$Ax+By=C$

3.5 – Standard Form

* - **Standard Form** → uses the form $Ax+By=C$ where A, B, and C are Integers and A and B cannot be zero AT THE SAME TIME. (whole #'s and their opposites.)

- linear equations in standard form have NO FRACTIONS and NO DECIMALS; must turn into Integers
- linear equations in standard form have "x" and "y" are on the same side (Left)
- linear equations in standard form have a value for "A" that is POSITIVE
- linear equations in standard form can be easily graphed by finding the x- and y-intercepts
- linear equations in standard form can be easily graphed by transforming the equation into Slope-Intercept Form "y=mx+b"

Example 1: Which equations are in standard form? Circle YES or NO. If NO, explain why.

a.) $-4x+y=3$ → YES (NO) b/c "A" negative

b.) $2x-4y=1$ → (YES) NO

c.) $x+y=-6$ → (YES) NO

d.) $3x+\frac{1}{2}y=2$ → YES (NO) b/c there is a fraction.

e.) $y=2x-1$ → YES (NO) b/c it is in Slope Intercept Form ($y=mx+b$)

f.) $4x=12$ → (YES) NO $4x+0y=12$ B=0, so 0(y)=0!

g.) $5y+3x=0$ → YES (NO) b/c "Ax" is not first!

h.) $y=\frac{1}{3}$ → YES (NO) b/c there is a fraction! $0x+y=\frac{1}{3}$

i.) $0x+0y=-4$ → YES (NO) b/c "A" and "B" are both zero!

j.) $2y-x=1$ → YES (NO) b/c "Ax" is not first and "Ax" is negative

* - **x-intercept** → is the point on the graph that crosses x-axis and written as $(x,0)$; $x=\#$

* - **y-intercept** → is the point on the graph that crosses y-axis and written as $(0,y)$; $y=\#$

$Ax+By=C$

- To find x-intercept and y-intercept when an equation is in standard form, do the following…

1.) to find x-intercept → substitute 0 for y and solve for x

2.) to find y-intercept → substitute 0 for x and solve for y

3.) plot both intercepts and connect the points

Ex: $2x-\frac{1}{3}y=10$

x-int let y=0: $2x-\frac{1}{3}y=10$; $2x-\frac{1}{3}(0)=10$; $2x=10$; $x=5$ (5,0)

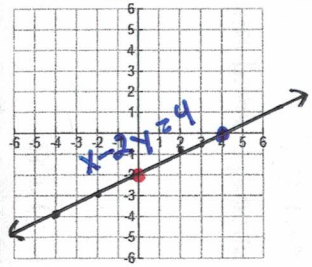
y-int Let x=0: $2x-\frac{1}{3}y=10$; $2(0)-\frac{1}{3}y=10$; $(-3)-\frac{1}{3}y=10(-3)$; $y=-30$ (0,-30)

Example 2: Graph each linear equation using x- and y-intercepts.

a.) $x-2y=4$

x-int: $x-2(0)=4$; $x=4$ (4,0)

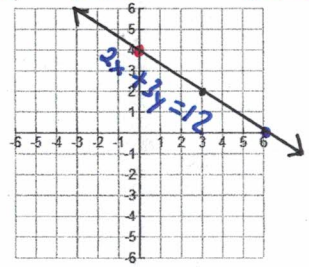
y-int: $(0)-2y=4$; $-2y=4$; $y=-2$ (0,-2)



b.) $2x+3y=12$

x-int: $2x+3(0)=12$; $2x=12$; $x=6$ (6,0)

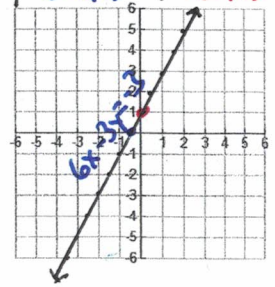
y-int: $2(0)+3y=12$; $3y=12$; $y=4$ (0,4)



c.) $6x-3y=-3$

x-int: $6x-3(0)=-3$; $6x=-3$; $x=-\frac{3}{6}$ or $-\frac{1}{2}$ (-½,0)

y-int: $6(0)-3y=-3$; $-3y=-3$; $y=1$ (0,1)



