"I know what we're going to do today."

Agenda:

~~Bell Ringer: page 16~~

Pick up take home test

1) Functions Unit- Lesson 2

- What is a linear function?
- How can you tell if a function is linear?
- What are solutions to a linear equation?
- What are intercepts?

2) Homework:

3) Take Home Test Due Tuesday

Jun 12-11:04 AM

Function Notation:

A function connects a number, n, to another number, f(n), by a rule.

Read f(n) as "the function of n".

Fill out the following function tables.

1) f(n) = n – 5 (similar to y = x + 5)

N	N – 5	F(n)
-5	-5 – 5	-10
0	0 – 5	-5
5	5 – 5	0
10	10 – 5	5
15	15 – 5	10

y

f(x) ~~y~~ = x + 5

y = 2x + 1

g(x)

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Quadratic

2) $f(n) = n^2 + 1$

N	$N^2 + 1$	F(n)	
-2	$(-2)^2 + 1$	5	-3
-1	$(-1)^2 + 1$	2	-1
0	$0^2 + 1$	1	
1	$1^2 + 1$	2	
2	$2^2 + 1$	5	

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Functions lesson 2

In this lesson you will learn to solve linear equations with 2 variables (x and y) and to graph linear equations using ordered pairs (x, y).

Functions can be represented as:

1) tables
2) graphs
3) equations

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A linear equation is an equation in which the variables (usually x and y) appear separately and both variables have an exponent of one.

$y = mx + b$

Examples:

1) $y = 2x + 1$ linear

2) $y = -x - 4$ linear

3) $y = 2x^2 - 7$ not linear

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Solutions of a linear equation are ordered pairs that make the equation true.
One way to find solutions is to make a table. (This should be familiar to you)

Examples

1) Find 4 solutions to $y = 2x + 4$

f(x)

X	2x + 4	y (f(x))
0	2(0) + 4	4
1	2(1) + 4	6
2	2(2) + 4	8
3	2(3) + 4	10

(0, 4) (1, 6) (2, 8) (3, 10)

+2 +2 +2

Constant Rate (slope)

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2) Find 4 solutions to $2x + y = 6$

First rewrite the equation by solving for y.

$2x+y=6$

$y=-2x+6$

X	Y = $-2x+6$	y
0	$-2(0)+6$	6
1	$-2(1)+6$	4
2	$-2(2)+6$	2
3		0

1 1 1 −2 −2 −2

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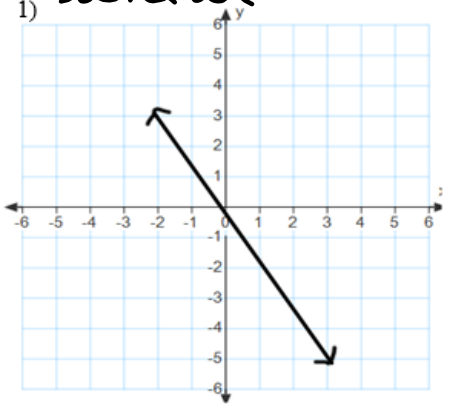
A linear equation can also be represented by a graph.

Look at the following graphs. Which are linear?

1) linear



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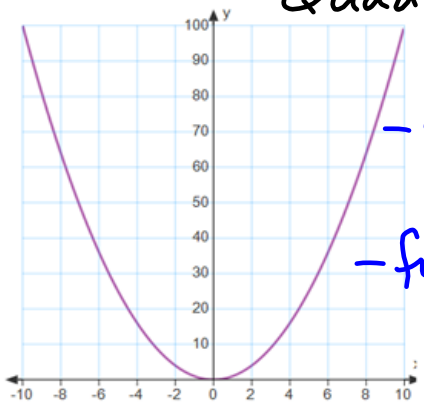

