TODAY'S AGENDA: Week of May 10- May 18

- Work on Khan Academy Mission:
- Whole Class Lessons
- Today's Objective:
- Parallel and Perpendicular Lines

- Standards:
- G.GPE. B.5:
- On the coordinate plane:
  - a) Explore the proof for the relationship between slopes of parallel and perpendicular lines;
  - b) Determine if lines are parallel, perpendicular, or neither, based on their slopes; and
  - c) Apply properties of parallel and perpendicular lines to solve geometric problems.

Parallel and Perpendicular Lines from a Graph

- Parallel lines go on forever in two directions and never intersect.

- Parallel lines have the SAME SLOPE

- Perpendicular lines intersect at a right angle.

- Perpendicular lines have NEGATIVE RECIPROCAL SLOPES

SLOPE

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$(3, 4)$ $(-4, 7)$

x_1, y_1 x_2, y_2

$\frac{7-4}{-4-3} = \frac{3}{-7}$

same -3 7

neg. rec.

NEGATIVE RECIPROCAL SLOPES

change sign

flipped

$\frac{7}{3}$

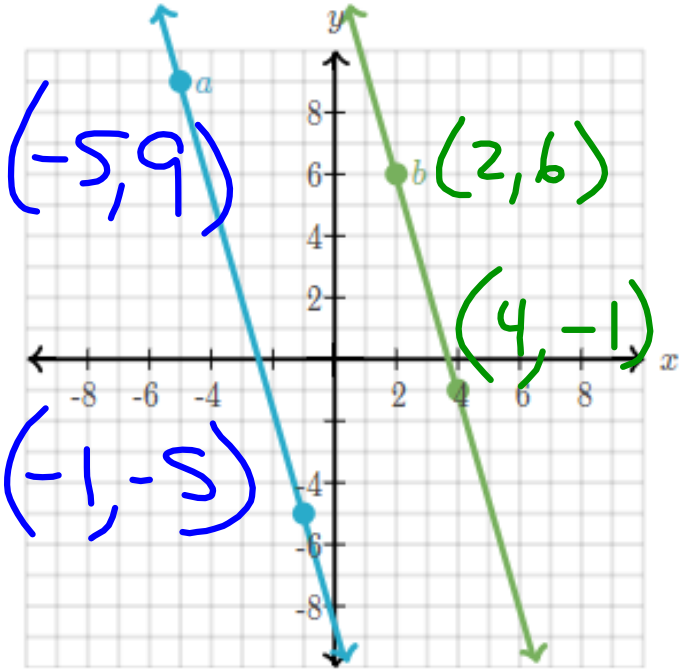
perpendicular lines have neg. rec. slopes

Are the lines in the figure parallel, perpendicular, or neither?

Choose 1 answer:

- Parallel
- B Perpendicular
- C Neither

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\frac{-5-9}{-1+5} = \frac{-14}{4} = \frac{-7}{2}$



$\frac{-1-6}{4-2} = \frac{-7}{2}$

perpendicular: $\frac{2}{7}$

One line passes through the points $(2, 1)$ and $(5, 7)$. Another line passes through points $(-3, 8)$ and $(8, 3)$.

Are the lines parallel, perpendicular, or neither?

Choose 1 answer:

