

Line Shift Lab

Use slope and intercept to model, write, and compare linear functions.

GRADE 8 • 8.PFA.3

8.PFA.3 "The student will represent and solve problems, including those in context, by using linear functions and analyzing their key characteristics (the value of the y-intercept (b) and the coordinates of the ordered pairs in graphs will be..."

NAME _____

DATE _____

SLOPE AND INTERCEPT

In $y = mx + b$, x is the independent variable, or input, and y is the dependent variable, or output. The slope m tells how much y changes when x increases by 1, and the y-intercept b is the value of y when $x = 0$. Adding a positive b moves the line up, while adding a negative b moves the line down.

WORKED EXAMPLE

For $y = 4x - 3$, find y when $x = 2$.

1. Substitute 2 for x : $y = 4(2) - 3$.
2. Multiply: $y = 8 - 3$.
3. Subtract: $y = 5$.

Answer: $y = 5$

PRACTICE 6 problems

- 1** For $y = -6x + 8$, identify the slope and y-intercept.

ANSWER _____

- 2** Write an equation in the form $y = mx + b$ for this table: x : -1, 0, 1; y : 8, 17, 26.

ANSWER _____

- 3** Make a table of values for $y = -8x + 16$ using $x = -1, 0$, and 1.

ANSWER _____

- 4** A line passes through (0, -7) and (1, -1). Write its equation in the form $y = mx + b$.

ANSWER _____

- 5** Start with $y = 7x$. Add $b = -9$. Describe the translation and write the new equation.

ANSWER _____

- 6** A game account starts with 20 energy points and loses 9 energy points each round. Let x be the number of rounds and y be the energy points remaining. Write an equation for the situation.

ANSWER _____

APPLY IT Show your work

- 1** An esports club begins a tournament with 13 points. The club earns 7 points for each match it wins. Let x be the number of wins and y be the total points. Write an equation for y , identify the independent and dependent variables, and find the total after 6 wins.

WORK SPACE

ANSWER _____

- 2** A phone battery is at 48% when a student starts a video project. The battery drops 7 percentage points each hour. Let x be hours and y be battery percentage. Write an equation and make a table for $x = 0, 1$, and 6.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Line A is $y = 8x - 11$. Line B is $y = 8x + 14$. Explain how Line B is related to Line A. Include the slopes, y -intercepts, and the vertical shift.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	For $y = -6x + 8$, identify the slope and y-intercept.	slope = -6; y-intercept = 8
2	Write an equation in the form $y = mx + b$ for this table: x: -1, 0, 1; y: 8, 17, 26.	$y = 9x + 17$
3	Make a table of values for $y = -8x + 16$ using $x = -1, 0$, and 1.	$(-1, 24), (0, 16), (1, 8)$
4	A line passes through $(0, -7)$ and $(1, -1)$. Write its equation in the form $y = mx + b$.	$y = 6x - 7$
5	Start with $y = 7x$. Add $b = -9$. Describe the translation and write the new equation.	The line shifts down 9 units; $y = 7x - 9$.
6	A game account starts with 20 energy points and loses 9 energy points each round. Let x be the number of rounds and y be the energy points remaining. Write an equation for the situation.	$y = -9x + 20$

PART 2 • APPLY IT

- $y = 7x + 13$; x , number of wins, is independent; y , total points, is dependent; after 6 wins, $y = 55$ points.**
The club starts with 13 points, so $b = 13$. Each win adds 7 points, so $m = 7$; substitute $x = 6$ to get 55.
- $y = -7x + 48$; $(0, 48), (1, 41), (6, 6)$** The starting battery percentage is the y-intercept, 48. Because the battery drops 7 percentage points per hour, the slope is -7.

CHALLENGE

Both lines have slope 8, so they are parallel. Line A has y-intercept -11 and Line B has y-intercept 14. Line B is shifted up 25 units from Line A.

Accept equivalent descriptions such as “moves down 9” for a vertical shift. For context variables, accept clear equivalent labels with correct units and roles.