

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.

Checking In

Diagnosing Your Problems

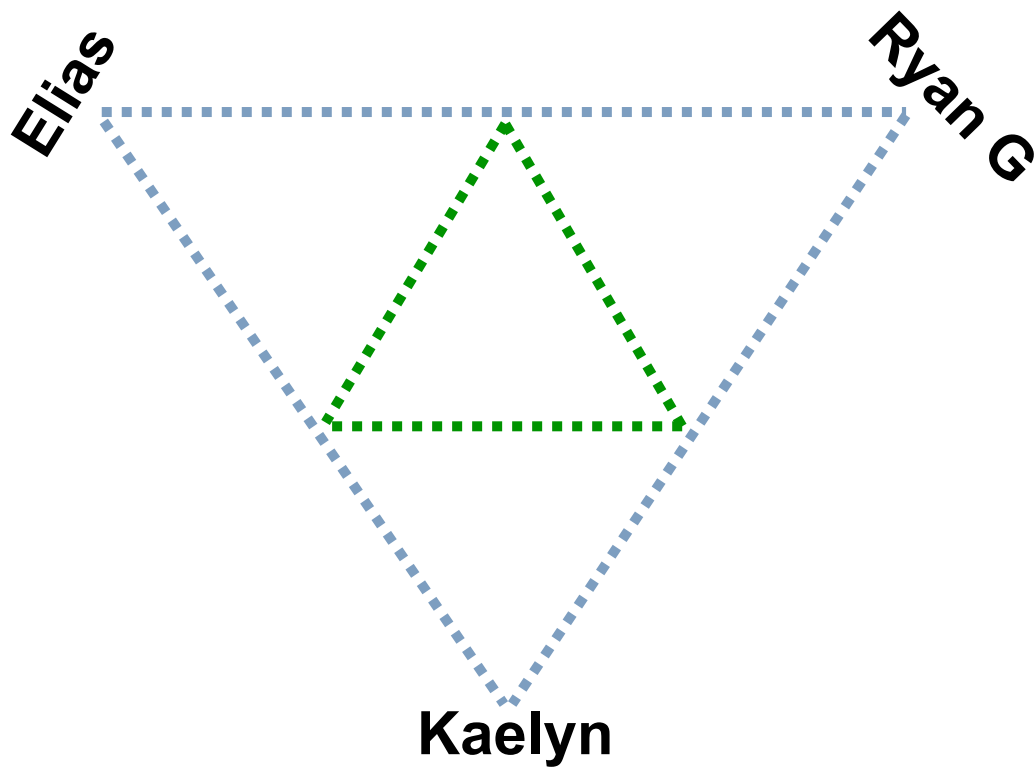
Please have last night's homework out.

Don't bring it to me.

I will come around and collect it.

This way I can easily tell who hasn't handed it in.

Unfinished Business



Minds on

Functions and Relations - A Few Terms

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.

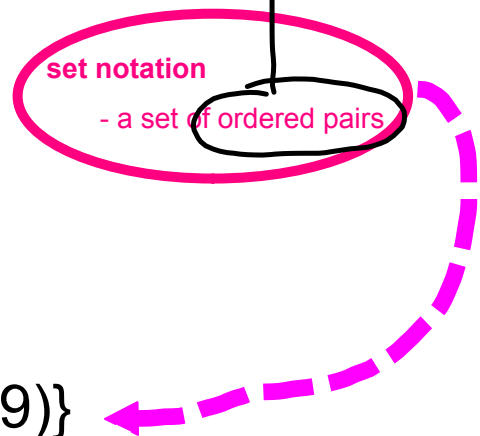
Minds on

Domain, Range and Set Notation

ind var | dep var

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

a point (x, y)