Example 3: Change each linear equation that's in slope-intercept form into standard form.

a.) $y=-3x+\frac{1}{4}$ b.) $y=\frac{1}{2}x-4$ c.) $y=\frac{3}{4}x+2$ d.) $y=-\frac{2}{3}x-5$

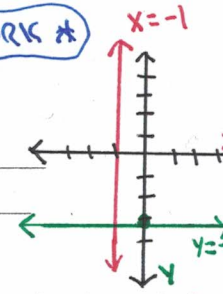
* SEE SEPARATE SHEET FOR WORK *

(m=0)

- **horizontal line** → has the form $y=\#$ and only crosses the y-axis

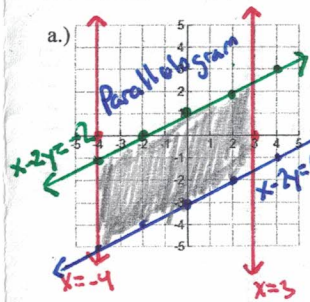
- **vertical line** → has the form $x=\#$ and only crosses the x-axis

(m=undefined)



Example 4: Graph each set of equations and shade in the figure that is created.

a.)



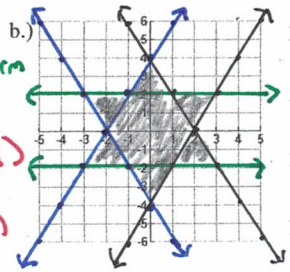
$x-2y=-2$

$x-2y=6$ Standard Form

$x+4=0$ (vertical)

$2x=6$ (vertical)

b.)



$y=2x+4$

$2x+y=4$

$2x-y=4$

$y=-2x-4$

$y=2$

$y=-2$ Horizontal

Fdm1 Unit 3

3.5 Standard Form

Ex. 3 $y = mx + b \longrightarrow Ax + By = C$

Rules

1) No Fractions / Decimals
2) x and y on left side
3) Ax must be + (positive)
4) Both A and B cannot be zero at the same time.

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

$+3x \quad +3x$

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

multiply by LCD! LCD: 4

$4\left(3x + y\right) = \frac{1}{4}(4)$

$12x + 4y = 1$

b) $y = \frac{1}{2}x - 4$

$-\frac{1}{2}x \quad -\frac{1}{2}x$

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

multiply by LCD! LCD = 2

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

change to positive! $0x + 2y = -8$

$-1 \quad -1 \quad -1$

$x - 2y = 8$

c) $y = \frac{3}{4}x + 2$

$-\frac{3}{4}x \quad -\frac{3}{4}x$

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

$-4\left(-\frac{3}{4}x + y\right) = 2(4)$

$3x - 4y = -8$

d) $y = -\frac{2}{3}x - 5$

$+\frac{2}{3}x \quad +\frac{2}{3}x$

$\frac{2}{3}x + y = -5$

$3\left(\frac{2}{3}x + y\right) = -5(3)$

$2x + 3y = -15$

Ex. 4

a) standard form to slope-intercept

$x - 2y = -2$

$-x \quad -x$

$-2y = -x - 2$

$-2 \quad -2 \quad -2$

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

$m = \frac{1}{2} \quad b = 1; \ (0,1)$

standard form to slope-intercept

$x - 2y = 6$

$-x \quad -x$

$-2y = -x + 6$

$-2 \quad -2 \quad -2$

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

$m = \frac{1}{2} \quad b = -3; \ (0,-3)$

$x + 4 = 0$

$-4 \quad -4$

$x = -4$

vertical line

$\frac{2x}{2} = \frac{6}{2}$

$x = 3$

vertical line

* Can find the x- and y- intercepts or transform to Slope-Intercept form $y = mx + b$ (solve for y)

b) $2x + y = 4$

$-2x \quad -2x$

$y = -2x + 4$

$m = \frac{-2}{1} \quad b = 4 \ (0,4)$

$2x - y = 4$

$-2x \quad -2x$

$-y = -2x + 4$

$-1 \quad -1 \quad -1$

$y = 2x - 4$

$m = \frac{2}{1} \quad b = -4 \ (0,-4)$