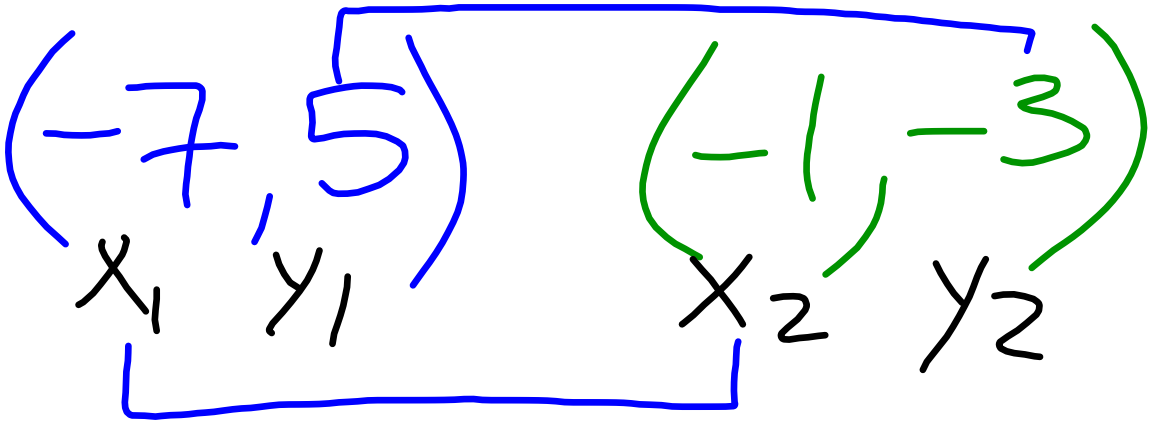
(A) Parallel

(B) Perpendicular

Neither

$$\frac{7-1}{5-2} = \frac{6}{3} = 2$$

$$\frac{3-8}{8+3} = \frac{-5}{11}$$



$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \frac{-3-5}{-1+7} = \frac{-8}{6} = \frac{-4}{3}$$

perpendicular $\frac{3}{4}$

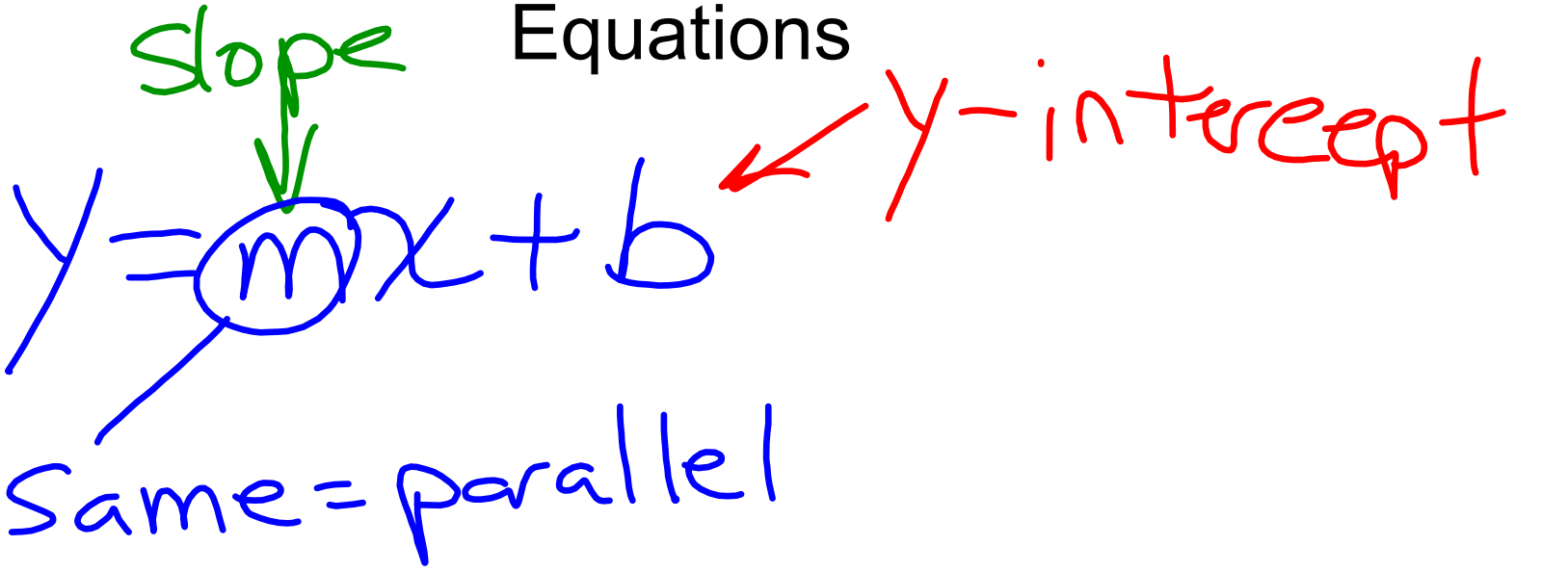
One line passes through the points $(1, 9)$ and $(4, -9)$. Another line passes through points $(6, 5)$ and $(8, -5)$.

Are the lines parallel, perpendicular, or neither?

