What's Going On?

Checking In   Diagnosing Your Problems

Minds on   Functions and Relations

Action!   Function or Not?

Consolidation   Hey equation, are you a function?

Learning Goal - I will be able to determine if a relation is a function from its mapping diagram, graph, table or equation.

Minds on

Functions and Relations

1) Given the model of a car (i.e. Civic), can you determine the make of the car? (i.e. Honda).

yes

Is this the only possible answer?

2) Given the make of a car (i.e. Honda), can you determine the model of the car? (i.e. Civic).

no

Minds on

Functions and Relations

ind   *dep*

(x, y)

NEW TERM

A **relation** is a set of ordered pairs where values of the independent variable are paired with values of the dependent variable.

NEW TERM

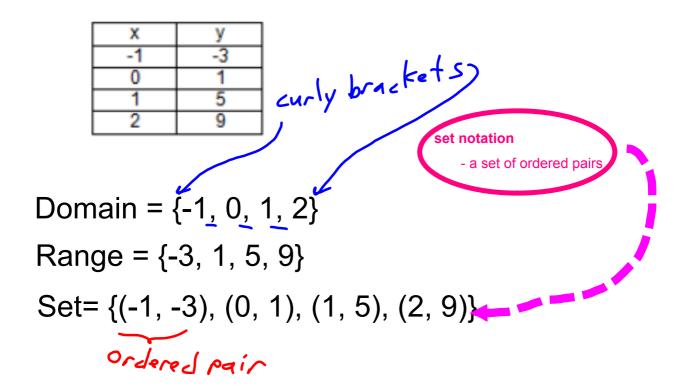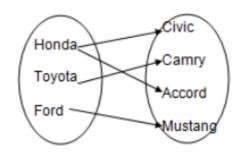The **domain** of a relation is the set of all values of the independent variable.

NEW TERM

The **range** of a relation is the set of all values of the dependent variable.

| Minds on

Domain, Range and Set Notation

x	y
-1	-3
0	1
1	5
2	9

curly brackets

set notation
- a set of ordered pairs

Domain = {-1, 0, 1, 2}

Range = {-3, 1, 5, 9}

Set= {(-1, -3), (0, 1), (1, 5), (2, 9)}

ordered pair

Minds on

Domain, Range and Set Notation

Domain = {Honda, Toyota, Ford}

Range = {Civic, Camry, Accord, Mustang}

Set= {(Honda, Civic), (Honda, Accord),
         (Toyota, Camry), (Ford, Mustang)}

Minds on

Functions and Relations

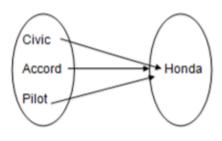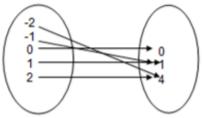A function is a special relation.

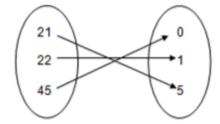On the next slide I will show you some examples of functions and some examples of non-functions.

Minds on

Mapping Diagrams

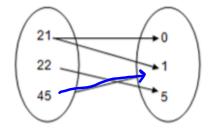**In a mapping diagram the independent variable is always "mapped onto" the dependent variable"**
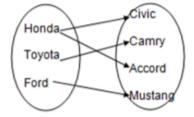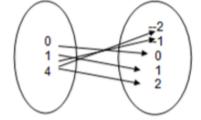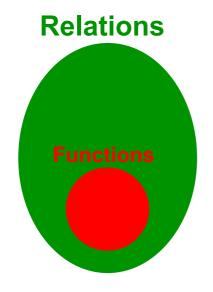
Functions   ## Non-Functions

Minds on

Functions and Relations

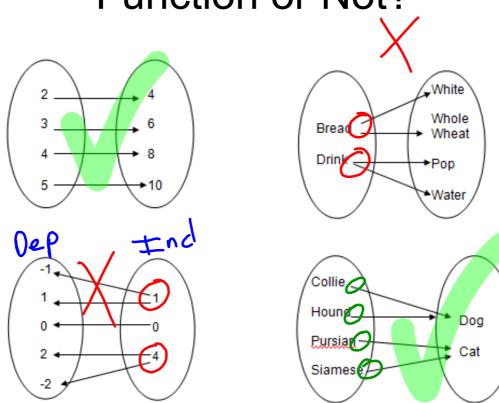A function is a special relation.

NEW TERM

Specifically, a **function** is a relation where each value of the independent variable corresponds with **only one** value of the dependent variable.
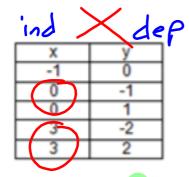
Minds on

That's Funny!

