

Slope: Steepness of the line

$$\text{slope} = \frac{\text{Rise}}{\text{Run}}$$

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

points

$(3, 4)$
 x_1, y_1

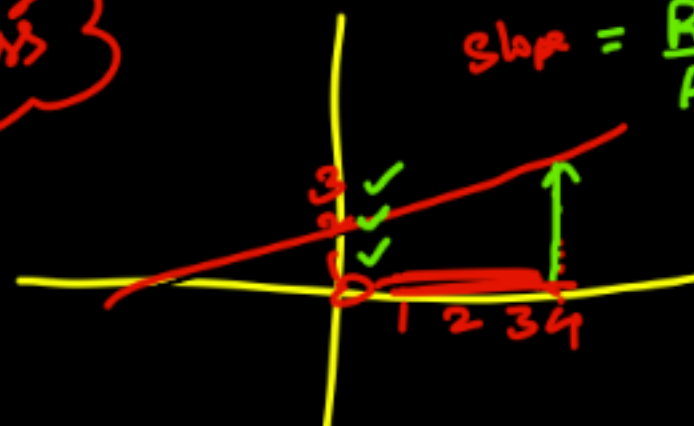
$(7, 8)$
 x_2, y_2

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

Graph

steepness

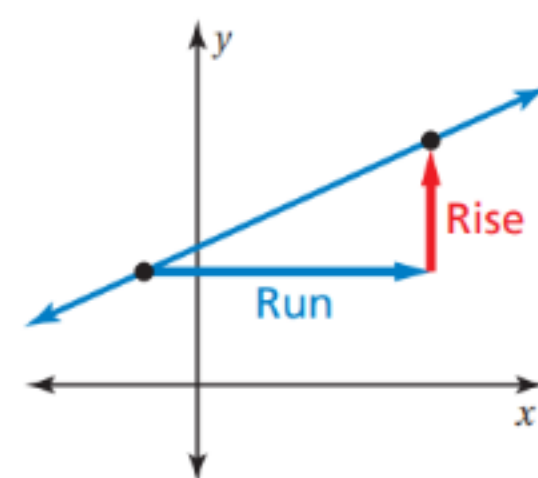
$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{3}{4}$$



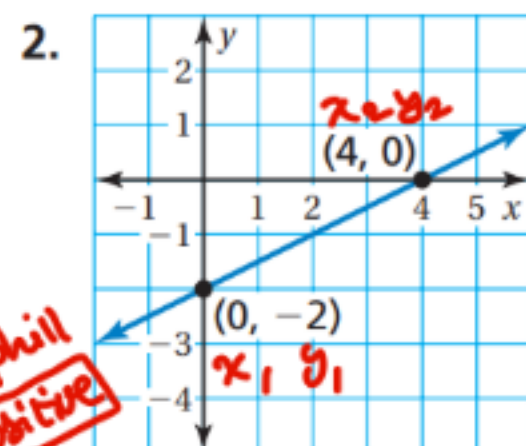
Slope

The **slope** of a line is a ratio of the change in y (the **rise**) to the change in x (the **run**) between any two points on the line.