Choose 1 answer:

- (A) Parallel
- (B) Perpendicular
- (C) Neither

Parallel and Perpendicular Lines from Equations

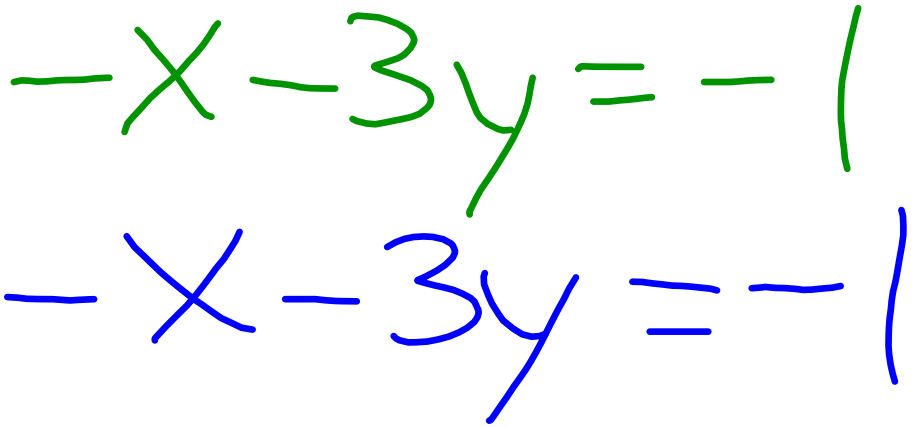


negative reciprocal = perpendicular

What do the following two equations represent?

$-x-3y=-1$

$-x-3y=-1$



Choose 1 answer:

- Equal lines
- B Parallel lines
- C Perpendicular lines
- D None of the above

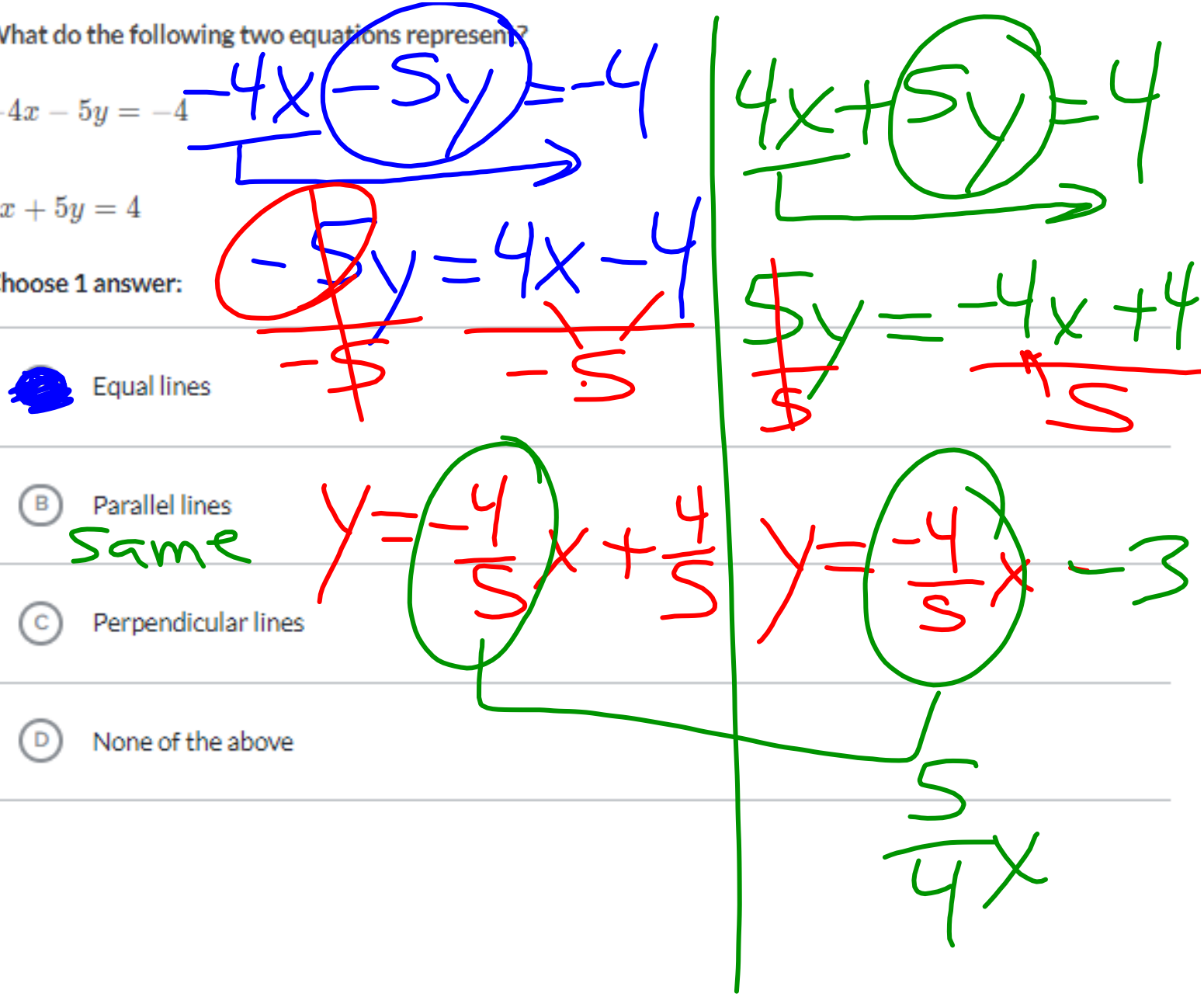
What do the following two equations represent?

