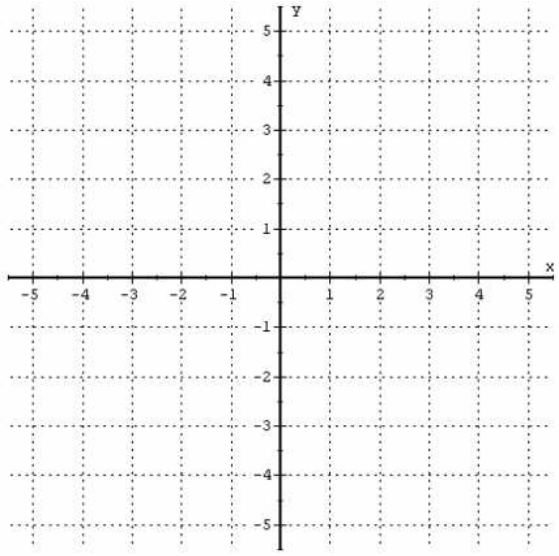
Functions and Domains:

Definition: A relation in mathematics is a set of one or more ordered pairs. It can be described by:

1. A set of ordered pairs: {(-3, -1), (-2, 1), (-1, 1), (1, 3), (3, 1), (3, 2), (0, 3)}

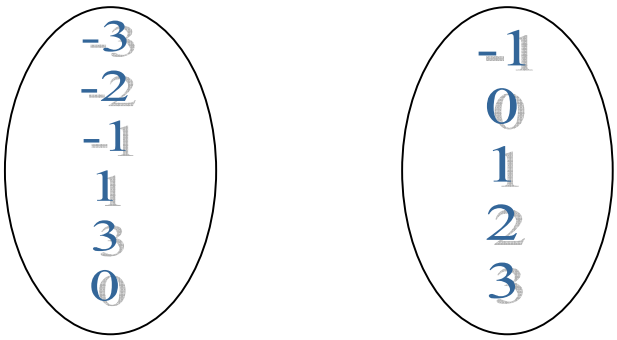
2. Graphs:



3. Tables:

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

4. Mappings:



The DOMAIN of a relation is the set of all the first elements (the *x*-values or *x*-coordinates) in the ordered pairs.

The RANGE of a relation is the set of all the second elements (the *y*-values or *y*-coordinates) in the ordered pairs.

A FUNCTION is a special relation in which each element, *x*, of the domain is paired with *exactly (only) one* element, called *f*(*x*), of the range. One way to test a relation to see if it is a function is by using the vertical line test.

1. Is the given relation a function?

a) $\{(1,-1),(2,5),(3,4)\}$

Domain:

Range:

b) $\{(1,2),(4,5),(3,2)\}$

Domain:

Range:

c) $\{(1,2),(4,5),(4,2)\}$

d) $\{(1,1),(0,0),(4,4)\}$

In the equation $y = f(x)$, the symbol $f(x)$ is read "f of x" and is the value of the function *f* at the number *x*. The range of *f* is the set of all possible values of $f(x)$ as *x* varies throughout the domain.

To evaluate *f* at a number, substitute the number for *x* into the definition of *f*. (Wherever there's an *x* in the equation, use the number in parentheses instead and simplify.)

2. If $f(x) = 6x - 5$, calculate $f(4)$.

3. If $f(x) = 5x^2 + 4x - 7$, calculate $f(-2)$.

4. If $f(x) = -2x^4 + 3x^3 + x^2 - 2x$, calculate $f(-1)$.

5. If $f(x) = \dfrac{10}{2x+4}$, calculate $f\left(\dfrac{1}{2}\right)$.

6. If $f(x) = |2x-5|$, calculate $f(1)$.

Domain of a function:

To find the domain of a function, one must determine what all possible *x*-values can go into the equation to get valid *y*-values. We ask, "Is there anything *x* cannot equal?" for a function.
If the answer to the question is "no," then the domain is all real numbers, written $(-\infty, \infty)$ or $\mathbb{R}$.

If the function has an *x* on the bottom of a fraction, then the domain cannot contain the number(s) that makes the denominator equal to zero (since division by zero is impossible).

7. Find the domain of the function $f(x) = 4x + 15$.

8. Find the domain of the function $f(x) = \dfrac{4x-1}{5}$.

9. Find the domain of the function $f(x) = \dfrac{5}{4-x}$.

10. Find the domain of the function $f(x)=\frac{x+4}{x-3}$.

11. Find the domain of the function $f(x)=\frac{x}{(x+1)(x-2)}$.

12. Find the domain of the function $f(x)=\frac{5}{x^2-16}$.

Radical Functions: If the function has an *x* on the inside of a square root sign, then the domain cannot contain those numbers which make the inside negative (since we can't take the square root of a negative number).

13.Find the domain of the function $f(x)=\sqrt{x-2}$.

14. Find the domain of the function $f(x)=\sqrt{8-2x}$.