

# Line Link Lab

Use slopes to compare and create line equations.

GRADE 8 • 8.FGR.7.5

**8.FGR.7.5** "Create and compare the equations of two lines that are either parallel to each other, perpendicular to each other, or neither parallel nor perpendicular."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## SLOPE SIGNALS

In  $y = mx + b$ ,  $m$  is the slope. Lines with equal slopes are parallel. Lines with slopes that multiply to  $-1$  are perpendicular. If neither rule is true, the lines are neither.

## WORKED EXAMPLE

Compare  $y = 4/7x + 1$  and  $y = -7/4x - 6$ .

1. The slopes are  $4/7$  and  $-7/4$ .
2. Multiply the slopes:  $(4/7)(-7/4) = -1$ .
3. A slope product of  $-1$  means the lines are perpendicular.

**Answer: The lines are perpendicular.**

## PRACTICE 6 problems

- 1** Compare  $y = 2x + 3$  and  $y = 2x - 5$ . Are the lines parallel, perpendicular, or neither?

ANSWER \_\_\_\_\_

- 2** Compare  $y = -3/2x + 8$  and  $y = 2/3x - 2$ . Are the lines parallel, perpendicular, or neither?

ANSWER \_\_\_\_\_

- 3** Compare  $y = 5/2x + 9$  and  $y = -2/5x - 8$ . Are the lines parallel, perpendicular, or neither?

ANSWER \_\_\_\_\_

- 4** Write an equation of the line parallel to  $y = -8x + 3$  that passes through  $(2, 9)$ .

ANSWER \_\_\_\_\_

- 5** Write an equation of the line perpendicular to  $y = 2/3x + 8$  that passes through  $(8, 5)$ .

ANSWER \_\_\_\_\_

- 6** Compare  $2x - 3y = 12$  and  $5x + 2y = 10$ . Are the lines parallel, perpendicular, or neither?

ANSWER \_\_\_\_\_

## APPLY IT Show your work

- At a skate park, Ramp A has a height of 2 feet when  $x = 0$  and rises 3 feet for every 5 feet forward.
- 1** Ramp B has a height of 9 feet when  $x = 0$  and rises 3 feet for every 5 feet forward. Write an equation for each ramp, then classify the ramps as parallel, perpendicular, or neither.

WORK SPACE

ANSWER \_\_\_\_\_

- On a game design grid, Path A starts at  $(0, 8)$  and goes down 2 units for every 3 units right. Path B starts at  $(0, -5)$  and goes up 3 units for every 2 units right. Write an equation for each path, then classify the paths.

WORK SPACE

ANSWER \_\_\_\_\_

## CHALLENGE One step up

### CHALLENGE

Line  $p$  passes through  $(-2, 8)$  and  $(2, -2)$ . Write an equation of line  $q$  that passes through  $(3, 5)$  and is perpendicular to line  $p$ . Explain how the slopes show that the lines are perpendicular.

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## PART 1 • PRACTICE

| # | PROBLEM                                                                                         | ANSWER                                                                 |
|---|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1 | Compare $y = 2x + 3$ and $y = 2x - 5$ . Are the lines parallel, perpendicular, or neither?      | <b>Parallel</b>                                                        |
| 2 | Compare $y = -3/2x + 8$ and $y = 2/3x - 2$ . Are the lines parallel, perpendicular, or neither? | <b>Perpendicular</b>                                                   |
| 3 | Compare $y = 5/2x + 9$ and $y = -2/5x - 8$ . Are the lines parallel, perpendicular, or neither? | <b>Perpendicular</b>                                                   |
| 4 | Write an equation of the line parallel to $y = -8x + 3$ that passes through (2, 9).             | <b><math>y = -8x + 25</math></b>                                       |
| 5 | Write an equation of the line perpendicular to $y = 2/3x + 8$ that passes through (8, 5).       | <b><math>y = -3/2x + 17</math></b>                                     |
| 6 | Compare $2x - 3y = 12$ and $5x + 2y = 10$ . Are the lines parallel, perpendicular, or neither?  | <b>Neither, the slopes are <math>2/3</math> and <math>-5/2</math>.</b> |

## PART 2 • APPLY IT

- Ramp A:  $y = 3/5x + 2$ . Ramp B:  $y = 3/5x + 9$ . The ramps are parallel.** Both ramps have slope  $3/5$ , so their equations have the same x coefficient. Equal slopes mean the lines are parallel.
- Path A:  $y = -2/3x + 8$ . Path B:  $y = 3/2x - 5$ . The paths are perpendicular.** The slopes are  $-2/3$  and  $3/2$ . Their product is  $-1$ , so the paths are perpendicular.

## CHALLENGE

**Line p has slope  $-5/2$ , so line q has slope  $2/5$ . An equation for line q is  $y = 2/5x + 19/5$ . The slopes multiply to  $-1$ , so the lines are perpendicular.**

Accept equivalent equations in slope-intercept, point-slope, or standard form. For classifications, accept correct slope comparisons and valid reasoning using equal slopes or a product of  $-1$ .