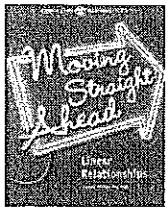
Name: Key Date: Class:



more linear functions... 4.2+

All of the patterns of change you have explored in this unit involved constant rates. For example, you worked with walking rates expressed in meters per second and pledge rates expressed in dollars per kilometer. In these situations, you found that the rate affects the following things:

- the steepness of the graph
- the coefficient, *m*, of *x* in the equation $y = mx + b$
- how the y-values in the table change for each unit change in the x-values

You have also explored various ways that the initial value can be represented for linear functions. For example, the initial value affects the following things:

- where a line crosses the y-axis
- the constant value, *b*, that is being added or subtracted in the equation $y = mx + b$
- the y-value associated with an x-value of zero.

In this investigation, you will explore other ways to express the constant rate and initial value of a linear function.

The points (1, 4) and (-2, -2) lie on a line.

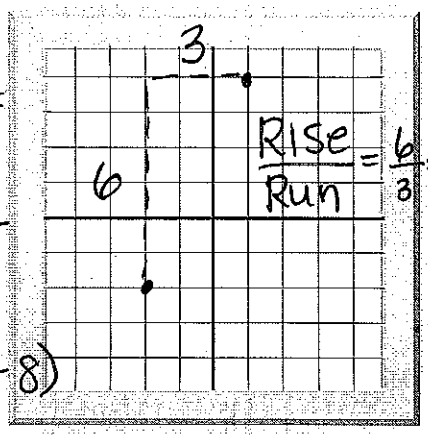
1. What is the slope of the line?

$m = 2$

x	y
1	4
-2	-2

$-3 < -6$

$\frac{\text{change in } y}{\text{change in } x} = \frac{-6}{-3} = +2$



2. Find two more points that lie on this line. Explain your method.

I could continue my pattern in the table

x	1	-2	-8	-14
y	4	-2	-5	-8

(-8, -5) & (-14, -8)

3. Aiden observed that any two points on a line can be used to find the slope. How is Aiden's observation related to the idea of "linearity"?

Because if the function is Linear, it has a constant rate of change (slope).

4. How could you find the y-intercept of this line?

I could graph it and look for where it crosses the y-axis; or I could use a point & the slope to solve for b

$y = mx + b$
$4 = (2)1 + b \quad b = 2$

5. Use your answers from #1 and #4 to write an equation for the line passing through the points (1,4) and (-2, -2).

$y = 2x + 2$

Match each equation below with the best description on the right.

a. $y = 2x$ — iii. y-intercept of 0

b. $y = 2x + 3$ — i. positive slope and positive y-intercept

c. $y = 2$ — v. horizontal line

d. $y = 3 - 3x$ — ii. negative slope and positive y-intercept

e. $y = -5x - 3$ — iv. negative slope and negative y-intercept

For each equation below, identify the slope and the y-intercept.

$y = 10 + 3x$

slope = 3 y—intercept = 10

$y = -3x$

slope = −3 y—intercept = 0

$y = 0.5x$

slope = .5 y—intercept = 0

$y = -5x + 2$

slope = −5 y—intercept = 2

Write the linear equation represented in each of the tables and graphs shown below.

x	0	1	2	3	4
y	0	2	4	6	8

+1, +2

$m = 2$
$b = 0$
$y = 2x + 0$

x	0	1	2	3	4
y	5	3	1	−1	−3

+1, −2

$m = -2$
$b = 5$
$y = -2x + 5$

x	0	1	2	3	4
y	3.5	4.5	5.5	6.5	7.5

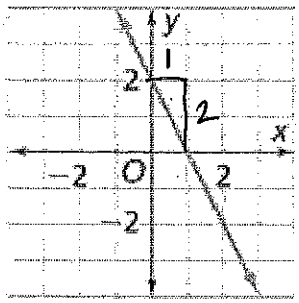
+1, +1

$m = 1$
$b = 3.5$

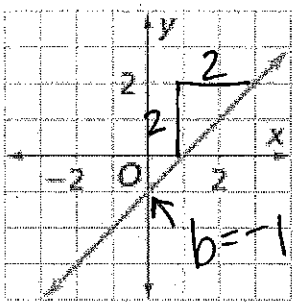
x	2	3	4	5	6
y	−11	−14	−17	−20	−23

+1, −3

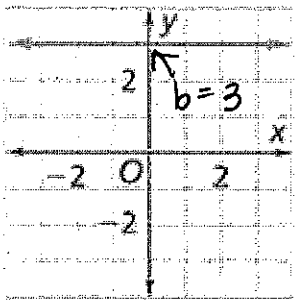
$m = -3$
$b = -5$
$y = -3x - 5$



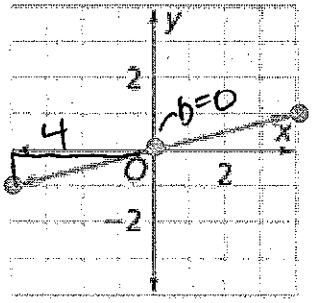
$m = 2$
$b = 2$
$y = 2x + 2$



$m = 1$
$b = -1$
$y = 1x - 1$
or
$y = x - 1$



horizontal line
slope = 0
$y = 0x + 3$
OR
$y = 3$



$m = \frac{1}{4}$ $b = 0$
$y = \frac{1}{4}x + 0$
OR
$y = \frac{1}{4}x$