Algebra 1 Unit 2 Linear Functions Notes

Name: ______________________________

Unit 2: Linear Functions

Learning Goal– Linear Functions

Learning Target #1: Creating and Evaluating Functions

- Determine if a relation is a function
- Identify the domain and range of a function
- Evaluate a function
- Create an input and output table
- Create a rule to describe a table, graph, or context

Learning Target #2: Graphs and Characteristics of Linear Functions

- Graph a function in slope intercept or standard form
- Convert between standard and slope intercept forms
- Calculate the slope in multiple representations
- Identify the y-intercept from multiple representations

Mon, 1/20 MLK Day	Tues, 1/21 Review	Wed, 1/22 Test Unit 1	Thurs, 1/23 Day 1: Functions	Fri, 1/24 Day 2: Characteristics of Linear Functions
Mon, 1/27 Day 3: Characteristics of Linear Functions	Tues, 1/28 Day 4: Graphing Inequalities	Wed, 1/29 Day 5: Graphing Linear Functions & Matching Graphs and Equations	Thurs, 1/30 Day 6: Writing Equations of Lines Review	Fri, 1/31 **Unit 2 Test**

Tutoring Times

	Monday	Tuesday	Wednesday	Thursday	Friday
AM	Mrs. Jackson 7:45 – 8:15 Room 1210	Mr. Phillips 7:45 – 8:15 Room 1206	Mrs. Jackson & Mr. Webb 7:45 – 8:15 Room 1210 Room 1205	Mr. Watson & Mr. Phillips 7:45 – 8:15 Room 1208 Room 1206	Mr. Watson 7:45 – 8:15 Room 1208
PM	NONE	Mrs. Petersen 3:30 – 4:30 Room 1210	NONE	NONE	NONE

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Day 1 – Functions

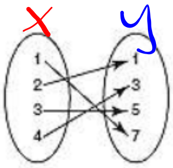
In 8th grade, you learned to express mathematical relationships using a coordinate graph. Relationships can also be represented by a set of ordered pairs, which is called a **relation**. Relations can be represented using tables, graphs, or mappings.

A **function** maps each input to one and only one output, which means a function has no input with more than one output (No x-values going to two different y-values). Each of the below representations are relations. The first coordinate of an ordered pair in a relation in the **input**, and the second coordinate is the **output**. We refer to the set of all inputs as the **domain** and the set of all outputs as the **range**.

Determine if the following are functions. Then state the domain and range.

a.

x y

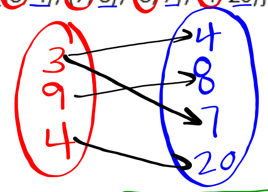


Function or Not a Function

x Domain: {1, 2, 3, 4}

y Range: {1, 3, 5, 7}

b. {(3, 4), (9, 8), (3, 7), (4, 20)}



Function or Not a Function

Domain: {3, 9, 4}

Range: {4, 7, 8, 20}

c. {(15, -10), (10, -5), (5, 2), (10, 5), (15, 10)}

Function or Not a Function

Domain: {15, 10, 5}

Range: {-10, -5, 2, 5, 10}

d.

x y

Input	Output
−10	20
−5	10
0	0
5	10
10	20

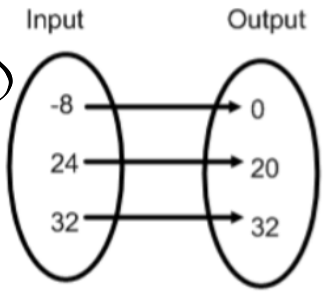
(-10, 20)

Function or Not a Function

Domain: {-10, -5, 0, 5, 10}

Range: {20, 10, 0}

e.

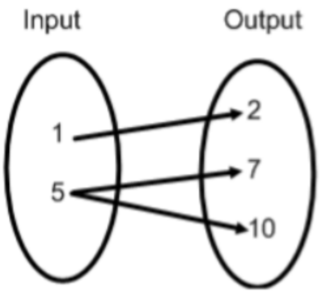


Function or Not a Function

Domain:

Range:

f.



Function or Not a Function

Domain:

Range:

g. (telephone number, person)

x y

Function or Not a Function

770-425-9701 → Mrs J

770-592-3495 → A J

404-291-5321 → Piper

h. (person, car)

x y

Function or Not a Function

Mrs. J → Buick, Ford, Infiniti

Brooks → Jeep

i. (shirt color, student)

x y

P, R, K → Black

Function or Not a Function

Black → P, R, K

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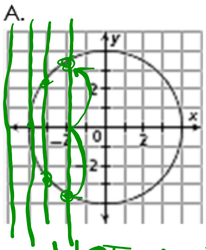
Testing if a Function is a Function (Vertical Line Test)

Another way to tell if a relation is a function is the **Vertical Line Test**. The Vertical Line Test is used with graphs of relations. To use the Vertical Line Test, consider all of the vertical lines that could be drawn on the graph of the relation. If any of the vertical lines intersect the graph of the relation at more than one point, then the relation is not a function.

