Algebra 2 2.1
Analyze relations and functions
Use equations of relations and functions

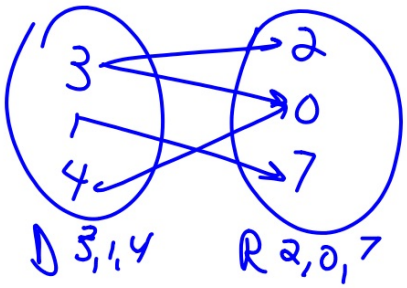
activity: mailman

relation numbers paired
function each x w. unique y.
one-to-one function
onto (not one-to-one) function disregard :(
domain x coord
range y coord
continuous "trace"
discrete separate parts
vertical line test (VLT)

$2 \to 5$
$3 \to 7$
$2 \to 2$

D: 3, 2
R 5, 7, 2

independent variable
dependent variable
function notation



3	6
1	2
5	8

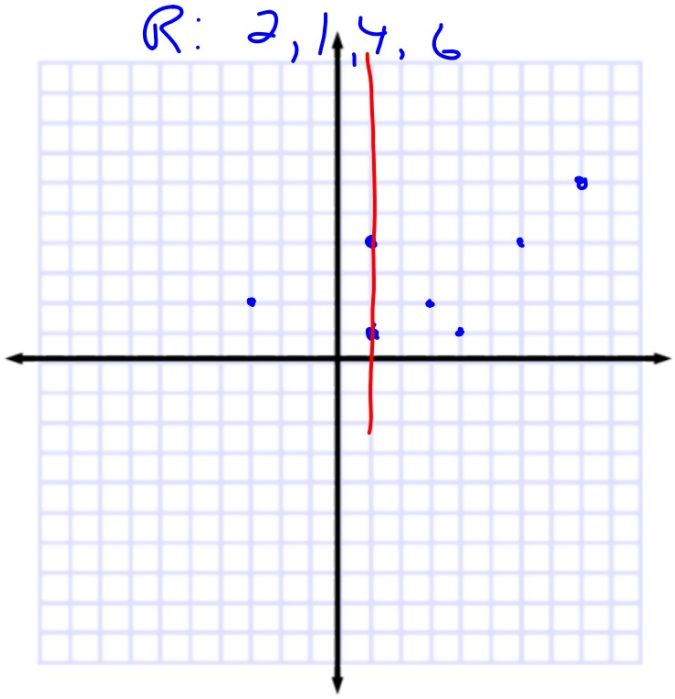
VLT

Graph: each x-coordinate has only one y-coordinate

-3	2
1	1
3	2
4	1
6	4
8	6
1	4

D: -3, 1, 3, 4, 6, 8

R: 2, 1, 4, 6




letter house
A 1
B 2
C 3
D 1
use!

- The table shows the monthly average low and high temperatures for Charlotte, North Carolina.

Monthly Average Temperature (°F) Charlotte, NC						
Month	Jan	Feb	Mar	Apr	May	Jun
Low	32	34	42	49	58	66

Month	Jul	Aug	Sep	Oct	Nov	Dec
Low	71	69	63	51	42	35

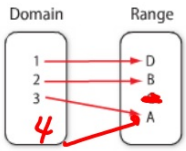
month temp
J 32
F 34

Every month has an average temp.
Can 2 different months have the same average low temp?
Can the same month have more than one average low temp?

KeyConcept Functions

~~One-to-one function~~

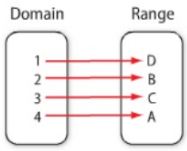
Each element of the domain pairs to exactly one unique element of the range.



function not 1:1

both one-to-one and

Each element of the domain is paired to exactly one element of the range, and each element of the range corresponds to a unique element of the domain.



function 1:1

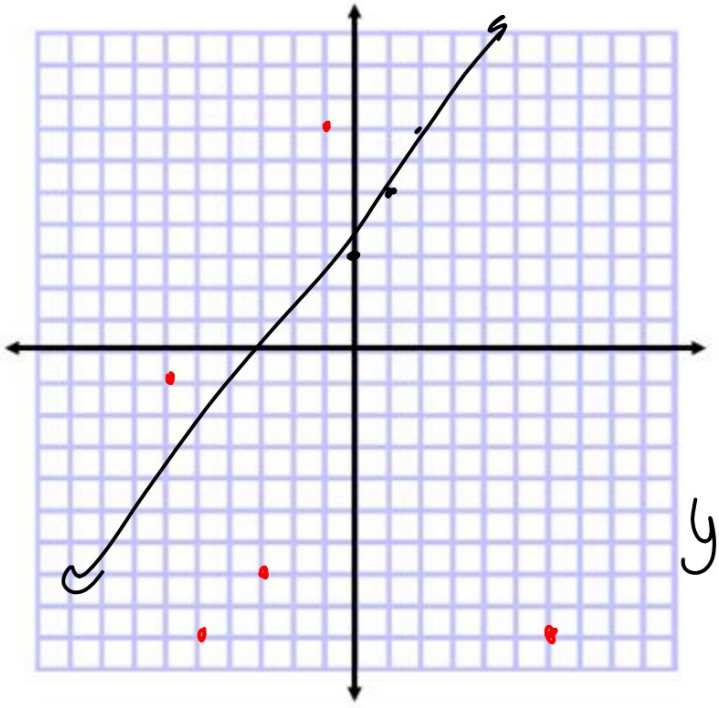
Disregard questions about "onto"

