

**Unit 3b Day 16: Equations in Point Slope Form**

Focus Question: How do I write an equation in Point Slope Form?

A. Review Yesterday:

1. Write the equation of a line that goes through the point (4, -2) and has a slope of 3.

$$\begin{aligned}
 y &= mx + b \\
 \textcircled{1} \quad -2 &= \textcircled{2} 3(\textcircled{3} 4) + b \\
 -2 &= 12 + b \\
 \frac{-12 \quad -12}{-14} &= b
 \end{aligned}$$

$$f(x) = \textcircled{4} 3x - \textcircled{5} 14$$

2. When you completed the process, how many times did you substitute? 5 values! That was a lot.

B. **Point-Slope form** is a second form of a linear function. We are going to take a few steps to understand it.

1. Solve the following equation:  $5 \cdot \frac{x}{5} = 4 \cdot 5$  To un-do division you multiply by the denominator

2. What is the equation for slope?

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

3. Solve the slope equation for  $y_2 - y_1$

$$(x_2 - x_1)m = y_2 - y_1$$

**Point Slope form** is  $y - y_1 = m(x - x_1)$ . Compare this to your answer above.

*There's no #2 b/c there's only 1 point*

It is called point slope form because all you need is a point and the slope. Because you only have one point, you only substitute into the  $y_1$ ,  $x_1$ , and  $m$  spots.

Just like in  $f(x) = mx + b$  the  $f(x)$  and  $x$  stay in your final answer to equation of the line, the  $y$  and  $x$  stay in the final answer for point slope form.

C. Write the following linear functions in point slope form.

1. A line through the point (4, -2) with slope of 3. Change it to slope intercept and compare your answer to part A.

$$y - -2 = 3(x - 4)$$

$$y + 2 = 3(x - 4)$$

$$\begin{aligned}
 y + 2 &= 3(x - 4) \\
 y + 2 &= 3x - 12 \\
 -2 & \quad -12 \\
 \hline
 & \quad -14
 \end{aligned}$$

$$y = 3x - 14$$

*these lines are the same*

2. A line with slope of -2 and a solution of (3, -4).

$$y - -4 = -2(x - 3)$$

$$y + 4 = -2(x - 3)$$

3. A line containing the point  $(-6, 4)$  and  $m = \frac{2}{3}$

$$y - 4 = \frac{2}{3}(x - (-6))$$

$$y - 4 = \frac{2}{3}(x + 6)$$

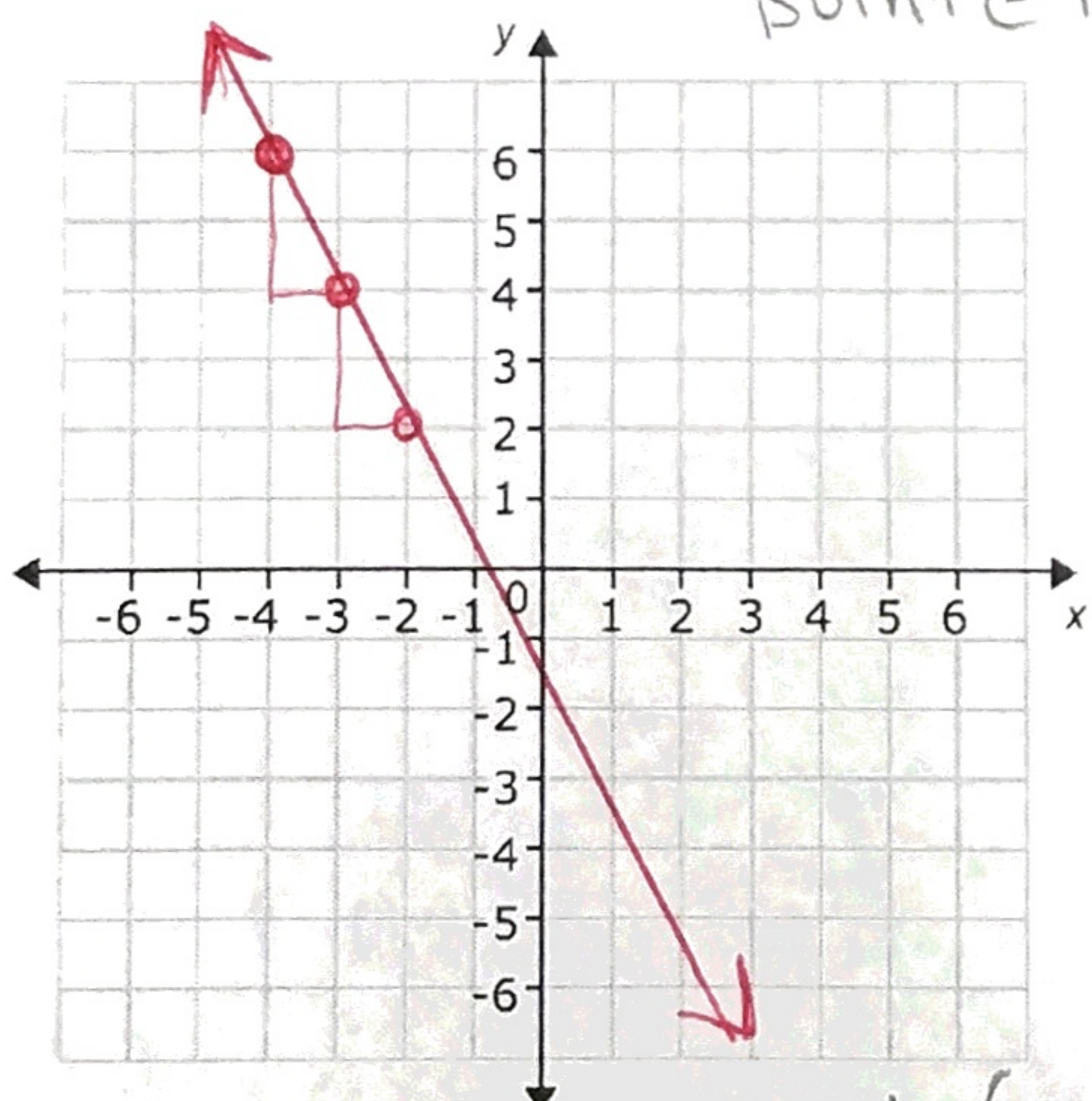
4. A line with  $m = -\frac{1}{4}$  through the point  $(7, -1)$

