Perpendicular Lines

If L_1 is the line with equation $y = m_1 x + b_1$ and
L_2 " " " " " $y = m_2 x + b_2$. Then,
L_1 is perpendicular to L_2 if and only if $m_1 \cdot m_2 = -1$

Example
The lines $y = 3x + 2$ and $y = -\frac{1}{3}x - 5$ are perpendicular lines because $m_1 = 3$ and $m_2 = -\frac{1}{3}$ and $m_1 m_2 = -1$.

Example
Find an equation of a line perpendicular to the line $y = 2x + 3$ and passing through the point $(3, 0)$

Our slope of the line must be $-\frac{1}{2}$ since $2(-\frac{1}{2}) = -1$.

$$y = mx + b$$
$$0 = -\frac{1}{2}(3) + b \implies b = \frac{3}{2}$$

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

Vertical Lines are lines that have equations that are of the form $x = $ constant.

Horizontal Lines are lines that have equations that are of the form $y = $ constant.

Ex $x = -3$ is a vertical line passing through $(-3, 0)$, $(-3, 2)$, $(-3, 5)$, $(-3, -1)$.

$y = 2$ is a horizontal line passing through $(0, 2)$, $(-3, 2)$, $(1, 2)$, ---