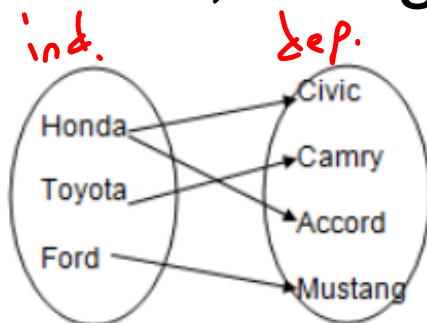
Domain = $\{-1, 0, 1, 2\}$

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

Set: $\{(-1, -3), (0, 1), (1, 5), (2, 9)\}$

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

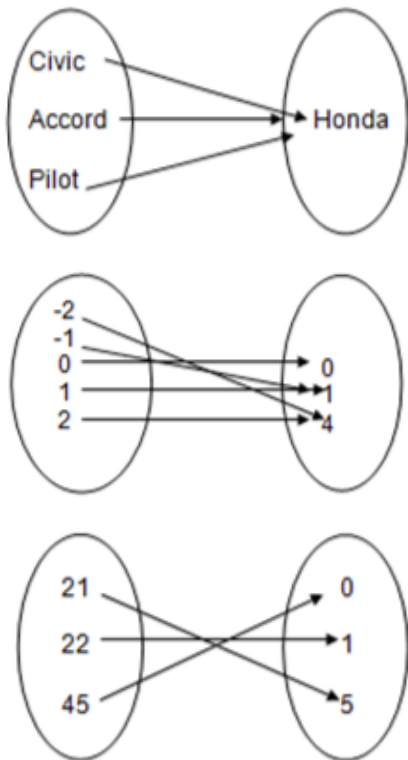
A function is a *special* relation.

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

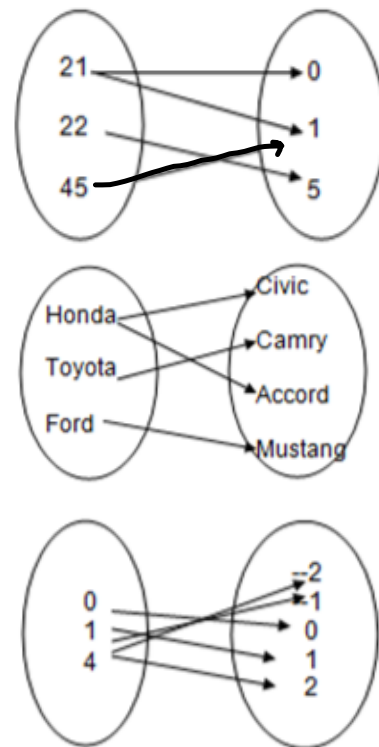
Minds on Mapping Diagrams

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.

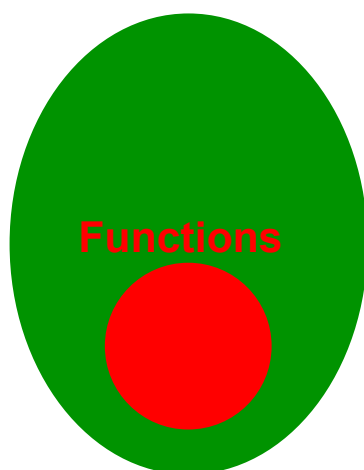
NEW TERM

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!

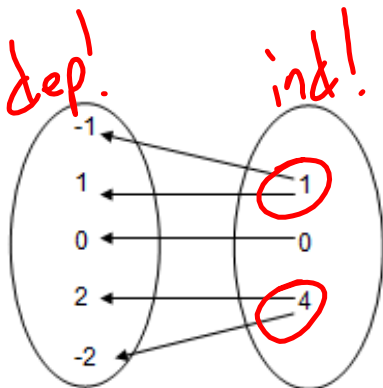
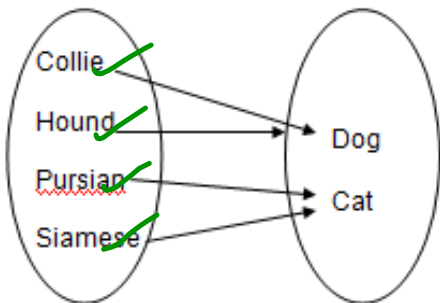
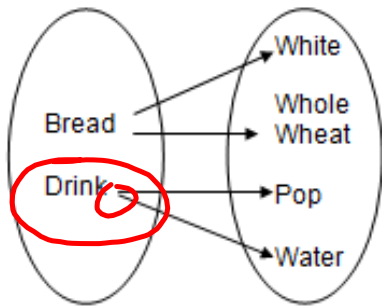
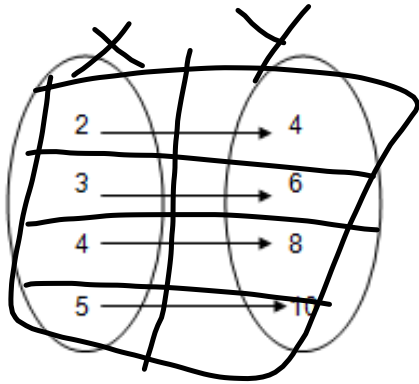
Relations



