

Linear Relations and Functions A linear equation has no operations other than addition, subtraction, and multiplication of a variable by a constant. The variables may not be multiplied together or appear in the denominator. A linear equation does not contain variables with exponents other than 1. The graph of a linear equation is always a line.

A linear function is a function with ordered pairs that satisfy a linear equation. Any linear function can be written in the form $f(x) = mx + b$, where m and b are real numbers.

If an equation is linear, you need only two points that satisfy the equation in order to graph the equation. One way is to find the x -intercept and the y -intercept and connect these two points with a line.

Example 1: Is $f(x) = 0.2 - \frac{x}{3}$ a linear function? Explain.

is a function. x is in the numerator (on top)

Example 2: Is $2x + xy - 3y = 0$ a linear function? Explain.

Not a function. Variable • variable

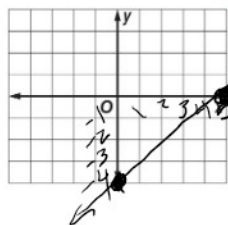
Standard Form The standard form of a linear equation is $Ax + By = C$, where A , B , and C are integers whose greatest common factor is 1.

Example 1: Write each equation in standard form. Identify A , B , and C .

$Ax + By = C$
 a. $y = 8x - 5$
 $-8x - y = -5$
 $-8x + y = -5$ standard form
 $A = -8$ $B = 1$ $C = -5$

b. $14x = -7y + 21$
 $2x = -y + 3$
 $+1y +1y$
 $2x + 1y = 3$ or $1y + 2x = 3$
 $A = 2$
 $B = 1$
 $C = 3$

Example 2: Find the x -intercept and the y -intercept of the graph of $4x - 5y = 20$. Then graph the equation.



x -int $(5, 0)$
 $y = 0$
 $4x - 5(0) = 20$
 $4x = 20$
 $\frac{4x}{4} = \frac{20}{4}$ $x = 5$

y -int $(0, -4)$
 $x = 0$
 $4(0) - 5y = 20$
 $-5y = 20$
 $\frac{-5y}{-5} = \frac{20}{-5}$ $y = -4$

Not a linear equation

- ① variable • variable
- ② variable in denominator
- ③ exponent > 1
- ④ curved graph