Lesson 5 – *Parallel and Perpendicular Lines*

Parallel Lines: Two lines are parallel if they have the same slope.

Conversely, if two lines have the same slope they are parallel.

Ex. $y = 2x + 3$ $y = 2x - 7$

slope = 2 slope = 2 Therefore these two lines are parallel.

Ex. $y = -5x - 9$ $10x + 2y - 12 = 0$

slope = -5 $2y = 10x + 12$

$y = 5x + 6$

slope = -5 Therefore these two lines are parallel.

Perpendicular Lines: Two lines are perpendicular if their slopes are negative reciprocals of each other.

Conversely, if two lines have slopes that are the negative reciprocal of each other they are perpendicular.

Ex. $y = 4x - 5$ and $y = -\frac{x}{4} + 3$

Slope = 4 $\rightarrow negative\ reciprocal = -\frac{1}{4}$ Therefore these two lines are perpendicular

Ex. Find the equation of the line that passes through point A (1, 6) and is parallel to $y = 2x - 7$.

$\therefore\ y = 2x + b$ **since slope = 2**

$6 = 2(1) + b$

$4 = b$

$\rightarrow\ y = 2x + 4$

Ex. Find the equation of the line that passes through point B (3, 8) and is perpendicular to $y = -\frac{1}{3}\,x + \,4$.

Slope = $-\frac{1}{3}$ $\rightarrow Slope\ of\ new\ line = 3$

$\therefore\ \boldsymbol{y = 3x + b}$ **since slope = 3**

$\boldsymbol{8 = \ 3(3) + \ b}$

$\boldsymbol{-1 = b}$

$\rightarrow\ \boldsymbol{y = 3x\ -\ 1}$