September 23, 2015

Why is the concept of a function important and how do I use function notation to show a variety of situations modeled by functions?

Today's Standards

MGSE9-12.F.LE.1a Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

MGSE9-12.F.LE.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

Linear Models

coefficient - a number multiplied by a variable
(so in this case, the slope!)

constant - a value that does not change

initial value - the y-intercept of a graph
(makes sense because this is where
you start when graphing a line using
the slope-intercept form)

Linear Models

Linear Model: the equation of the line (written in slope-intercept form) that represents the data

$y = mx + b$ or $f(x) = mx + b$

- m: Slope, Rate of change
- b: y-intercept, Initial value

Linear Models

Rate of Change: the ratio of the change in the output value and the input value of a function. (slope)

$$\frac{\text{Change in Dependent}}{\text{Change in Independent}} = \frac{\text{Output}}{\text{Input}} = \frac{y}{x} = \frac{\text{rise}}{\text{run}}$$

(same as slope!)

When the rate of change is linear we call it a **constant rate of change**.

Linear Models

Comparing rates of change:

When we compare rates of change we are comparing the slopes.

- The lowest rate of change has the smallest absolute value.
- The greatest rate of change has the largest absolute value.

Linear Models

Slopes: positive, negative, zero and undefined

increasing change: when the slope is positive

decreasing change: when the slope is negative

Guided Practice

What is the initial value of each function?

1. $y = \frac{2}{3}x + 2$ (2)

2.

x	y
-1	2
0	4
1	6

(4)

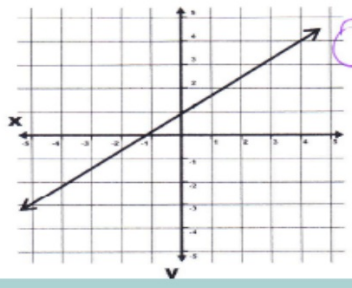
3.

x	y
-1	-5
0	-4
1	-3

(-4)

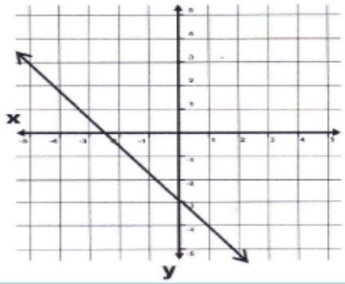
4. $y = -\frac{1}{2}x$ (0)

5.



(1)

6.



(-3)

Guided Practice

Is the rate of change increasing or decreasing?

7. $y = -\frac{3}{4} + 5$ dec

8. $y = \frac{1}{2}x$ inc

9. $y = 4x - 3$ inc

10. $y = -3x + 6$ dec

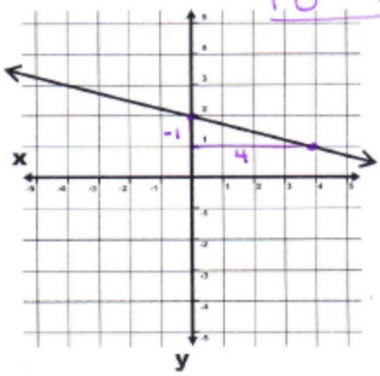
11. $y = 2x - 3$ inc

12. $y = -x + 2$ dec

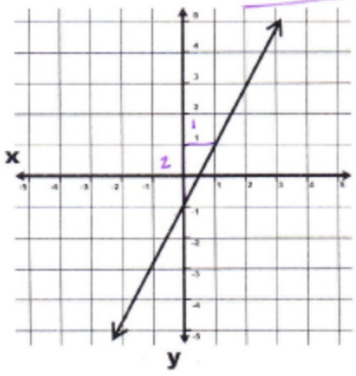
Guided Practice

Write a linear model for each problem.

13. $y = -\frac{1}{4}x + 2$

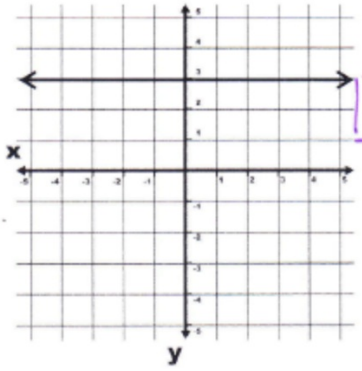


14. $y = 2x - 1$



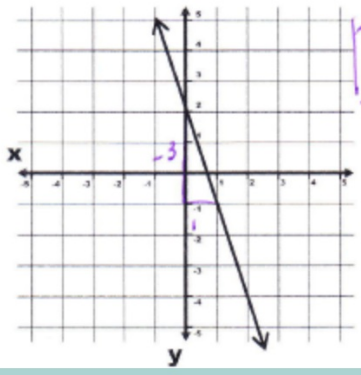
Guided Practice

15.



$y = 3$

16.



$y = -3x + 2$

Guided Practice

Rate of Change:

a. $y = x + 2$ b. $y = -3x - 2$ c. $y = -\frac{3}{4}x + 3$ d. $y = 2x + 5$

17. Which equation above has the greatest rate of change? b

18. What is the rate of that equation? $\frac{-3}{1}$ or -3

19. Is this an increasing or decreasing rate? dec.

Guided Practice

a.

x	y
-1	2
0	4
1	6
2	8

$m = 2$

b.

x	y
-2	6
0	5
2	4
4	3

$m = -\frac{1}{2}$

c.

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

$m = 4$

d.

x	y
-4	-2
0	1
4	4
8	7

$m = \frac{3}{4}$

20. Which table above has the lowest rate of change? b

21. What is the rate of that table? $-\frac{1}{2}$

22. Is this an increasing or decreasing rate? dec

Complete Class Practice Handout