Graphing Linear Functions

Strand: Patterns, Functions, and Algebra

Topic: Graphing Linear Equations

Primary SOL: 8.16 The student will

   d) graph a linear function given the equation in $y = mx + b$ form

Related SOL: 6.12, 7.10, 8.15

Materials

- Large Graph template (attached)
- Small candy pieces
- Stained Glass Graph activity sheet (attached)
- Graph paper
- Rulers

Vocabulary

axis, coordinate plane, ordered pairs, quadrants, slope, y-intercept (earlier grades)

horizontal line, linear function, negative slope, positive slope, undefined slope, vertical line, zero slope (8.16)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Distribute small candy pieces and the Large Graph template. Review the axes and quadrants and how to graph ordered pairs on the grid. List several ordered pairs for students to graph by placing candy pieces on the grid.

2. Give students a linear function, such as **$y = x + 3$**. Model how to graph the function by creating a table and then plotting the points on a graph, using the candy pieces. Walk around to assist students and check whether they have graphed the points correctly. Give students additional examples of linear functions in **$y = mx + b$** form, and have them make a table and then graph each line. You might choose to have individual students model their graphs for other students to check.

3. Distribute sheets of graph paper, rulers, and the Stained Glass Graph activity sheet. Have students work individually to complete the activity sheet by creating tables for the equations and graphing the lines on the graph paper.

Assessment

- **Questions**
  - What is the difference between the graph of $y = x + 3$ and the graph of $y = x − 3$?
  - What are three ordered pairs that can be used to graph the function $y = −x + 5$?

- **Journal/writing prompts**
  - Graph the linear equation $y = −2x + 7$.

     o   Write how you would explain to another student how to graph a linear equation.

Extensions and Connections (for all students)

- Have students create their own linear functions to graph.
- Discuss what is similar and different about the lines in the activity. Discuss patterns, positive and negative coefficients, and constants and how they affect the graph of the line.

Strategies for Differentiation

- Give students fewer lines for the Stained Glass Graph activity, and/or have them use larger graph paper.
- Begin with integer values of slope and progress to fractional values.
- Provide students with a sheet of blank tables so they can fill in each table before graphing.
- Provide students with the domain for the Stained Glass Graph activity.
- Provide students with a numbered copy of the coordinate plane attached.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Large Graph
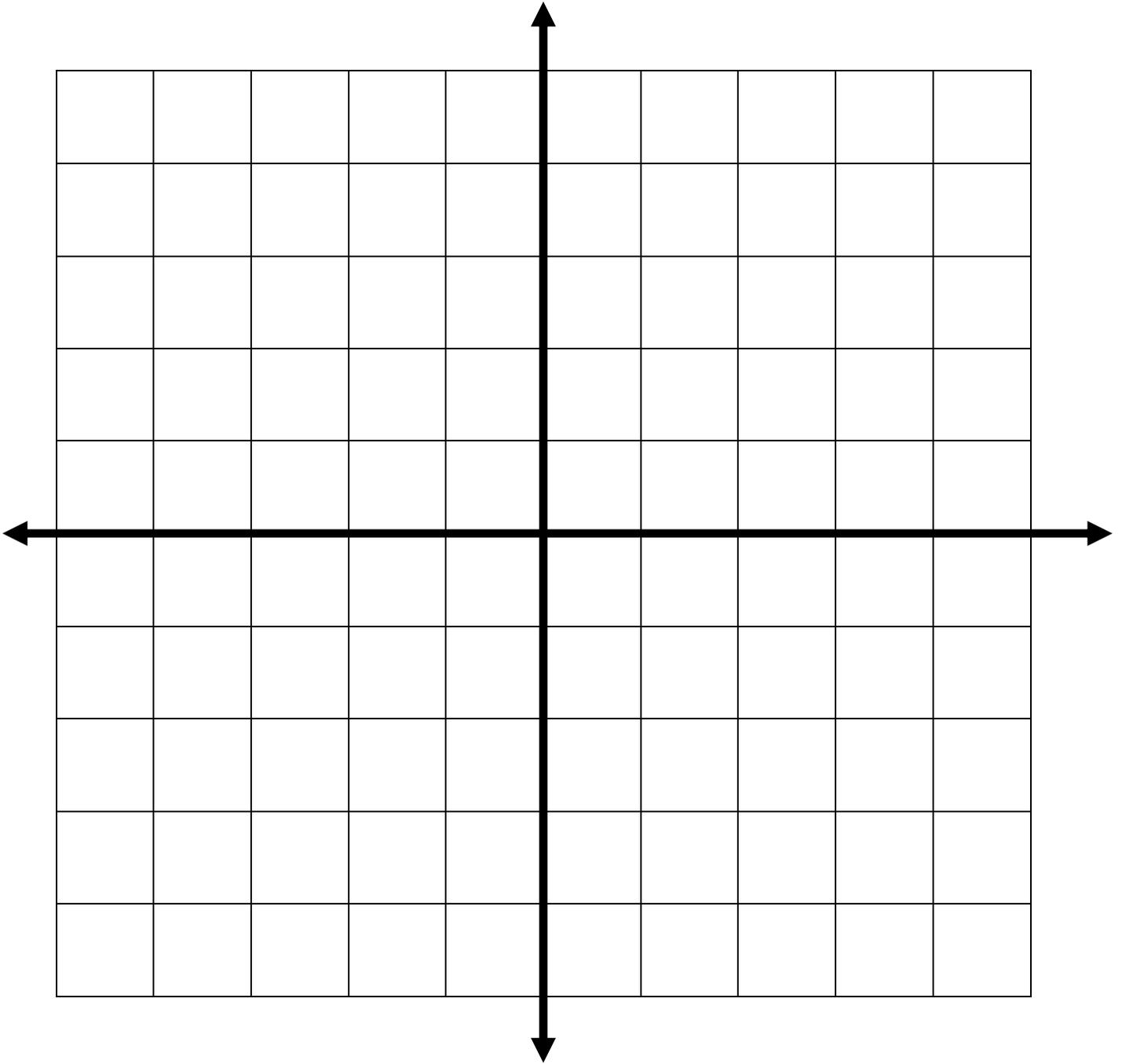
Stained Glass Graph

Name _____ **Date** _____

1. Using regular graph paper, create a table for each equation, and then graph each of the lines.
2. Draw the lines to the edges of your graph paper.
3. Use a black marker to make each line bold.
4. Color each section a different color.

1. $y = -\dfrac{1}{2}x - 4$

2. $y = -x + 12$

3. $y = 12$

4. y-axis

5. $y = \dfrac{1}{2}x + 4$

6. $y = \dfrac{1}{2}x - 4$

7. $y = -\dfrac{1}{2}x + 4$

8. $y = x + 12$

9. $y = -12$

10. $y = -x - 12$

11. $y = x - 12$