LESSON MAKER PRO

Linear Model Moves

Find the rate and starting value.

GRADE 8 · 8.F.B.4

CCSS.Math.Content.8.F.B.4 "Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values..."

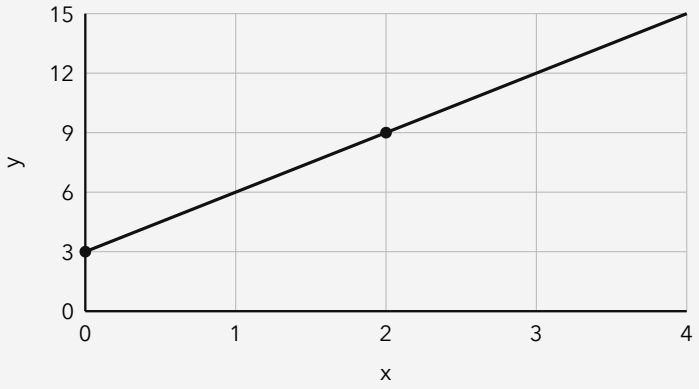
NAME _____ DATE _____

BUILD A LINEAR RULE

For a linear relationship, the rate of change is how much y changes when x increases by 1. The initial value is y when x = 0. Write the rule as y = mx + b, where m is the rate and b is the initial value.

WORKED EXAMPLE

The graph shows a linear relationship. Find its rate of change, initial value and equation.



1. Rate = (9 - 3) / (2 - 0) = 3.
2. The value at x = 0 is 3.
3. Use y = mx + b: y = 3x + 3.

Answer: Rate: 3; initial value: 3; y = 3x + 3

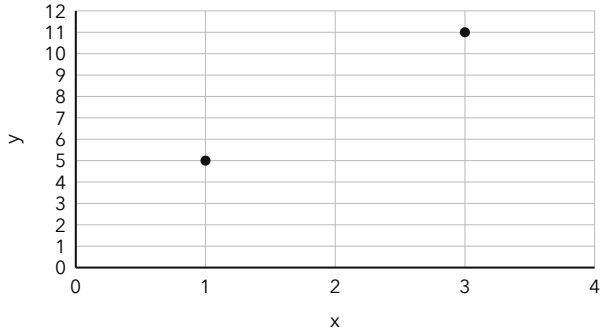
PRACTICE 4 problems

1 A game starts you with 6 coins and adds 4 coins each round. Find the rate, initial value, and equation.

ANSWER _____

_____

2 Read the two plotted points on a linear relationship. Find the rate, initial value and equation.



ANSWER _____

_____

3 A line passes through (2, 7) and (6, 15). Find the rate of change, initial value, and equation.

ANSWER _____

_____

4 A tank has y liters of water after x minutes: y = -2x + 8. Interpret the rate and initial value.

ANSWER _____

_____

APPLY IT Show your work

1 A music app adds songs to a playlist in packs of four. Let x be the number of packs added and y be the total number of songs. Use the table to find and interpret the rate and initial value, then write the equation.

PLAYLIST SONGS

Packs added (x)	Total songs (y)
0	15
2	23
4	31

2 A skate shop charges $8 for a custom board design plus $3 for each sticker. Let x be the number of stickers and y be the total cost. Write an equation and find the cost of 5 stickers.

CHALLENGE One step up

Plan A costs y = 5x + 12 dollars. Plan B costs y = 3x + 24 dollars. Find when the plans cost the same. Explain why Plan B costs less after that number of uses.

ANSWER KEY

Linear Model Moves

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A game starts you with 6 coins and adds 4 coins each round. Find the rate, initial value, and equation.	**Rate: 4; initial value: 6; y = 4x + 6**
2	Read the two plotted points on a linear relationship. Find the rate, initial value and equation.	**Rate: 3; initial value: 2; y = 3x + 2**
3	A line passes through (2, 7) and (6, 15). Find the rate of change, initial value, and equation.	**Rate: 2; initial value: 3; y = 2x + 3**
4	A tank has y liters of water after x minutes: y = -2x + 8. Interpret the rate and initial value.	**The water decreases by 2 liters each minute. The tank starts with 8 liters.**

PART 2 · APPLY IT

1. **Rate: 4 songs per pack added; initial value: 15 songs; y = 4x + 15** Adding 2 packs adds 8 songs, so the rate is 8 / 2 = 4 songs per pack. The row with x = 0 shows that the playlist starts with 15 songs.
2. **y = 3x + 8; $23** The $3 per sticker is the rate, and the $8 design fee is the initial value. Substitute x = 5 to get y = 3(5) + 8 = 23.

CHALLENGE

At 6 uses, both plans cost $42. Plan B has a lower rate of change, $3 per use instead of $5 per use, so it becomes less expensive after 6 uses.

Accept equivalent equation forms, such as 4x + 6 = y. For interpretations, accept equivalent units and wording that correctly identifies the starting value and change per 1 unit of x.