

Algebra 1 3.1

Identify linear equations,
intercepts, and zeros

Graph linear equations



integer
"linear" equation straight
standard form \star
constant number
variable x
x-intercept
y-intercept

$$y = mx + B$$

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

$$Ax + By = C$$

whiteboards

 **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*

integer Format
GCF
Start Pos x

Linear equations

$$4x - 5y = 16$$

$$x = 10$$

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

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

Nonlinear equations

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

$$y = \sqrt{x} + 2$$

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

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

exponents & $\sqrt{\quad}$
x in denom, product of xy

How can we tell by inspection?

Example 1 Identify Linear Equations



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

a. $y = 4 - 3x$

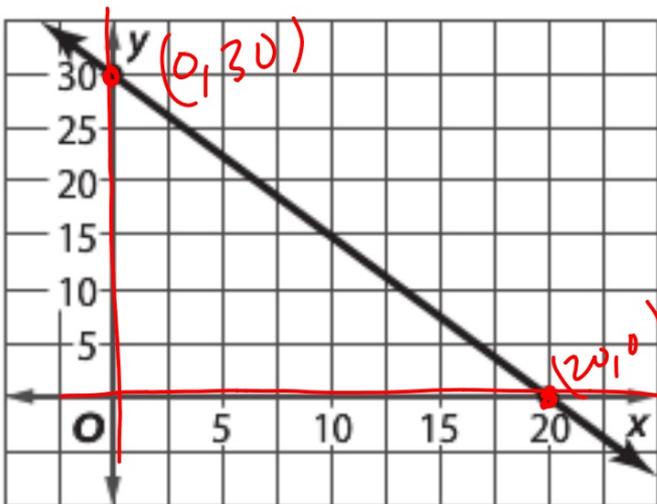
yes

b. $6x - xy = 4$

no product of vars.

Standardized Test Example 2 Find Intercepts

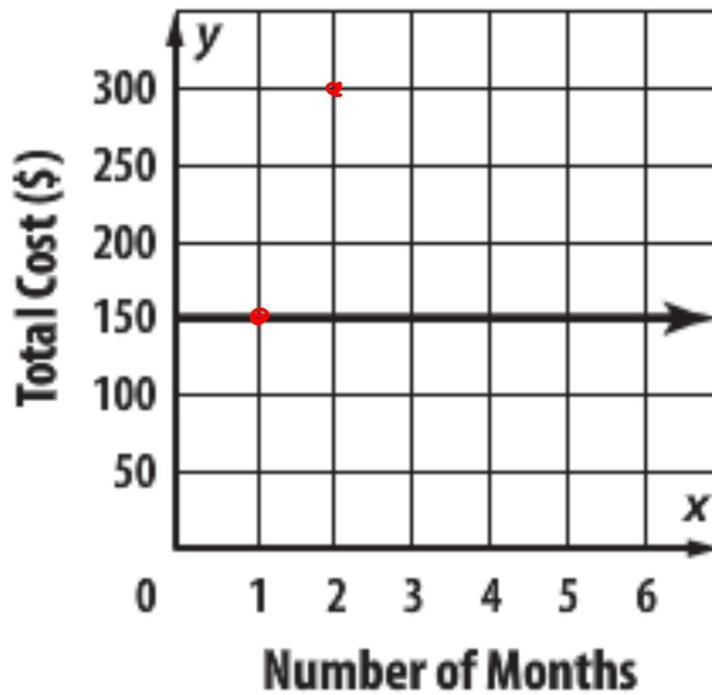
Find the x - and y -intercepts of the line graphed at the right.



y int. $(0, 30)$
 x int $(20, 0)$
 (x, y)

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

Gym Membership



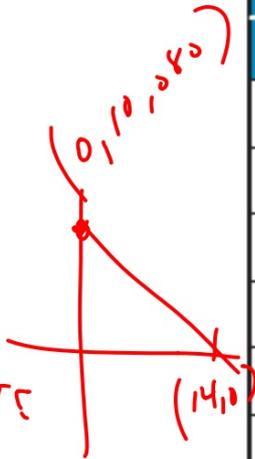
y int (0, 150)
 x int none

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.
- 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



