LESSON MAKER PRO

Same Line, Same Slope

Use right triangles to test the slope of a line.

GRADE 8 · 8.AF.B.9.a

8.AF.B.9.a "Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in a coordinate plane."

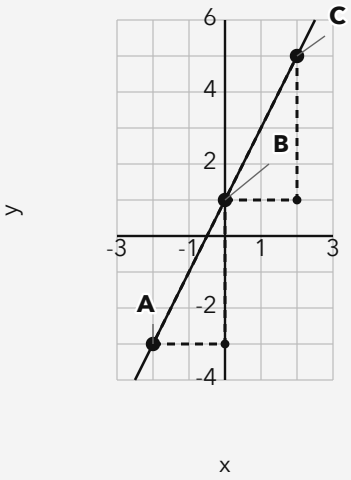
NAME _____ DATE _____

THE BIG IDEA

A rise and a run between two points on a non-vertical line form a right triangle. Right triangles formed along the same line are similar, so rise/run is always the same. When the line falls as you move right, the rise is negative.

WORKED EXAMPLE

Use the graph to compare the slopes from A to B and from B to C.

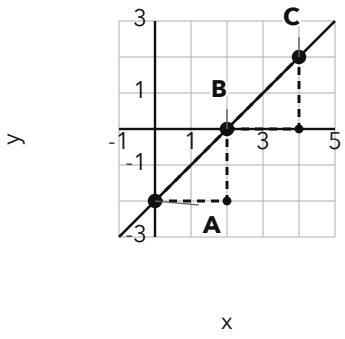


1. From A to B, the run is 2 and the rise is 4, so the slope is 4/2 = 2.
2. From B to C, the run is 2 and the rise is 4, so the slope is 4/2 = 2.
3. The right triangles have the same shape, so their rise/run ratios match.

Answer: Both slopes are 2.

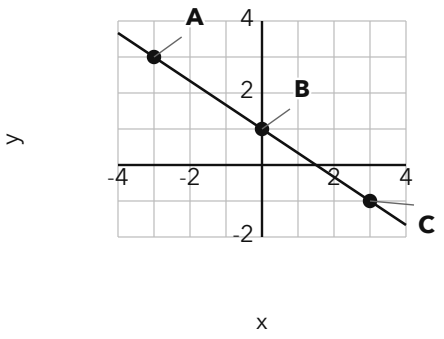
PRACTICE 6 problems

1 Use the graph. Find the rise and run from A to B and from B to C. What slope do both triangles show?



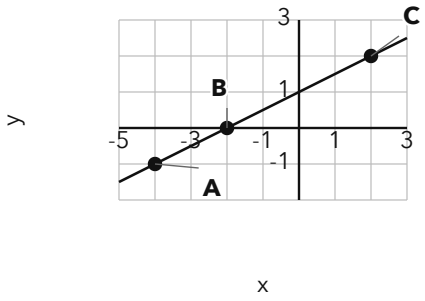
ANSWER _____

2 Use the graph. Find the slopes from A to B and from B to C. Are they equal?



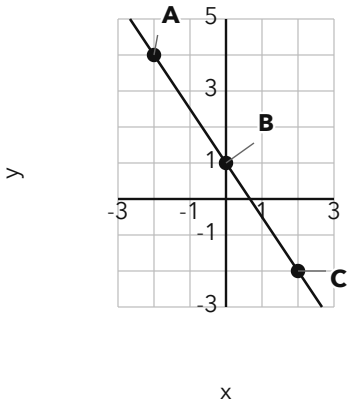
ANSWER _____

3 Use the graph. How many times as long are the run and rise from B to C as from A to B? What is the slope of the line?



ANSWER _____

4 Use the graph to find the slope from A to C.



ANSWER _____

5 A(1, 9), B(3, 3), and C(5, -3) lie on a line. Find the rise and run from A to B and from B to C. Use them to explain why the slopes match.

ANSWER _____

6 A(1, 1), B(3, 5), and C(6, 11) are three points. Are they on one non-vertical line? Compare two slopes to explain.

ANSWER _____

APPLY IT Show your work

1 In a game, you have 7 points after 1 minute, 13 points after 3 minutes, and 19 points after 5 minutes. Find the points earned per minute. Use the rise and run of two similar right triangles to explain why the rate is the same for both time periods.

WORK SPACE

ANSWER _____

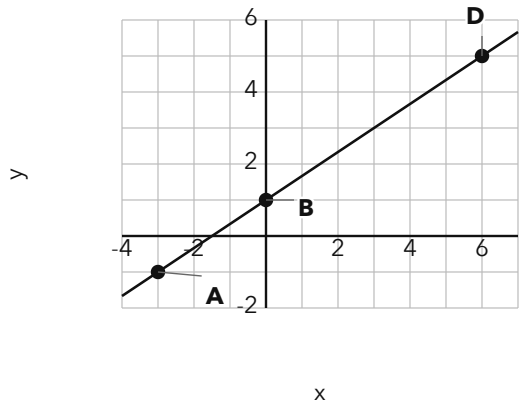
2 While you watch videos, your phone battery is at 70% after 1 hour, 60% after 3 hours, and 50% after 5 hours. Find the change in battery percentage points per hour. Explain how similar right triangles show the rate is constant.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use the graph. Compare the right triangles formed by the rise and run from A to B, from A to D, and from B to D. Explain why all three slopes are the same.



WORK SPACE AND ANSWER

ANSWER KEY

Same Line, Same Slope

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the graph. Find the rise and run from A to B and from B to C. What slope do both triangles show?	**AB: rise 2, run 2. BC: rise 2, run 2. Both slopes are 1.**
2	Use the graph. Find the slopes from A to B and from B to C. Are they equal?	**AB: -2/3. BC: -2/3. Yes, they are equal.**
3	Use the graph. How many times as long are the run and rise from B to C as from A to B? What is the slope of the line?	**The run and rise are each 2 times as long. The slope is 1/2.**
4	Use the graph to find the slope from A to C.	**-3/2**
5	A(1, 9), B(3, 3), and C(5, -3) lie on a line. Find the rise and run from A to B and from B to C. Use them to explain why the slopes match.	**AB and BC each have a rise of -6 and a run of 2. Both slopes are -6/2 = -3.**
6	A(1, 1), B(3, 5), and C(6, 11) are three points. Are they on one non-vertical line? Compare two slopes to explain.	**Yes. The slope from A to B is 4/2 = 2, and the slope from B to C is 6/3 = 2.**

PART 2 · APPLY IT

1. **3 points per minute. Each triangle has a rise of 6 points and a run of 2 minutes, so both have a rise/run ratio of 6/2 = 3.** The triangles for minutes 1 to 3 and 3 to 5 have equal horizontal and vertical legs, so they are similar. Their equal rise/run ratios give the same rate.
2. **-5 percentage points per hour. Each period has a rise of -10 percentage points and a run of 2 hours, so both slopes are -10/2 = -5.** The two right triangles each have a horizontal leg of 2 hours and a vertical leg of 10 percentage points, so they are similar. The battery level falls in both periods, making each rise and slope negative.

CHALLENGE

AB has rise 2 and run 3. AD has rise 6 and run 9, and BD has rise 4 and run 6. AD's legs are 3 times AB's legs, and BD's legs are 2 times AB's legs, so the right triangles are similar. Their slopes are 2/3, 6/9, and 4/6, which are all equal to 2/3.

Accept equivalent fractions and decimals for slopes. For explanations, look for proportional rises and runs, similar right triangles, and a negative rise on descending lines.