EDSTAR ANALYTICS | Deep Dive 5
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Parallel Lines Share a Slope

Parallel lines have the same slope and different y-intercepts: same m, different b. Decide whether lines are parallel, then write a parallel line through a point by keeping m and finding b.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Parallel	Lines that never cross, always the same distance apart. On a graph: the same slope, different y-intercepts.	Compare m. Same m and different b means parallel.
Slope (m)	The steepness and direction: rise over run, how much y changes for each step of x.	Read it off y = mx + b, or count it on the graph.
y-intercept (b)	Where the line crosses the y-axis, the value when x is 0.	Parallel lines differ here. To write a parallel line through a point, keep m and use the point to find b.
Same line	Same slope and same y-intercept: one line written twice.	If both m and b match, it is not a pair of parallel lines.
Family of lines	All lines share y = mx + b. Parallel lines are the members with the same m.	Changing b slides a line; every slide is a parallel line.
Vertical, horizontal	Straight up and down (no slope), or flat (slope 0).	Any two vertical lines are parallel; any two horizontal lines are parallel.

Part A Parallel, not parallel, or the same line?

Compare the slopes, then the y-intercepts. Rewrite into y = mx + b when you need to.

PAIR	SLOPES	ANSWER
y = 5x + 2 and y = 5x − 7		
y = −x + 3 and y = x + 3		
y = 2x − 1 and 4x − 2y = 2		
y = 1/3 x + 4 and x − 3y = 9		
x = 2 and x = −5		

Part B Draw a parallel line

Each grid shows a line and a point. Draw the parallel line through the point (same rise over run), then write its equation.

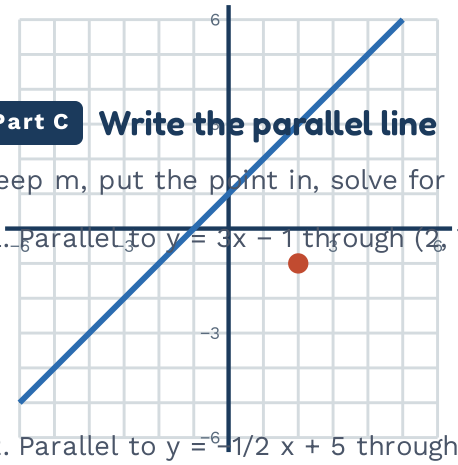
1. Line y = x + 1, point (2, −1)

2. Line y = −2x + 4, point (−1, −3)

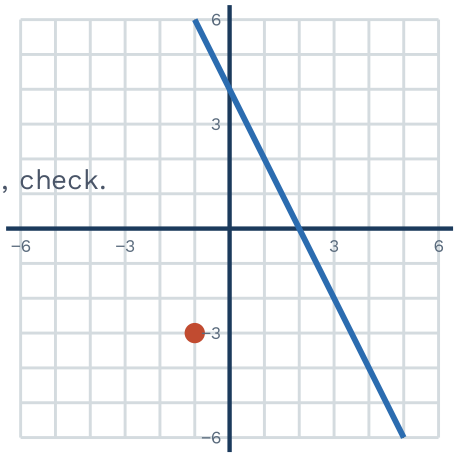
Part C Write the parallel line

Keep m, put the point in, solve for b, write y = mx + b, check.

1. Parallel to y = 3x − 1 through (2, 7)



2. Parallel to y = −1/2 x + 5 through (4, 0)



equation: _____

equation: _____

3. Parallel to 2x + y = 6 through (−1, 4)

4. Parallel to y = 4 through (3, −2)

Part D In your own words

1. Why do two lines with the same slope never cross?

2. How are parallel lines the family of lines idea from Unit 3?

3. Why can you not compare slopes for two vertical lines, and are they parallel anyway?

Part E Exit ticket

1. Are $y = -2x + 1$ and $y = -2x + 6$ parallel? Why?

2. Write the line parallel to $y = 4x + 1$ through $(2, 3)$.

Answer key

Part A. 5 and 5: parallel. −1 and 1: not parallel. 2 and 2 ($4x - 2y = 2$ is $y = 2x - 1$): the same line. 1/3 and 1/3 ($x - 3y = 9$ is $y = 1/3\ x - 3$): parallel. Two vertical lines: parallel.

Part B. 1. $y = x - 3$. 2. $y = -2x - 5$.

Part C. 1. $y = 3x + 1$. 2. $y = -1/2\ x + 2$. 3. $y = -2x + 2$. 4. $y = -2$ (horizontal, slope 0).

Part D. 1. Same m means the gap between them never changes. 2. Same m, different b: the line slid up or down. 3. Vertical lines have no slope; they are parallel by sight, since both go straight up and down.

Part E. 1. Yes: same m = −2, different b. 2. $y = 4x - 5$.