Pool full @ time 0 hrs.
Pool is empty after 14 hrs

y -int
 x -int

Draining a Pool



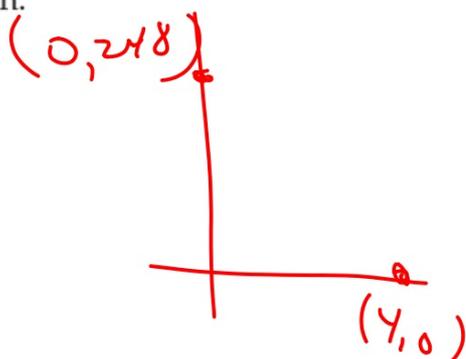
Guided Practice

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

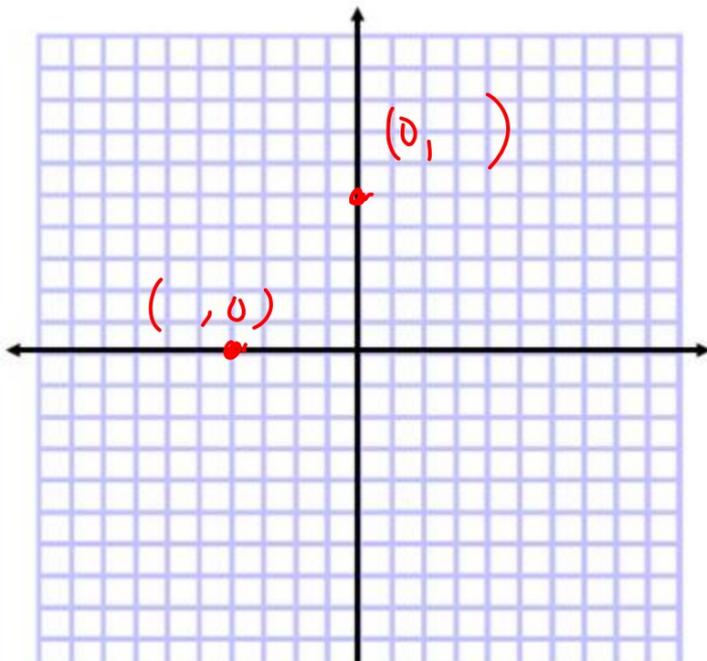
y int

x int



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

0 $(?, 0)$ $(-4, 0)$
 \uparrow $(0, ?)$ $(0, 5)$
 0



How can I use what I know about intercepts?

Example 4 Graph by Using Intercepts

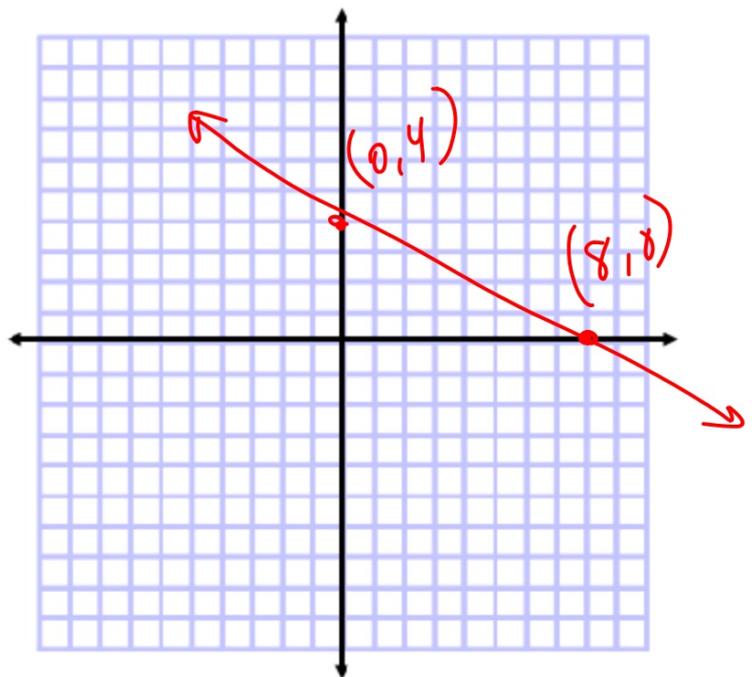
Graph $2x + 4y = 16$ by using the x - and y -intercepts.

