

### Problem 4.2 *continued*

- B** The points (3, 5) and (-2, 10) lie on a line.
1. What is the slope of the line?
  2. Find two more points that lie on this line. Explain your method.
  3. Eun Mi observed that any two points on a line can be used to find the slope. How is Eun Mi's observation related to the idea of "linearity?"
- C**
1. John noticed that for lines represented by equations of the form  $y = mx$ , the points (0, 0) and (1,  $m$ ) are always on the line. Is he correct? Explain.
  2. What is the slope of a horizontal line? A vertical line? Explain your reasoning.
- D**
1. Compare your methods for finding the slope of a line from a graph, a table, and an equation.
  2. In previous Investigations, you learned that linear relationships have a constant rate of change. As the independent variable changes by a constant amount, the dependent variable also changes by a constant amount. How is the constant rate of change of a linear relationship related to the slope of the line that represents that relationship?

**A C E** Homework starts on page 98.

## 4.3 Exploring Patterns With Lines

Your understanding of linear relationships can be used to explore some ideas about groups of lines.



For example, suppose the slope of a line is 3.

- Sketch a line with this slope.
- Can you sketch a different line with this slope? Explain.

In this Problem, you will use slope to explore some patterns among linear relationships.

**Problem 4.3****A** Consider the two groups of lines shown below.

**Group 1**  $y = 3x$      $y = 5 + 3x$      $y = 10 + 3x$      $y = -5 + 3x$

**Group 2**  $y = -2x$      $y = 4 - 2x$      $y = 8 - 2x$      $y = -4 - 2x$

1. What features do the equations in each group have in common?
2. For each group, graph the equations on the same coordinate axes. What patterns do you observe in the graphs?
3. Describe another group of lines that have the same pattern.

**B** Consider the three pairs of lines shown below.**Pair 1**

$y = 2x$

$y = -\frac{1}{2}x$

**Pair 2**

$y = 4x$

$y = -0.25x$

**Pair 3**

$y = -3x + 5$

$y = \frac{1}{3}x - 1$

1. What features do the equations in each pair have in common?
2. For each pair, graph both equations on the same coordinate axes. What patterns do you observe in the graphs?
3. Describe another pair of lines that have the same pattern.

**C** Consider the three pairs of lines shown below.**Pair 1**

$y = 2x + 1$

$y = 2(x + 1) - 1$

**Pair 2**

$y = 5 - 2x$

$y = 3 - 2(x - 1)$

**Pair 3**

$y = 2(x - 1)$

$y = 4x - 2x - 2$

1. For each pair, graph both equations on the same coordinate axes.
2. What do you notice about the graphs of each pair of equations? How might you have predicted this from the equations?



Homework starts on page 98.