Graphing Linear Functions and Matching Representations

STRAND: Patterns, Functions, and Algebra

STRAND CONCEPT: Proportional and Additive Relationships; Slope; Linear Functions

SOL 8.16d, e

Remediation Plan Summary

Students graph linear functions given the equation in $y = mx + b$ form and make connections between and among representation of a linear function using verbal descriptions, tables, equations, and graphs.

Common Errors and Misconceptions

- Students, when using slope triangles to graph a line, may incorrectly invert the relationship as a constant ratio of $\dfrac{change\ in\ x}{change\ in\ y}$ versus $\dfrac{change\ in\ y}{change\ in\ x}$.
- Students may confuse the slope and *y*-intercept in a given equation.
- Students make connections between graphs and tables without reviewing checking that all ordered pairs in the table match those on the graph.

Materials

1. Graphing Linear Functions Practice – Boss/Secretary Activity
2. Representation Match – Linear Functions

Introductory Activity

Ask students to create a graph of the linear function $y = 2x$ using a dry erase board and marker. Have students then compare their graph with a classmate and discuss the strategy used to create their graph. Ask students to share their strategies as a whole class. Hopefully, some students may have plotted points by finding *x* and *y* values using the equation, created a ratio table, or used slope triangles to plot points on the line. Have students then graph the linear function $y = x + 3$. Again compare strategies and discuss as a whole class. As a whole class, graph the linear function $y = 2x + 3$ trying to apply the strategies already shared during the class discussion. Compare and contrast the three graphs and the strategies used.

Plan for Instruction

1. Model how to graph the linear function y = -3x + 2 first by creating a table of values and plotting the points on a graph. Then model how to graph the linear function by plotting the y-intercept and using the slope to create slope triangles. Walk around to assist students and check whether they have graphed the points correctly. Give students an additional example of a linear function in y = mx + b form, and have them use either strategy to graph each line.

2. Distribute Graphing Linear Functions Practice – Boss/Secretary Activity. Have students work in pairs, with one student explaining verbally how to create the graph and the other drawing the graph on the handout provided. Have the students take turns for each equation being the boss or secretary. Encourage the students to create some of the graphs using a table of values and plotting the points and other graphs by plotting the *y*-intercept and using slope triangles.

3. Ask students to compare their graphs with another pair of students. Have a large group discussion about the strategies used and discuss any graphs for which the pairs may have had differing graphs.

4. Have students work as pairs to complete the Representation Match – Linear Functions activity. Encourage students to use whiteboards and markers to create the graphs when needed.

5. Debrief the activity as a whole group.

Pulling It All Together (Reflection)

Exit Ticket: Complete the following statement using what you learned from the lesson today.

To create the graph of a linear function in $y = mx + b$ form, I find it easiest to use the following strategy………
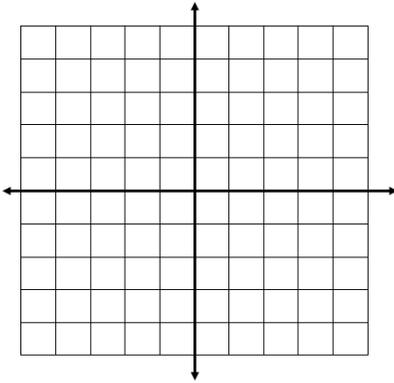
I like to use this strategy because……

Note: The following pages are intended for classroom use for students as a visual aid to learning.
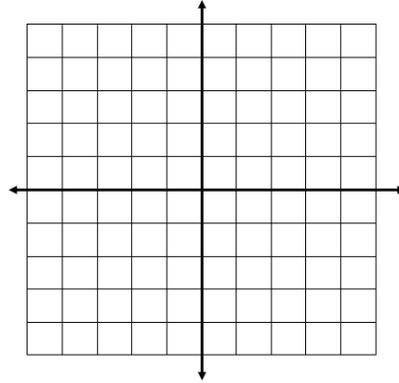
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Graphing Linear Functions – Boss/Secretary Activity

1. $y = -\dfrac{1}{2}x - 3$

2. $y = -\dfrac{1}{2}x + 3$

3. $y = -2x + 5$
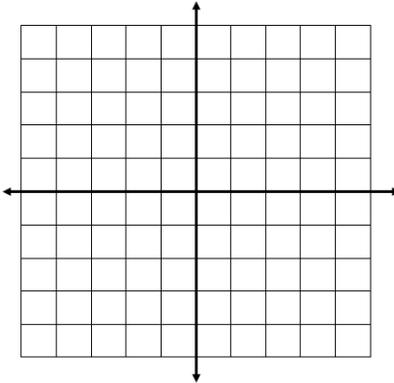
4. $y = 2x + 5$
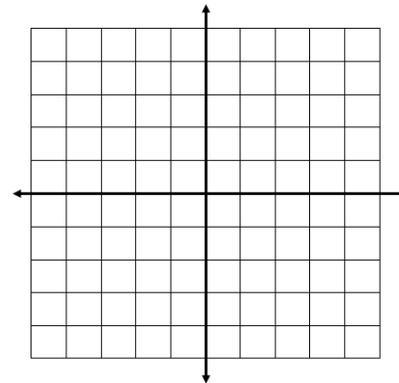
5. $y = -\dfrac{2}{3}x + 1$
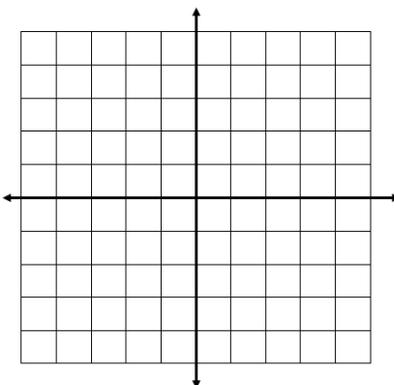
6. $y = \dfrac{2}{3}x + 1$
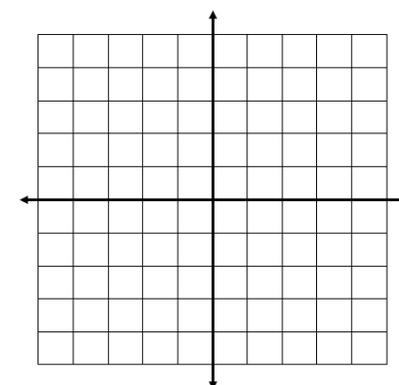
Representations of Relationships

$y = \dfrac{3}{2}x + 2$	y equals three-halves times a number, increased by two.	$\begin{array}{c\|c} x & y \\ \hline -2 & -1 \\ 0 & 2 \\ 2 & 5 \end{array}$	
$y = x + 5$	Five more than a number is equal to y.	$\begin{array}{c\|c} x & y \\ \hline -2 & 3 \\ -1 & 4 \\ 2 & 7 \end{array}$	
$y = -2x - 3$	The product of negative two and a number, minus three, is another number.	$\begin{array}{c\|c} x & y \\ \hline -2 & 3 \\ -1 & 1 \\ 0 & -1 \end{array}$	
$y = 4x + 1$	Four times a number plus one is y.	$\begin{array}{c\|c} x & y \\ \hline -2 & -7 \\ 0 & 1 \\ 1 & 5 \end{array}$	
$y = -3$	y is negative three.	$\begin{array}{c\|c} x & y \\ \hline 2 & -3 \\ 3 & -3 \\ 4 & -3 \end{array}$	