LESSON MAKER PRO

Find the Rule

Build linear models from rates, tables, graphs, and real situations.

GRADE 8 · 8.F.4c

8.F.4c "Apply the concepts of linear functions to real-world and mathematical situations. Construct a function in slope-intercept form that models a linear relationship between two quantities."

NAME _____ DATE _____

BUILD A LINEAR MODEL

In y = mx + b, m is the change in y for each increase of 1 in x, and b is the value of y when x = 0. If you know two points, divide the change in y by the change in x to find m. Substitute either point to find b.

WORKED EXAMPLE

A skateboard shop charges $19 for 2 hours of board rental and $40 for 5 hours. The total cost y is linear in the number of hours x. Write a model in slope-intercept form.

1. Find the hourly change: m = (40 - 19)/(5 - 2) = 7.
2. Use the first cost to find the starting charge: 19 = 7(2) + b.
3. Solve for b: b = 5.

Answer: y = 7x + 5

PRACTICE 6 problems

1 A tank starts with 12 liters of water and gains 3 liters each minute. Let x be minutes and y be liters of water. Write y in slope-intercept form.

ANSWER _____

2 The table shows a linear function. Write its equation in slope-intercept form.

INPUT AND OUTPUT

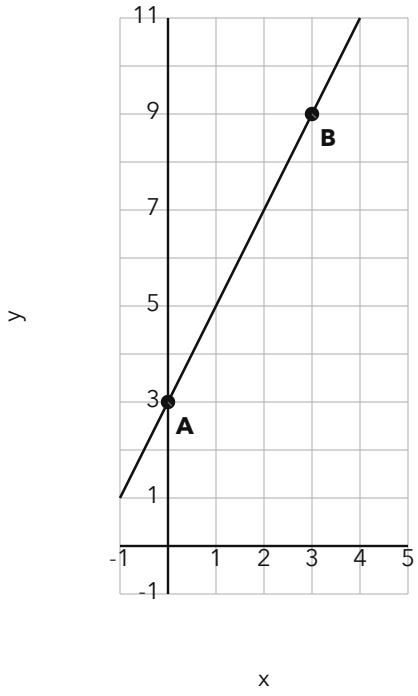
x	y
0	8
3	14
6	20

ANSWER _____

3 A linear function passes through (1, 9) and (4, 18). Write its equation in slope-intercept form.

ANSWER _____

4 Use the graphed line to write its equation in slope-intercept form.



ANSWER _____

5 Each time x increases by 1, y decreases by 3. When x = 0, y = 10. Write the equation in slope-intercept form.

ANSWER _____

6 The table shows a linear function. Write its equation in slope-intercept form.

INPUT AND OUTPUT

x	y
-3	24
0	18
3	12

ANSWER _____

APPLY IT Show your work

1 A gaming lounge charges an entry fee plus the same amount for each hour of play. Three hours cost $18, and six hours cost $30. Let x be hours and y be total cost in dollars. Write a model in slope-intercept form.

WORK SPACE

ANSWER _____

2 At a school fair, you start with 72 tickets and use the same number of tickets for each game. After 3 games, you have 57 tickets left. Let x be games played and y be tickets left. Write a model in slope-intercept form.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two music plans charge a starting fee plus a monthly fee. Plan A costs $14 after 1 month and $32 after 4 months. Plan B charges $12 to start and $4 per month. Let x be months and y be total cost in dollars. Write an equation for each plan, then find when their costs are equal.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Rule

GRADE 8 · 8.F.4c

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A tank starts with 12 liters of water and gains 3 liters each minute. Let x be minutes and y be liters of water. Write y in slope-intercept form.	**y = 3x + 12**
2	The table shows a linear function. Write its equation in slope-intercept form.	**y = 2x + 8**
3	A linear function passes through (1, 9) and (4, 18). Write its equation in slope-intercept form.	**y = 3x + 6**
4	Use the graphed line to write its equation in slope-intercept form.	**y = 2x + 3**
5	Each time x increases by 1, y decreases by 3. When x = 0, y = 10. Write the equation in slope-intercept form.	**y = -3x + 10**
6	The table shows a linear function. Write its equation in slope-intercept form.	**y = -2x + 18**

PART 2 · APPLY IT

1. **y = 4x + 6** The hourly charge is (30 - 18)/(6 - 3) = 4 dollars. Substitute x = 3 and y = 18 to find the entry fee of 6 dollars.
2. **y = -5x + 72** The change per game is (57 - 72)/3 = -5 tickets. The starting amount is 72 tickets.

CHALLENGE

Plan A: y = 6x + 8. Plan B: y = 4x + 12. Their costs are equal after 2 months, when each costs $20.

Accept equations with terms in a different order if they are equivalent. In the challenge, students should identify both models and the month when the costs match.