Algebra 2 2.2

Identify linear relations and functions

Write linear equations in standard form

linear forms a line

nonlinear

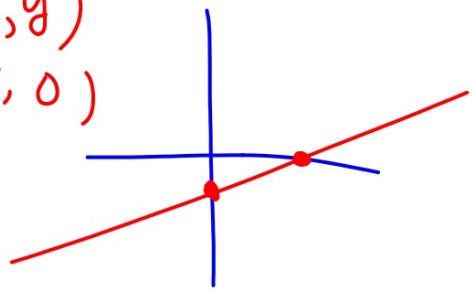
linear equation $y =$

linear function $f(x) =$

y-intercept $(0, y)$

x-intercept $(x, 0)$

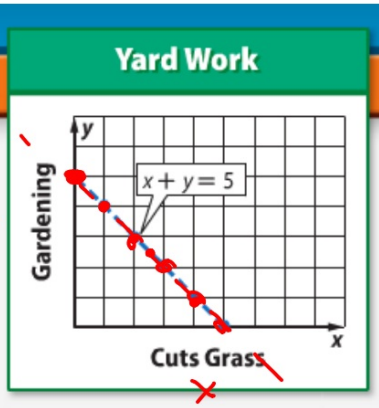
standard form



Alg 1 Ch. 3 & 4

Why?

- Laura does yard work to earn money during the summer. She either cuts grass x or does general gardening y, and she schedules 5 jobs per day. The equation $x + y = 5$ can be used to relate how many of each task Laura can do in a day.



$$x + y = 5$$
$$-x \qquad -x$$
$$y = -x + 5$$

Linear equations

$4x - 5y = 16$

$x = 10$

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

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

x y
no exponents

Nonlinear equations

$2x + 6y^2 = -25$

$y = \sqrt{x} + 2$

$x + xy = -\frac{5}{8}$

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

exponent

$\sqrt{\ }$

xy

$\frac{1}{x}$

How can we tell?

Example 1 Identify Linear Functions

State whether each function is a linear function. Write *yes* or *no*. Explain.

a. $f(x) = 8 - \frac{3}{4}x$ yes

b. $f(x) = \frac{2}{x}$ no var. in denom

c. $g(x, y) = 3xy - 4$ no product of var

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

Guided Practice

1A. $f(x) = \frac{5}{x + 6}$

1B. $g(x) = -\frac{3}{2}x + \frac{1}{3}$

$y = mx + b$ $\frac{2x}{5} = \frac{2}{5}x$

Real-World Example 2 Evaluate a Linear Function

PT

PLANTS The growth rate of a sample of Bermuda grass is given by the function $f(x) = 5.9x + 3.25$ where $f(x)$ is the total height in inches x days after an initial measurement.

a. How tall is the sample after 3 days?

$= 5.9(3) + 3.25$

$= 20.95$ in

b. The term 3.25 in the function represents the height of the grass when it was initially measured. The sample is how many times as tall after 3 days?

$3.25x = 20.95$

$x \approx 6.4$

Real-World Link

The largest member of the grass family, bamboo, is capable of growing from 1 to 4 feet per day.

Source: Infoplease

$Ax + By = C$

2 Standard Form Any linear equation can be written in **standard form**, $Ax + By = C$, where A, B, and C are integers with a greatest common factor of 1.

KeyConcept Standard Form of a Linear Equation

Words	The standard form of a linear equation is $Ax + By = C$, where A, B, and C are integers with a greatest common factor of 1, $A \geq 0$, and A and B are not both zero.
Example	$3x + 5y = 12$; $A = 3$, $B = 5$, and $C = 12$

$2x + 4y = 18$

$A=3$ $B=5$ $C=12$

1) in order
2) integers
3) GCF/A is positive
(we want there to only be one version)

Example 3 Standard Form

Write $-\frac{3}{10}x = 8y - 15$ in standard form. Identify A, B, and C.

integers in order (GCF)

