Algebra 1 3.1

Identify linear equations, intercepts, and zeros

Graph linear equations

integer - whole numbers + opposites

linear equation graph is a line

standard form $Ax + By = C$

constant numbers

variable change x, y

x-intercept cross x-axis

y-intercept cross y-axis

whiteboards

23.

★ 12 ml. 5% 0.05

★ ?x 30% 0.3

★ 12+?x 20% 0.2

(Conc x amt) + (Conc x amt) = (Conc x amt)

$(0.05)(12) + 0.3x = 0.2(12+x)$

$0.6 + 0.3x = 2.4 + 0.2x$

$-0.6 \quad -0.2x \quad -0.6 \quad -0.2x$

$\frac{0.1x}{0.1} = \frac{1.8}{0.1}$

$x = 18$

KeyConcept Standard Form of a Linear Equation

Words	The standard form of a linear equation is $Ax + By = C$, where $A \geq 0$, A and B are not both zero, and A, B, and C are integers with a greatest common factor of 1.
Examples	In $3x + 2y = 5$, $A = 3$, $B = 2$, and $C = 5$. In $x = -7$, $A = 1$, $B = 0$, and $C = -7$.

tomorrow

Format
GCF
Pos x

Linear equations

$4x - 5y = 16$

$x = 10$

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

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

Nonlinear equations

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

$y = \sqrt{x} + 2$

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

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

How can we tell by inspection?

linear: no exponents, product $x \cdot y$, var. in denom

Example 1 Identify Linear Equations

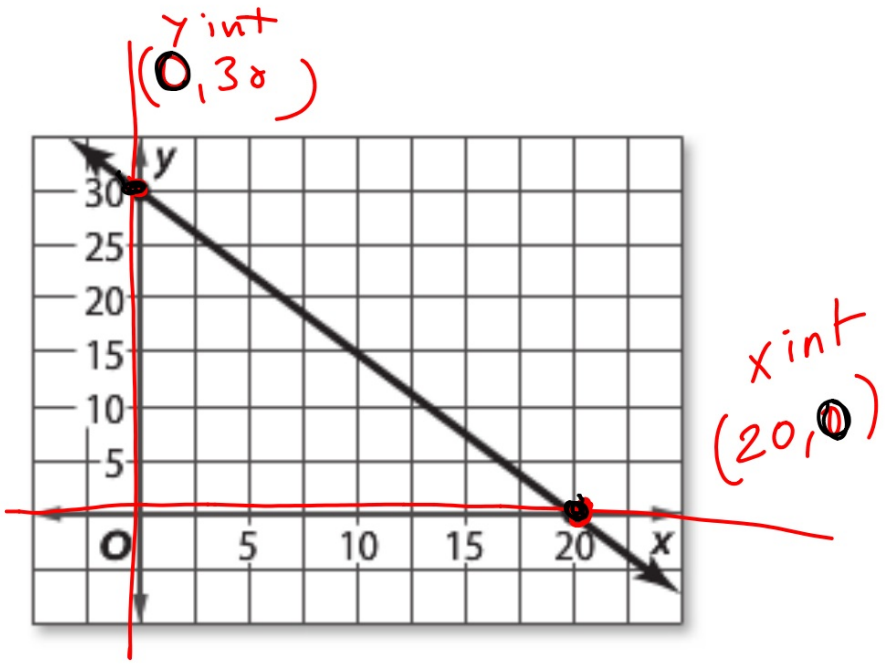
Determine whether each equation is a linear equation. Write the equation in standard form.