$$y + 1 = -\frac{1}{4}(x - 7)$$

D. You can also graph from point slope form without changing it to slope intercept form first.  $m = \frac{2}{3}$

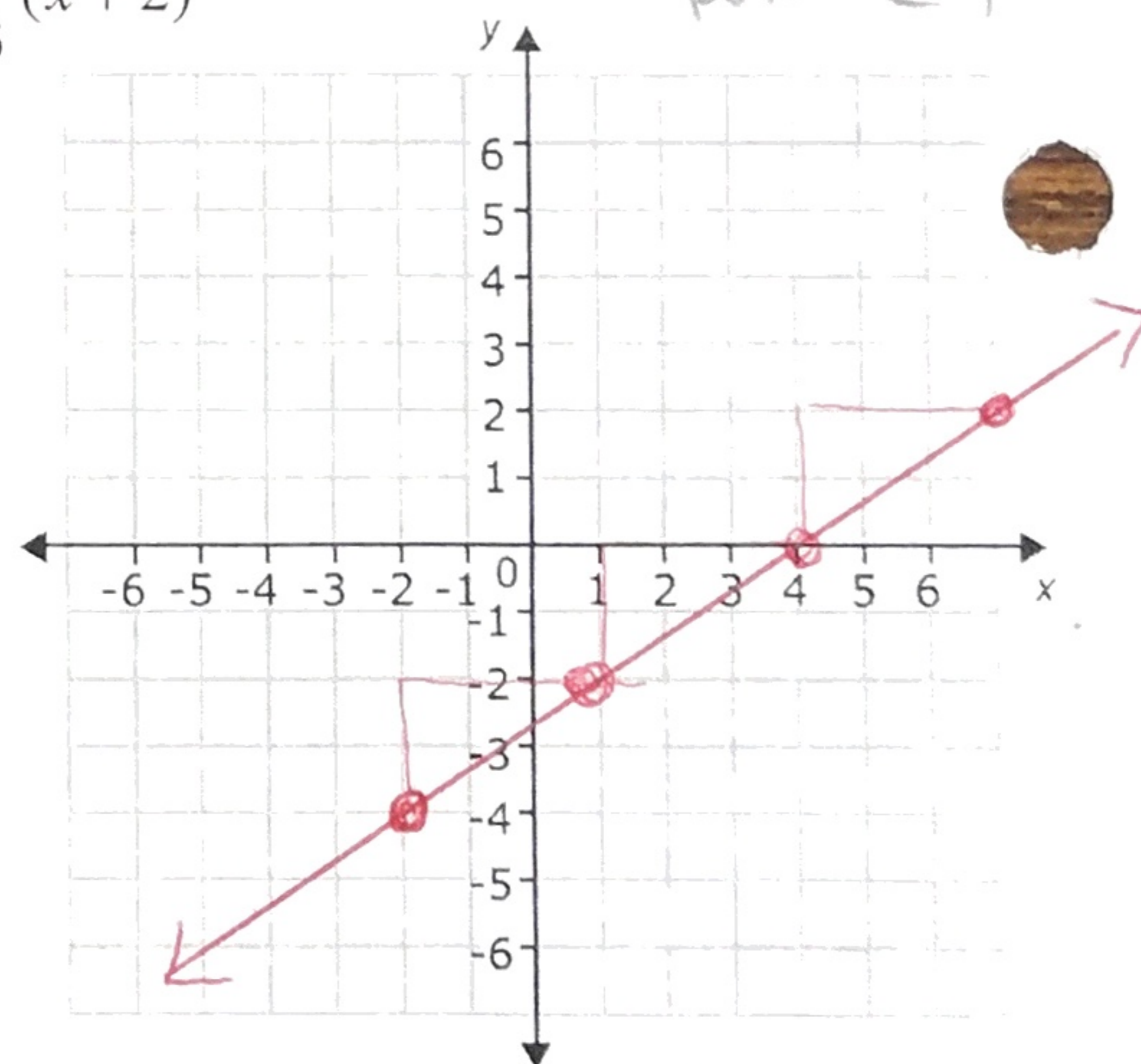
1.  $y - 6 = -2(x + 4)$

$m = -2$   
point  $(-4, 6)$