Quadratic x^2

- not linear
- function

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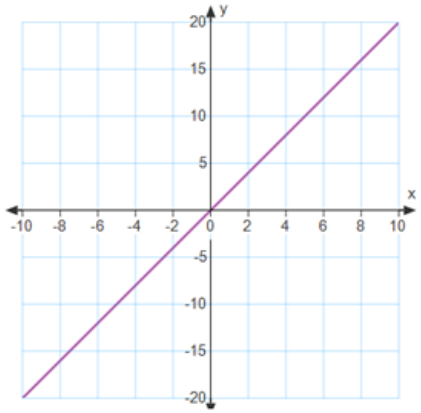
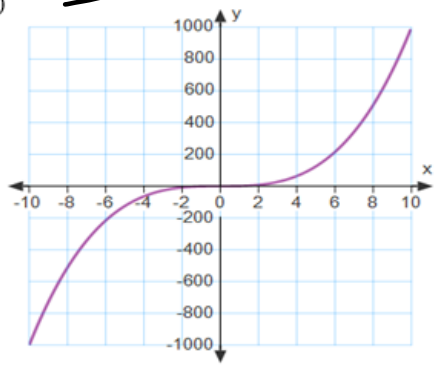
linear

3)



no cubic x^3

4)



Graphs of linear equations are always straight lines.

The coordinates of all points on the line are solutions to the equation.

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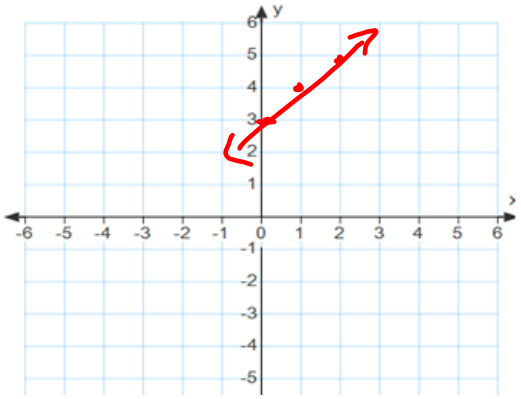
To graph linear equations, find ordered pair solutions and plot them. Draw a line through the points.

Examples: Graph the following equations by plotting ordered pair solutions.

1) y = x + 3



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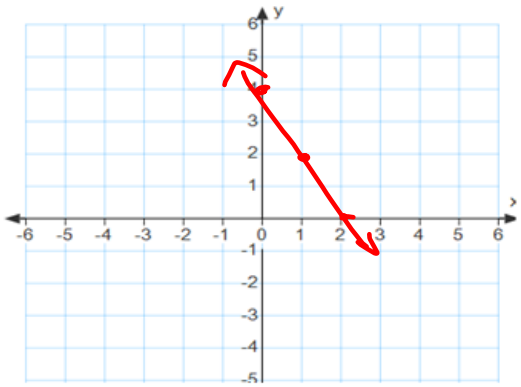
2) y = -2x + 4



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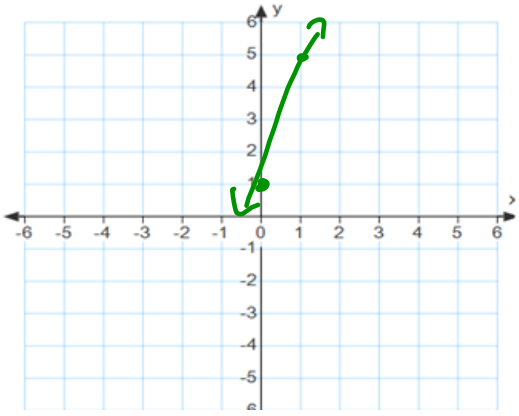
3) y = 4x + 1



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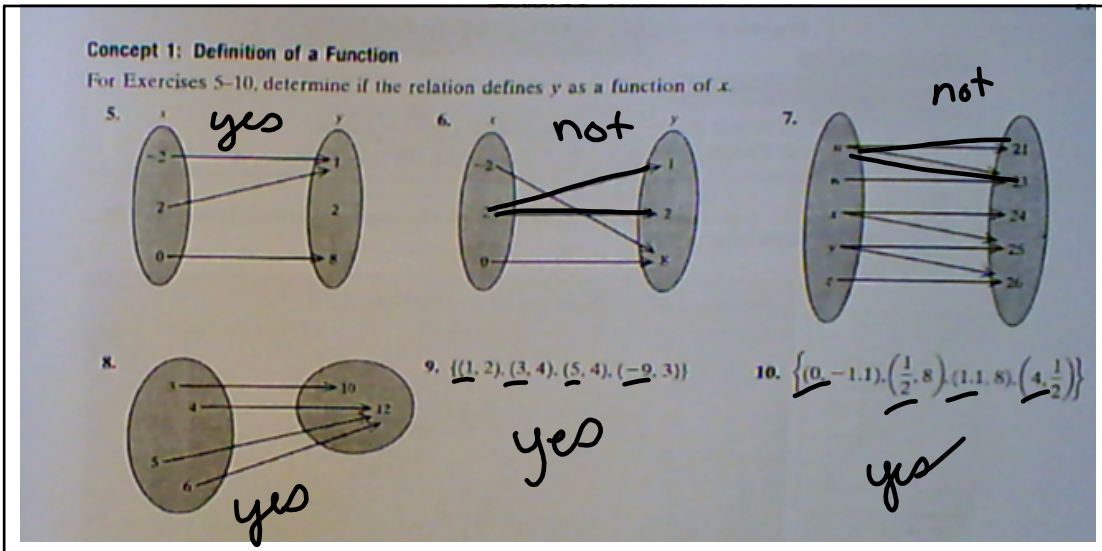

