Name: _____ Date: _____

Learning Goal 4.2	I can graph and describe linear relations.

There are 3 ways to represent an equation for a line for graphing

1. Slope - intercept form

$y = mx + b$ ← y-intercept (where the line crosses the vertical axis)

slope $= \frac{\text{rise}}{\text{run}} = \frac{\text{vertical change}}{\text{horizontal change}}$

2. Slope - point form

$y - y_1 = m(x - x_1)$ also slope

- line passes through the point (x_1, y_1)

3. Standard form

$Ax + By = C$

* no decimals or fractions

whole # $(0, 1, 2, 3, \ldots)$ integers $(\ldots -2, -1, 0, 1, 2, \ldots)$

Example 1 Graph the following lines on the grid provided.

Slope - intercept form

$y = 3x + 2$

slope, y-int

$3 = \frac{+3}{+1}$ ← up 3, right 1

$= \frac{-3}{-1}$ ← down 3, left 1

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

slope, y-int

$\frac{1}{3} = \frac{+1}{+3}$ ← up 1, right 3

$= \frac{-1}{-3}$ ← down 1, left 3

$y = -3x - 4$

slope, y-int

$-3 = \frac{-3}{+1}$ ← down 3, right 1

$= \frac{+3}{-1}$ ← up 3, left 1

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

slope, y-int

$-\frac{1}{3} = \frac{-1}{+3}$ ← down 1, right 3

$= \frac{+1}{-3}$ ← up 1, left 3

Example 2 Graph the following lines on the grid provided. Standard form

$x + 4y = 8$

x-int $(y = 0)$: $x + 4(0) = 8$, $x = 8$

y-int $(x = 0)$: $(0) + 4y = 8$, $\frac{4y}{4} = \frac{8}{4}$, $y = 2$

$4x + y = 8$

x-int $(y = 0)$: $4x + (0) = 8$, $\frac{4x}{4} = \frac{8}{4}$, $x = 2$

y-int $(x = 0)$: $4(0) + y = 8$, $y = 8$

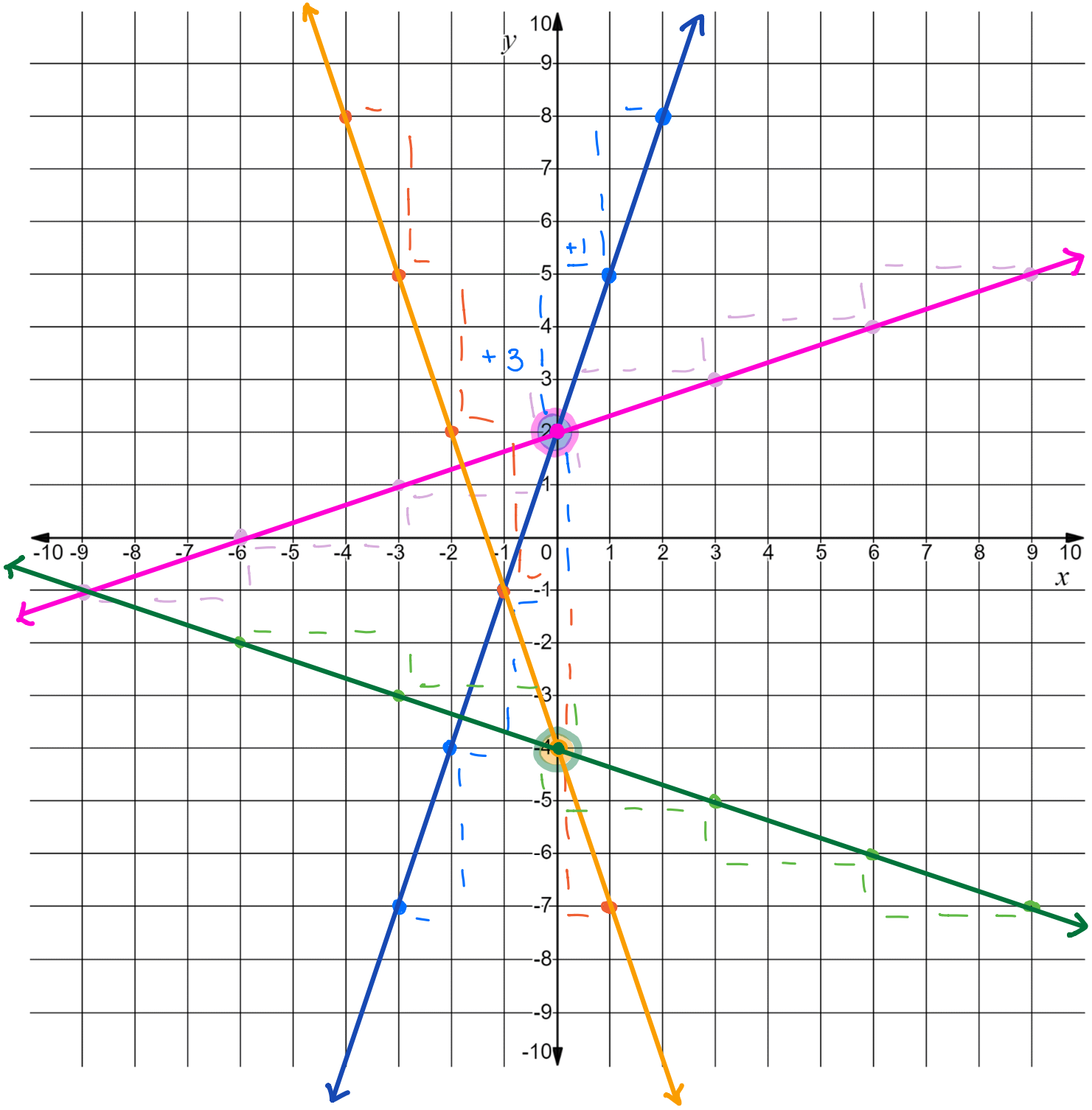
$3x + 4y = 12$

x-int $(y = 0)$: $3x + 4(0) = 12$, $\frac{3x}{3} = \frac{12}{3}$, $x = 4$

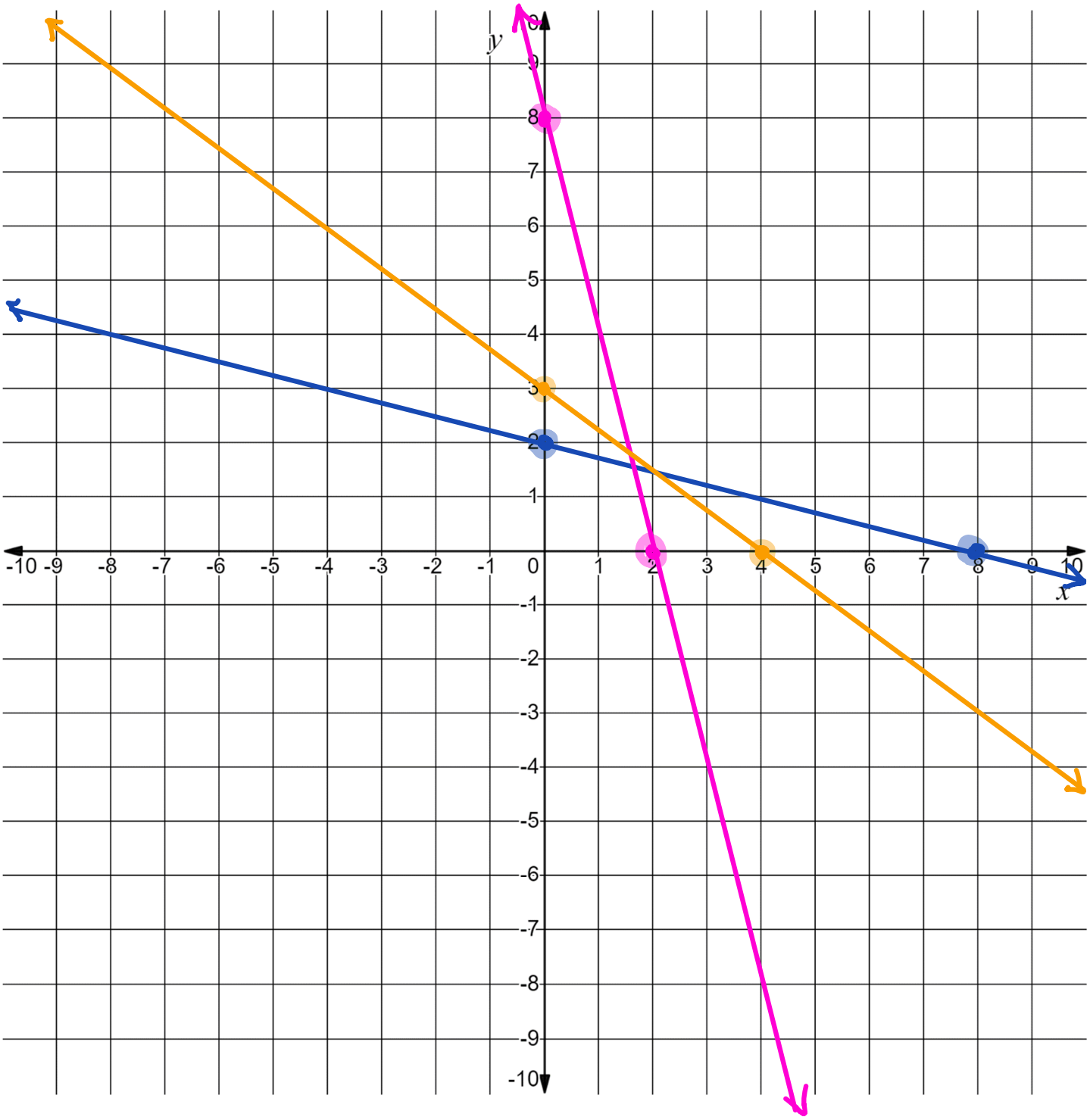
y-int $(x = 0)$: $3(0) + 4y = 12$, $\frac{4y}{4} = \frac{12}{4}$, $y = 3$

Assignment | Handout | Quiz Next Day!

Example 1 Start at the y-intercept, move by the slope



