LESSON MAKER PRO

Slope Connection Lab

Use slopes to test parallel and perpendicular relationships.

HIGH SCHOOL · MA.912.GR.3

MA.912.GR.3 "Use coordinate geometry to solve problems or prove relationships."

NAME _____ DATE _____

SLOPE RELATIONSHIPS

For nonvertical lines, find slope with rise/run. Two distinct nonvertical lines are parallel exactly when their slopes are equal; equal slope and equal intercept describe the same line. Two distinct vertical lines are parallel. Nonvertical lines are perpendicular when their slopes multiply to -1. A vertical line and a horizontal line are perpendicular.

WORKED EXAMPLE

Find the slope of the line through (11, 14) and (13, 18).

1. Use $m = (y_2 - y_1)/(x_2 - x_1)$.
2. Substitute: $m = (18 - 14)/(13 - 11)$.
3. Simplify: $m = 4/2 = 2$.

Answer: m = 2

PRACTICE 6 problems

1 Find the slope of the line through A(-4, 6) and B(2, -3).

ANSWER _____

2 Use slopes to decide whether line CD through C(-5, -2) and D(1, 2) is parallel to line EF through E(0, 4) and F(3, 6).

ANSWER _____

3 A line passes through (-3, -4) and (1, 2). Find the slope of a line perpendicular to it.

ANSWER _____

4 Which point lies on the line through (2, -1) with slope -4/5: (7, -5) or (-3, 4)?

ANSWER _____

5 Use slopes to decide whether PQ and RS are parallel. P(-5, 5), Q(-1, 3), R(0, -2), and S(4, -4).

ANSWER _____

6 Line r has equation 2x + 3y = 6. Line s has equation 3x - 2y = 4. Are the lines parallel, perpendicular, or neither? Show both slopes.

ANSWER _____

APPLY IT Show your work

1 A game design club maps two paths on a game screen. Path AB goes from A(-4, -2) to B(2, 2). Path CD goes from C(-1, 1) to D(2, 3). Are the two paths parallel?

WORK SPACE

ANSWER

2 The media club places a cable from (-4, 4) to (2, 0). A camera slider runs from (0, -1) to (2, 2). Is the slider perpendicular to the cable?

WORK SPACE

ANSWER

CHALLENGE One step up

Points A(-6, -4), B(0, -4), C(0, y), and D(-6, 2) are consecutive vertices of a square. Find y. Then use slopes and distances to explain why the points form a square.

WORK SPACE AND ANSWER

ANSWER KEY

Slope Connection Lab

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the slope of the line through A(-4, 6) and B(2, -3).	**m = -3/2**
2	Use slopes to decide whether line CD through C(-5, -2) and D(1, 2) is parallel to line EF through E(0, 4) and F(3, 6).	**Yes. Both lines have slope 2/3, so they are parallel.**
3	A line passes through (-3, -4) and (1, 2). Find the slope of a line perpendicular to it.	**m = -2/3**
4	Which point lies on the line through (2, -1) with slope -4/5: (7, -5) or (-3, 4)?	**(7, -5)**
5	Use slopes to decide whether PQ and RS are parallel. P(-5, 5), Q(-1, 3), R(0, -2), and S(4, -4).	**Yes. The slope of PQ is -1/2 and the slope of RS is -1/2, so they are parallel.**
6	Line r has equation 2x + 3y = 6. Line s has equation 3x - 2y = 4. Are the lines parallel, perpendicular, or neither? Show both slopes.	**Perpendicular. Line r has slope -2/3, and line s has slope 3/2.**

PART 2 · APPLY IT

1. **Yes, the paths are parallel.** The slope of AB is (2 - (-2))/(2 - (-4)) = 4/6 = 2/3. The slope of CD is (3 - 1)/(2 - (-1)) = 2/3, so the paths are parallel.
2. **Yes, the slider is perpendicular to the cable.** The cable has slope (0 - 4)/(2 - (-4)) = -4/6 = -2/3. The slider has slope (2 - (-1))/(2 - 0) = 3/2, which is the negative reciprocal of -2/3.

CHALLENGE

y = 2. AB has length 6 and slope 0. AD has length 6 and is vertical, so AB and AD are perpendicular. With C at (0, 2), BC and CD also have length 6, so all four sides are equal and adjacent sides are perpendicular.

Accept equivalent simplified slope forms. For parallel or perpendicular conclusions, accept correct slope calculations and a correct statement that distinct nonvertical lines with equal slopes are parallel or negative reciprocal slopes are perpendicular. Parallel-line claims require distinct supporting lines. Equal slope alone also permits coincident lines; check different intercepts or an off-line point. Handle vertical and horizontal lines separately.