Name: _____ Date: _____ Unit 3 Class Work

Relations and Functions Notes

Why are functions important to learn about?!	Thoughts/Questions About Functions
• they are the basis of almost ALL math :) ~engineering, accounting, finance, weather, science, technology,...	• Notation: f(x) "f of x"

Short-Term Goals
(which will help you achieve long-terms goals of understanding further concepts in this and future math courses)

~ identify function vs. non-function
~ identify domain & range of function
~ create, model with, & analyze functions

Examples:

* CAR:
  - keys → engine (input → output) turns on
  - press brakes → stops
* COMPUTER
  - flash drive → access to files
  - type "s" → "s" appears
  - "CTRL+C" / right click, copy / edit-copy → copy text
  - *multiple inputs can have same output

Non-Examples:

- type "s" → "S" "s" — not functioning
- hit brakes → stops, windows roll down — NOT functioning

Each input should produce EXACTLY one output

Essential: what can we conclude about functions in terms of inp

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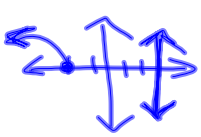
Domain and Range

* D: left, right R: down, up

Notation	When to Use	Example(s)
open ( )	• infinity • not included	D: left, right (-2,∞) x>-2; R: down, up (-∞,-1) y≤-1
closed	• including	D: L,R [-3,5) -3≤x<5; R: down, up -1<y≤1
set	• set of points or • only 1 value	D: left, right ℝ; R: y=3 {3}

The Union:



D: left, right (-∞,-2] ∪ {3}
x≤-2 ∪ x=3
R: ℝ

ex. ©
D: (-∞,5) x<5
R: (-∞,3] y≤3

① D: ℝ
R: [-3,∞) y≥-3

④ D: {-7,0,3,9}
R: {1,2,8}

⑤ D: ℝ
R: must be positive, or zero — so [0,∞) y≥0

⑥ D: {-9,-3,-1,3,10}
R: {-2,0,2,10}

⑦ D: [0,∞) x≥0
R: ℝ

⑧ D: [-7,∞) x≥-7
R: [-6,7] -6≤y≤7

Sep 20-10:51 AM

Relations and Functions Class Work

Objective: You will be able to identify whether or not relations are functions, support your identification, and state the domain and range of relations.

In the world of Algebra, there are a few vocabulary terms you must understand in order to grasp mathematical functions!

Definitions:

- ☆ **Relation:** a relationship btwn 2 sets of info
- ☆ **Domain:** all of the inputs (x-values)
- ☆ **Range:** all of the outputs (y-values)
- ✱ **FUNCTION:** when every input has exactly 1 output

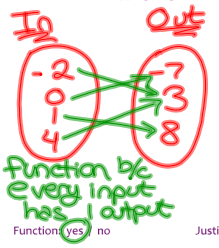
*remember alphabetical order

Guided Examples: Part 1: Determine whether or not each relation is a function.
Part 2: Identify the domain and range of each relation.

A. SET OF POINTS

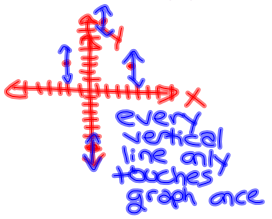
Consider the relation: {(-2,3), (1,8), (0,-7), (4,3)}

Method 1: Mapping Diagram



function b/c every input has 1 output

Method 2: Vertical Line Test (VLT)

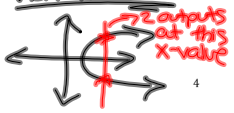


every vertical line only touches graph once

Function: yes / no

Justification(s):

ex. of non-function



Domain:

Range:

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B. EQUATION **Is the equation $x = y^3$ a function?**

ex.
Input $x=4 \rightarrow 4=y^2 \rightarrow y=2, y=-2$
In 4 < Out 2, -2
NOT a function
ex. Input of 4 produces 2 outputs (2, -2)

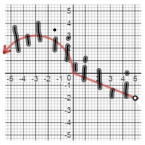
What is the domain of the relation?

inputs cannot be neg.
$[0,\infty)$
$x \geq 0$

What is the range of the relation?

outputs $\mathbb{R}$

C. GRAPH



Function: yes / no

Justification:
passes VLT
each x matches exactly 1 y

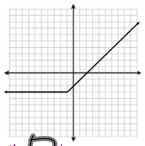
Domain:

Range:

Now You Try Some!