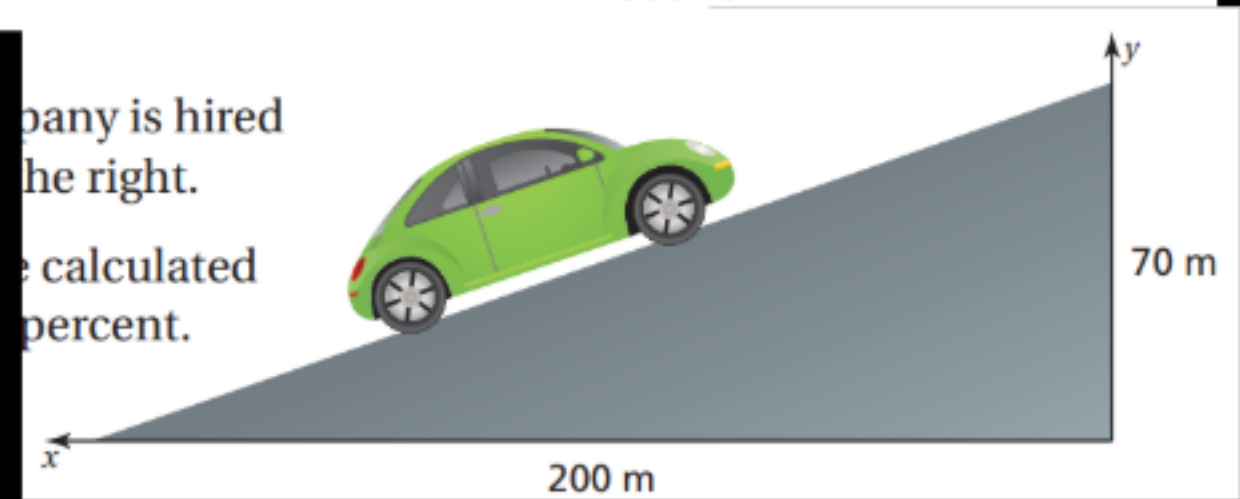
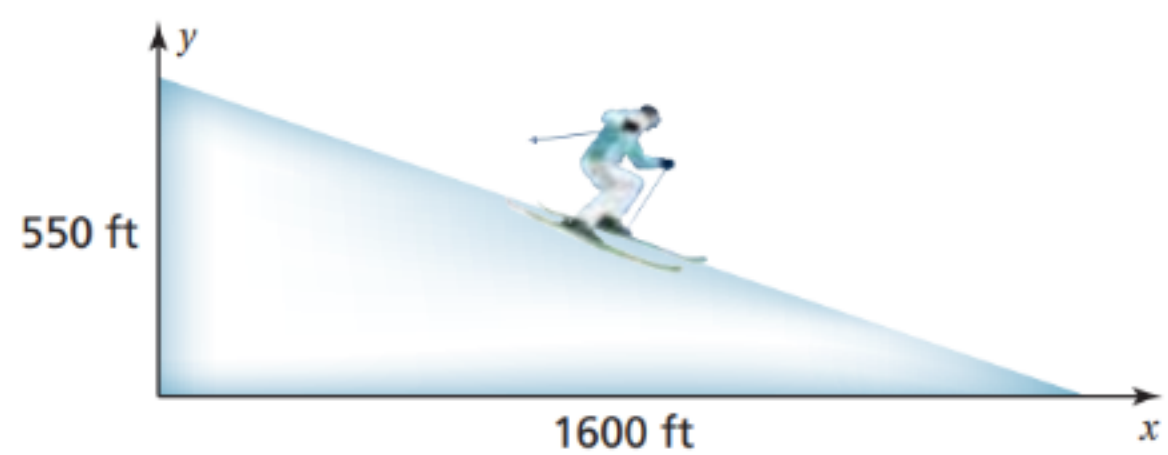
$$\text{slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{\text{rise}}{\text{run}}$$