Relations

Functions

'Olive' the functions that exist are relations!

But... 'olive' the relations that exist are **not** functions.

Action! Function or Not?

Action! Function or Not?

ind ✗ dep

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

x	y
21	0
21	1
22	5
45	0

x	y
-1	-3
0	1
1	5
2	9

x	y
-1	5
0	5
1	5
2	5

x	y
21	1
22	0
45	5

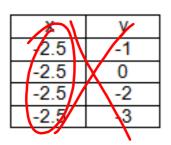| x	y
-2	3
-1	0
0	-1
1	0
2	3

CLICK!

A function is a relation where each
x-value

corresponds with <u>**only one**</u>
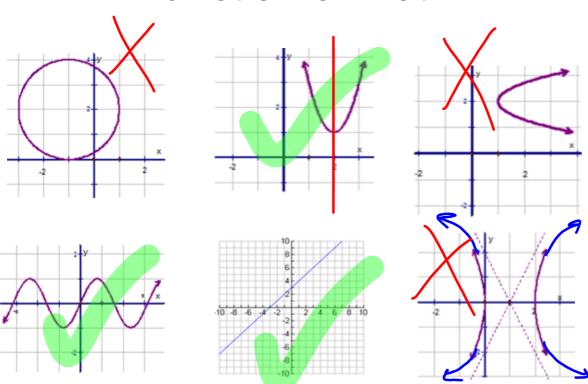# y-value

*NOTE: We will not <u>**always**</u> be using 'x' and 'y'. I use them for this example only because you are used to creating tables of values and graphs with x as the independent variable and y as the dependent variable.

Action! Function or Not?

x	y
-2.5	-1
-2.5	0
-2.5	-2
-2.5	-3

x	y
0	3
2	0
5	-1

x	y
6	5
8	4
9	4.5
11	5

x	y
1	6
1	7
2	3
7	8

Action! Function or Not?

Action!

> A function is a relation where each value of the independent variable corresponds with **only one** value of the dependent variable.
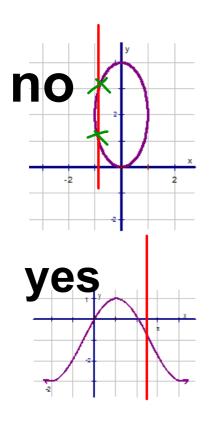
OR

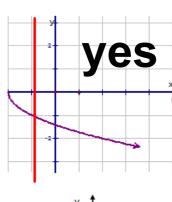> A function is a relation where each
> **x-value**
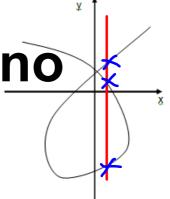> corresponds with **only one**
> **y-value**

The Vertical-Line Test

We can use what is called the **vertical-line test** to determine if the graph of a particular relation is a function.

If any vertical line intersects the graph of a relation more than once, then the relation is not a function.

Action! Function or Not?

no

yes

yes

no

Action!

Function or Not?

a) $y = 2x - 5$

yes

b) $x^2 + y^2 = 9$

$\sqrt{y^2} = \sqrt{9 - x^2}$

$y = \sqrt{9 - x^2}$

NO

$\sqrt{4}$

$= \pm 2$

c) $y = 2x^2 - 3x + 1$

yes

Consolidation

Hey equation, are you a function?

We've figured out how to tell if a relation is a function from its mapping diagram, table of values and graph.

How can we determine if a relation is a function from its equation?

Consolidation

Hey equation, are you a function?

Linear Relations: $y = mx + b$ or $Ax + By = C$

Quadratic relations:

Vertical Parabola

$y = ax^2 + bx + c$ or

$y = a(x - h)^2 + k$

$y = a(x - s)(x - t)$

Horizontal Parabola

$x = ay^2 + by + c$

$x = a(y - h)^2 + k$

$x = a(y - s)(y - t)$

Circle Relations:

$x^2 + y^2 = r^2$

$y = \pm\sqrt{r^2 - x^2}$

Consolidation

Hey equation, are you a function?

Basically:

- If it's a linear equation it's a function

- If it's a quadratic function in terms of y (y = ...) it's a function

- If it's a quadratic function in terms of x (x = ...) it's **NOT** a function

- If it's a circle it's **NOT** a function

values of the dependent variable

If you can find two y-values that give the same x-value it's NOT a function!

value of ind. var.

NEW TERMS

Function

Relation

Domain

Range

Vertical Line Test

Consolidation

Homework!

Pg. 10: 1 - 4, 7, 9, 11

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