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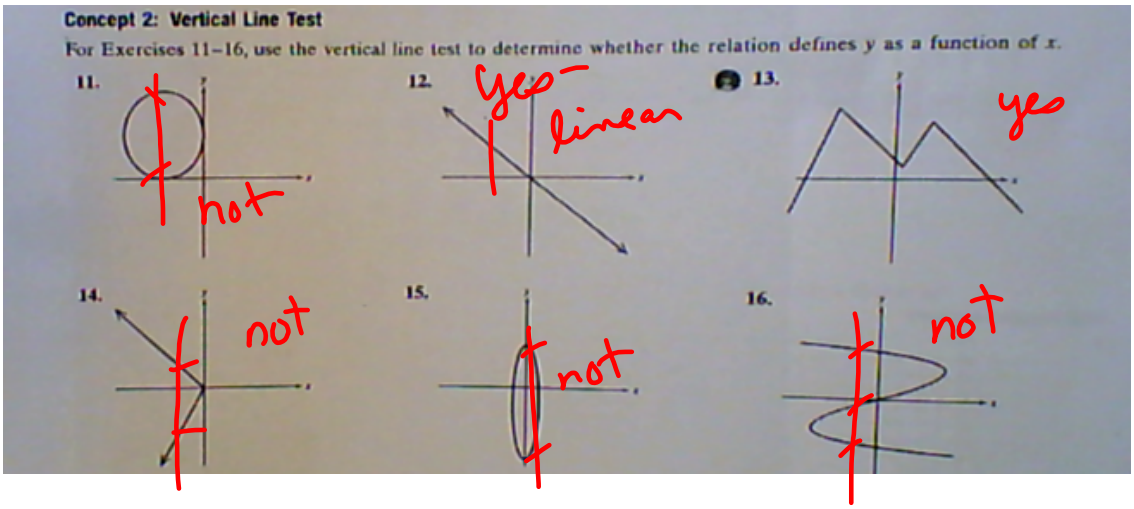

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Concept 3: Function Notation

Consider the functions defined by $f(x) = 6x - 2$, $g(x) = -x^2 - 4x + 1$, $h(x) = 7$, and $k(x) = |x - 2|$. For Exercises 17–48, find the following.

17. $g(2)$ 18. $k(2)$ 19. $g(0)$ 20. $h(0)$

21. $k(0)$ 22. $f(0)$ 23. $f(t)$ 24. $g(a)$

$k(0) = |0-2|$

$k(0) = |-2|$

$k(0) = 2$

$f(0) = 6(0) - 2$

$f(0) = 0 - 2$

$f(0) = -2$

$f(t) = 6t - 2$

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Check Your Understanding

Determine whether each table, graph, or equation represents a *linear* or *nonlinear* function. Explain.

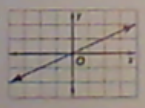
Examples 1–6 (pp. 528-529)

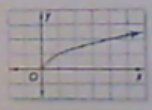
1.

x	0	1	2	3
y	1	3	5	10

2.

x	0	3	6	9
y	−3	9	21	33

3. 

4. 

5. $y = \frac{x}{3}$

6. $y = 2x^2$

Example 7 (p. 530)

7. **MEASUREMENT** The table shows the measures of the sides of several rectangles. Are the widths of the rectangles a linear function of the lengths? Explain.