a. $y = 4 - 3x$ yes

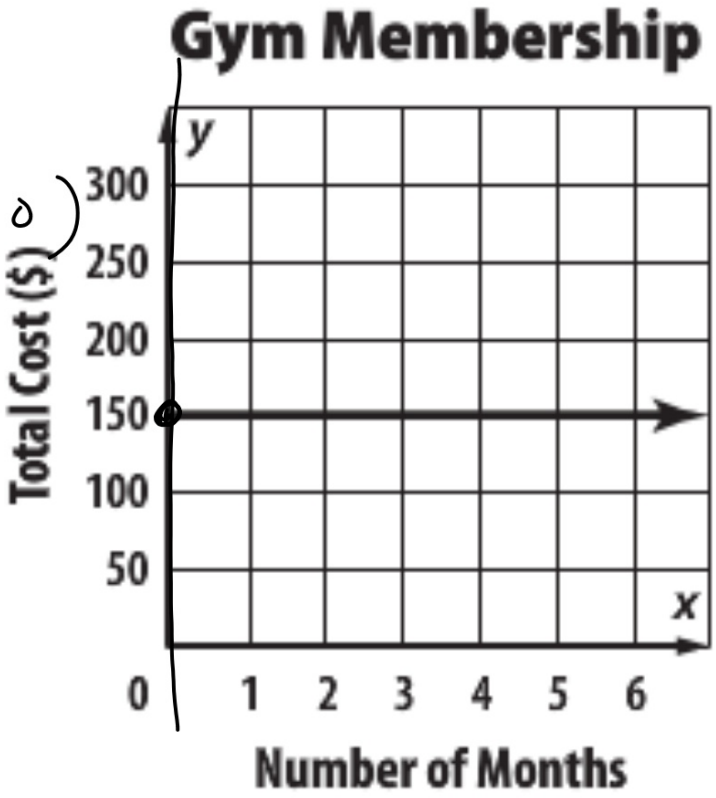
b. $6x - xy = 4$ no

Standardized Test Example 2 Find Intercepts

Find the x- and y-intercepts of the line graphed at the right.



2. **HEALTH** Find the x- and y-intercepts of the graph.



y int
(0, 150)

(X-int
none)

Real-World Example 3 Find Intercepts from a Table

SWIMMING POOL A swimming pool is being drained at a rate of 720 gallons per hour. The table shows the function relating the volume of water in a pool and the time in hours that the pool has been draining.

a. Find the x- and y-intercepts of the graph of the function.

X-int (14, 0)

Y-int (0, 10,080)

b. Describe what the intercepts mean in this situation.

Draining a Pool	
Time (h)	Volume (gal)
x	y
0	10,080
2	8640
6	5760
10	2880
12	1440
14	0

GuidedPractice

3. DRIVING The table shows the function relating the distance to an amusement park in miles and the time in hours the Torres family has driven. Find the x- and y-intercepts. Describe what the intercepts mean in this situation.

Time (h)	Distance (mi)
0	248
1	186
2	124
3	62
4	0

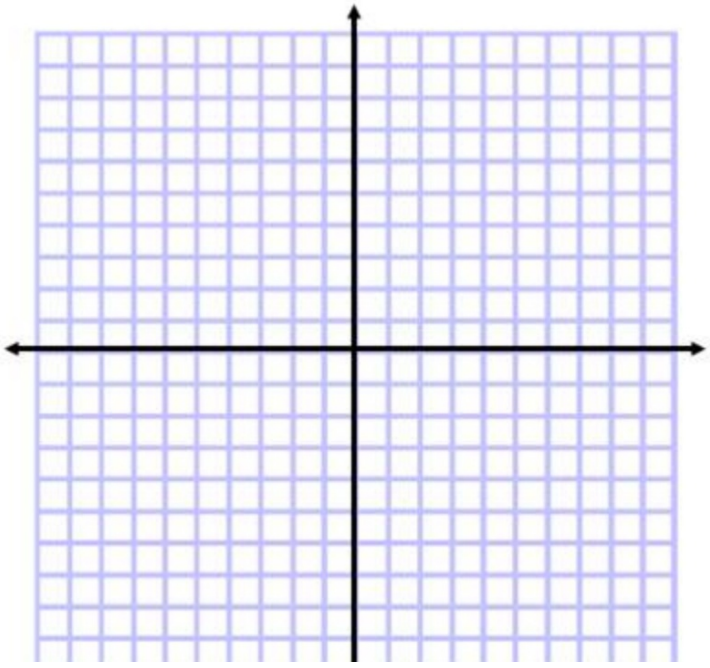
x-int (4, 0)

y-int (0, 248)

$(?, 0) \longrightarrow (x, 0)$

When @ x-intercept, what is the y-coordinate?
When @ y-intercept, what is the x-coordinate?

$(0, ?) \rightarrow (0, y)$



How can I use what I know about intercepts?

x | y

$y = mx + B$

Example 4 Graph by Using Intercepts

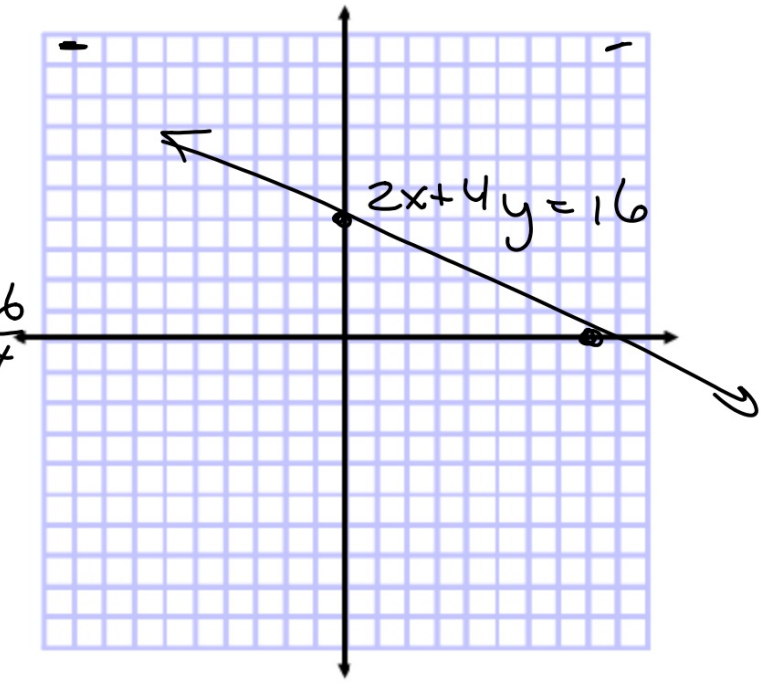
Graph $2x + 4y = 16$ by using the x- and y-intercepts.

