

Module 6 Lesson 3

Math Lab: Parallel and Perpendicular Lines

Purpose

You will analyze the slopes of parallel and perpendicular lines.

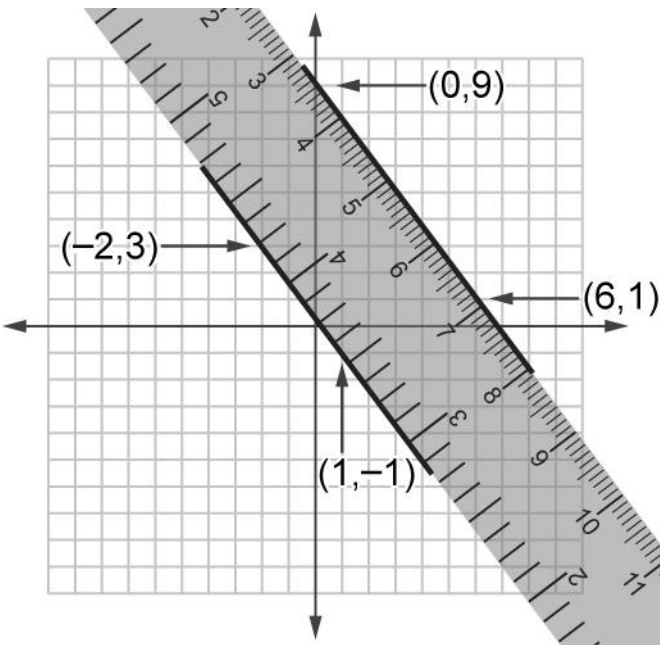
Materials

- two pages of grid paper
- ruler or straightedge
- index card or heavy weight paper

Part A: Parallel Lines

Procedure

Step 1: Place the ruler diagonally across a piece of grid paper so that one edge passes through at least two points with integer coordinates on the grid paper. See the following image as an example.



Step 2: Trace a line onto the grid paper along *each* edge of the ruler as shown in the image.

Step 3: Remove the ruler. Calculate the slope of each line. You may use the $\frac{\text{rise}}{\text{run}}$ method or the slope formula. In either case, check that the sign of each is correct.

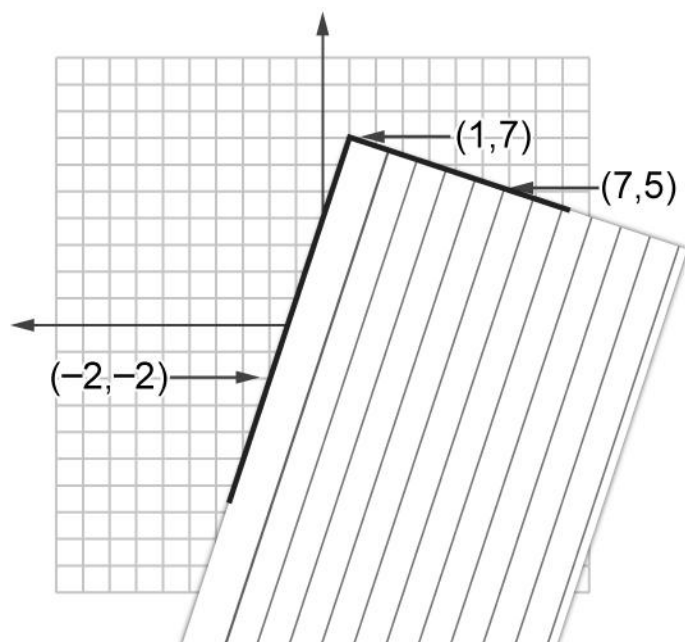
Analysis

1. What do you notice about the slopes of the two lines?

2. Using the evidence you have collected, justify how you know that the two lines that you drew are parallel.
3. Repeat the experiment, but this time place the ruler in a different orientation across the grid. Compare the slopes of the lines. Do you get similar results as the first time? **Note:** You may want to repeat the experiment a third time to discover a pattern or to confirm the pattern you observed in the first two trials.
4. Generate a conclusion about the slopes of parallel lines.

Part B: Perpendicular Lines

Step 1: Place one corner of the index card (or heavyweight paper) at a point with integer coordinates on a piece of grid paper.



Step 2: While holding the corner in position, rotate the card such that the edges of the card, which meet at the corner, pass through integer coordinates. See the image as an example.

Step 3: Trace a line onto the grid paper along *each* edge of the index card that arises from the corner as shown in the image.

Step 4: Remove the index card. Calculate the slope of each line. You may use the $\frac{\text{rise}}{\text{run}}$ method or the slope formula. In either case, check that the sign of each slope is correct.

Analysis

5. How do you know that the two lines that you drew are perpendicular?
6. What do you notice about the slopes of the two lines?
7. Repeat the experiment, but this time place the index card in a different orientation across the grid. Compare the slopes of the two lines. How are the results similar to the initial results? **Note:** You may want to repeat the experiment a third time to discover a pattern or to confirm the pattern you observed in the first two trials.
8. Generate a conclusion about the slopes of perpendicular lines.