Length (in.)	1	4	8	10
Width (in.)	64	16	8	6.4

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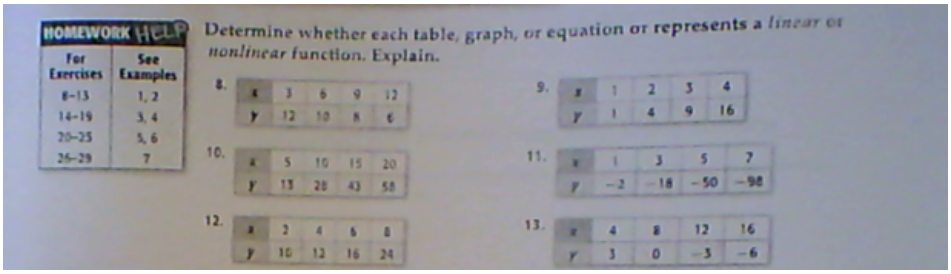

HOMEWORK HELP

For Exercises	See Examples
8–13	1, 2
14–19	3, 4
20–25	5, 6
26–29	7

Determine whether each table, graph, or equation or represents a *linear* or *nonlinear* function. Explain.

8.

x	3	6	9	12
y	12	10	8	6

9.

x	1	2	3	4
y	1	4	9	16

10.

x	5	10	15	20
y	13	28	43	58

11.

x	1	3	5	7
y	−2	−18	−50	−98

12.

x	2	4	6	8
y	10	12	16	24

13.

x	4	8	12	16
y	3	0	−3	−6

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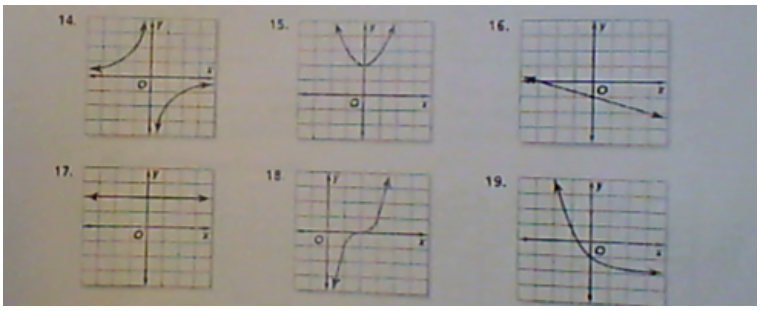

14. 15. 16.

17. 18. 19.

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20. $y = x^3 - 1$ 21. $y = 4x^2 + 9$ 22. $y = 0.6x$

23. $y = \frac{3x}{2}$ 24. $y = \frac{4}{x}$ 25. $y = \frac{8}{x} + 5$

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Practice

Determine which linear function has a greater rate of change. Then explain how yc

1. $y = 3x - 4$

x	-7	-5	-3	-1	1	3
y	-10	-6	-2	2	6	10

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2. The output of a function is equal to the input divided by two.

x	−6	−3	0	3	6
y	−2	−1	0	1	2

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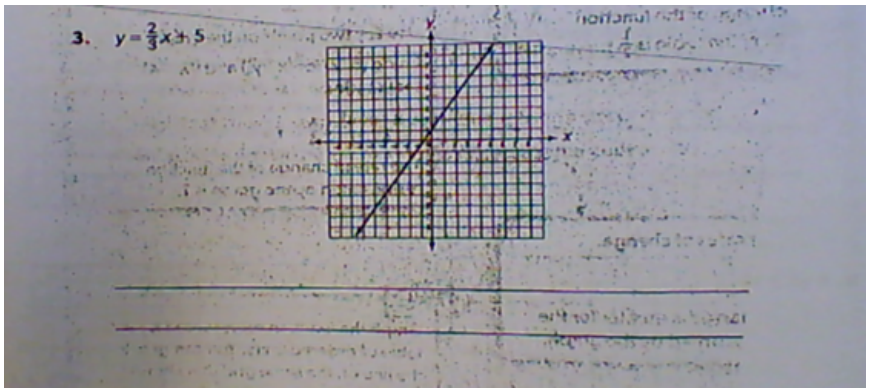
3. $y = \frac{2}{3}x + 5$



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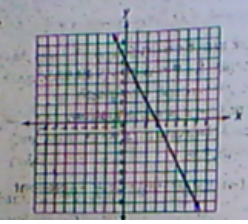
Determine which function has a greater y-intercept. Then explain...

