Sec. 5-5 Standard Form

$$Ax + By = C,$$

where A, B, and C are real numbers
A and B are not both 0.

Problem 1:

What are the x- and y- intercepts of

a. $2x + 6y = 18$

x-int: $y = 0$

$2x + 6(0) = 18$

$\frac{2x}{2} = \frac{18}{2}$

$x = 9$ (9,0)

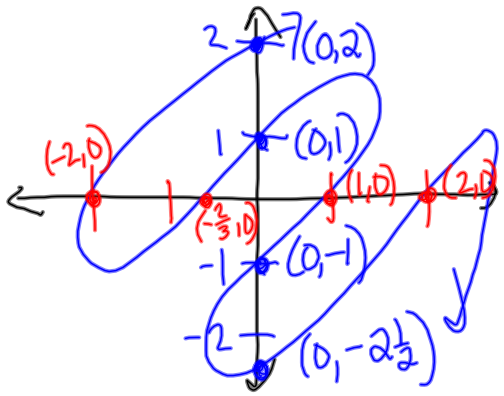
y-int: $x = 0$

$2(0) + 6y = 18$

$\frac{6y}{6} = \frac{18}{6}$

$y = 3$ (0,3)

*Note:
y-intercept: MAKE x = 0
where the graph crosses the y-axis
x-intercept: MAKE y = 0
where the graph crosses the x-axis



(9 | 0)
(0 | 3)

Problem 2:

What is the graph of $4x - 3y = 12$?

x-int: $y = 0$ $(3, 0)$

$4x - 3(0) = 12$

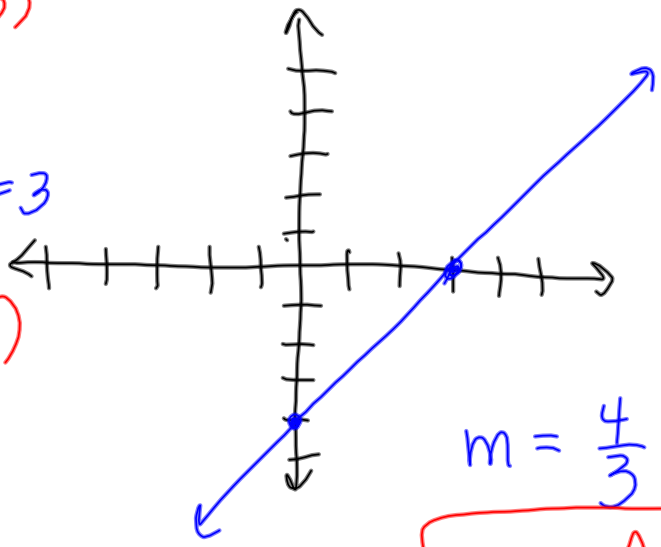
$\frac{4x}{4} = \frac{12}{4}$ $x = 3$

y-int: $x = 0$ $(0, -4)$

$4(0) - 3y = 12$

$\frac{-3y}{-3} = \frac{12}{-3}$

$y = -4$



$m = \frac{4}{3}$

$m = -\frac{A}{B}$

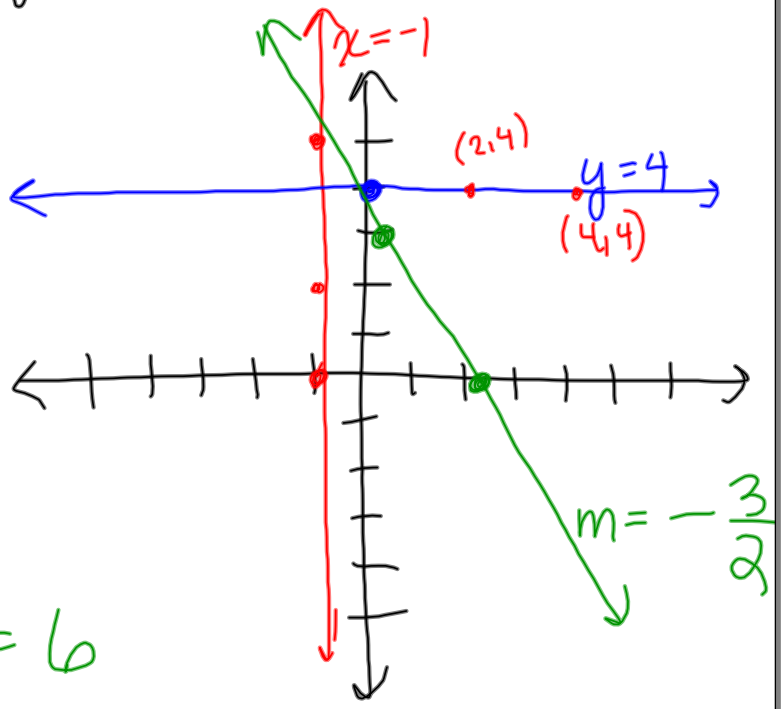
Problem 3:

What is the graph of

a. ligne $x = -1$

$(-1,0)$ $(-1,5)$

$(-1,2)$



b. $y = 4$

c. $3x + 2y = 6$

x-int: $3x + 2 \cdot 0 = 6$

$3x = 6$

$x = 2$

y-int: $3 \cdot 0 + 2y = 6$

$2y = 6$

$y = 3$

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Problem 4:

a. What is $y = -\frac{3}{5}x + 4$ in standard form using integers?