Example 2 Calculate the x- and y-intercepts, connect the dots.



Example 3 Graph the following lines on the grid provided.

Slope-point form

$y - (2) = \frac{1}{2}(x - (6))$

y_1 x_1

Slope $= \frac{1}{2}$

$= \frac{+1}{+2}$ ← up 1, right 2

$= \frac{-1}{-2}$ ← down 1, left 2

point $(6, 2)$

$y + 2 = \frac{1}{2}(x + 6)$

$-(-2)$ $-(-6)$

y_1 x_1

Slope $= \frac{1}{2}$

$= \frac{+1}{+2}$ ← up 1, right 2

$= \frac{-1}{-2}$ ← down 1, left 2

point $(-6, -2)$

$y - (2) = -2(x - (6))$

y_1 x_1

Slope $= -2$

$= \frac{-2}{+1}$ ← down 2, right 1

$= \frac{+2}{-1}$ ← up 2, left 1

point $(6, 2)$

$y + 2 = -2(x + 6)$

$-(-2)$ $-(-6)$

y_1 y_2

Slope $= -2$

$= \frac{-2}{+1}$ ← down 2, right 1

$= \frac{+2}{-1}$ ← up 2, left 1

Example 4 Graph the following lines on the grid provided.

$y - 2 = 0$

$+2$ $+2$

$y = 2$

⇒ no matter what value x is, $y = 2$

⇒ horizontal line.

$y = -2$

⇒ no matter what value x is, $y = -2$

⇒ horizontal line.