4.



The output of a function is equal to four more than the product of the input and three.

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5. $y = \frac{3}{4}x + 2$

x	-2	-1	0	1	2	3
y	-10	-6	-2	2	6	10

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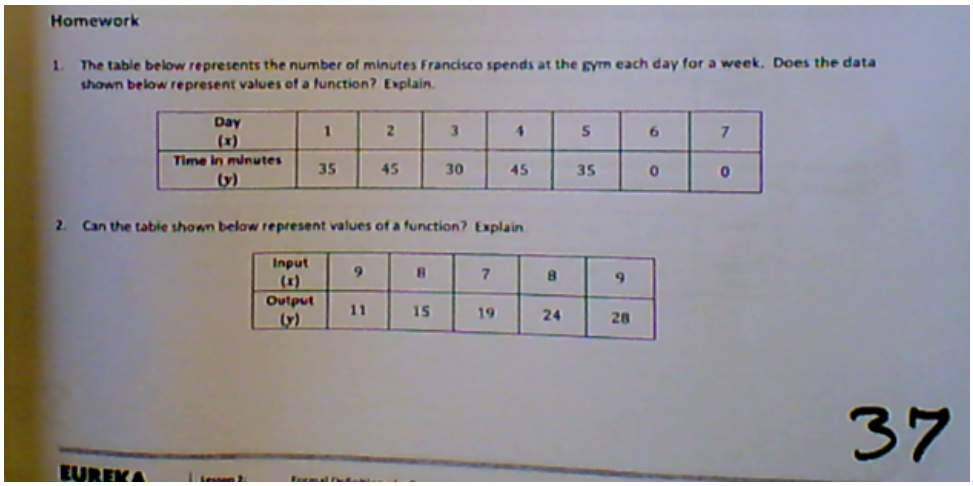

Homework

1. The table below represents the number of minutes Francisco spends at the gym each day for a week. Does the data shown below represent values of a function? Explain.

Day (x)	1	2	3	4	5	6	7
Time in minutes (y)	35	45	30	45	35	0	0

2. Can the table shown below represent values of a function? Explain.

Input (x)	9	8	7	8	9
Output (y)	11	15	19	24	28

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EUREKA

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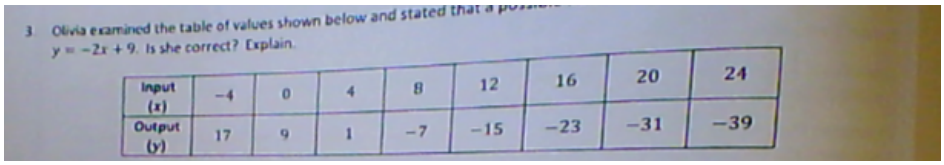

3. Olivia examined the table of values shown below and stated that a possible equation is $y = -2x + 9$. Is she correct? Explain.

Input (x)	−4	0	4	8	12	16	20	24
Output (y)	17	9	1	−7	−15	−23	−31	−39

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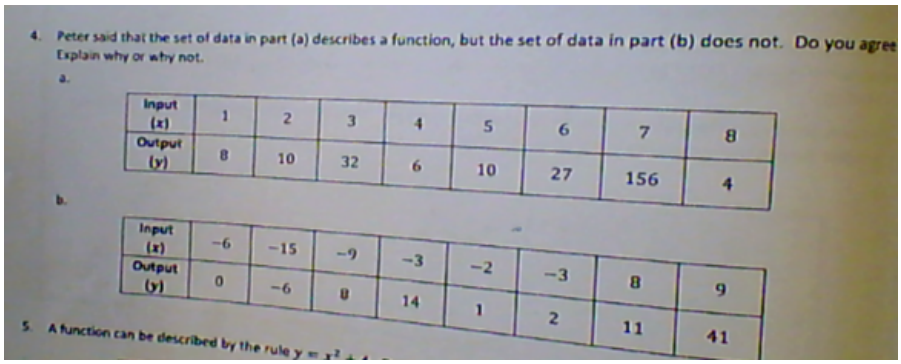

4. Peter said that the set of data in part (a) describes a function, but the set of data in part (b) does not. Do you agree
Explain why or why not.

a.

