

Slope Line Links

Use slopes to identify parallel and perpendicular lines.

HIGH SCHOOL • GEO-G.GPE.5.a

GEO-G.GPE.5.a "Explore the proof for the relationship between slopes of parallel and perpendicular lines;"

NAME _____

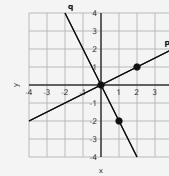
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SLOPE RELATIONSHIPS

On a graph, slope is rise/run. Parallel nonvertical lines have equal slopes because they make the same rise and run. Perpendicular nonvertical lines have slopes with a product of -1 , so the slopes are negative reciprocals. A horizontal line and a vertical line are also perpendicular.

WORKED EXAMPLE

Use the graph to find the slopes of p and q . How are the slopes related?



1. For p , rise 1 and run 2: $m = 1/2$.
2. For q , rise -2 and run 1: $m = -2/1 = -2$.
3. Multiply: $(1/2)(-2) = -1$.

Answer: p has slope $1/2$ and q has slope -2 . They are negative reciprocals, so the lines are perpendicular.

PRACTICE 4 problems

- 1** Line a has slope $7/9$. What is the slope of a line parallel to a ?

ANSWER _____

- 2** Line c has slope $-8/3$. What is the slope of a line perpendicular to c ?

ANSWER _____

- 3** Lines have slopes $-4/11$ and $11/4$. Are they parallel, perpendicular, or neither?

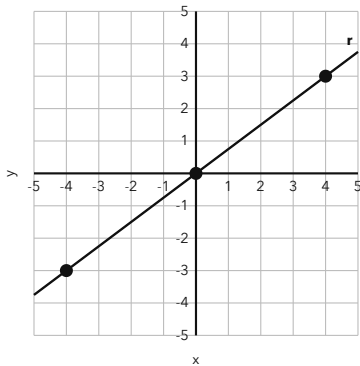
ANSWER _____

- 4** Find the slope of a line perpendicular to the line through $(10, 6)$ and $(14, 22)$.

ANSWER _____

APPLY IT Show your work

- 1** The grid shows edge r of a skate ramp. A handrail must be parallel to r . What slope should the handrail have?



ANSWER _____

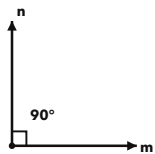
- 2** At a music festival, a lighting cable has slope $\frac{6}{5}$. A brace must meet the cable at a right angle. What slope must the brace have?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The figure shows perpendicular lines m and n . Line m has equation $y = \frac{7}{12}x + 5$, and line n has equation $y = kx - 7$. Find k . Explain using the slopes.



WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Line a has slope $7/9$. What is the slope of a line parallel to a?	$7/9$
2	Line c has slope $-8/3$. What is the slope of a line perpendicular to c?	$3/8$
3	Lines have slopes $-4/11$ and $11/4$. Are they parallel, perpendicular, or neither?	perpendicular
4	Find the slope of a line perpendicular to the line through $(10, 6)$ and $(14, 22)$.	$-1/4$

PART 2 • APPLY IT

1. **$3/4$** From the graph, r rises 3 units for a run of 4 units. A parallel handrail has the same slope.
2. **$-5/6$** A perpendicular slope is the negative reciprocal of $6/5$. Reverse the numerator and denominator, then change the sign.

CHALLENGE

$k = -12/7$ because $(7/12)(-12/7) = -1$.

Accept equivalent fractions and decimals where appropriate. For perpendicular lines, accept a correct negative-reciprocal explanation or a correct product of -1 .