Ex. Use the Vertical Line Test to determine if the graphs of the relations are functions.

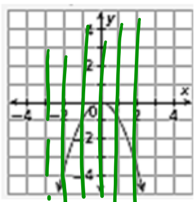
A.



hits graph 2x

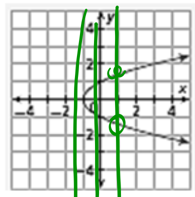
NOT A FUNCTION

B.



yes!

C.



NOT A FUNCTION

Function Notation & Evaluation

The following problems are written in **function notation**. ©MrsETeachesMath

output $f(x) = 3x + 1$ → y

$f(a) = 3a + 1$

$f(x) = x^2 + 3x - 1$ output

$f(♡) = ♡^2 + 3♡ - 1$

$f(x) = 2x^2 + x - 1$

$f(3) = 2(3)^2 + (3) - 1$ $f(3)=20$

$2 \cdot 9 + 3 - 1$

$18 + 3 - 1$

$21 - 1 = 20$

What do you think function notation means?

Ex. Convert the following equations into function notation.

a. ~~y~~ = 5x + 7 b. g = 8h – 2 c. b = -4d

$f(x) = 5x + 7$ $f(h) = 8h - 2$ $f(d) = -4d$

Evaluating Functions
$F(x) = x + 1$
$F(2) = 2 + 1$

Ex. Evaluate f(x) = 3x when x = 2 and x = -8

$f(x) = 3x$ $f(x) = 3x$

$f(2) = 3(2)$ $f(-8) = 3(-8)$

$f(2) = 6$ $f(-8) = -24$

Ex. Evaluate g(x) = ½x – 3 when x = -4 and x = 8

$g(x) = 1/2x - 3$ $g(8) = 1/2(8) - 3$

$g(-4) = 1/2(-4) - 3$ $g(8) = 4 - 3$

$g(-4) = -2 - 3$ $g(8) = 1$

$g(-4) = -5$

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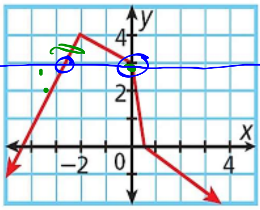
Evaluating a Function from a Graph



Can you figure out what this notation means?

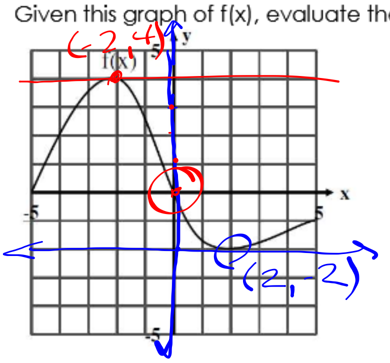
✓ $f(-2) = 4$ ✓ $f(0) = 3$

✓ $f(-1) = 3.5$ ✓ $f(2) = -1$

$f(1) = -0.2$

$\boxed{f(0) = 3}$

Given this graph of f(x), evaluate the following:



a. f(-4) = 2 b. f(0) = 0 c. f(-5) = 0

d. f(2) = -2 e. f(0) = 0 f. f(2) = 4

Understanding Function Notation

The table provides height measurements for Julia from birth to age 16, with heights rounded to the nearest inch.

Age (yrs.)	x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Height (in.)	y	21	30	35	39	43	46	48	51	53	55	59	62	64	65	65	66	66

1. Which variable is the independent variable, and which is the dependent variable? Explain your choice.

x = indep. = age
y = dep = height

2. What is the value of $h(11)$? What does this mean in context?

height at age 11
$h(11) = 62$

65 in $\cdot \frac{1\text{ ft}}{12\text{ in}}$ = 5' 5''

3. When x is 3, what is the value of y? Express this fact using function notation.

$h(3) = 39$

4. Find an x such that $h(x) = 53$. What does your answer mean in context?

height (y)
$h(8) = 53$ at age 8, Julia was 53" tall

5. Find an x such that $h(x) = 65$. What does your answer mean in context?

$h(13) = 65$
$h(14) = 65$
at age 13 + 14, Julia was 65" tall