3 - 1
Representing Relations

Relation - *is a set of ordered pairs*

Relation can be represented in 4 ways

1) Ordered Pairs
2) Table
3) Graph
4) Mapping

SAMPLE

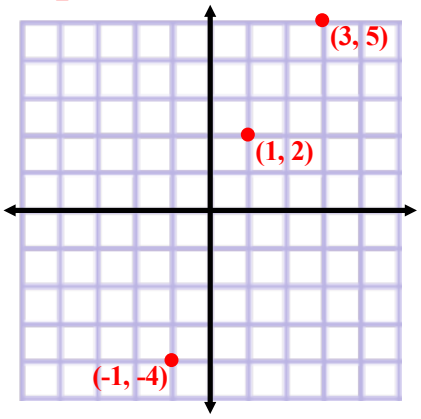
1) Ordered Pairs

(1, 2), (3, 5), (-1, -4)

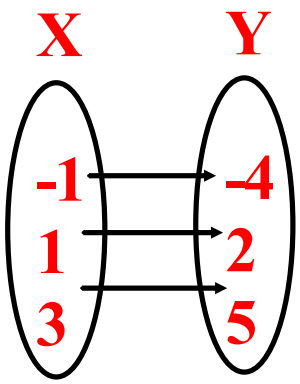
2) Table

X	Y
1	2
3	5
-1	-4

3) Graph



4) Mapping



INVERSE

The inverse of any relation requires the switching of the coordinates of each ordered pair.

The Domain becomes the Range and the Range becomes the Domain.

Inverse Sample

(1, 2) ⟷ (2, 1)
(3, 5) ⟷ (5, 3)
(-1, -4) ⟷ (-4, -1)

3 - 2
Representing Functions

FUNCTION

For every input (x-value) there is exactly one unique output (y-value)

EXAMPLE

Which of the following set of ordered pairs is a function?

(1, 2), (3, 4), (5, 2)

(1, 2), (3, 4), (1, 5)

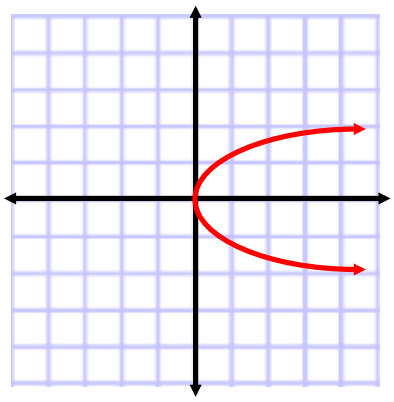
GRAPHICALLY (Functions)

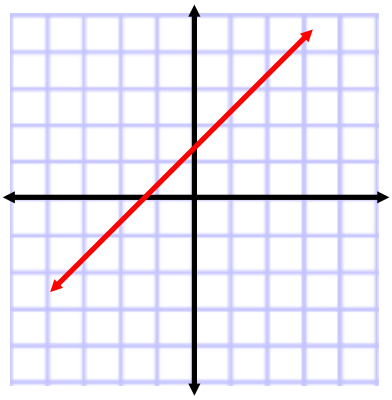
Vertical Line Test

If, on a graph, a vertical line touches two or more points at the same time, the graph does not depict a function

EXAMPLE

Which of the following graph depicts a function?





Function Notation

Any algebraic equation that is written with an f(x) is written in function notation form.

The f(x) is read "f" of "x", which means "The function of x"(Basically, what does "x" do)

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

This equation says the function of "x" is: multiply the "x" by two and then add three to the result

EXAMPLE

Problems will ask you to evaluate the function using a specific "x" value.

$$f(x) = 2x + 3 \quad g(x) = -x^2 - 2x$$

1) f(2) =
2) g(3) =
3) f(2a) =
4) g(-5b) =
5) f(a - 1) =

3 - 3
Linear Functions

Linear Functions

A function that can be graphically represented by a straight line in a Cartesian Plane

* Any function that can be manipulated into Standard form is considered linear

LINEAR

$y = 3x + 1$

$y = -3$

$x = 4$

$3x - 2y = 4$

NOT LINEAR

$y = x^2 + 3$

$y = \frac{1}{x} + 3$

Standard Form

$$Ax + By = C$$

* *A, B, and C must be real numbers*

* *A must be a Whole Number*

* *A, B, and C should be Whole Numbers but are not required*

SAMPLE

$$2x - 3y = 6$$

The above function is in Standard Form.
A = 2, B = -3 and C = 6

EXAMPLES

Convert the following equations into Standard Form

1) $y = -2x + 3$

2) $y = -(1/2)x + 3$

3) $2x - 4y = 6x + 4(y - 1)$

4) $3y = 0.5(x + 1)$

INTERCEPTS

Location where a function, when graphed, crosses the x-axis or y-axis

x-intercept

- Location where a graph crosses the x-axis.
- All x-intercepts have a y-value of zero.

y-intercept

- Location where a graph crosses the y-axis
- All y-intercepts have a x-value of zero

EXAMPLE

Graph the following function by finding the intercepts.

$$2x - 3y = 6$$

x - int (y = 0)

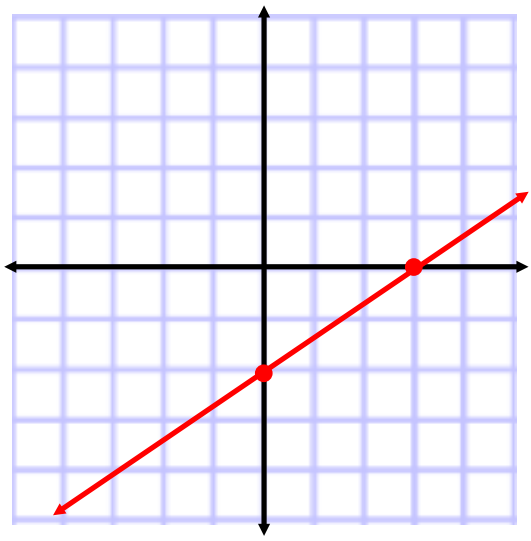
$2x - 3y = 6$

$2x - 3(0) = 6$

$2x - 0 = 6$

$2x = 6$

$x = 3$



y - int (x = 0)

$2x - 3y = 6$

$2(0) - 3y = 6$

$0 - 3y = 6$

$-3y = 6$

$y = -2$

3 - 5
Proportional and Non-Proportional Relationships

PATTERNS

Find the next 3 numbers of the sequence. What is the pattern?

1, 3, 5, 7, ___, ___, ___

1, 2, 4, 8, ___, ___, ___

FINDING EQUATIONS

slope intercept

$$y = mx + b$$

b = y-intercept

$$m = \text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in y}}{\text{change in x}}$$

Use this relationship when using a graph

Use this relationship when using a table

EXAMPLE

Find the equation, in slope-intercept form, that matches each table

x	y
1	2
2	5
3	8

x	y
1	9
3	3
5	-3

EXAMPLE

Find the equation, in slope-intercept form, that matches the graph below