Math 1201

6.6B General Form of the Equation for a Linear Function

Converting Slope-Intercept and Slope-Point Forms to General Form

$Ax + By + C = 0$

Example 1:
Rewrite the following in general form

(A) $y = 2x + 1$

$0 = 2x - y + 1$

$2x - y + 1 = 0$

A B C

(B) $y - 3 = 4(x - 2)$

$y - 3 = 4x - 8$

$0 = 4x - y - 8 + 3$

$0 = 4x - y - 5$

$4x - y - 5 = 0$

A B C

Equations Involving Fractions
Perhaps the easiest way to deal with equations involving fractions is to get rid of the fraction first, by multiplying all terms present by the denominator of the fraction.

Example 2:
Rewrite the following equations in general form:

(A) $y = -\frac{2}{3}x + 4$ LCD: 3

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

$3y = -2x + 12$

$2x + 3y - 12 = 0$

A B C

(B) $y - 1 = \frac{3}{5}(x + 2)$ LCD: 5

$5y - 5(1) = 5 \cdot \frac{3}{5}(x+2)$

$5y - 5 = 3(x+2)$

$5y - 5 = 3x + 6$

$0 = 3x - 5y + 6 + 5$

$0 = 3x - 5y + 11$

$3x - 5y + 11 = 0$

*Terms are separated by addition or subtraction, not multiplication or division.

Example 3:
Determine the equation of the line passing through $(-3, 4)$ and $(3, 2)$ in general form.

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{2-4}{3-(-3)}$

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

$m = -\frac{1}{3}$

Slope-point

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

$y - 4 = -\frac{1}{3}(x+3)$ LCD: 3

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

$3y - 12 = -(x+3)$

$3y - 12 = -x - 3$

$x + 3y - 9 = 0$

$x_1 y_1$ $x_2 y_2$

Slope-Intercept

$y = mx + b$

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

$2 = -\frac{1}{3}(3) + b$

$2 = -1 + b$

$b = 3$

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

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

$3y = -x + 9$

$x + 3y - 9 = 0$

Applications of Linear Equations

Example 4:
Joan and Kimberley downloaded music and videos last month. The detailed cost is listed below.

	~~Music~~ songs (s)	Video (v)	Total Cost
Joan	4	2	\$12
Kimberley	6	4	\$22

(A) Write an equation representing the total cost of downloads for each person.

$4s + 2v = 12$ ← standard form

$6s + 4v = 22$ ←

(B) Rewrite your answers in (A) in general form.

$4s + 2v - 12 = 0$

$6s + 4v - 22 = 0$

Determining if a Given Point Lies on a Line Given the Equation of the Line

Example 5:
Determine whether the point $(4, 9)$ lies on the following lines:

(A) $y = 2x + 1$

x y

$9 = 2(4) + 1$ $\therefore$ $(4, 9)$ does lie on the line

$9 = 8 + 1$ $y = 2x + 1$

$9 = 9$

LHS = RHS

(B) $y - 2 = 3(x + 1)$

$9 - 2 = 3(4 + 1)$ BEDMAS $(4, 9)$ does <u>not</u> lie on the line $y - 2 = 3(x - 1)$

$7 = 3(5)$

$7 \neq 15$

LHS $\neq$ RHS

(C) $3x - 4y + 2 = 0$

$3(4) - 4(9) + 2 = 0$ $(4, 9)$ does <u>not</u> lie on the line $3x - 4y + 2 = 0$

$12 - 36 + 2 = 0$

$-22 \neq 0$

LHS $\neq$ RHS

Example 6:
The lines $nx + 12y - 2 = 0$ and $3x + ny + 6 = 0$ are parallel. What are the possible values of n?

① $nx + 12y - 2 = 0$

$12y = -nx + 2$

$\frac{12y}{12} = \frac{-nx}{12} + \frac{2}{12}$

$y = -\frac{n}{12}x + \frac{1}{6}$

② $3x + ny + 6 = 0$

$ny = -3x - 6$

$\frac{ny}{n} = \frac{-3x}{n} - \frac{6}{n}$

$y = \frac{-3}{n}x - \frac{6}{n}$

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

$\frac{n}{12} = \frac{3}{n}$

$n^2 = 36$

$\sqrt{n^2} = \sqrt{36}$

$n = \pm 6$

Textbook Questions: page 384 - 385 #6, 8, 10, 11, 16, 18, 21, 24