$-4x - 5y = -4$

$4x + 5y = 4$

Choose 1 answer:

- Equal lines
- B Parallel lines
- C Perpendicular lines
- D None of the above



What do the following two equations represent?

$$-4x + 3y = 5$$

$$-9x - 12y = -1$$

Choose 1 answer:

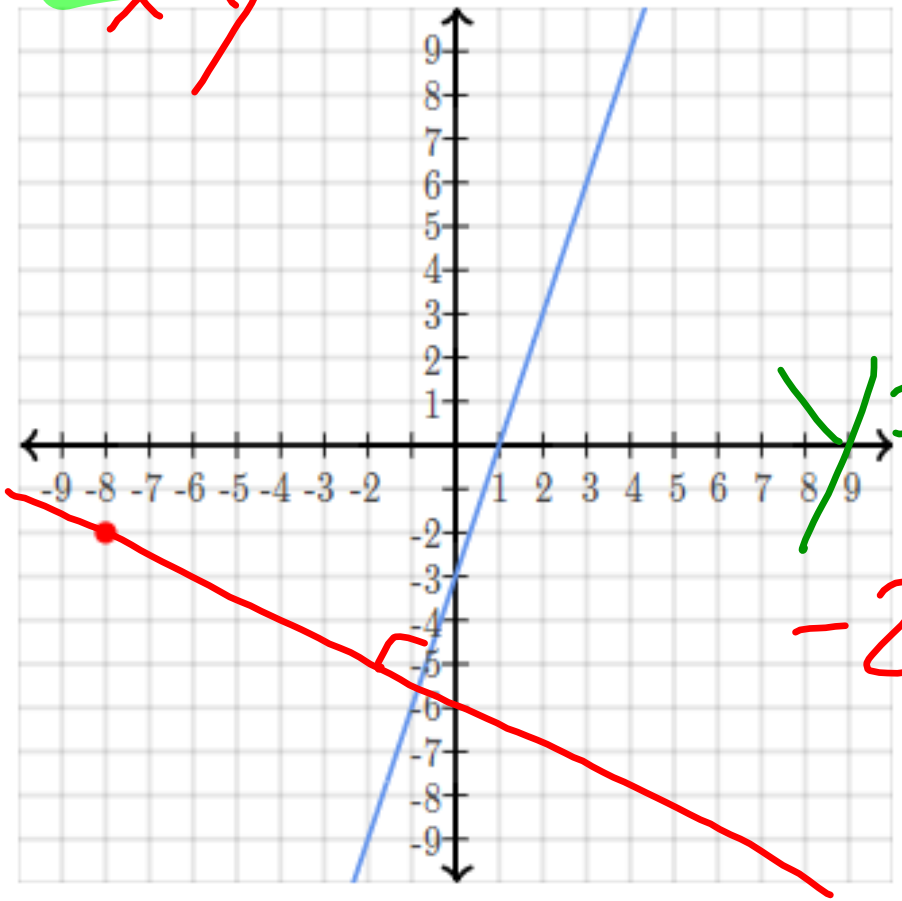
(A) Equal lines

(B) Parallel lines

(C) Perpendicular lines

(D) None of the above

Find the slope and y-intercept of the line that is perpendicular to $y = 3x - 3$ and passes through the point $(-8, -2)$.



