LESSON MAKER PRO

Lines in Context

Find a line's rate, initial value, and related equations.

HIGH SCHOOL · MT.CORE.ALG.LIN.3

MT.CORE.ALG.LIN.3 "Represent linear functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:..."

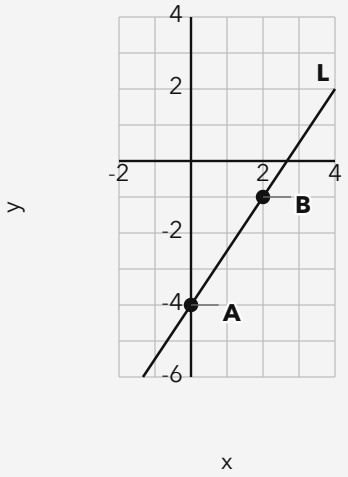
NAME _____ DATE _____

THE BIG IDEA

A line's rate of change is the change in y divided by the change in x. Its initial value is y when x = 0. Parallel lines have the same slope. When both slopes are defined, perpendicular slopes multiply to -1; a horizontal line and a vertical line are also perpendicular.

WORKED EXAMPLE

Use points A and B on the graph to find the rate of change and initial value. Then write an equation for the line.



1. Find the rate: (-1 - (-4))/(2 - 0) = 3/2.
2. At x = 0, point A shows that the initial value is -4.
3. Use y = mx + b with m = 3/2 and b = -4.

Answer: Rate: 3/2; initial value: -4; equation: y = (3/2)x - 4.

PRACTICE 6 problems

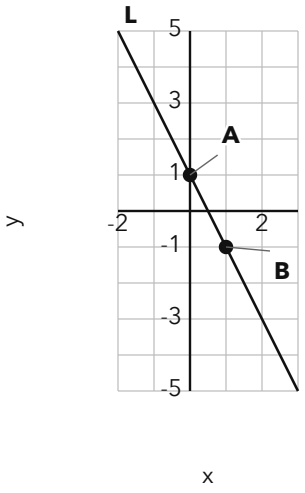
1 Use the table to find the rate of change and initial value. Write an equation for y in terms of x.

LINE A

x	y
0	9
2	7
4	5

ANSWER _____

2 Use the graph to find the rate of change and initial value. Write an equation for line L.



ANSWER _____

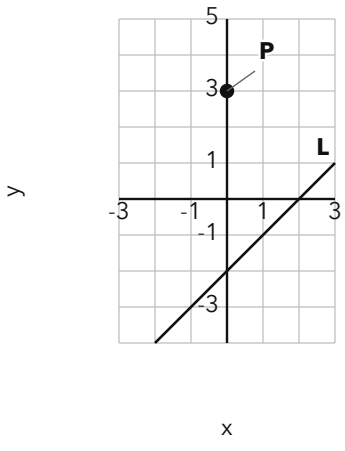
3 Write an equation for a line parallel to y = -3x + 4 that passes through (0, -2).

ANSWER _____

4 Write an equation for a line perpendicular to y = (1/2)x + 6 that passes through (4, 0).

ANSWER _____

5 Use the graph to write an equation for the line perpendicular to L that passes through P.



ANSWER _____

6 Find an equation for the table by hand. If a graphing tool is available, use it to check your equation. Otherwise, state exactly what you would enter and name one table point you would check on its graph.

LINE B

x	y
2	6
4	7
6	8

ANSWER _____

APPLY IT Show your work

1 At a public exhibit featuring artwork by Montana Indigenous artists, volunteers set out 10 chairs. They add 4 chairs each minute. Let x be the number of minutes and y be the total number of chairs. Write an equation, identify the rate and initial value, and find the total after 6 minutes.

WORK SPACE

ANSWER _____

2 Two sponsors offer to pay for rides to a Montana community event. Sponsor A pays a $6 starting charge plus $2 per mile. Sponsor B pays a $10 starting charge plus $1 per mile. Let x be miles and y be dollars. Write an equation for each offer, identify each rate and initial value, and find the distance at which the costs are equal.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A line has equation x = -2. Write an equation for the line perpendicular to it through (1, 3). Explain why multiplying slopes to get -1 cannot be used here. Describe how a coordinate-graphing tool could check your answer.

WORK SPACE AND ANSWER

Lines in Context

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the table to find the rate of change and initial value. Write an equation for y in terms of x.	**Rate: -1; initial value: 9; y = -x + 9.**
2	Use the graph to find the rate of change and initial value. Write an equation for line L.	**Rate: -2; initial value: 1; y = -2x + 1.**
3	Write an equation for a line parallel to y = -3x + 4 that passes through (0, -2).	**y = -3x - 2.**
4	Write an equation for a line perpendicular to y = (1/2)x + 6 that passes through (4, 0).	**y = -2x + 8.**
5	Use the graph to write an equation for the line perpendicular to L that passes through P.	**y = -x + 3.**
6	Find an equation for the table by hand. If a graphing tool is available, use it to check your equation. Otherwise, state exactly what you would enter and name one table point you would check on its graph.	**y = (1/2)x + 5. Enter y = (1/2)x + 5 and check that its graph passes through (6, 8).**

PART 2 · APPLY IT

1. **y = 4x + 10; rate: 4 chairs per minute; initial value: 10 chairs; after 6 minutes: 34 chairs.** The starting 10 chairs give the initial value, and adding 4 each minute gives the rate. Substitute x = 6 to get y = 4(6) + 10 = 34.
2. **A: y = 2x + 6, rate $2 per mile, initial value $6. B: y = x + 10, rate $1 per mile, initial value $10. The costs are equal at 4 miles, when each is $14.** Set the two costs equal: 2x + 6 = x + 10, so x = 4. Substituting 4 into either equation gives $14.

CHALLENGE

y = 3. The given line is vertical, so its slope is undefined; the perpendicular line is horizontal. Graphing x = -2 and y = 3 would show that they meet at a right angle.

Accept equivalent equations and correctly labeled rates and initial values. For the graphing-tool task, accept any listed table point used to check the entered equation.