# 3.4 – Slope Intercept Form ( $y=mx+b$ )

* - **linear equation** → its graph is a line (not curved), has no exponents >1, and "x" has to be in the numerato

**Example 1: Which equations are linear? Circle YES or NO. If NO, explain why it's not linear.**

a.) $y = 2x + 5$ → (YES) NO N/A

b.) $y = x^2 + 5$ → YES (NO) has an exponent of 2

c.) $y + 1 = \frac{1}{3}x$ → (YES) NO N/A
$y+1 = \frac{1}{3}x \rightarrow y = \frac{1}{3}x - 1$ (−1, −1)

d.) $y = 2x - \frac{1}{x} - 4$ → YES (NO) "x" is in denominator

e.) $y = \frac{x+6}{2}$ → (YES) NO N/A

f.) $2x - 8y = 10$ → (YES) NO N/A

g.) $y = 2\sqrt{x+4}$ → YES (NO) it is curved b/c of $\sqrt{}$
GRAPH IT IN CALCULATOR!

h.) $y - 3 = \frac{1}{2}(x+2)$ → (YES) NO N/A
$y-3 = \frac{1}{2}x + 1$ (+3, +3) $\rightarrow y = \frac{1}{2}x + 4$

**There are three ways to WRITE linear equations:**

1.) Slope-Intercept Form $y=mx+b$ 2.) Standard Form $Ax+By=C$ 3.) Point-Slope Form $y-y_1 = m(x-x_1)$

* - **slope intercept form** → uses the form $y=mx+b$ where m is slope and b is the y-intercept

- slope (m) can be represented as $\frac{\text{rise}}{\text{run}}$ (referring to a graph) OR $m = \frac{y_2 - y_1}{x_2 - x_1}$ (referring to two pts)
- y-intercept (b) represents a point on the line that crosses y-axis and written as $b = \#$ or $(0, b)$

* The y-intercept will always have 0 as the x-coordinate of its ordered pair. *

**Example 2: Complete the table about each linear equation.** $y=mx+b$

| Linear Equation | Slope (m) | y-intercept (b) | Linear Equation | Slope (m) | y-intercept (b) |
|---|---|---|---|---|---|
| a.) $y = 3x - 5$ (m b) | $m = 3$ | $b = -5$ $(0, -5)$ | b.) $y = \frac{1}{2}x + 2$ (m b) | $m = \frac{1}{2}$ | $b = 2$ $(0, 2)$ |
| c.) $y = -2x$ (m b) | $m = -2$ | $b = 0$ $(0, 0)$ | d.) $y=mx+b$ $y = 1x - 4$ | $m = 1$ | $b = -4$ $(0, -4)$ |
| e.) $y + 2 = \frac{2}{3}x$ (−2, −2) $y = \frac{2}{3}x - 2$ | $m = \frac{2}{3}$ | $b = -2$ $(0, -2)$ | f.) $4x - y = 12$ $y = 4x - 12$ (−4x, −4x) $-y = -4x + 12$ (÷−1, ÷−1, ÷−1) | $m = 4$ | $b = -12$ $(0, -12)$ |
| Horizontal Line g.) $y = 3$ $y = 0x + 3 \rightarrow y = 3$ | $m = 0$ | $b = 3$ $(0, 3)$ | h.) $x = -1$ Vertical line | m = undefined | NONE |
| i.) $y = -\frac{1}{4}x + 1$ | $m = -\frac{1}{4}$ | $b = 1$ $(0, 1)$ | j.) $y = -4$ | $m = 0$ | $b = -4$ $(0, -4)$ |