$x + 3 = 0$

-3 -3

$x = -3$

⇒ no matter what value y is, $x = -3$

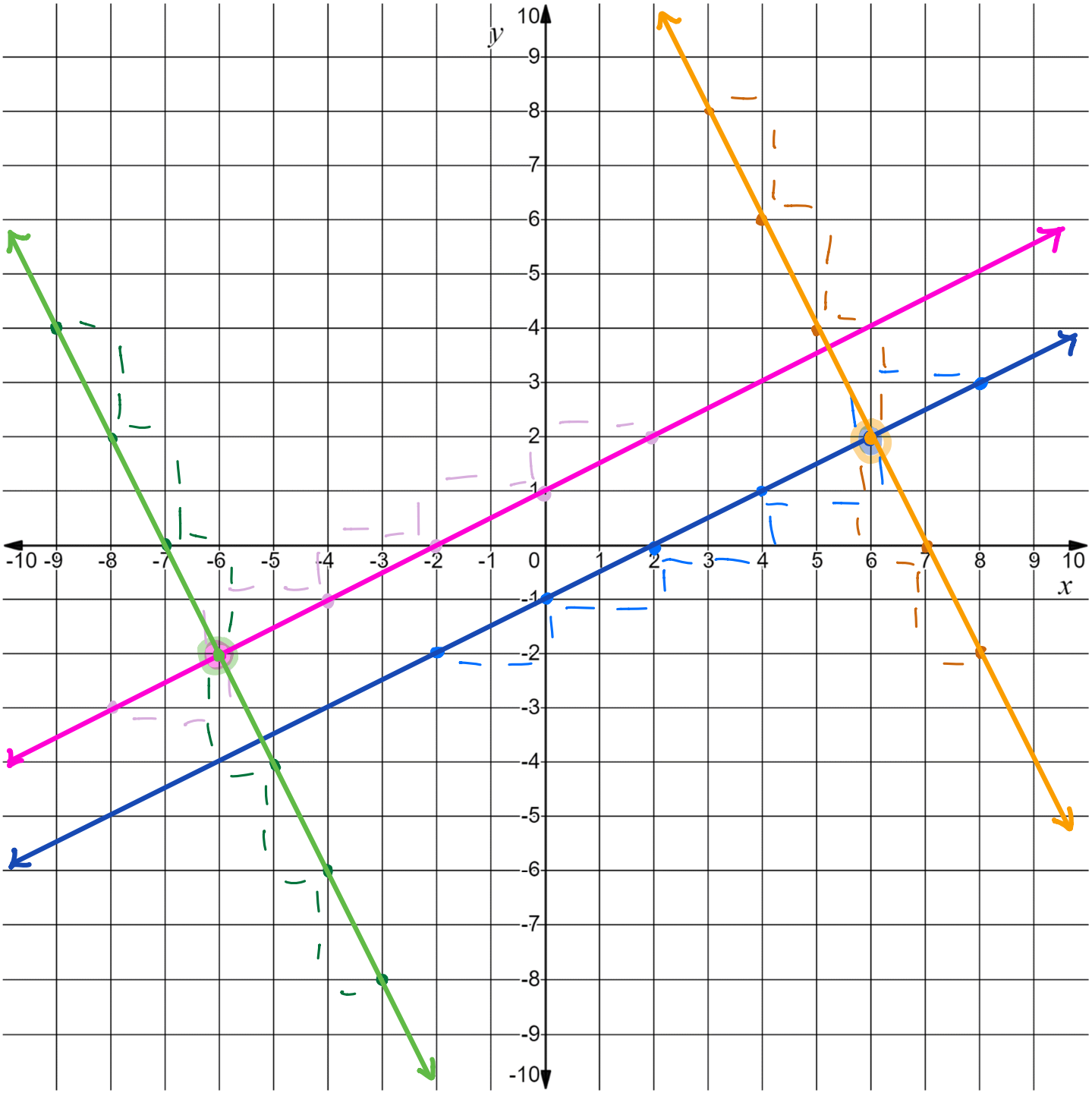