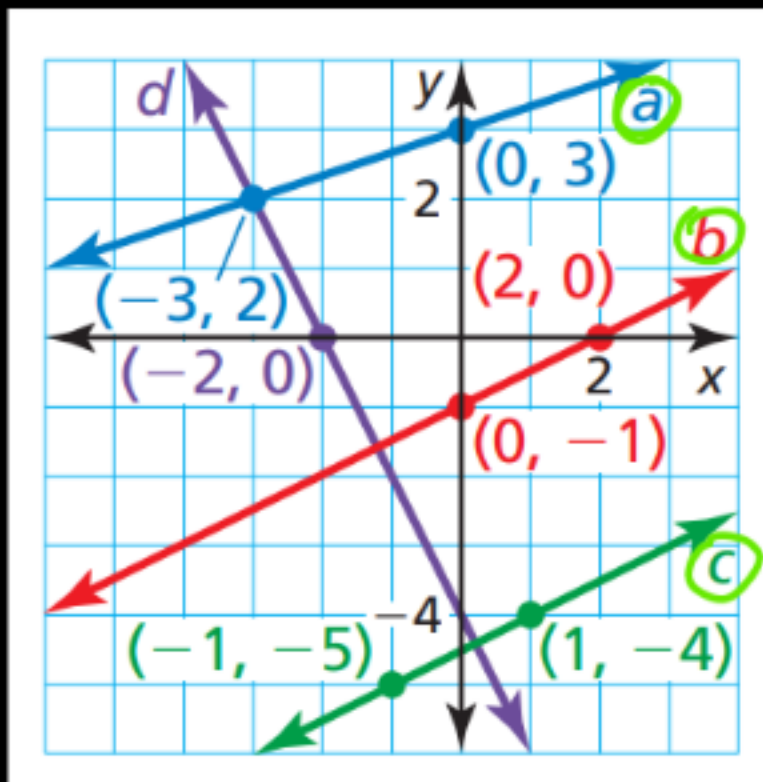


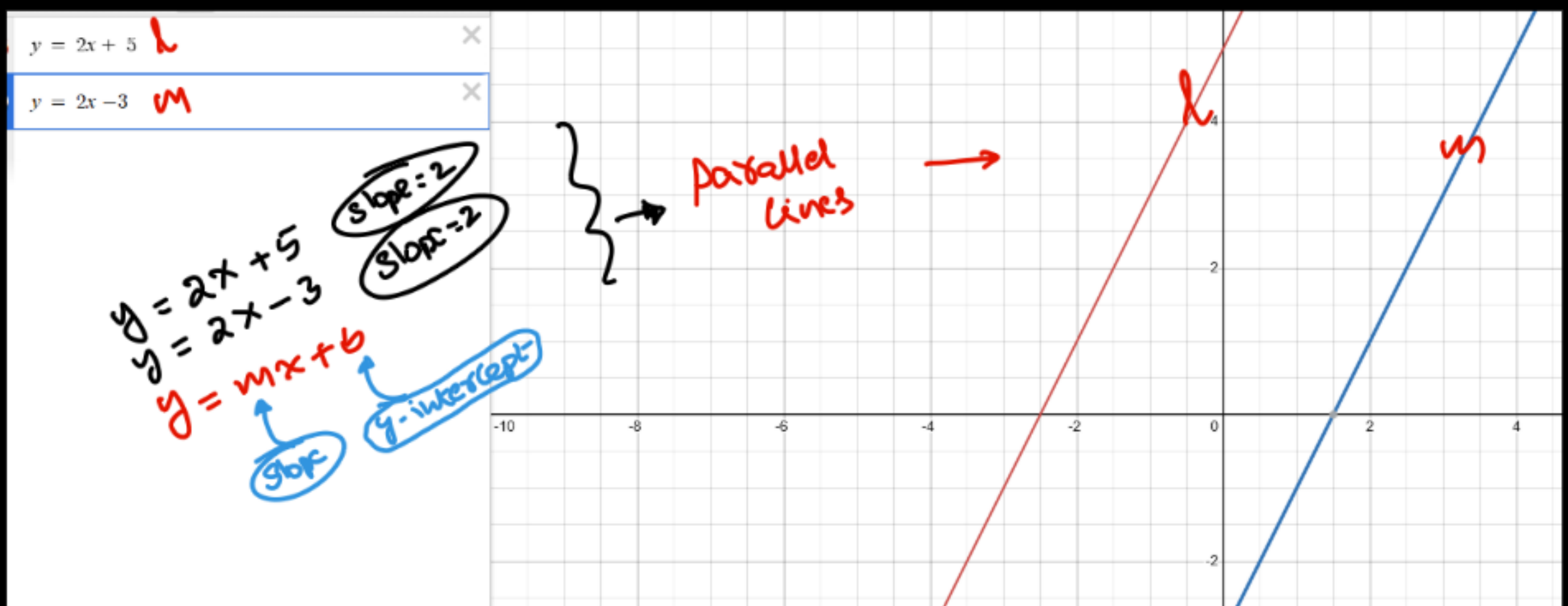
Find the slope of the line.