'Olive' the functions that exist are relations!

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

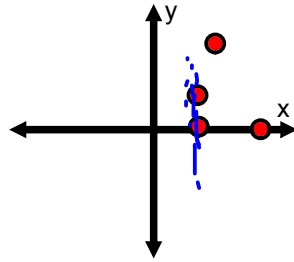
Action! Function or Not?



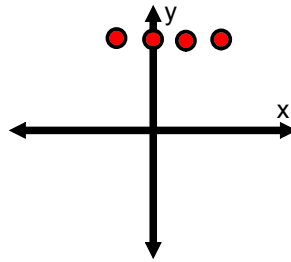
Action! Function or Not?



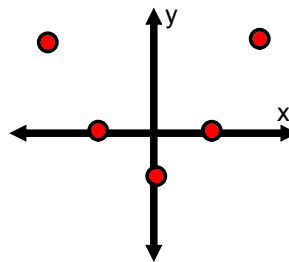
x	y
21	0
21	1
22	5
45	0



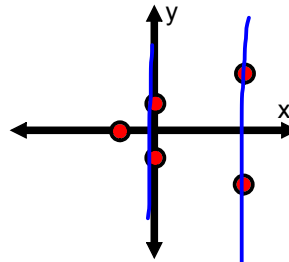
x	y
-1	5
0	5
1	5
2	5



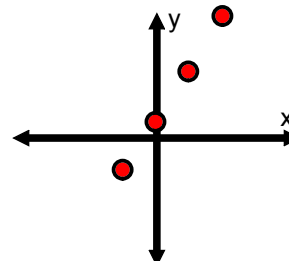
x	y
-2	3
-1	0
0	-1
1	0
2	3



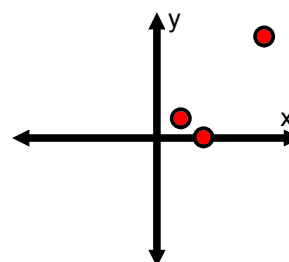
x	y
-1	0
0	-1
0	1
-3	-2
3	2



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



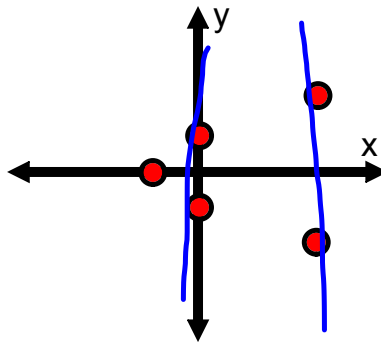
x	y
21	1
22	0
45	5



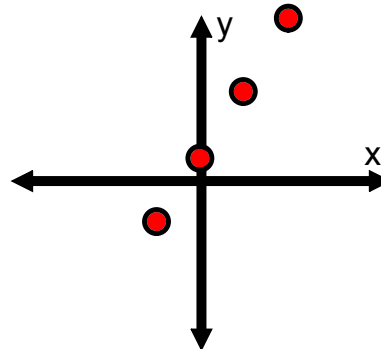
Action! Function or Not?



