Absolute Value - the distance away from 0.

\[ |3| = 3 \quad \text{and} \quad |1-3| = 3 \quad \text{with arrows from -3 to 0 to 3} \]

\[ |x| = 7 \]
\[ x = 7 \text{ or } x = -7 \]

\[ |x+2| = -5 \]
\[ \text{No solution} \quad \text{it is supposed to be distance (positive)} \]

Section 1.2 Circles - are only relations not functions

Equation of a circle in standard form:
\[ (x-h)^2 + (y-k)^2 = r^2 \]

Center \((h, k)\), Opposites: Opposites

r - radius

\[ (x+2)^2 + (y-3)^2 = 16 \]
Center \((-2, 3)\), Radius \(4 = \sqrt{16}\)
Example:
Center $(1, -5)$ Diameter $14$

$$r = \frac{14}{2} = 7$$

$$(x - 1)^2 + (y + 5)^2 = 7^2$$

$$(x - 1)^2 + (y + 5)^2 = 49$$

Example:
Write the equation of this circle in standard form.

$$x^2 + y^2 - 10x + 6y - 7 = 0$$

$$x^2 + y^2 - 10x + 6y = 7$$

$$(x^2 - 10x) + (y^2 + 6y) = 7$$

*Complete the square for both*

$$(x^2 - 10x + 25) + (y^2 + 6y + 9) = 7 + 25 + 9$$

$$(x - 5)^2 + (y + 3)^2 = 41$$

Section 1.3: Functions vs Relations
- Relation - relates values
- Function - A relation for every $x$ value there is only one $y$-value.

Representations of functions

Mappings

Input: $a, b, c, d$

Output: $1, 2, 3$

No $x$ repeats (function)
(1,5) is okay because it repeats the same exact something.

This is not a function because the input 2 has two Y's.

Coordinates

(2,3) (5, -7) (4, 4) (2, -3)

not a function

Graph

Vertical line Test
Draw a vertical line, if it crosses more than 1 point it is not a function.

Equation

Determine if y is a function of x. Solve for y and determine how many y-values for each x-value.

\[ 2x - 3y = 7 \]
\[ -3y = 7 - 2x \]
\[ y = \frac{-7}{3} + \frac{2}{3}x \]

This is linear and its a function.
\[ x + y^2 = 7 \]
\[ y^2 = 7 - x \]
\[ y = \pm \sqrt{7-x} \]
\[ y = \sqrt{7-x} \quad y = -\sqrt{7-x} \]

not a function because \( y \) will have 2 different answers for every \( x \).

\[ |y| = x \]

\[ y = -x \quad \text{or} \quad y = \pm x \quad \text{not a function} \]

\[ y = x \]