LESSON MAKER PRO

Line Clues

Find slope, intercepts, and variable roles in linear functions.

GRADE 8 · 8.PFA.3.b

8.PFA.3.b "Describe key characteristics of linear functions including slope (m), y-intercept (b), and independent and dependent variables."

NAME _____ DATE _____

READ THE EQUATION

A linear function can be written as y = mx + b. The slope, m, tells the rate of change, and the y-intercept, b, is the value of y when x = 0. Usually x is the independent variable and y is the dependent variable because y changes based on x.

WORKED EXAMPLE

For y = -7x + 13, describe the slope, y-intercept, independent variable, and dependent variable.

1. Compare y = -7x + 13 to y = mx + b.
2. The coefficient of x is -7, so m = -7.
3. The constant is 13, so b = 13 and the y-intercept is (0, 13).
4. x is independent, and y is dependent.

Answer: Slope: -7. y-intercept: 13, or (0, 13). Independent variable: x. Dependent variable: y.

PRACTICE 6 problems

1 For y = 5x - 1, name the slope, y-intercept, independent variable, and dependent variable.

ANSWER _____

2 For y = -3/4x + 8, state the slope and write the y-intercept as an ordered pair.

ANSWER _____

3 A line passes through (1, -2) and (5, 10). Find the slope, then write the equation in y = mx + b form.

ANSWER _____

4 Which function is linear? Give one reason. A. y = 4x + 9 B. $y = x^2 + 9$

ANSWER _____

5 For y = -x + 9, state the value of y when x = 0. Then tell whether y increases or decreases as x increases.

ANSWER _____

6 A line has a slope of 1/3 and a y-intercept of -4. Write its equation. Then name the independent and dependent variables.

ANSWER _____

APPLY IT Show your work

1 Mina uses a piano app. The table shows the total number of songs she has mastered after each day of practice. Let d be the number of days and s be the total number of mastered songs. Describe the independent and dependent variables, the slope, and the y-intercept. Then write an equation for s in terms of d.

MINA'S MASTERED SONGS

Days of practice, d	Mastered songs, s
0	2
1	5
2	8
3	11

ANSWER _____

2 A phone-case shop charges a $4 base price plus $3 for each sticker added. Let x be the number of stickers and y be the total cost in dollars. Write a linear equation, then describe the slope and y-intercept in this situation.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two gaming teams track their points each week. Team A has P = 3w + 18 points. Team B has P = 6w + 6 points. Let w be the number of weeks. At what week will the teams have the same number of points? Explain how the slopes and y-intercepts show which team starts ahead and which team gains points faster.

WORK SPACE AND ANSWER

ANSWER KEY

Line Clues

GRADE 8 · 8.PFA.3.b

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For y = 5x - 1, name the slope, y-intercept, independent variable, and dependent variable.	**Slope: 5. y-intercept: -1, or (0, -1). Independent variable: x. Dependent variable: y.**
2	For y = -3/4x + 8, state the slope and write the y-intercept as an ordered pair.	**Slope: -3/4. y-intercept: (0, 8).**
3	A line passes through (1, -2) and (5, 10). Find the slope, then write the equation in y = mx + b form.	**Slope: 3. Equation: y = 3x - 5.**
4	Which function is linear? Give one reason. A. y = 4x + 9 B. $y = x^2 + 9$	**A is linear because x has an exponent of 1 and the function has a constant slope of 4.**
5	For y = -x + 9, state the value of y when x = 0. Then tell whether y increases or decreases as x increases.	**When x = 0, y = 9. y decreases as x increases.**
6	A line has a slope of 1/3 and a y-intercept of -4. Write its equation. Then name the independent and dependent variables.	**y = 1/3x - 4. The independent variable is x, and the dependent variable is y.**

PART 2 · APPLY IT

1. **Independent variable: d, days of practice. Dependent variable: s, mastered songs. Slope: 3 songs per day. y-intercept: 2 songs. Equation: s = 3d + 2.** The total rises by 3 songs for each additional day, so the slope is 3. At 0 days, Mina has 2 songs, so the y-intercept is 2.
2. **Equation: y = 3x + 4. The slope is 3, meaning each sticker adds $3. The y-intercept is 4, meaning the case costs $4 before stickers are added.** The cost per sticker is the slope, 3. The base price is the y-intercept, 4.

CHALLENGE

The teams have the same number of points at week 4, when P = 30. Team A starts ahead because its y-intercept is 18, which is greater than 6. Team B gains points faster because its slope is 6, which is greater than 3.

Accept y-intercepts written as either b-values or ordered pairs when the prompt allows either form. Accept equivalent equations with terms in a different order, such as y = -5 + 3x.