

Slope Line Lab

Use rise, run, and intercepts to build 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 LINE, SAME SLOPE

Right triangles made between different pairs of points on the same nonvertical line are similar. Their rise/run ratios match, so the slope stays the same. A line through the origin has equation $y = mx$, and a line with vertical intercept b has equation $y = mx + b$.

WORKED EXAMPLE

Find the equation of the line through $(17, 32)$ and $(34, 45)$.

1. Find the slope: $m = (45 - 32) / (34 - 17) = 13/17$.
2. Use $y = mx + b$ with $(17, 32)$: $32 = (13/17)(17) + b$.
3. Solve for b : $32 = 13 + b$, so $b = 19$.

Answer: $y = 13/17x + 19$

PRACTICE 6 problems

- 1** Find the slope of the line through $(-5, 4)$ and $(3, 8)$.

ANSWER _____

- 2** A line passes through the origin and has slope $-3/4$. Write its equation.

ANSWER _____

- 3** Write the equation of a line with slope $2/5$ and vertical intercept -6 .

ANSWER _____

- 4** Find the equation of the line through $(-8, -2)$ and $(4, 10)$.

ANSWER _____

- 5** Are $P(-6, 9)$, $Q(-2, 3)$, and $R(2, -3)$ on the same nonvertical line? Show the two slopes.

ANSWER _____

- 6** For the line $y = -4/3x + 8$, state the slope and the vertical intercept.

ANSWER _____

APPLY IT Show your work

- 1** A gaming club's tournament score begins at 18 points and increases by 6 points for each challenge the club completes. Let x be the number of completed challenges and y be the score. Write an equation, then find the score after 5 challenges.

WORK SPACE

ANSWER _____

- 2** A game app uses y megabytes after x sticker packs are downloaded. It uses 15 MB for 4 packs and 27 MB for 10 packs. Assume the relationship is linear. Write an equation, then predict the storage used for 16 packs.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Points $A(-9, 15)$, $B(3, 7)$, and $C(12, 1)$ are on a nonvertical line. Use the rise and run from A to B and from B to C to explain why the slope is the same. Then write the equation of the line.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Find the slope of the line through (-5, 4) and (3, 8).	$m = 1/2$
2	A line passes through the origin and has slope $-3/4$. Write its equation.	$y = -3/4x$
3	Write the equation of a line with slope $2/5$ and vertical intercept -6.	$y = 2/5x - 6$
4	Find the equation of the line through (-8, -2) and (4, 10).	$y = x + 6$
5	Are P(-6, 9), Q(-2, 3), and R(2, -3) on the same nonvertical line? Show the two slopes.	Yes. Slope PQ = $-3/2$ and slope QR = $-3/2$.
6	For the line $y = -4/3x + 8$, state the slope and the vertical intercept.	$m = -4/3, b = 8$

PART 2 • APPLY IT

- $y = 6x + 18$; after 5 challenges, $y = 48$ points.** The score increases by 6 for each challenge, so $m = 6$, and the starting score is $b = 18$. Substitute $x = 5$ into $y = 6x + 18$.
- $y = 2x + 7$; for 16 packs, $y = 39$ MB.** The slope is $(27 - 15) / (10 - 4) = 2$. Using either point gives $b = 7$, then substitute $x = 16$.

CHALLENGE

From A to B, the rise is -8 and the run is 12, so the slope is $-8/12 = -2/3$. From B to C, the rise is -6 and the run is 9, so the slope is $-6/9 = -2/3$. The triangles have matching rise/run ratios, so the slope is the same. The equation is $y = -2/3x + 9$.

Accept equivalent simplified slope fractions and equivalent equation forms. For equation answers, accept forms that are algebraically equivalent to slope-intercept form.