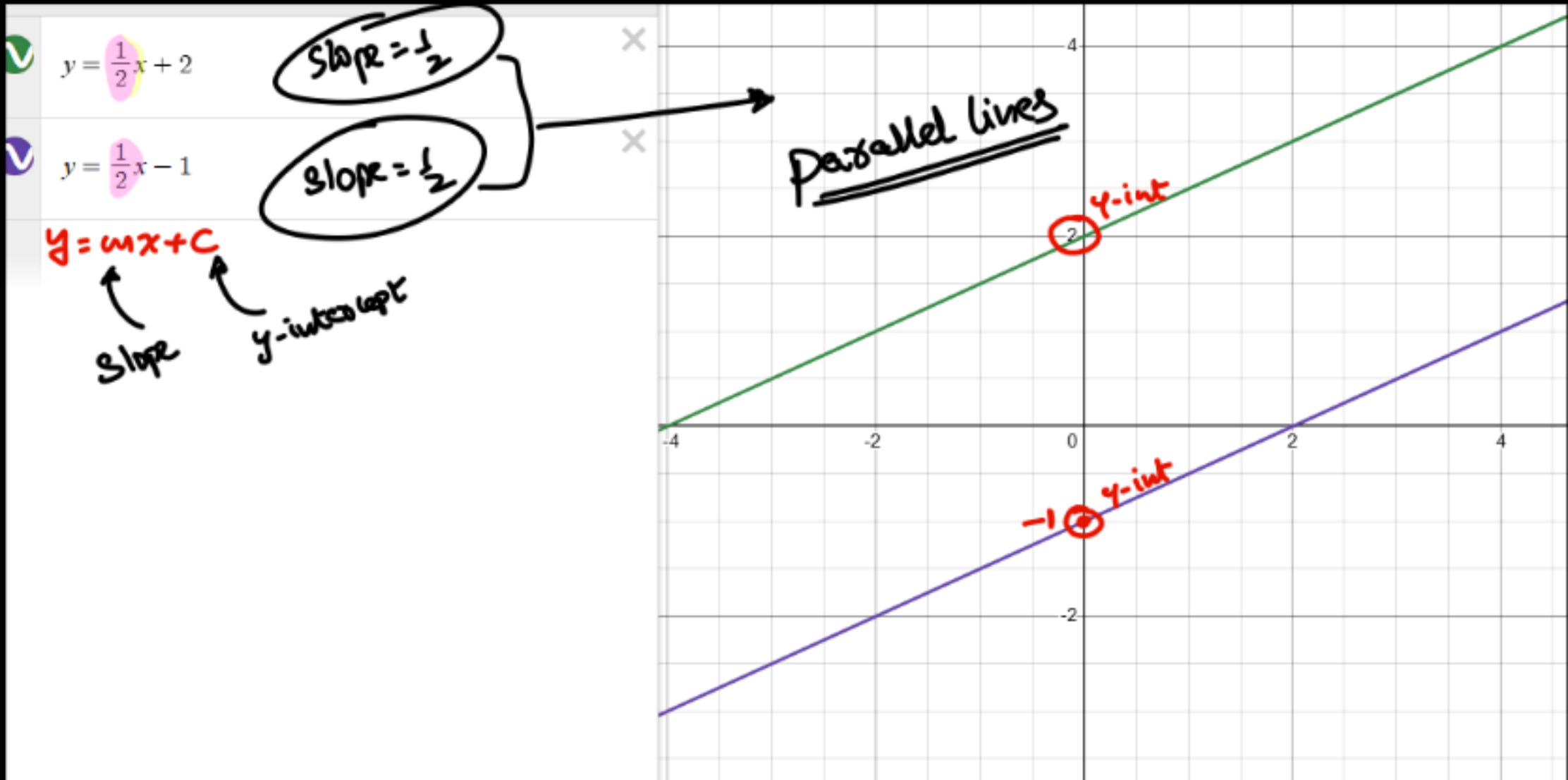


$$\begin{aligned}
 \text{Slope} &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{0 - (-2)}{4 - 0} \\
 &= \frac{0 + 2}{4} \\
 &= \frac{2 \div 2}{4 \div 2} = \frac{1}{2}
 \end{aligned}$$









If a line is parallel to $y = 5x - 2$ and passes through $(1, 3)$, what is its equation?