x -int: $(8, 0)$ \downarrow $0, 8$
 $8, 0$

$$\frac{2x}{2} + 0 = \frac{16}{2}$$

y -int: $(0, 4)$ \parallel

$$0 + \frac{4y}{4} = \frac{16}{4}$$



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

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

4B. $y = -x - 5$

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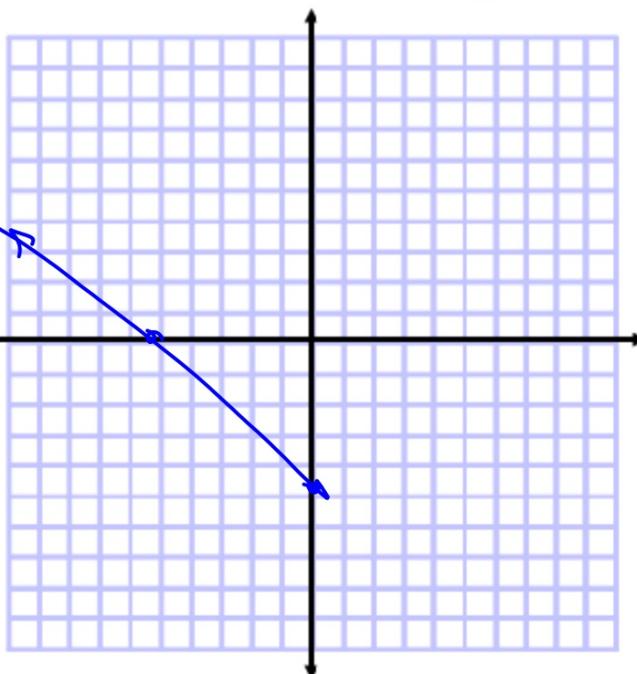
$\frac{-x}{-1} = \frac{3}{-1}$
 $x = -3$

