LESSON MAKER PRO

Routes That Cross

Use slopes to compare lines and model paths.

HIGH SCHOOL · A1.A.4.2

A1.A.4.2 "Analyze and interpret mathematical models involving lines that are parallel, perpendicular, horizontal, and vertical."

NAME _____ DATE _____

SLOPE CONNECTIONS

In y = mx + b, m is the slope. Parallel lines have the same slope, and perpendicular lines have slopes whose product is -1. Horizontal lines have slope 0, while vertical lines have undefined slope.

WORKED EXAMPLE

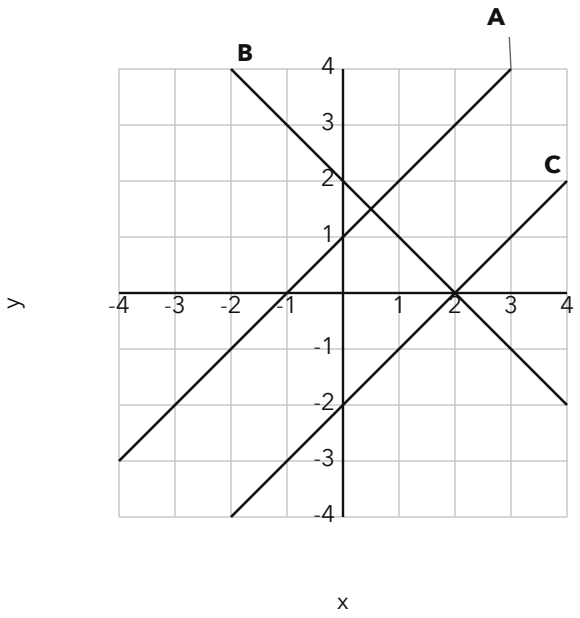
Find the equation of a line perpendicular to y = 5/7x + 11 that crosses the y-axis at -9.

1. The given line has slope 5/7.
2. A perpendicular line has slope -7/5 because (5/7)(-7/5) = -1.
3. Its y-intercept is -9, so substitute -7/5 for m and -9 for b.

Answer: y = -7/5x - 9

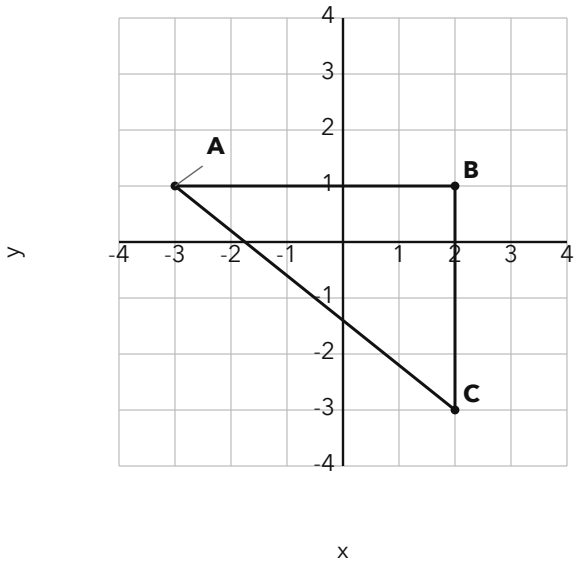
PRACTICE 6 problems

1 Look at the graph. Which line is parallel to line A?



ANSWER _____

2 Look at the graph. Which side is perpendicular to AB?



ANSWER _____

3 Line r passes through (1, 2) and (4, 8). What is the slope of a line perpendicular to r?

ANSWER _____

4 A line is parallel to y = -3x + 4 and passes through (0, -2). Write its equation.

ANSWER _____

5 A vertical line passes through (-4, 6). Write its equation.

ANSWER _____

6 Line k has equation y = 1/4x - 3. Is the line y = -4x + 2 parallel or perpendicular to k? Use the slopes to explain.

ANSWER _____

_____

APPLY IT Show your work

1 A skate park ramp is modeled by y = 3/2x + 1, where x is horizontal distance and y is height, both in feet. A safety rail crosses the ramp at a right angle at (2, 4). Write an equation for the rail.

WORK SPACE

ANSWER _____

2 On a game map, a wall lies along x = -6. A laser beam travels perpendicular to the wall and passes through (2, 3). Write an equation for the beam's path.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A music app plots a trend line through (0, 1) and (4, 3). A second trend line is perpendicular to it and passes through (2, 5). Find the second line's equation and the point where it crosses the y-axis.

WORK SPACE AND ANSWER

ANSWER KEY

Routes That Cross

HIGH SCHOOL · A1.A.4.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Look at the graph. Which line is parallel to line A?	**Line C**
2	Look at the graph. Which side is perpendicular to AB?	**BC**
3	Line r passes through (1, 2) and (4, 8). What is the slope of a line perpendicular to r?	**-1/2**
4	A line is parallel to y = -3x + 4 and passes through (0, -2). Write its equation.	**y = -3x - 2**
5	A vertical line passes through (-4, 6). Write its equation.	**x = -4**
6	Line k has equation y = 1/4x - 3. Is the line y = -4x + 2 parallel or perpendicular to k? Use the slopes to explain.	**Perpendicular. The slopes 1/4 and -4 have a product of -1.**

PART 2 · APPLY IT

1. **y = -2/3x + 16/3** The rail's slope is -2/3. Substitute (2, 4) into y = -2/3x + b to get b = 16/3.
2. **y = 3** The wall is vertical, so a perpendicular beam is horizontal. Every point on its path has y-coordinate 3.

CHALLENGE

The first slope is 1/2, so the second slope is -2. Its equation is y = -2x + 9, and it crosses the y-axis at (0, 9).

Accept equivalent equations, such as 3y = -2x + 16 for the skate park rail. For explanations, accept any correct statement that establishes the required slope relationship.