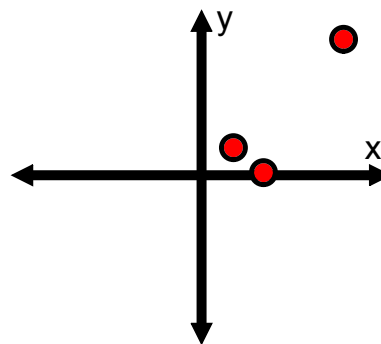
x	y
-1	0
0	-1
0	1
3	-2
3	2



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



x	y
21	1
22	0
45	5



A function is a relation where each

~~value of the independent variable~~
x-value

corresponds with only one

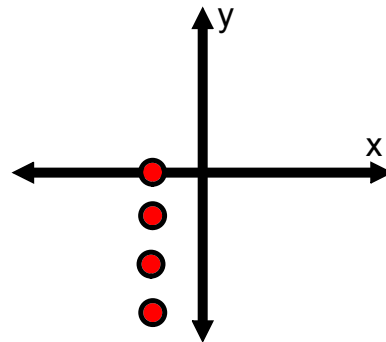
~~value of the dependent variable.~~
y-value

*NOTE: We will not always 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.

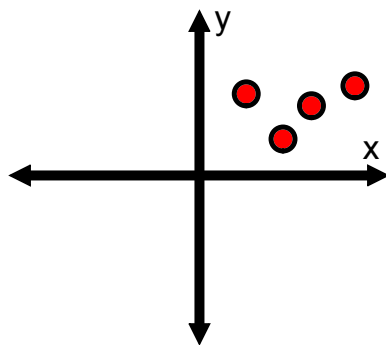
Action! Function or Not?



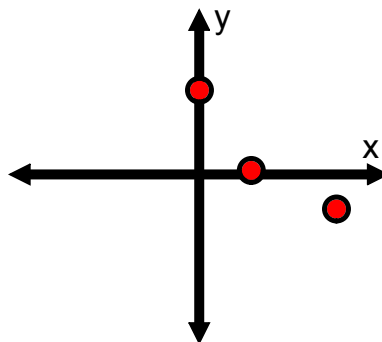
x	y
-2.5	-1
-2.5	0
-2.5	-2
-2.5	-3



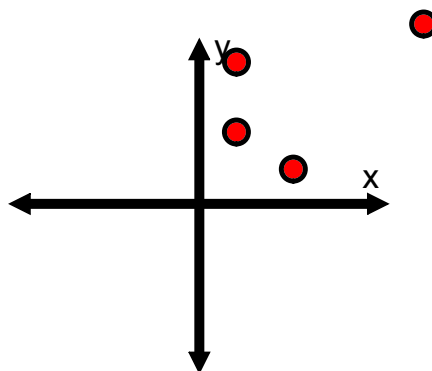
x	y
6	5
8	4
9	4.5
11	5



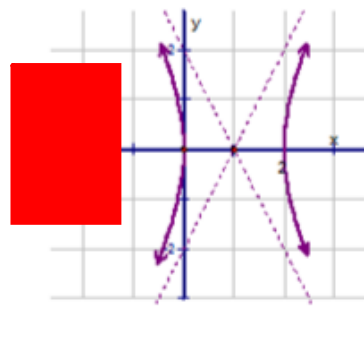
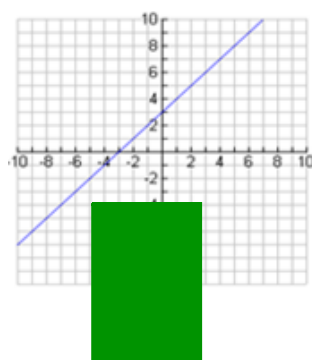
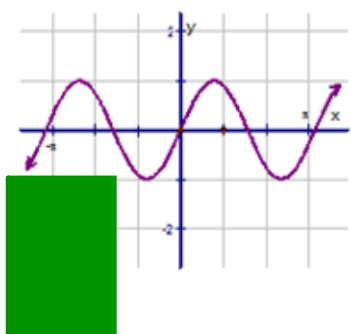
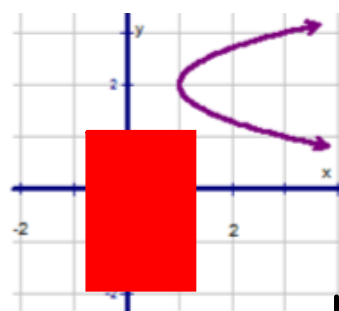
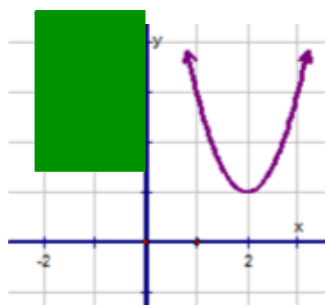
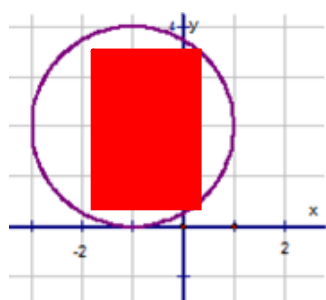
x	y
0	3
2	0
5	-1