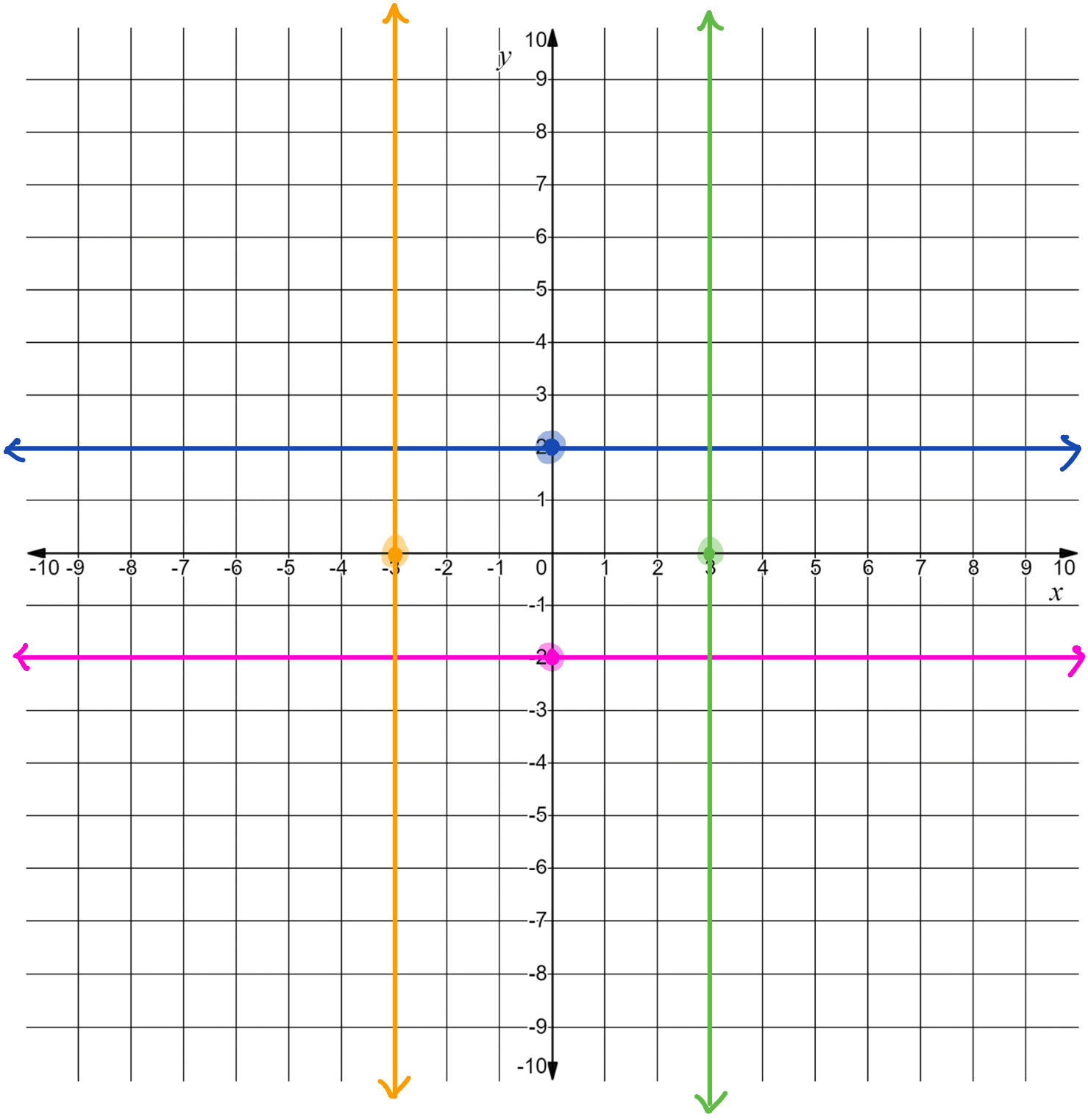
⇒ vertical line

$x = 3$

⇒ no matter what value y is, $x = 3$

⇒ vertical line

Example 3



Example 4