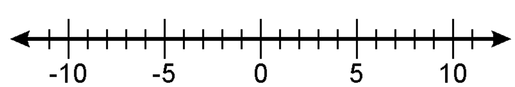
$f(x) = \sqrt{9 - x^2}$



$f(x) = 1 + \dfrac{1}{x}$



$f(x) = \dfrac{1}{x^2 - x - 6}$



The solid and open dots on the number lines represent only a small portion of *x*-values included in the domain of each function.

- If you think that other *x*-values between the table values would also be included in the domain, shade the number lines to include those values.

- If you think *x*-values beyond the table values would also be included in the domain, shade the arrows on the number lines to indicate that the domain continues.

4. Verbal and Symbolic Representations

To describe the domain of a function, you can use words or symbols.

- If the domain of a function includes all *x*-values, state that the domain extends "from $-\infty$ to ∞," or use symbols, $(-\infty, \infty)$.
- To express that the domain of a function includes all values except a particular *x*-value (2, for example), state that the domain includes "all *x* except 2," or use symbols, $x \neq 2$.
- To express that the domain of a function includes all values between a particular *x*-value (2, for example) and infinity, state that the domain extends "from 2 to ∞," or use symbols, $[2, \infty)$.

Express the domain of each function using words and symbols:

FUNCTION	DOMAIN (USING WORDS)	DOMAIN (USING SYMBOLS)
$f(x) = 3x - 2$		
$f(x) = 4 - x^2$		
$f(x) = x^3 - 2x - 1$		
$f(x) = 1 + \frac{1}{x}$		
$f(x) = \sqrt{x+2}$		
$f(x) = \frac{1}{x-3}$		
$f(x) = \sqrt{9 - x^2}$		
$f(x) = \frac{1}{x^2 - x - 6}$		