$(0, 1.5)$

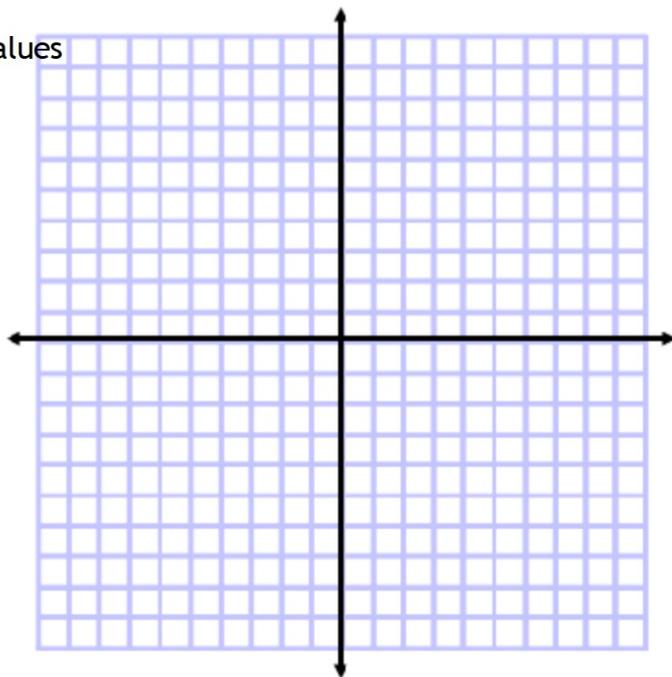
$(-3, 0)$

$0 = -x - 5$
 $+x \quad +x$
 $x = -5$

$\frac{2x}{2} = \frac{12}{2}$

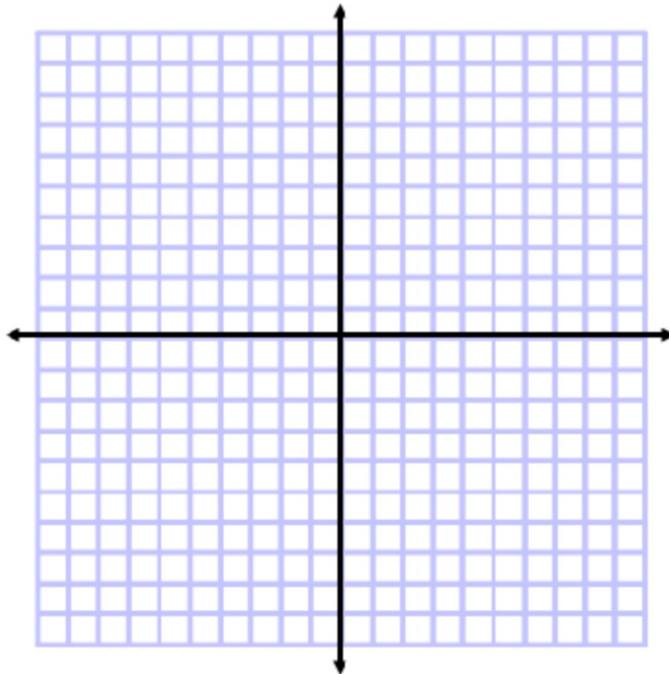


Graph by making a table of values
 $y = 2x + 1$



Example 5 Graph by Making a Table

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

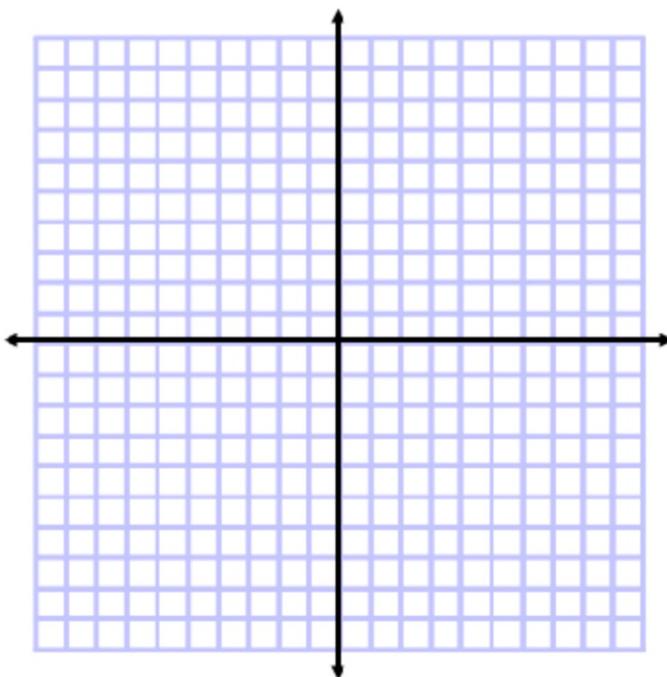


▸ **Guided**Practice

Graph each equation

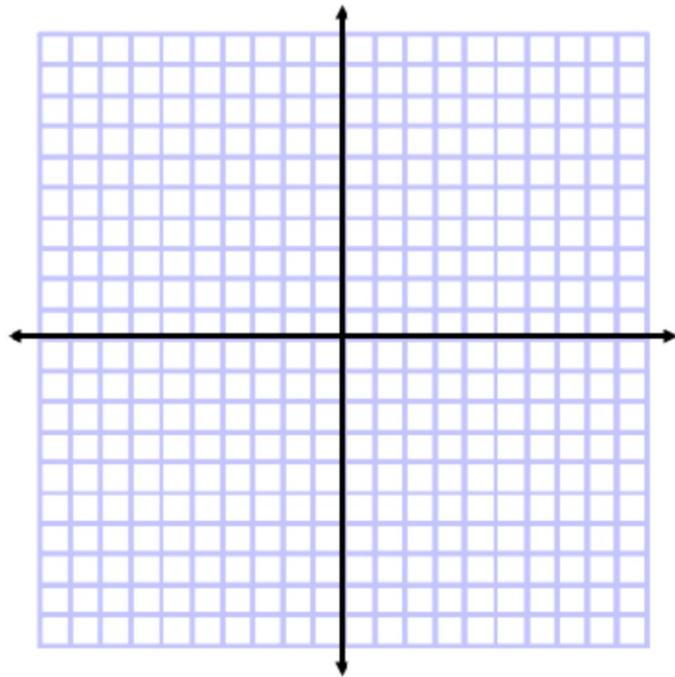
5A. $2x - y = 2$

Solve for y



You can only choose 3 for x

5B. $x = 3$



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

5C. $y = -2$