Input (x)	1	2	3	4	5	6	7	8
Output (y)	8	10	32	6	10	27	156	4

b.

Input (x)	−6	−15	−9	−3	−2	−3	8	9
Output (y)	0	−6	8	14	1	2	11	41

5. A function can be described by the rule $y = x^2$

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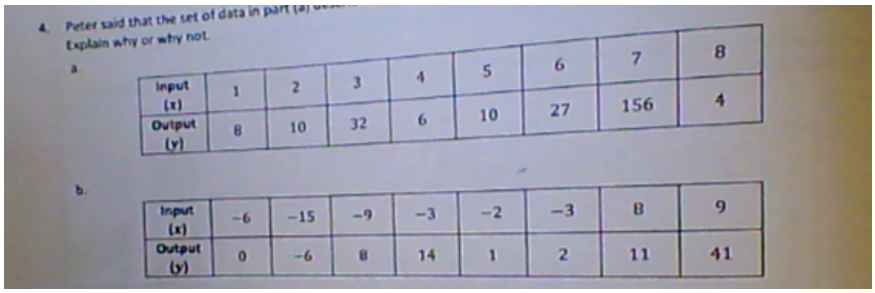

4. Peter said that the set of data in part (a)
Explain why or why not.

a.

Input (x)	1	2	3	4	5	6	7	8
Output (y)	8	10	32	6	10	27	156	4

b.

Input (x)	−6	−15	−9	−3	−2	−3	8	9
Output (y)	0	−6	8	14	1	2	11	41

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5. A function can be described by the rule $y = x^2 + 4$. Determine the corresponding output for each given input.

Input (x)	−3	−2	−1	0	1	2	3	4
Output (y)								

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6. Examine the data in the table below. The inputs and outputs represent a situation where constant rate can be assumed. Determine the rule that describes the function.

Input (x)	−1	0	1	2	3	4	5	6
Output (y)	3	8	13	18	23	28	33	38

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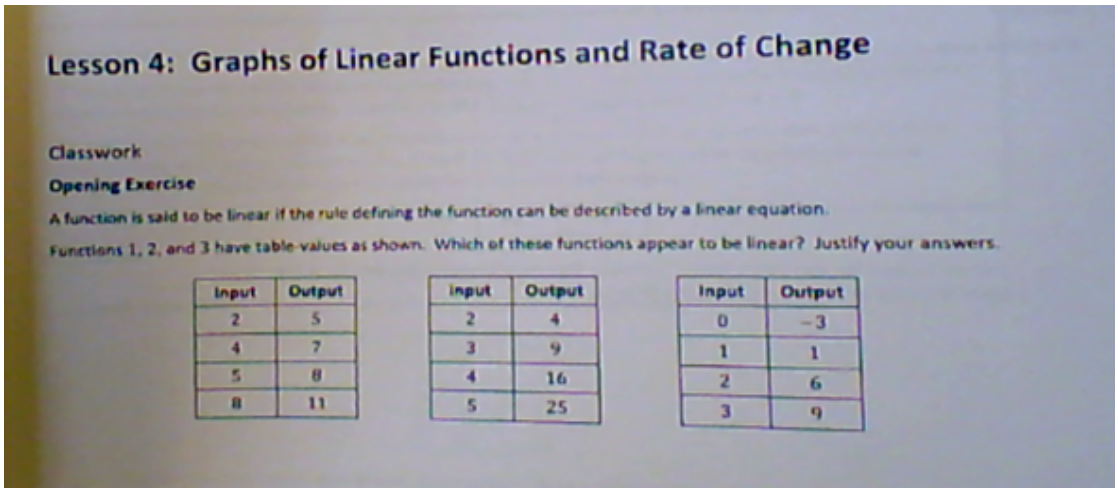

Lesson 4: Graphs of Linear Functions and Rate of Change

Classwork

Opening Exercise

A function is said to be linear if the rule defining the function can be described by a linear equation.

Functions 1, 2, and 3 have table values as shown. Which of these functions appear to be linear? Justify your answers.

Input	Output
2	5
4	7
5	8
8	11

Input	Output
2	4
3	9
4	16
5	25

Input	Output
0	−3
1	1
2	6
3	9

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