Example 1 Domain and Range

State the domain and range of each relation. Then determine whether each relation is a *function*. If it is a function, determine if it is *one-to-one*, [redacted], or *neither*.

a. {(−6, −1), (−5, −9), (−3, −7), (−1, 7), (6, −9)}

function
not 1:1

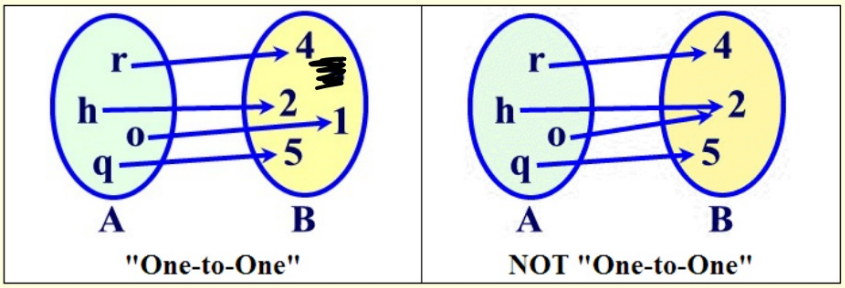


3 → A
4 ↗
yes

3 → A
↘ B

$y = \frac{1}{2}x + 3$ no

In a one-to-one function, given any y there is only one x that can be paired with the given y.
Such functions are referred to as injective.

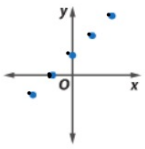


function? function?

Function: Does every x have a single partner?
One to one function: Does every x have a single partner?
AND Nobody shares a y partner either?

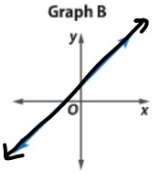
A relation in which the domain is a set of individual points, like the relation in Graph A, is said to be a **discrete relation**. Notice that its graph consists of points that are not connected. When the domain of a relation has an infinite number of elements and the relation can be graphed with a line or smooth curve, the relation is a **continuous relation**.

Graph A



discrete relation

Graph B



continuous relation

Number of pets

Weight of a pet

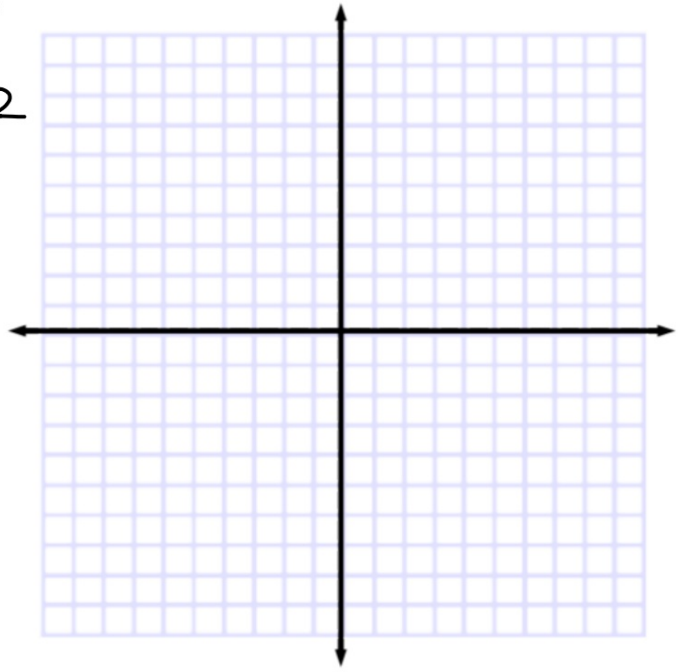
discrete vs
continuous
specific ordered pairs are given vs equation given

b.