x-int (8, 0) $\frac{2x}{2} = \frac{16}{2}$

$x = 8$

y-int (0, 4) $\frac{4y}{4} = \frac{16}{4}$

$y = 4$



Graph each equation by using the x- and y-intercepts.

4A. $-x + 2y = 3$ **4B.** $y = -x - 5$

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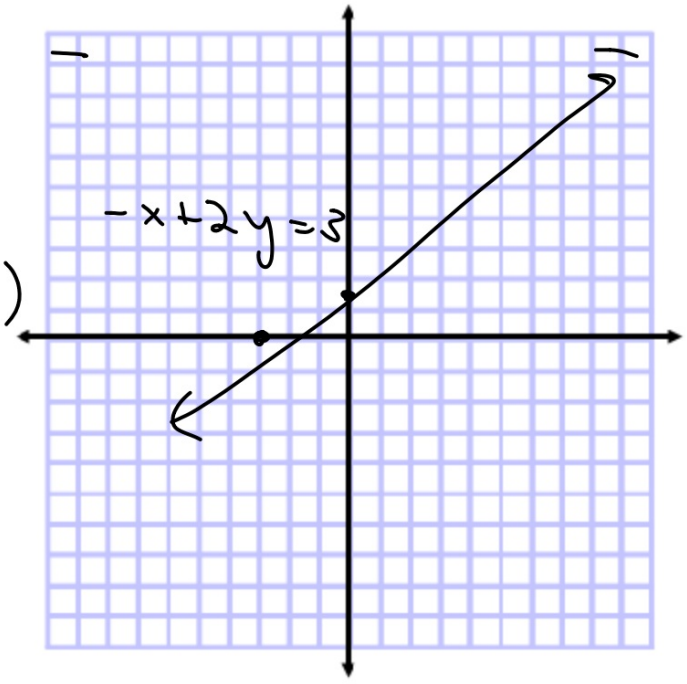
- x-int $(-3, 0)$ $\frac{-x}{-1} = \frac{3}{-1}$

