Finding the Slope of a Line

You are already familiar with the concept of **slope.** When you walk uphill, you walk up a slope. When you walk downhill, you walk down a slope. A graphed line, like a hill, has a slope.

The slope of a line is given as a number. When you move between two points on the line, the slope is found by dividing the change in y values by the corresponding change in x values.

> Slope of a line $= \dfrac{\text{Change in } y \text{ value (vertical change)}}{\text{Change in } x \text{ value (horizontal change)}}$

- A line that goes up from left to right has a *positive slope.*
- A line that goes down from left to right has a *negative slope.*
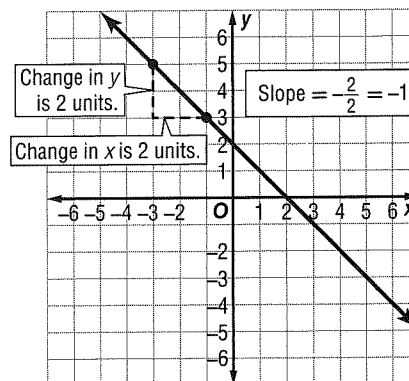
In Example 1, the slope of the line is 2.

In Example 2, the slope of the line is $-\left(\frac{2}{2}\right) = -1$.

EXAMPLE 1 Slope $= \dfrac{4}{2} = 2$
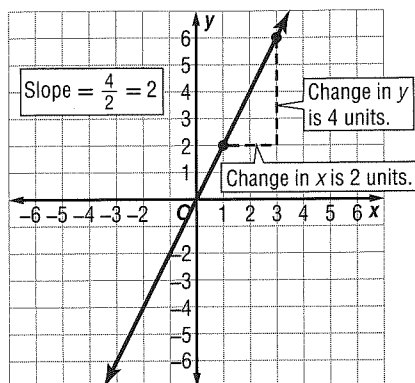
EXAMPLE 2 Slope $= -\dfrac{2}{2} = -1$

The line above has a *positive slope* because it goes *up* from left to right.

The line above has a *negative slope* because it goes *down* from left to right.

## Zero Slope and Undefined Slope

Two types of lines have neither positive nor negative slope.
- A horizontal line has *zero slope,* or the slope equals zero. The x-axis (or any horizontal line) is a line with 0 slope.
- A vertical line has an *undefined slope.* The concept of slope does not apply to a vertical line. The y-axis (or any vertical line) is a line with undefined slope.
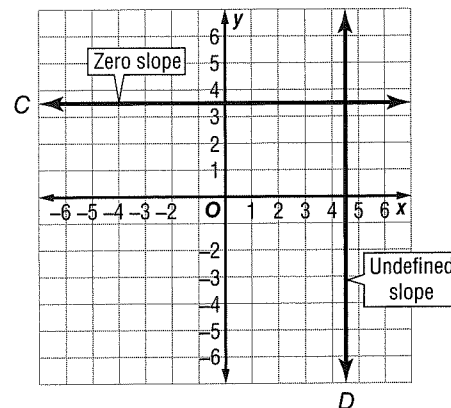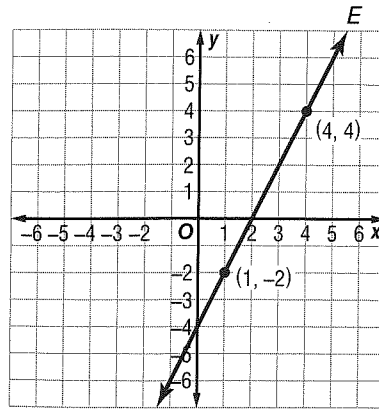
Solve the following problems.

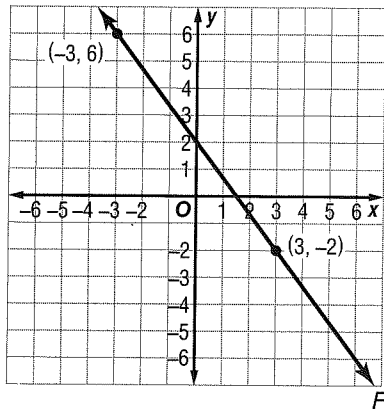1. Identify the slope of each line as *positive, negative, zero,* or *undefined.*
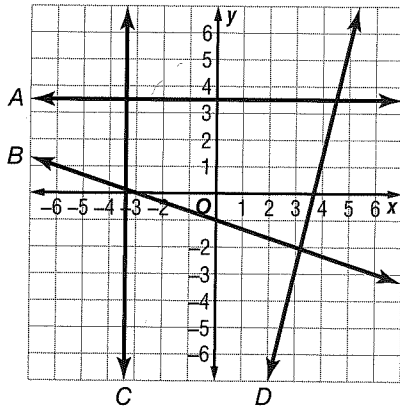
Line *A:* _____   Line *B:* _____

Line *C:* _____   Line *D:* _____

2. Find the numerical value of the slope of line *E*. Identify the *x*- and *y*-intercepts.

Slope of line *E* = _____

x-intercept = (,   )

y-intercept = (,   )

3. Find the numerical value of the slope of line *F*. Identify the *x*- and *y*-intercepts.

Slope of line *F* = _____

x-intercept = (,   )

y-intercept = (,   )

4. Subtract the coordinates to find the slope of the line that passes through each pair of points. Part a is done as an example.

a. (3, 1) and (4, 6)

$$\text{slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{6 - 1}{4 - 3} = \frac{5}{1} = 5$$

b. (0, 2) and (1, 4)

c. (1, 2) and (−2, 5)

d. (0, 0) and (3, 2)