LESSON MAKER PRO

Slope Stays Steady

Use rise, run, and similar triangles to find constant slope.

GRADE 7 · 7.PAR.4.7

7.PAR.4.7 "Use similar triangles to explain why the slope, m, is the same between any two distinct points on a nonvertical line in the coordinate plane."

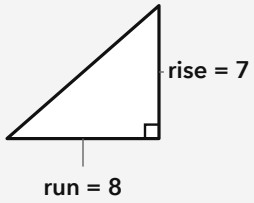
NAME _____ DATE _____

WHY SLOPE DOES NOT CHANGE

For any nonvertical line, make right triangles by moving horizontally for the run and vertically for the rise between pairs of points. The right triangles are similar, so the ratio rise/run is equal for every pair. That constant ratio is the slope, m.

WORKED EXAMPLE

Find the slope of the rising line represented by the slope triangle: run = 8 and rise = 7.



1. The rise is 7.
2. The run is 8.
3. m = rise/run = 7/8.

Answer: m = 7/8

PRACTICE 6 problems

1 Find the slope of the line through (-2, 1) and (2, 3).

ANSWER _____

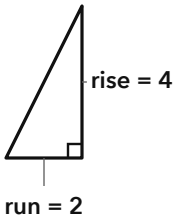
2 Find the slope of the line through (1, -4) and (4, 2).

ANSWER _____

3 Find the slope of the line through (0, -6) and (6, 0).

ANSWER _____

4 Find the slope represented by the rising slope triangle: run = 2 and rise = 4.



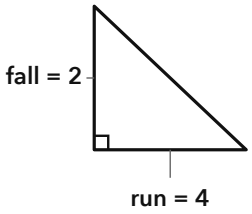
ANSWER _____

5 Two slope triangles on the same nonvertical line have rise/run ratios of 2/4 and 3/6. Do they show the same slope? Explain using the ratios.

ANSWER _____

_____

6 The slope triangle represents a line that falls from left to right: run = 4 and fall = 2. Find the slope.



ANSWER _____

APPLY IT Show your work

1 A BMX ramp follows a straight line on a coordinate grid. The table gives two points on the ramp, where x is horizontal distance and y is height. Find the ramp's slope. Then state why the slope would stay the same if you used another pair of points on the ramp.

BMX RAMP POINTS

x	y
2	1
6	3

ANSWER _____

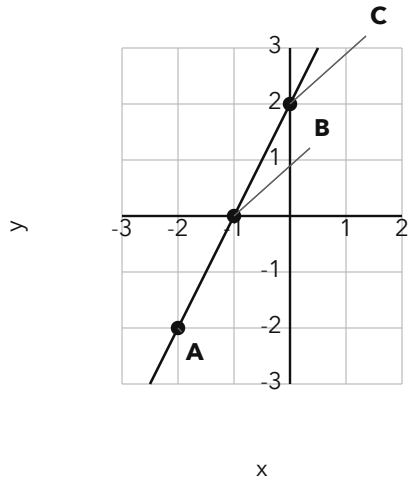
2 In a video game, a character moves along a straight path on a coordinate map. The character is at (1, 2), then later at (4, 11). Find the slope of the path. Explain why a slope triangle made from any other two points on this path has the same slope.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Points A, B, and C lie on the same nonvertical line. Find the slope from A to B, from B to C, and from A to C. Then explain how the rise-run triangles show that the slope is the same for every pair of points.



WORK SPACE AND ANSWER

ANSWER KEY

Slope Stays Steady

GRADE 7 · 7.PAR.4.7

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the slope of the line through (-2, 1) and (2, 3).	**m = 1/2**
2	Find the slope of the line through (1, -4) and (4, 2).	**m = 2**
3	Find the slope of the line through (0, -6) and (6, 0).	**m = 1**
4	Find the slope represented by the rising slope triangle: run = 2 and rise = 4.	**m = 2**
5	Two slope triangles on the same nonvertical line have rise/run ratios of 2/4 and 3/6. Do they show the same slope? Explain using the ratios.	**Yes. 2/4 = 1/2 and 3/6 = 1/2, so both triangles show a slope of 1/2.**
6	The slope triangle represents a line that falls from left to right: run = 4 and fall = 2. Find the slope.	**m = -1/2**

PART 2 · APPLY IT

1. **m = 1/2. Any rise-run triangles made along the same straight ramp are similar, so their rise/run ratios are equal.** Subtract the y-values and x-values: (3 - 1)/(6 - 2) = 2/4 = 1/2. Similar slope triangles on one straight line have equal rise/run ratios.
2. **m = 3. The rise-run triangles along the straight path are similar, so each has the same rise/run ratio.** The rise is 11 - 2 = 9 and the run is 4 - 1 = 3, so m = 9/3 = 3. Similar triangles keep the ratio constant.

CHALLENGE

m from A to B = 2, m from B to C = 2, and m from A to C = 2. The rise-run triangles have ratios 2/1, 2/1, and 4/2. These triangles are similar because their corresponding leg ratios are equal, so every pair has slope 2.

Accept equivalent simplified or unsimplified slope ratios when they are correct. For explanations, accept a statement that right triangles along one nonvertical line are similar and therefore have equal rise/run ratios.