LESSON MAKER PRO

Slope Line Detectives

Use rise, run, and intercepts to write line equations.

GRADE 8 · 8.EE.B.6

CCSS.Math.Content.8.EE.B.6 "Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane..."

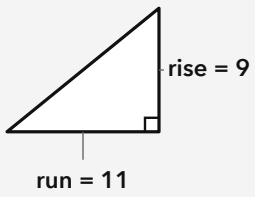
NAME _____ DATE _____

SAME RISE, SAME RUN RATIO

On a non-vertical line, right triangles made by moving horizontally and vertically are similar. Their rise/run ratios are equal, so the slope stays the same between any two points. A line through the origin has b = 0, so its equation is y = mx.

WORKED EXAMPLE

The hypotenuse rises to the right. Moving right gives run +11 and moving up gives rise +9. Use the shown slope triangle to find the slope.

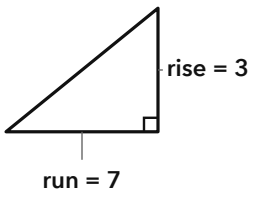


1. Use m = rise/run.
2. Substitute the labeled lengths: m = 9/11.
3. The slope is 9/11.

Answer: m = 9/11

PRACTICE 6 problems

1 The hypotenuse rises to the right: run +7, rise +3. Use this triangle to find the slope.



ANSWER _____

2 Find the slope of the line through (-2, 1) and (2, 7).

ANSWER _____

3 Find the slope of the line through (-3, 7) and (2, -3).

ANSWER _____

4 Write the equation of the line through (0, 3) and (3, -3).

ANSWER _____

5 Write the equation of a line through the origin with slope 2/7.

ANSWER _____

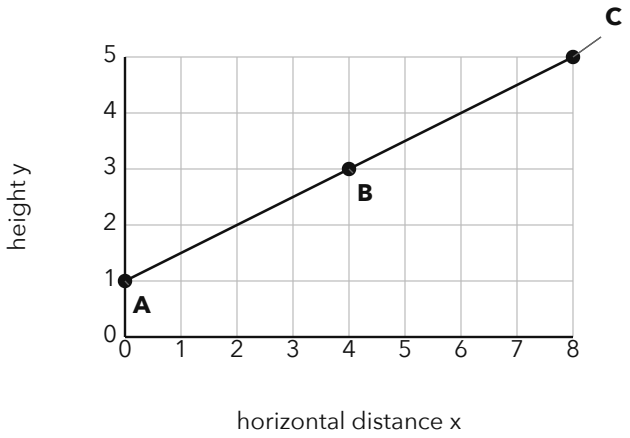
6 Points A(1, -1), B(3, 3), and C(4, 5) are on one non-vertical line. Find the slope from A to B and from B to C. Then state why the slopes match.

ANSWER _____

_____

APPLY IT Show your work

1 A game designer graphs a character's height above the ground as the character moves forward. Use the graph to find the slope and write the equation for height y in terms of horizontal distance x. The plotted points are A(0,1), B(4,3) and C(8,5).



ANSWER _____

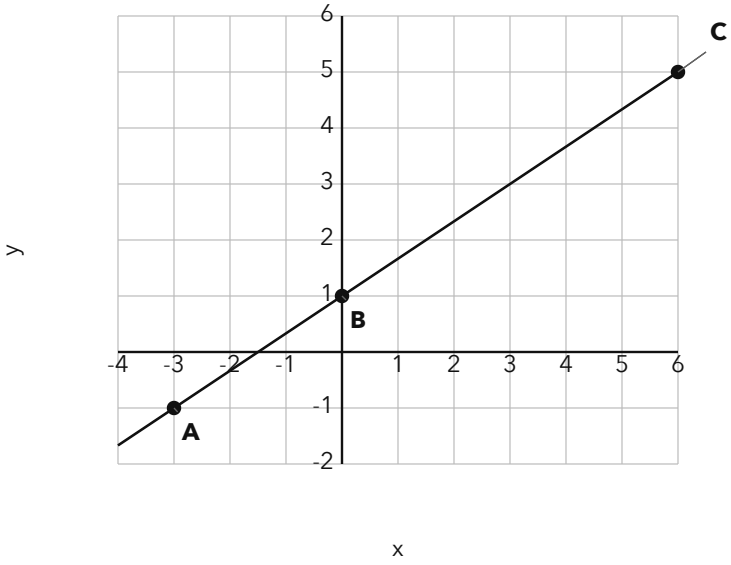
2 A music creator's dashboard shows earnings of $19 after 3 song downloads and $31 after 7 downloads. The creator earns the same amount per download and started with a fixed bonus. Find the amount earned per download, the starting bonus, and an equation for earnings y after x downloads.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use the graph. Find the slope from A to B and from B to C. Explain how the rise/run triangles show that the slopes are equal, then write the equation of the line. The plotted points are A(-3,-1), B(0,1) and C(6,5).



WORK SPACE AND ANSWER

ANSWER KEY

Slope Line Detectives

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The hypotenuse rises to the right: run +7, rise +3. Use this triangle to find the slope.	**m = 3/7**
2	Find the slope of the line through (-2, 1) and (2, 7).	**m = 3/2**
3	Find the slope of the line through (-3, 7) and (2, -3).	**m = -2**
4	Write the equation of the line through (0, 3) and (3, -3).	**y = -2x + 3**
5	Write the equation of a line through the origin with slope 2/7.	**y = (2/7)x**
6	Points A(1, -1), B(3, 3), and C(4, 5) are on one non-vertical line. Find the slope from A to B and from B to C. Then state why the slopes match.	**mAB = 2 and mBC = 2. The rise/run right triangles are similar, so their ratios are equal.**

PART 2 · APPLY IT

1. **m = 1/2; y = (1/2)x + 1** From A to B, the rise is 2 and the run is 4, so m = 2/4 = 1/2. The line crosses the vertical axis at 1.
2. **$3 per download; $10 starting bonus; y = 3x + 10** The earnings increase by $12 for 4 more downloads, so the rate is $3 per download. Subtracting 3(3) from 19 gives a starting bonus of $10.

CHALLENGE

mAB = 2/3 and mBC = 4/6 = 2/3. The rise/run triangles are similar because they share the line's angle and each has a right angle, so their ratios match. y = (2/3)x + 1

Accept equivalent simplified slope calculations and equivalent equation forms. For explanations, accept that the right triangles are similar and therefore have equal rise/run ratios.