$m =$ -1/3

$b =$ -14/3

$y = 3x - 3$

$y = -\frac{1}{3}x + b$

$-2 = -\frac{1}{3}(-8) + b$

$-2 = \frac{8}{3} + b = -14/3$

$-8/3$

$-2x - 4y = -3$

$-4y = +2x - 3$

$\frac{-4y}{-4} = \frac{+2x - 3}{-4}$

$y = -\frac{1}{2}x + \frac{3}{4}$

$6x + 12y = 9$

$\frac{12y}{12} = \frac{-6x + 9}{12}$

$y = -\frac{1}{2}x + \frac{9}{12} - \frac{3}{4}$

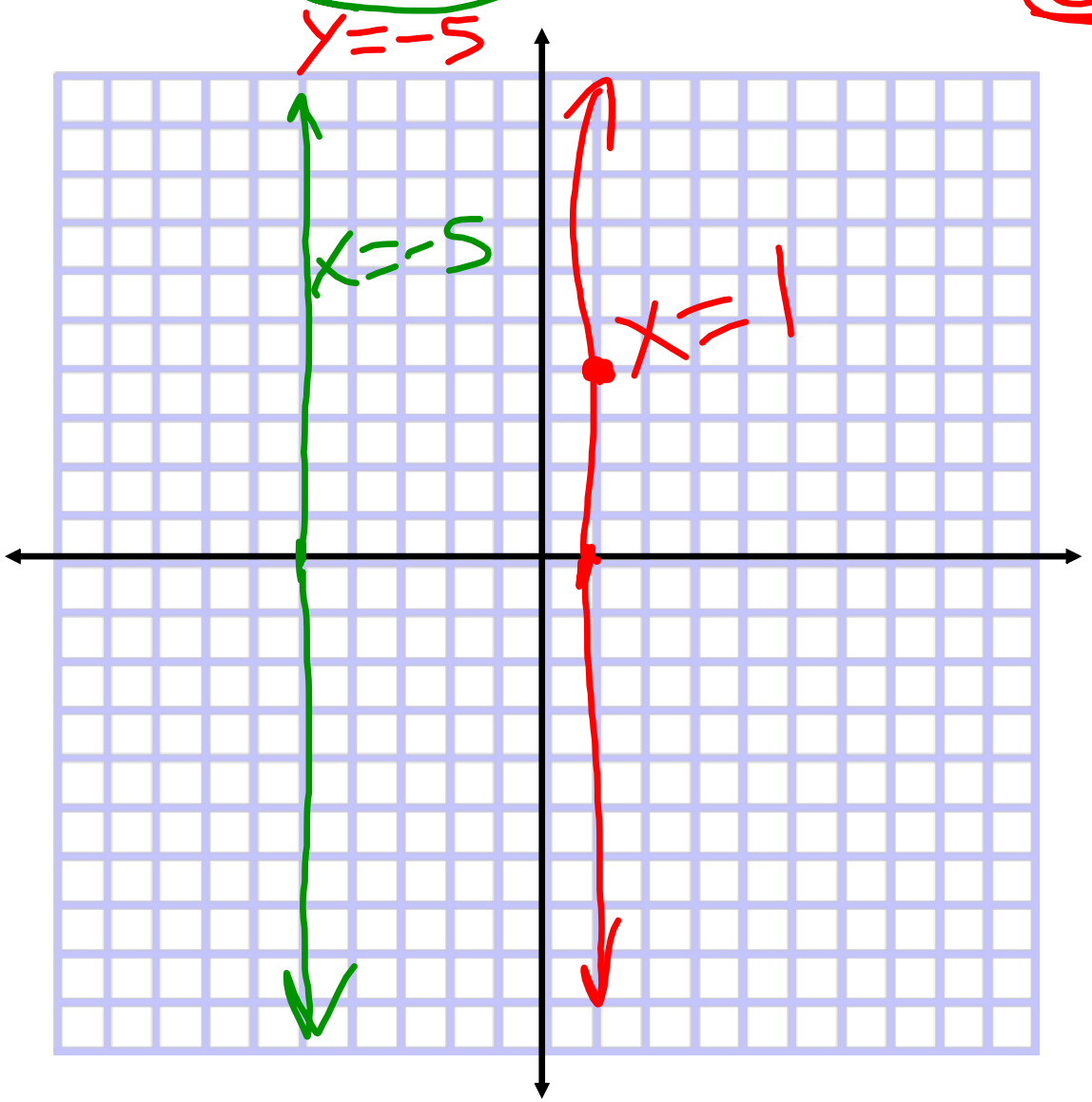
Equal!!

Writing Equations of Parallel and Perpendicular Lines

Your answer will ALWAYS* be in the form:

$y = mx + b$

Write the equation of a line that is parallel to $x = -5$ and that passes through the point $(1, 4)$.



