5.7 HW Page 165 #1-13

For Exercises 1–2, find an equation for the line that passes through the given point and is parallel to the graph of the given line.

1. $(3, -1)$; $y = 2x - 4$
2. $(4, -2)$; $x - y = 3$

① $y = mx + b$

$m = 2$ $\quad -1 = 2(3) + b$

$(3, -1)$ $\quad -1 = 6 + b$

$x \quad y$ $\quad -7 = b$

$\boxed{y = 2x - 7}$

② $x - y = 3$

$-y = -x + 3$

$y = x - 3$

$m = 1$ $\quad y = mx + b$

$(4, -2)$ $\quad -2 = 1(4) + b$

$x \quad y$ $\quad -6 = b$

$\boxed{y = x - 6}$

For Exercises 3–4, find an equation for the line that passes through the given point and is perpendicular to the given line.

3. $(-4, 2)$; $y = \frac{2}{3}x + 1$
4. $(2, -5)$; $x + 5y = 1$

③ $y = mx + b$

$m = -\frac{3}{2}$ $\quad 2 = -\frac{3}{2}\left(\frac{-4}{1}\right) + b$

$(-4, 2)$ $\quad 2 = 6 + b$

$x \quad y$ $\quad -4 = b$

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

④ $x + 5y = 1$

$5y = -x + 1$

$y = -\frac{1}{5}x + \frac{1}{5}$

$m = 5$ $\quad y = mx + b$

$(2, -5)$ $\quad -5 = 5(2) + b$

$x \quad y$ $\quad -15 = b$

$\boxed{y = 5x - 15}$

For Exercises 5–6, determine whether the two lines are parallel, perpendicular, or neither.

5. Line 1: $2x - 5y = -8$
   Line 2: $4y + 10x = 7$
6. Line 1: contains the points $(1, 1)$ and $(-1, -5)$
   Line 2: has a slope of 3 and a y-intercept of -6

⑤ $-5y = -2x - 8$ $\qquad 4y = -10x + 7$

$y = \frac{2}{5}x + \frac{8}{5}$ $\qquad y = -\frac{5}{2}x + \frac{7}{4}$

$m = \frac{2}{5}$ $\qquad m = -\frac{5}{2}$

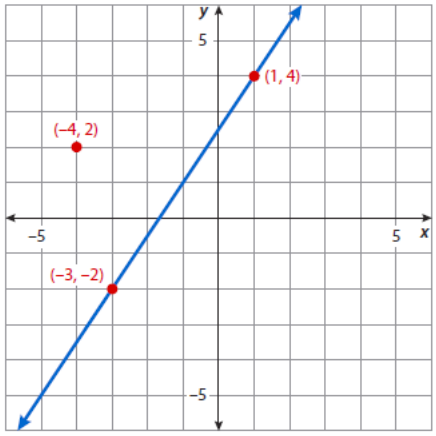
$\boxed{\text{perpendicular}}$

⑥ $m = \frac{-5+1}{-1+1}$ $\qquad m = 3$

$m = \frac{-6}{-2}$ $\qquad \boxed{\text{parallel}}$

$m = 3$

7. Write an equation for the line that passes through the point $(-4, 2)$ and is parallel to the line shown in the graph.



1st slope of line:

$m = \frac{6}{4}$

$m = \frac{3}{2}$

2nd // slope: $m = \frac{3}{2}$

3rd $y = mx + b$

$m = \frac{3}{2}$ $\quad 2 = \frac{3}{2}(-4) + b$

$(-4, 2)$ $\quad 2 = -6 + b$

$x \quad y$ $\quad 8 = b$

$\boxed{y = \frac{3}{2}x + 8}$

9. Write an equation of the line that has an x-intercept of 4 and is parallel to the line that passes through $(5, 0)$ and $(4, 3)$.

x-int $(4, 0)$

$m = \frac{3-0}{4-5} = -3$

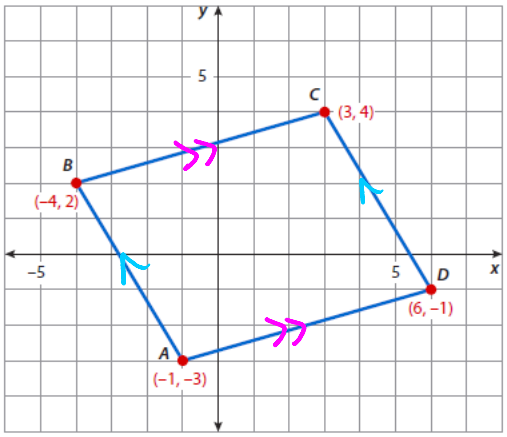
$\boxed{y = -3x + 12}$

$y = mx + b$

$0 = -3(4) + b$

$12 = b$

10. Determine whether *ABCD* is a parallelogram. Explain your reasoning.



$m_{AB} = \frac{-5}{3}$
$m_{CD} = \frac{-5}{3}$
} ∥, b/c have same slope

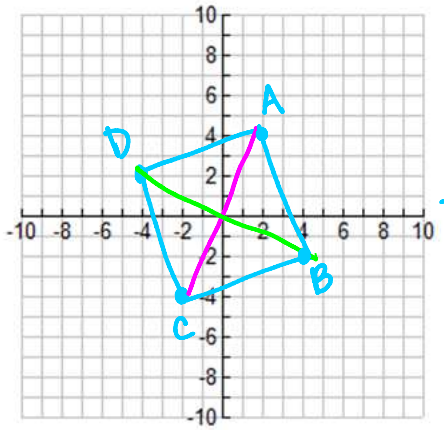
$m_{BC} = \frac{2}{7}$
$m_{AD} = \frac{2}{7}$
} ∥, b/c have same slope

Yes, it is a □, b/c both pairs of opp. sides are ∥.

11. Square *ABCD* has vertices at $A(2, 4)$, $B(4, -2)$, $C(-2, -4)$, and $D(-4, 2)$.

a. Find the slopes of the diagonals of the square.

b. What is the relationship between the two diagonals?



$m_{AC} = 2$

$m_{DB} = -\frac{1}{2}$

The diagonals are ⊥ (☺)!

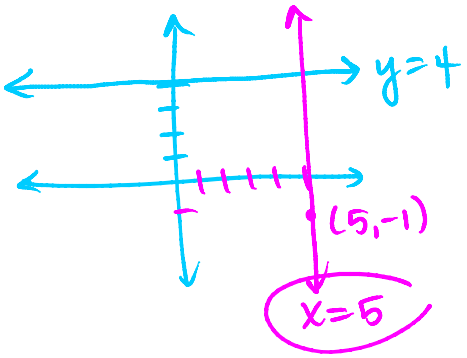
12. You know that vertical and horizontal lines are perpendicular. Explain why the product of their slopes is not equal to −1.

A horizontal line has a slope of zero $\left(\frac{0}{\#}\right)$
A vertical line has a slope that is undefined $\left(\frac{\#}{0}\right)$.
Therefore, there is no product of the 2 slopes.

13 **a.** Find an equation of the line that is perpendicular to the line $y = 4$ and passes through the point $(5, -1)$.

b. Are the slopes of these lines negative reciprocals of each other?

a)



b) No, a horizontal line has a slope of zero and a vertical line has an undefined slope. Even though they are not opp. reciprocal slopes, they are still ⊥.