

Student Workbook

Linear Functions

Name: _____

Date: _____

Period: _____

Learning Target: I can write, classify, and interpret linear functions using function notation.

Vocabulary

Term	Meaning
Linear Function	$f(x) = mx + b$, where m is the slope and b is the y-intercept.
Slope (Rate of Change)	$m = (y_2 - y_1) / (x_2 - x_1)$ — how much the output changes per unit of input.
Point-Slope Form	$y - y_1 = m(x - x_1)$ — used to write an equation given a slope and one point.
Increasing / Decreasing / Constant	A linear function is increasing if $m > 0$, decreasing if $m < 0$, and constant if $m = 0$.

Key Concept: Classifying a Linear Function

THE SIGN OF THE SLOPE TELLS THE STORY

Slope	Behavior
$m > 0$	Increasing (rises left to right)
$m < 0$	Decreasing (falls left to right)
$m = 0$	Constant (horizontal line)

EXAMPLE 1

Find the slope between (2, 3) and (5, 12), then classify the function.

$m = (12-3)/(5-2) = \rule{1cm}{0.4pt} \rightarrow \rule{1cm}{0.4pt}$

Key Concept: Writing an Equation with Point-Slope Form

METHOD

If you know the slope m and one point (x_1, y_1) : write $y - y_1 = m(x - x_1)$, then solve for y to get slope-intercept form.

Write the equation of the line with slope 4 through the point (1, 6).

COMMON MISTAKE

In $y - y_1 = m(x - x_1)$, watch your signs carefully! If the point is $(-3, 5)$, you write $y - 5 = m(x - (-3)) = m(x + 3)$, NOT $m(x - 3)$.

Key Concept: Interpreting Slope & Intercept in Context

A gym membership costs a \$20 sign-up fee plus \$15 per month: $f(x) = 15x + 20$.

y-intercept (20) represents: _____

Guided Practice — Part A: Find the Slope & Classify

A1 (1, 4) and (5, 16)

A2 $(-2, 7)$ and $(3, 7)$

A3 $(0, 5)$ and $(4, -3)$

Guided Practice — Part B: Write the Equation (Point-Slope)

B1 Slope 4, through (1, 6)

B2 Slope -2, through (-3, 5)

Guided Practice — Part C: Interpret Slope & Intercept

C1 A water tank starts with 500 gallons and drains at 25 gallons per minute: $f(x) = -25x + 500$. Interpret the slope and y-intercept.

Guided Practice — Part D: Write the Function from Two Points

D1 Through (2, 5) and (6, 17)

D2 Through (-1, 8) and (3, -4)

BEFORE YOU MOVE ON

Check with a partner: does your final equation actually pass through BOTH given points? Plug them in to check!