☒ $y = -\frac{1}{5}x + 3$

☐ $y = 5x - 3$

☐ $y = 5x - 1$

$y = 5x + C$

Same slope
to obtain
parallel lines

$y = 5x + C$

$3 = 5(1) + C$

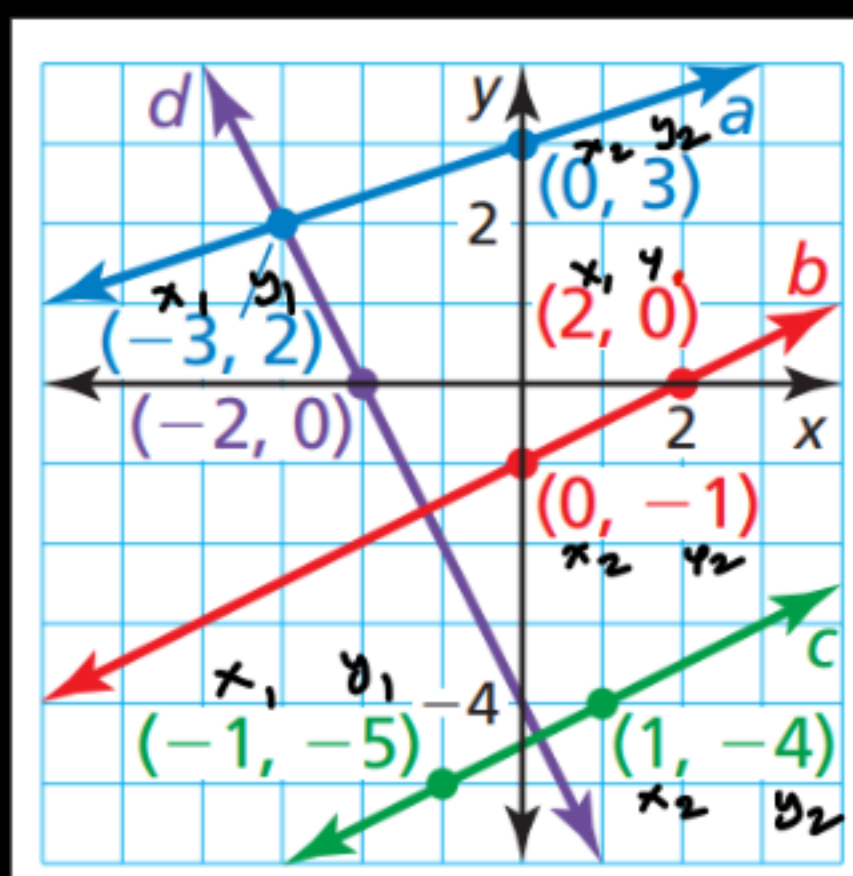
$3 = 5 + C$

$-5 \quad -5$

 $-2 = C$

✓ $y = 5x - 2$

$y = 5x - 2$



Slope

a) $\frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 2}{0 - (-3)}$

$\left(\frac{1}{3}\right)$

b) $\frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 0}{0 - 2} = \frac{-1}{-2} = \frac{1}{2}$

$\left(\frac{1}{2}\right)$

c) $\frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - (-5)}{1 - (-1)} = \frac{-4 + 5}{1 + 1} = \frac{1}{2}$