x	y
1	5
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

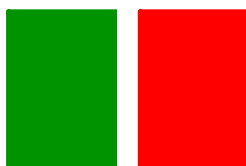
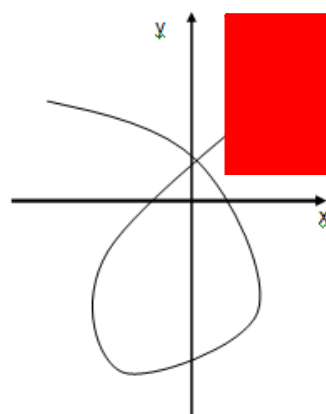
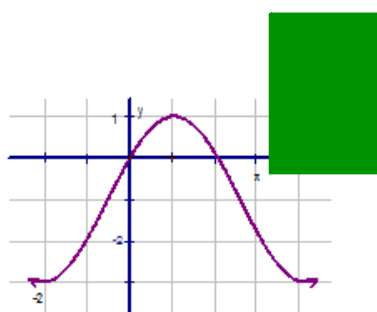
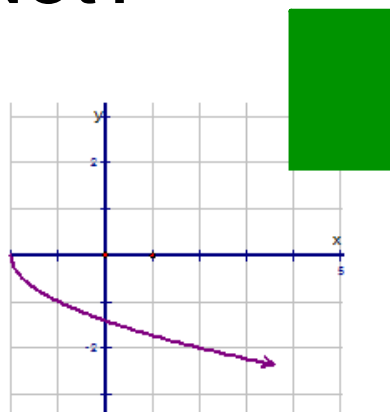
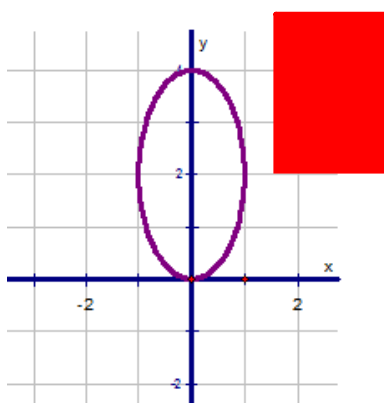
A function is a relation where each **x-value** corresponds with only one **y-value**

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?



Action!

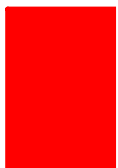
Function or Not?



$$y = 2x - 5$$

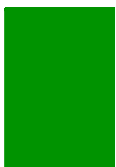
- line
 - initial value is -5
 (y-intercept)

- slope is 2



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

- circle
 - radius is 3



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

→ y-int = 1
 → parabola

→ opens up U



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

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

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

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

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 relation in terms of y ($y = \dots$) it's a function
- If it's a quadratic relation in terms of x ($x = \dots$) it's NOT a function
- If it's a circle it's NOT a function

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



NEW TERMS

Function

Relation

Domain

Range

Vertical Line Test

Consolidation

Homework!

gilbertmath.com