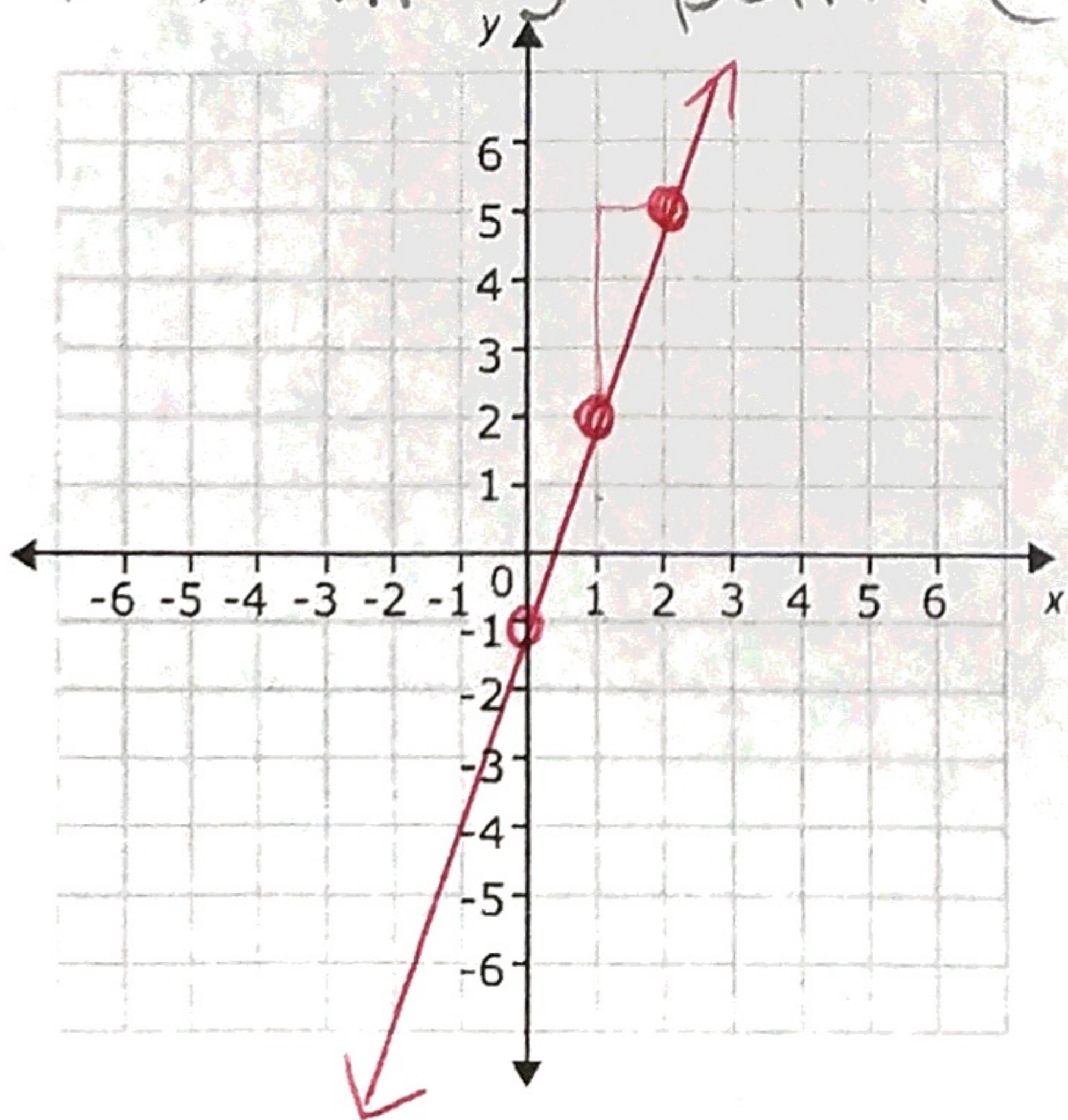
2.  $y + 4 = \frac{2}{3}(x + 2)$

$m = \frac{2}{3}$   
point  $(-2, -4)$



3.  $y - 2 = 3(x - 1)$

$m = 3$  point  $(1, 2)$



4.  $y + 3 = \frac{5}{2}(x - 2)$

$m = \frac{5}{2}$  pt  $(2, -3)$