$Ax + By = C$

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

$+\frac{3}{5}x \quad +\frac{3}{5}x$

$5\left(\frac{3}{5}x + y\right) = (4)5$

$\boxed{3x + 5y = 20}$

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b. Write $y-2=-\frac{1}{3}(x+6)$ in standard form.

$Ax+By=C$

$y-2=-\frac{1}{3}(x+6)$

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

$+\frac{1}{3}x \qquad +\frac{1}{3}x$

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

$+2 \quad +2$

$3\left(\frac{1}{3}x+y\right)=(0)3$

$\boxed{x+3y=0}$

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

$3(y+2)=3\left(\frac{2}{3}x+\frac{8}{3}\right)$

$3y+6=2x+8$

$-2x \qquad -2x$

$-2x+3y+6=8$

$-6 \quad -6$

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

$2x-3y=-2$

$y+2=\frac{2}{3}x+\frac{8}{3}$

$-\frac{2}{3}x$

$-\frac{2}{3}x+y+2=\frac{8}{3}$

$2\frac{2}{3}$

$-2=-\frac{6}{3}$

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

$-2x+3y=2$

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d. $y-4=-\frac{2}{3}(x-3)$

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

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

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

$+4 \quad +4$

$3\left(\frac{2}{3}x+y\right)=(6)3$

$2x+3y=18$

$\left(-\frac{2}{3}\right)\left(-\frac{3}{1}\right)=\frac{6}{3}$

$+ \qquad =2$

$\frac{3}{1}\cdot\frac{2}{3}=2$

e. $y-10=-2(x-1)$

$y-10=-2x+2$

$+2x \quad +2x$

$2x+y-10=2$

$+10 \quad +10$

$2x+y=12$

f. $y-4=\frac{3}{7}(x+5)$

$7(y-4)=\frac{7}{1}\left[\frac{3}{7}(x+5)\right]$

$7y-28=3(x+5)$

$7y-28=3x+15$

$-3x \quad -3x$

$-3x+7y-28=15$

$+28 \quad +28$

$\frac{-3x}{-1}+\frac{7y}{-1}=\frac{43}{-1}$

$3x-7y=-43$

9. $3(y-5) = 3\left[\frac{2}{3}(x+6)\right]$

$2(x+6)$

$3y - 15 = 2x + 12$

$-2x \quad -2x$

$-2x + 3y - 15 = 12$

$+15 \quad +15$

$\frac{-2x}{-1} + \frac{3y}{-1} = \frac{27}{-1}$

$2x - 3y = -27$

$y - 5 = \frac{2}{3}x + 4$

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

$-\frac{2}{3}x + y - 5 = 4$

$+5 \quad +5$

$-3\left(-\frac{2}{3}x + y\right) = (9)(-3)$

$2x - 3y = -27$

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Find the x- and y-intercepts of the line that passes through the given point.

a. $(-6,4)$ $(3,-5)$

$$m = \frac{-5-4}{3-(-6)} = \frac{-9}{9} = -1$$

P-S $y - y_1 = m(x - x_1)$

$(3,-5)$ $y-(-5) = -1(x-3)$

$y+5 = -x+3$

$+x \qquad +x$

$x + y + 5 = 3$

$-5 \quad -5$

$x + y = -2$

x-int: $y=0$ $x+0=-2$ $\boxed{x=-2}$

y-int: $x=0$ $0+y=-2$ $\boxed{y=-2}$

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Problem 7

A line has the same slope as $3x - 5y = 12$ and the same y-intercept as $x - 7y = 14$.

Write the equation of the line.

m

$3x - 5y = 12$

$-3x \quad -3x$

$\frac{-5y}{-5} = \frac{-3x}{-5} + \frac{12}{-5}$

$y = \frac{3}{5}x - \frac{12}{5}$

$m = \frac{3}{5}$

Change both to slope-intercept form, $y = mx + b$.

b ✓

$x - 7y = 14$

$-x \quad -x$

$\frac{-7y}{-7} = \frac{-1x}{-7} + \frac{14}{-7}$

$y = \frac{1}{7}x - 2$

$b = -2$

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

$5y = 3x - 10$

$-3x \quad -3x$

$\frac{-3x}{-1} + \frac{5y}{-1} = \frac{-10}{-1}$

$\boxed{3x - 5y = 10}$

$3x - 5y = 12$

$m = -\frac{A}{B}$

$= \frac{-3}{-5} = \frac{3}{5}$

$x - 7y = 14$

y-int: $x = 0$

$0 - 7y = 14$

$\frac{-7y}{-7} = \frac{14}{-7}$

$y = -2$

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$(3, -8)$ $(-4, 13)$

line: $m = \frac{13-(-8)}{-4-3} = \frac{21}{-7} = -3$

$y - y_1 = m(x - x_1)$

$(3, -8)$ $y - (-8) = -3(x - 3)$

$y + 8 = -3x + 9$

$+3x \qquad +3x$

$3x + y + 8 = 9$

$-8 \quad -8$

$3x + y = 1$

x-int: $\frac{1}{3}$

y-int: 1

x-int: $y = 0$

$3x + 0 = 1$

$\frac{3x}{3} = \frac{1}{3}$

$x = \frac{1}{3}$

y-int: $x = 0$

$3 \cdot 0 + y = 1$

$y = 1$

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