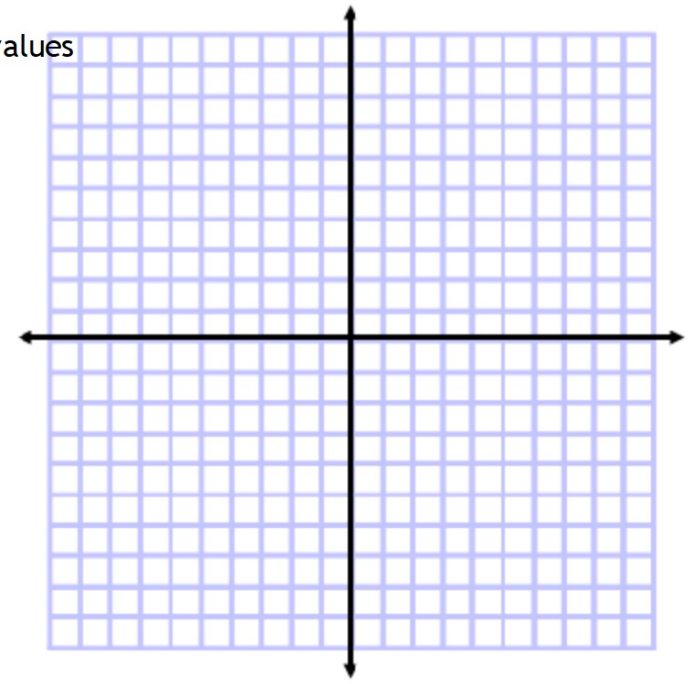
y-int $(0, \frac{3}{2})$ $(0, 1.5)$

$\frac{2y}{2} = \frac{3}{2}$



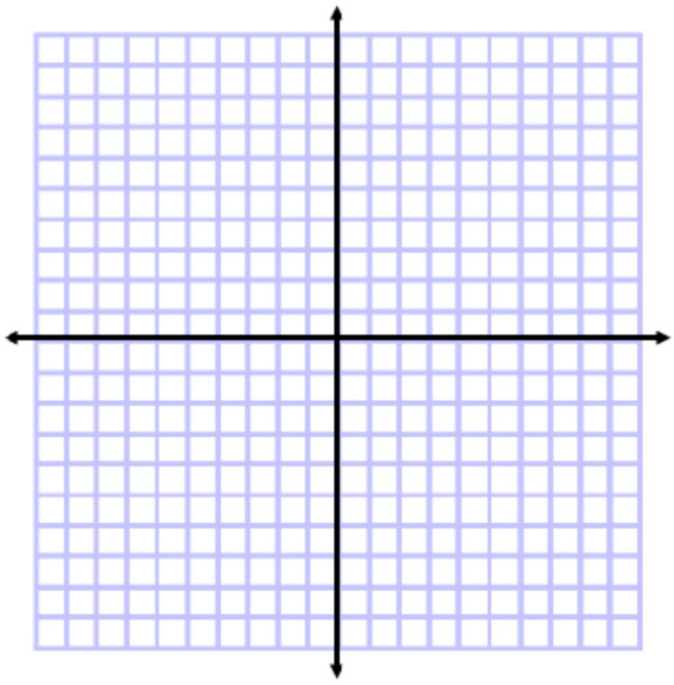
Graph by making a table of values
$y = 2x + 1$

3.1 p.159
13-49 odd



Example 5 Graph by Making a Table

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

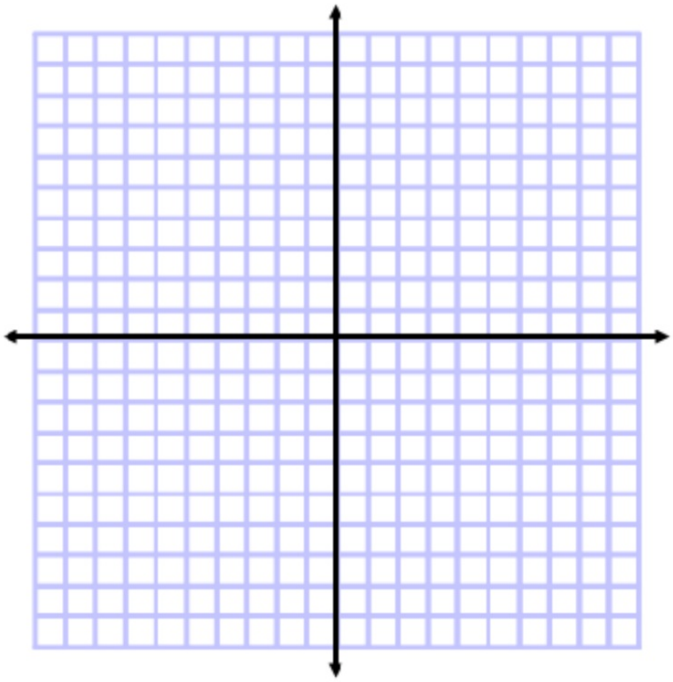


Solve for y

GuidedPractice

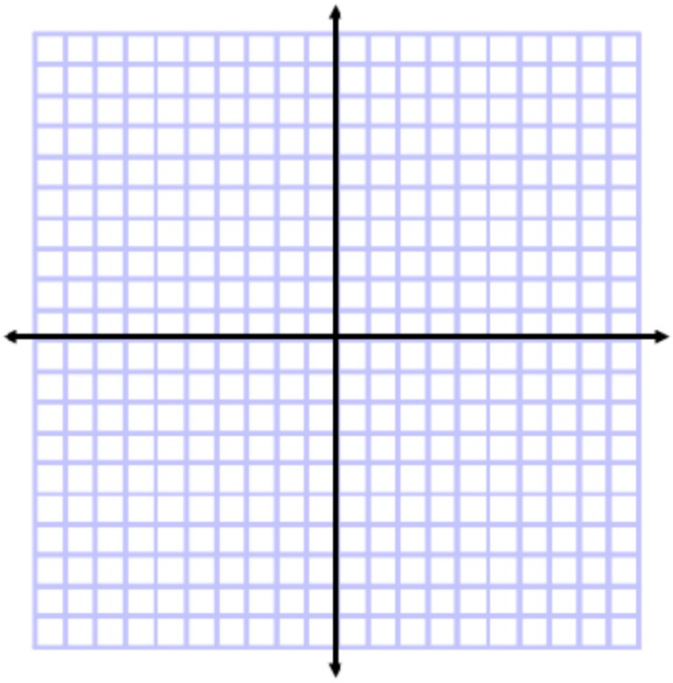
Graph each equation

5A. $2x - y = 2$



You can only choose 3 for x

5B. $x = 3$



You will get -2 for y, no matter what...

5C. $y = -2$