Designing a City with Linear Equations

Create Linear Equations: You must create at least five linear equations that will represent different streets in your city. Each street must be named for reference. Your lines must meet the following requirements:

- 2 of your streets must be parallel
- 1 of your streets must have a negative slope
- 1 of your streets must have a positive slope
- 1 of your streets must have an undefined slope
- 1 of your streets must have a zero slope

Terms of Use

Thank you for your purchase!

By purchasing this resource, you are agreeing that the contents are the property of **Inspired By Math** and licensed to you only for classroom/personal use as a single user. We retain the copyright, and reserve all rights to this product.

You MAY:

- Use free and purchased items for your own classroom students, or your own personal use.
- Reference this product in blog posts, at seminars, professional development, workshops, or other such venues, ONLY if credit is given to Inspired By Math as the author.

You MAY NOT:

- Claim this work as your own, alter the files in any way, or remove copyright.
- Sell the files or combine them into another unit for sale/free.
- Post this document for sale/free elsewhere on the internet (this includes Google Doc links on blogs).

Making copies of purchased items to share with others is strictly forbidden and is a violation of the terms of use.

Thank you for abiding by universally accepted codes of professional ethics while using this product. If you encounter an issue with your file, notice an error, or are in any way experiencing a problem, please contact us and we will be more than happy to help sort it out. You can message us at chill@inspiredbymath.net

Thank You!

Cassidy and Chloe - Inspired By Math

Designing a City with Linear Equations

Project Overview

Exciting news! A brand new city is being built and the founders need to hire an urban designer to create the physical layout of the city. Your task is to create a detailed layout of the new city on a coordinate plane. You will use your understanding of slope and graphing to represent the city's streets in slope-intercept form.

Objectives

By the end of this project, you will be able to:

1. Understand and apply the concept of slope in linear equations.
2. Graph linear equations in slope-intercept form.

Materials Needed

- Graph paper
- Rulers
- Colored pencils or markers
- Calculators

Part 1: Show the Founders What You Know!

Review Slope-Intercept Form:

- The slope-intercept form of a linear equation is written as: _____
- m represents the _____
- b represents the _____
- The slope indicates how steep the line is, while the y-intercept is where the line crosses the y-axis.

1. **Calculate Slope**: The slope of a line can be calculated using the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Where $(x_1,\ y_1)$ and $(x_2,\ y_2)$ are two points on the line.

Calculate the slope of the line passing through $(-7,\ 4)$ and $(3,\ -1)$:

Part 2: Designing Your City

1. Name your city and brainstorm ideas for your layout. You must create a system of streets that connects the different areas of the city. You will use linear equations to represent these streets.

    ● City Name: _____

2. **Create Linear Equations**: You must create at least five linear equations that will represent different streets in your city. Each street must be named for reference. Your lines must meet the following requirements:
    ○ 2 of your streets must be parallel
    ○ 1 of your streets must have a negative slope
    ○ 1 of your streets must have a positive slope
    ○ 1 of your streets must have an undefined slope
    ○ 1 of your streets must have a zero slope

Name of Street	Equation	Slope

3. **Graph Your Equations**: Use graph paper to plot your linear equations. Draw the lines that represent your streets. Use a different color for each street to make your city visually appealing.

4. You must place a stop sign at all intersections (where your streets intersect). List the coordinates of your stop signs:

Part 3: Presenting Your City

1. **City Layout**: Now that your streets are graphed, you need to decide where to place important landmarks in your city. Assume 1 square unit = 400 square feet. Include the following buildings:
   - Post Office in Quadrant I
   - Bank in Quadrant III
   - Fire Department in Quadrant I
   - Police Station in Quadrant III
   - School in Quadrant IV
   - Courthouse in Quadrant I
   - Gas Station
   - Your House

Evaluation Criteria

Rubric for Project: Designing a City

Category	Points Earned	Points Possible
Name of City		
Name of Each Street		
2 Parallel Streets		
1 Street with Positive Slope		
1 Street with Negative Slope		
1 Street with Zero Slope		
1 Street with Undefined Slope		
Stop Signs/Traffic Lights on Graph & Coordinates Given		
All Required Buildings Included		
Post Office, Bank, Fire Department, Police Station, School, and Courthouse in Correct Quadrants		
Neatness, Color, & Creativity		
Total		