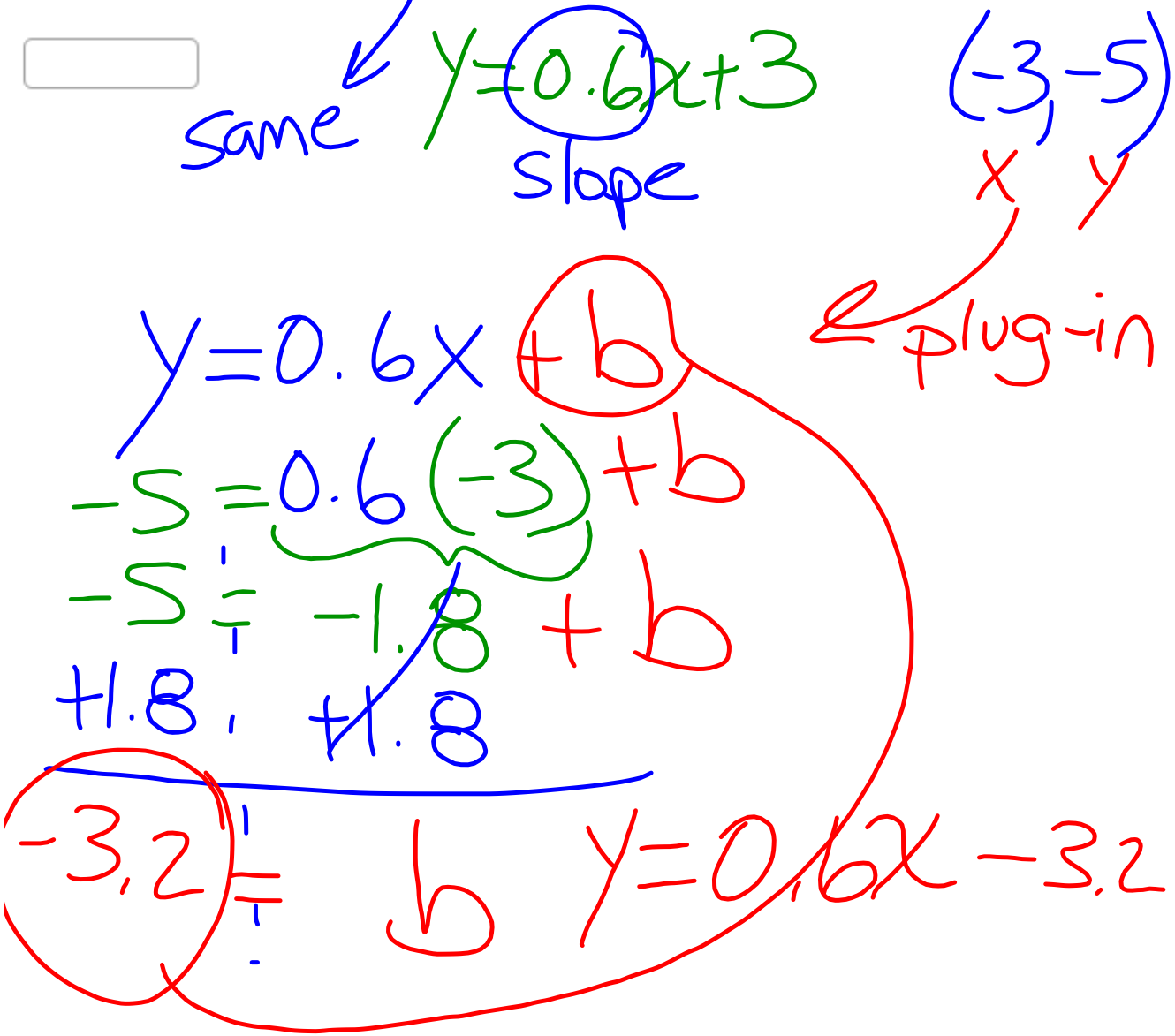
Write the equation of a line that is ~~perpendicular~~ to $y = 5$ and that passes through the point $(-7, -5)$.

$x = -7$

parallel (same letter)

perpendicular (opposite letter)

Write the equation of a line that is parallel to $y = 0.6x + 3$ and that passes through the point $(-3, -5)$.



Skills You Should Be Working on:

1. Parallel and Perpendicular lines from graph
2. Parallel and Perpendicular lines from equation
3. Write equations of parallel and perpendicular lines