3 EQUATIONS TO DESCRIBE A LINE

METHOD 1: S/I $y = mx + b$

METHOD 2: P/S $y - y_1 = m(x - x_1)$

5.4 Method 3: Writing Equations in Standard From

Your Notes:

(3) The standard form of a linear is $Ax + By = C$ where A, B, and C are INTEGERS

Ex) $2x + 4y = 12$

* The best method to graph lines in this form is with x and y intercepts

EXAMPLE 1

Put the following equations in Standard Form:

S/I a) $y = -2x + 6$

$+2x \quad +2x$

$2x + y = 6$

P/S b) $y + 4 = -2(x - 5)$

$y + 4 = -2x + 10$

$+2x \quad -4 \quad +2x \quad -4$

$2x + y = 6$

c) $(.4x + .2y = 1.2) \cdot 10 = 4x + 2y = 12$

$\frac{}{2} \quad \frac{}{2} \quad \frac{}{2}$

$2x + y = 6$

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

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

$2x + y = 6$

ALL THESE EQUATIONS DESCRIBE THE SAME LINE

① ONLY 1 S/I EQ

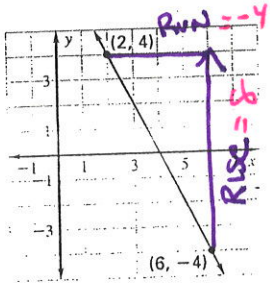
② ∞ # of P/S EQ

③ ∞ # of STD EQ

∞ = INFINITY

Example 2 *Write an equation from a graph*

Write an equation in standard form of the line shown.



↳ $Ax + By = C$

Solution

All linear equations can be written in standard form, $Ax + By = C$.

Step 1 Calculate the slope.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ (2,4) (6,−4)

$M = \frac{\Delta y}{\Delta x} = \frac{4 + 4}{2 - 6}$

$M = \frac{8}{-4}$

$M = -2$

MUST =

OR

$M = \frac{\text{Rise}}{\text{Run}} = \frac{8}{-4}$

$M = -2$

(Cont)

Since we do not know the y-intercept we must use P/S Form.

Step 2 Write an equation in point-slope form. Use (2, 4). ← you can pick either point

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

$M = -2$

Now substitute

P/S $y - 4 = -2(x - 2)$

Step 3 Rewrite the equation in standard form.

$y - 4 = -2x + 4$

$+2x \quad +4 \quad +2x \quad +4$

$2x + y = 8$

Checkpoint Complete the following exercise.

3. Write an equation in standard form of the line through (3, −1) and (2, −4).

STEP I FIND SLOPE

$M = \frac{\Delta y}{\Delta x} = \frac{-1+4}{3-2} = \frac{3}{1}$ $(M = 3)$

STEP II Pick one pt and put in P/S

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

P/S (3, −1) or P/S (2, −4)

$y + 1 = 3(x - 3)$ or $y + 4 = 3(x - 2)$

$y + 1 = 3x - 9$ $\quad$ $y + 4 = 3x - 6$

$-3x \quad -1 \quad -3x \quad -1$ $\quad$ $-3x \quad -4 \quad -3x \quad -4$

$-3x + y = -10$ ☺ $-3x + y = -10$ same

STEP III PUT IN STD FORM $Ax + By = C$

= * WAY IS THIS THE SAME EQUATION?

$3x - y = 10$