Lesson 8

Graphing Linear Equations (Slope-Intercept Form)

Lesson

A linear equation graphs as a straight line. The most useful form is slope-intercept form:

$$y = mx + b$$

where:
- m = slope (rise over run -- how steep the line is)
- b = y-intercept (where the line crosses the y-axis)

Slope formula between two points (x_1, y_1) and (x_2, y_2):

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

Example: Graph $y = 2x - 3$

Identify: $m = 2$ (slope), $b = -3$ (y-intercept)

Step 1: Plot the y-intercept at $(0, -3)$

Step 2: From that point, use the slope: rise 2, run 1
Move up 2 and right 1 to reach $(1, -1)$

Step 3: Plot that point and draw a line through both points.

Check another point: $x = 2$ gives $y = 2(2) - 3 = 1$, so $(2, 1)$ should be on the line.

Practice Problems

1) Identify the slope and y-intercept of $y = 4x + 1$.

2) Identify the slope and y-intercept of $y = -3x + 5$.

3) Find the slope between the points (1, 2) and (3, 8).

4) Find the slope between the points (2, 7) and (5, 1).

5) Rewrite in slope-intercept form: $2x + y = 10$.

6) Rewrite in slope-intercept form: $3x - 2y = 12$.

7) A line passes through (0, 4) with slope -2. Write its equation and find the value of y when x = 3.

8) Identify the slope and y-intercept of $y = (1/2)x - 4$.

9) Identify the slope and y-intercept of $y = -x + 7$.

10) Find the slope between the points (-2, 3) and (4, 9).

11) Find the slope between the points (0, 5) and (6, 5).
What kind of line does this slope describe?

12) Rewrite in slope-intercept form: $4x - y = 8$.

13) Rewrite in slope-intercept form: $x + 3y = 15$.

14) Write the equation of a line with slope 3 and y-intercept -5.

15) Write the equation of a line with slope 0 and y-intercept 2.

16) A line passes through (0, -2) and (4, 6).
Find the slope and write its equation.

17) Do y = 2x + 1 and y = 2x - 3 intersect? Explain.

18) Find the slope between (-3, 4) and (1, -4).

19) Rewrite in slope-intercept form: 5x - 3y = 15.
Then find y when x = 6.

20) The cost to rent a bicycle is C = 3h + 8 dollars (h = hours).
Identify the slope and y-intercept and explain what each means.