Part 1 Determine whether or not each relation is a function.
Support your answer! ☺
Part 2: Identify the domain and range of each relation, using ALL appropriate notations.

1.



Function: yes / no

Justification:
passes VLT

Domain:

Range:

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2. $\sqrt{x}+1=y$

Function: yes / no

Justification:
each input only produces 1 output

$x=4 \rightarrow \sqrt{4}+1=y$, $y=2+1=3$
$x=9 \rightarrow \sqrt{9}+1=y$, $y=4$

Domain:
input: no negatives
D: $[0,\infty)$ $x \geq 0$

Range:
$\sqrt{0}+1=y$, $y=1$ is lowest
R: $[1,\infty)$ $y \geq 1$

---

3. $\frac{3}{x-5}$

Function: yes / no

Justification:
every input has 1 output

$x \neq 5$

Domain:
$(-\infty,5) \cup (5,\infty)$
$x<5 \cup x>5$

$y \neq 0$

Range:
$(-\infty,0) \cup (0,\infty)$
$y<0 \cup y>0$

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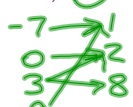
4. {(0,2), (3,2), (-7,1), (9,1), (3,8)}

Function: yes no

Justification:
input "3" produces 2 outputs



Domain:

Range:

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5. $y = |2x + 8|$

Function: yes / no

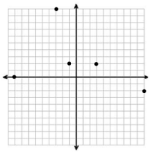
Justification:
each input has 1 output

In: $x=1$ Out: $y=10$

Domain:

Range:

6.



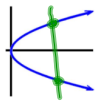
Function: yes / no

Justification:
every x matches only 1 y

Domain:

Range:

7. **Function:** yes (no)



Justification: most x values have 2 y-values

Domain:

Range:

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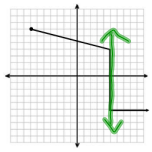
8. **Function:** yes (no)



Justification: does not pass VLT

Domain:

Range:

9. Consider the input output table below.

Input	-15	23	0	12	-3	
Output	3	0	8	2	3	9

a. Choose any value to place in the empty cell so that the table of values satisfies the definition of a function. Explain your choice.

10, 6, -8, 29

b. Choose any value to place in the empty cell so that the table of values does not satisfy the definition of a function. Explain your choice.

23, 0, 12, -15, -3

10. Choose all values that can be placed in the empty cell so that the table of values satisfies the definition of a function.

Input	9	13	28	-12	-2	
Output	0	4	-8	4	-3	0

☑ -3 ☑ 13 ☑ 4
☑ 0 ☐ 9 ☐ 8

Homework Part 1: p. 59-60 #12-21, #40-45, 62, and 63
Part 2: p.59-60 #12, 17, 18, 19, 21 (just state the domain and range of each relation) and #36-39, & 58

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Day 1:

Complete A is your favorite season is Summer or Winter.

Complete B if your favorite season is Spring or Fall.

A. Create any relation that IS a function. Explain your decision.

B. Create any relation that is NOT a function. Explain your decision.

Write/Draw your function on the front of your post-it note, & the answer on the back. ☺

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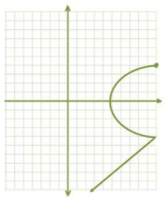
Day 2:

1. Determine whether or not each relation is a function. Then state the domain and range of each.

A. {(-2,4), (-1,3), (0,4)}

B.



C. Create any relation that IS a function. Explain your decision.

2. Write any questions you still have regarding functions, domain, and/or range. If you do not have any questions, create a problem that could be solved using any of these ideas. ☺

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