$\frac{1}{2}$

~~a) a & b~~

b) b & c ✓

c) a & c

d) a, b, & c

Equal

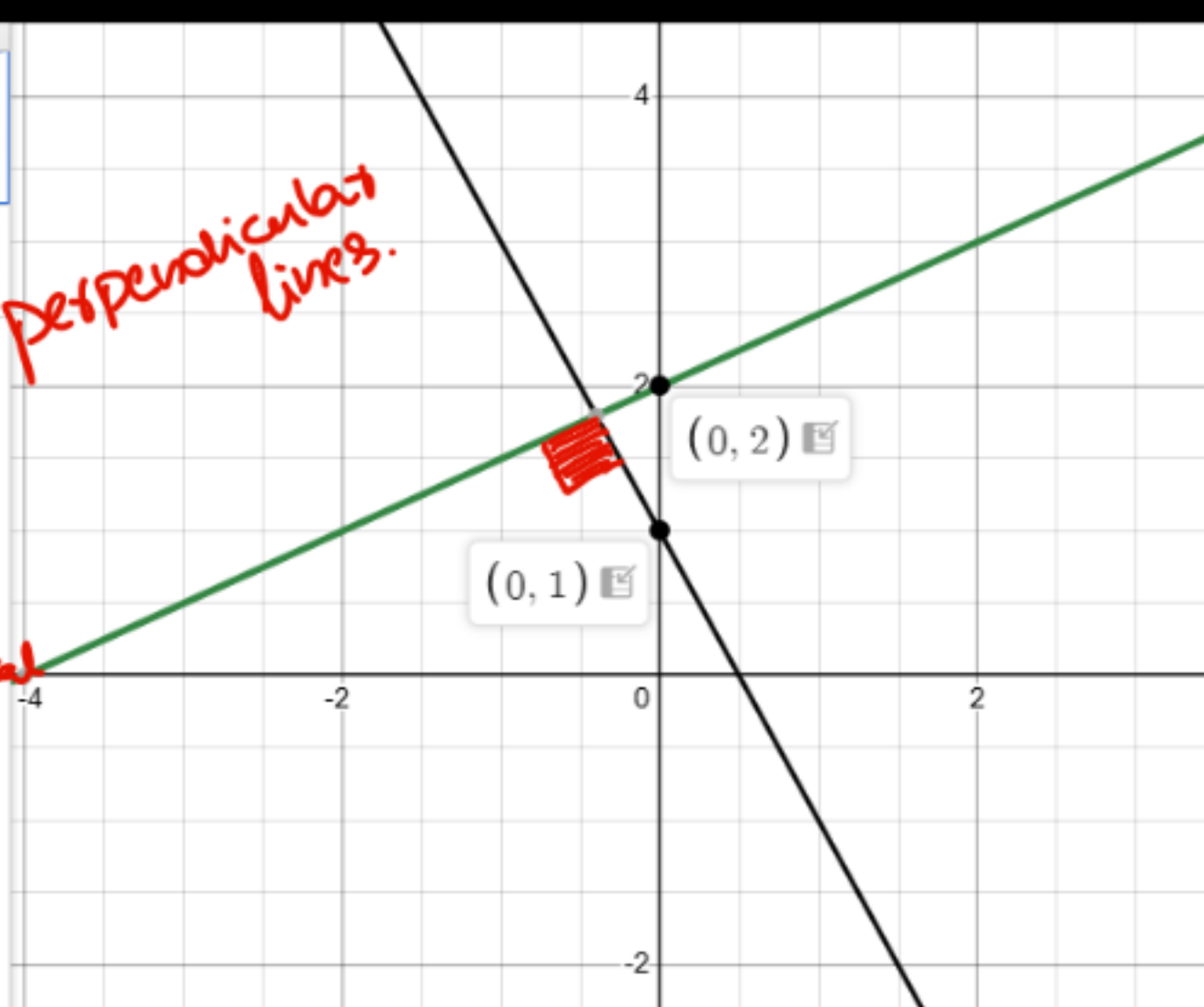
$$y = \frac{1}{2}x + 2 \quad l$$

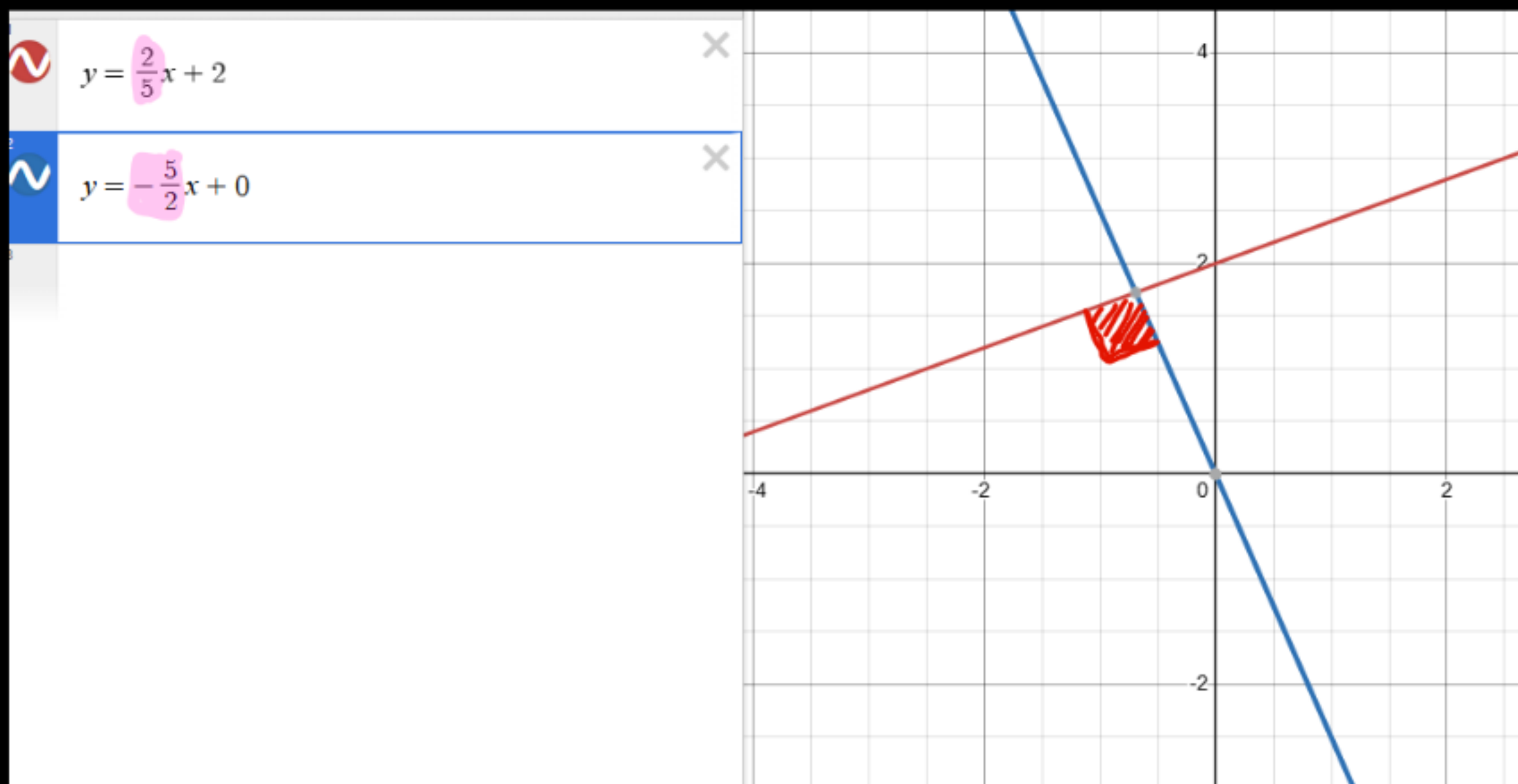
$$y = -\frac{1}{2}x + 1 \quad m$$

perpendicular line $\rightarrow$ slope Negative Reciprocal.

Reciprocal $\frac{2}{3}$

perpendicular lines.





Two lines have slopes of 3 and $-\frac{1}{3}$. What is the relationship between these lines?

- ☐ They are the same line
- ☐ They are parallel
- ☒ They are perpendicular
- ☐ They intersect at a 45° angle

$$y = mx + c$$
$$y = \underline{3}x$$
$$y = \underline{-\frac{1}{3}}x$$

Negative Reciprocal

What is the slope of a line perpendicular to the line with equation $2x + 4y = 8$?

☐ -2

☒ 2 ✓

☐ $-\frac{1}{2}$

☐ $\frac{1}{2}$

$$y = mx + b$$

slope

Negative
Reciprocal

$$\begin{aligned} 2x + 4y &= 8 \\ -2x &\quad -2x \\ \hline 4y &= -2x + 8 \\ \frac{4}{4}y &= \frac{-2x + 8}{4} \\ y &= \frac{-2x}{4} + \frac{8}{4} \\ y &= -\frac{1}{2}x + 2 \end{aligned}$$

2