x	2	−1	−2	−1	2
y	−2	−1	0	1	2

$y = \frac{3}{2}x - 2$

$f(x) = \frac{3}{2}x - 2$

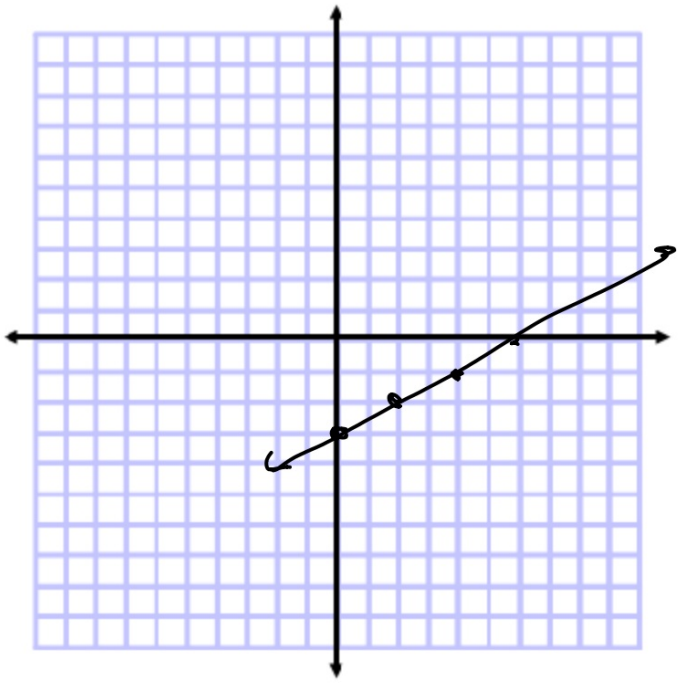


discrete vs continuous
equation: we choose the domain to evaluate (could choose anything)

Example 3 Graph a Relation

Graph $y = \frac{1}{2}x - 3$, and determine the domain and range. Then determine whether the equation is a *function*, is *one-to-one*, State whether it is *discrete* or *continuous*.

D: ARN
R: ARN
function
contin.
one to one



order of operations...

PEMDAS
GEMA

$y = x^2 + 1$

2.1 11-31 odd

GuidedPractice

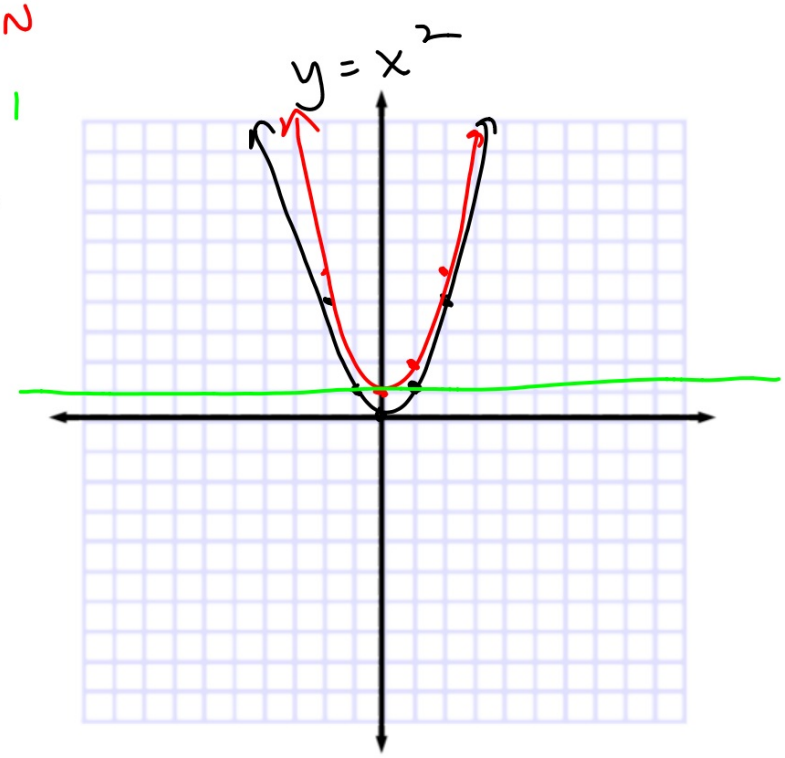
3. Graph $y = x^2 + 1$, and determine the domain and range. Then determine whether the equation is a *function*, is *one-to-one*, State whether it is *discrete* or *continuous*.

x	y
0	1
1	2
2	5
-2	5
-1	2

D: ARN

R: $y \geq 1$

function
contin.
not 1:1



order of operations...

spaghetti & nickles

When an equation represents a function, the variable, often x, with values making up the domain is called the **independent variable**. The other variable, often y, is called the **dependent variable** because its values depend on x.

Function notation (algebra 1) every place you see an x, substitute
cut & paste

Example 4 Evaluate a Function

Given $f(x) = 2x^2 - 8$, find each value.

a. $f(6)$

b. $f(2y)$

Guided Practice

Given $g(x) = 0.5x^2 - 5x + 3.5$, find each value.

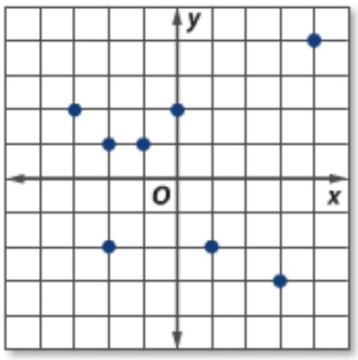
4A. $g(2.8)$

4B. $g(4a)$

whiteboards

State the domain and range of each relation. Then determine whether each relation is a *function*. If it is a function, determine if it is *one-to-one*, *onto*, *both*, or *neither*.

1A.



1B.

KeyConcept Vertical Line Test

Words	If no vertical line intersects a graph in more than one point, the graph represents a function.	If a vertical line intersects a graph in two or more points, the graph does not represent a function.
Models