$10\left(-\frac{3}{10}x\right) = 10(8y) - 10(15)$

$\frac{-30}{10}$

$-3x = 80y - 150$

$-80y \quad -80y$

$\frac{-3x}{-1} - \frac{80y}{-1} = \frac{-150}{-1}$

$3x + 80y = 150$

$A = 3 \quad B = 80 \quad C = 150$

GuidedPractice

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

3A. $2y = 4x + 5$

$-4x \quad -4x$

$-4x + 2y = 5$

$\frac{-4x}{-1} + \frac{2y}{-1} = \frac{5}{-1}$

~~$5 = 4x - 2y$~~

$4x - 2y = -5$

$A = 4 \quad B = -2 \quad C = -5$

3B. $3x - 6y - 9 = 0$

$y = mx + b$ ←

Example 4 Use Intercepts to Graph a Line

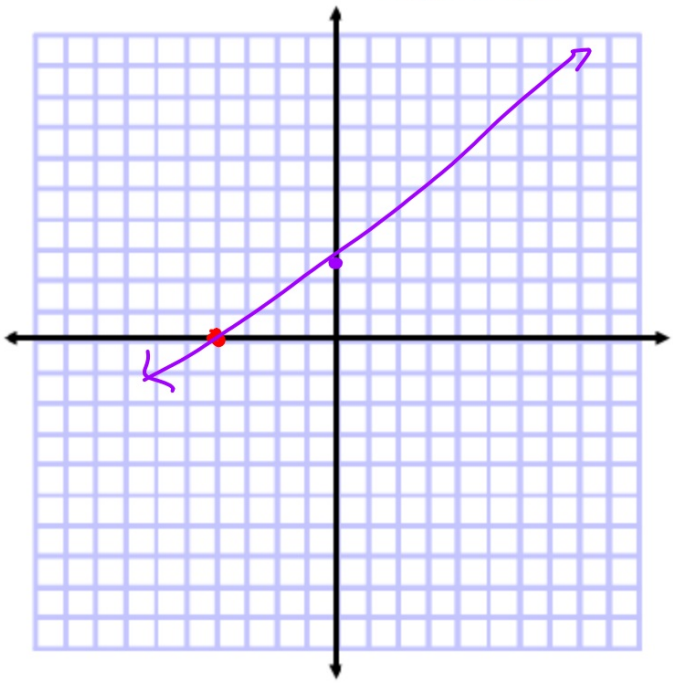
PT

Find the x-intercept and the y-intercept of the graph of $2x - 3y + 8 = 0$. Then graph the equation.

$(-4, 0)$

$(0, \frac{8}{3})$

TOV or x-int & y-int



$2x - 3(0) + 8 = 0$

$2 \cdot 0 - 3y + 8 = 0$

$-3y + 8 = 0$

$-8 \quad -8$

$\frac{-3y}{-3} = \frac{-8}{-3}$

$y = \frac{8}{3}$

GuidedPractice

4. Find the x-intercept and the y-intercept of the graph of $2x + 5y - 10 = 0$. Then graph the equation.

(5, 0) (0, 2)

$2x + 5 \cdot 0 - 10 = 0$

$2x - 10 = 0$ $\quad x = 5$

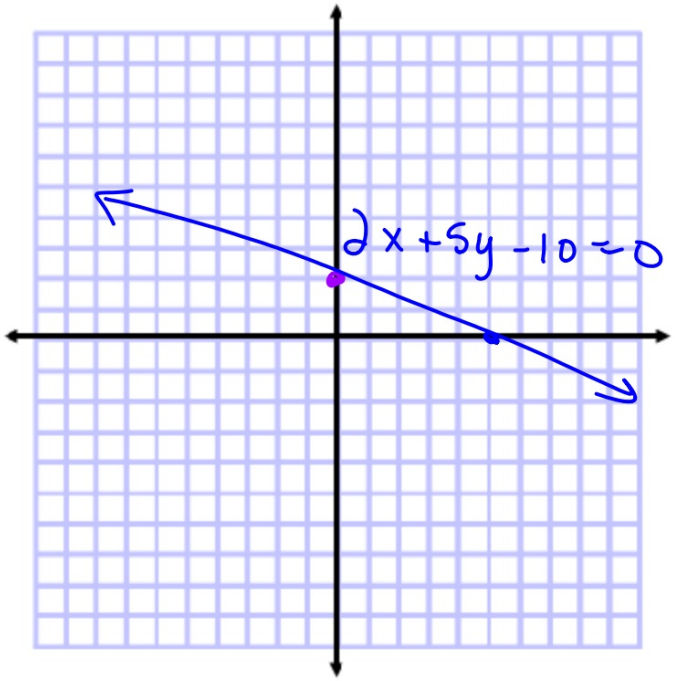
$2x = 10$

$2 \cdot 0 + 5y - 10 = 0$

$5y - 10 = 0$

$\frac{5y}{5} = \frac{10}{5}$

$y = 2$



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