4.5 Write Equations of Parallel and Perpendicular Lines

Parallel Lines have the same slopes.

$y = mx + b$

Write an equation of the line that passes through the given point and is parallel to the given line.

Ex. 1) ~~$y = -x + 5$~~; (-2, 11)

$m = -1$ x y

$y - 11 = -1(x + 2)$

$y - 11 = -x - 2$

$+11 \quad +11$

E = $y = -x + 9$

Ex. 2) ~~$y = 3x - 1$~~; (-3, -5)

$m = 3$ x y

$y + 5 = 3(x + 3)$

$y + 5 = 3x + 9$

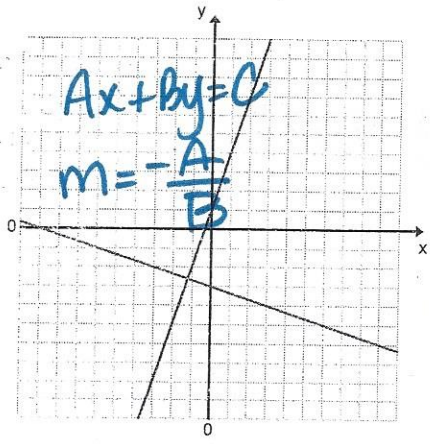
$-5 \quad -5$

E = $y = 3x + 4$

Perpendicular Lines: two lines that intersect to form a 90° or right angle.

Perpendicular slopes are opposite reciprocals of one another.

$\frac{1}{2} \rightarrow -2 \qquad -4 \rightarrow \frac{1}{4}$



Determine which lines, if any are parallel or perpendicular.

Ex. 3) Line a: $y = 5x - 3$ $m = 5$

Line b: $x + 5y = 2$ $m = \frac{-1}{5}$

Line c: $-10y - 2x = 0$ $m = \frac{2}{-10} = \frac{-1}{5}$

Ex. 4) Line a: $2x + 6y = -3$ $m = \frac{-2}{6} = \frac{-1}{3}$

Line b: $y = 3x - 8$ $m = 3$

Line c: $-1.5y + 4.5x = 6$

Write an equation of the line that passes through the given point and is perpendicular to the given slope.

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

x y

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

$y + 5 = -\frac{1}{2}x + 2$

$-5 \quad\quad -5$

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

Ex. 6) (4, 3); ~~$y = 4x - 7$~~ $4 \rightarrow -\frac{1}{4} = m$

x y

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

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

$+3 \quad\quad +3$

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

Ex. 7) (4, -2), $y = 4x + 2$

E = _____

Homework: