3.1 The Rectangular Coordinate System

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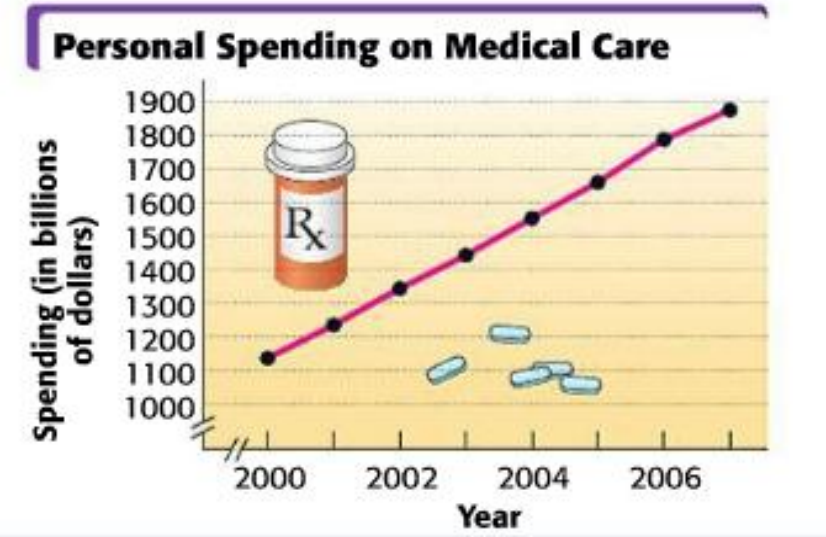
Objectives:

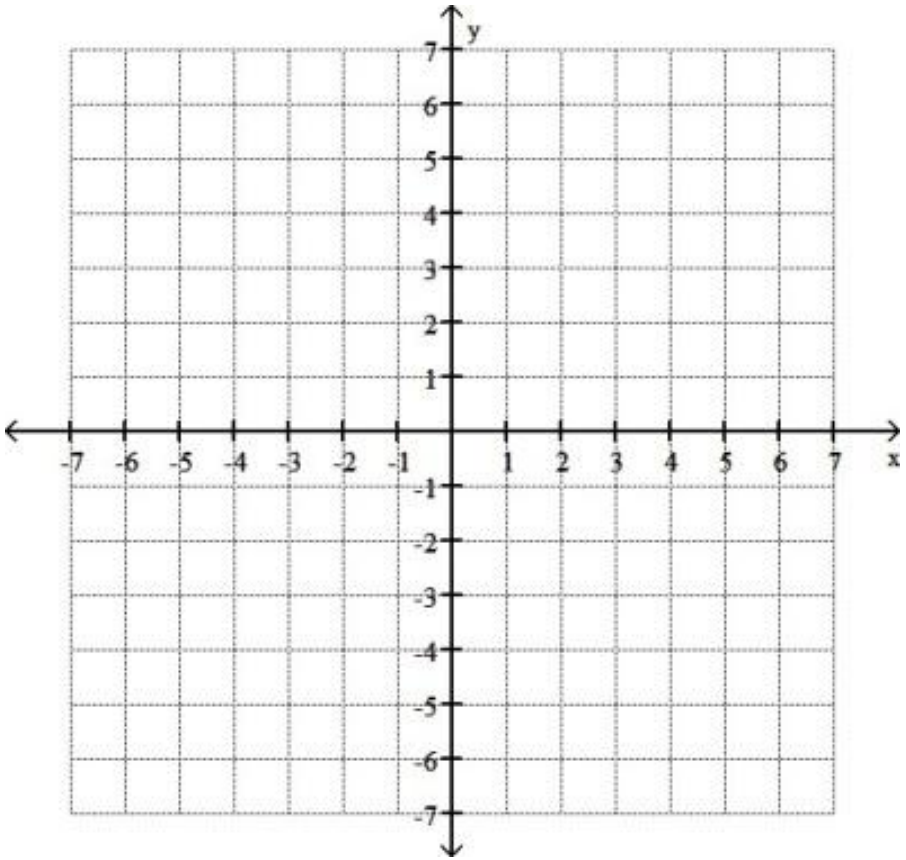
- Interpret graphs.
- Plot ordered pairs.
- Find ordered pairs that satisfy a given equation.
- Graph lines.
- Find x- and y-intercepts.
- Recognize equations of horizontal and vertical lines and lines passing through the origin.
- Use the midpoint formula.

EXAMPLE 1

- The following line graph shows personal spending (in billions of dollars) on medical care in the United States from 2000 through 2007. About how much was spent on medical care in 2006?



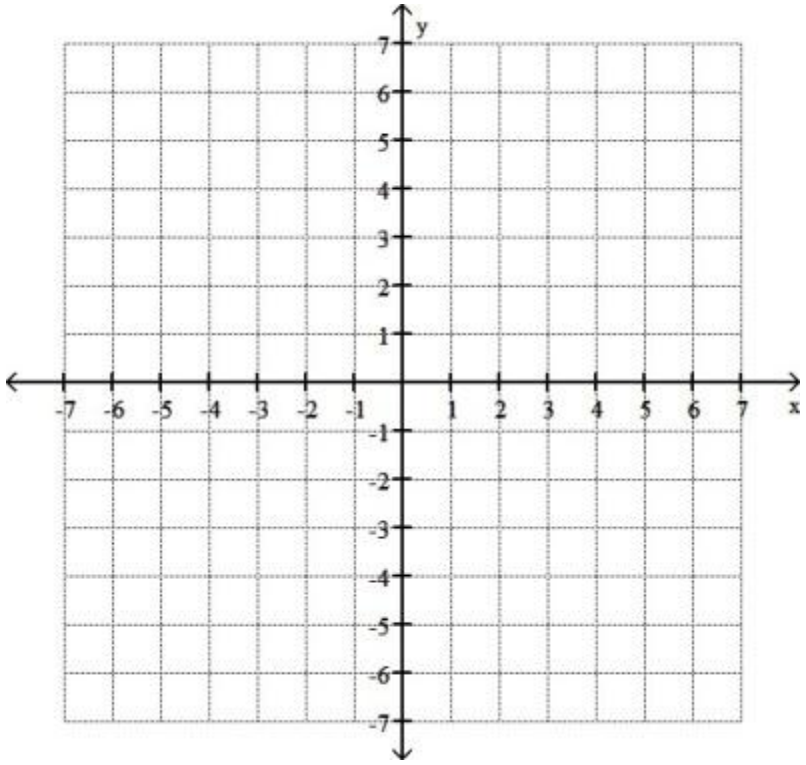
Cartesian Coordinate System



Example 2

- Plot the following ordered pairs:

$$(-3,1), (2,-4), (0,-1), \left(\frac{5}{2}, 3\right), (-4,-3), (-4,0)$$



Linear Equation in Two Variables

A **linear equation in two variables** can be written in the form

Where A, B, and C are real numbers and A and B are not both 0.
This form is called _____

- What is a solution?

- Each solution of an equation with two variables, such as $y = 4x + 5$ includes two numbers, one for each variable.

Example 3

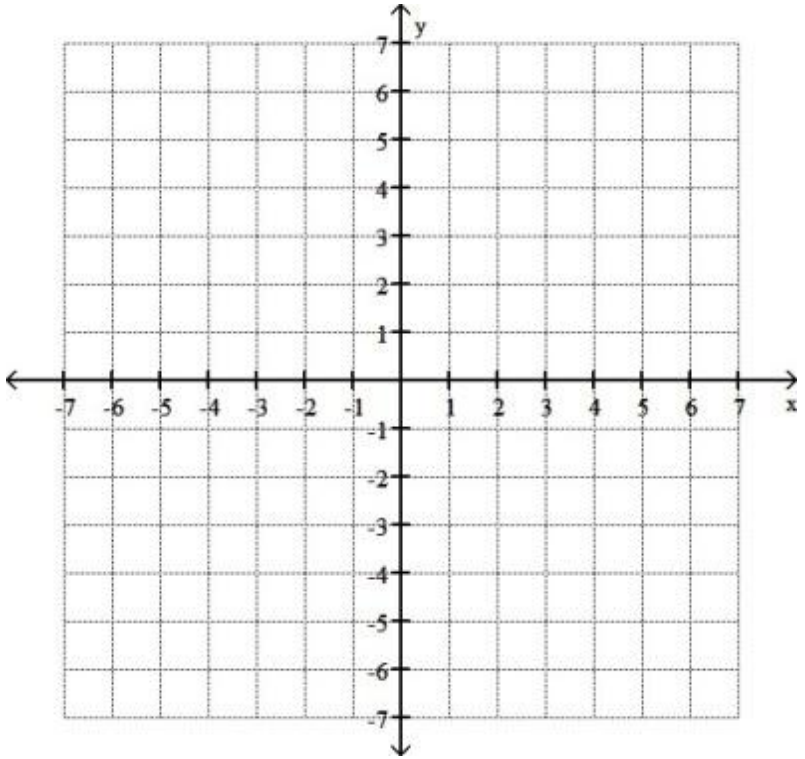
- Complete the table of ordered pairs for $3x - 4y = 12$.

x	y
0	
	0
−6	
	−2

Example 4

- Graph the following equation.

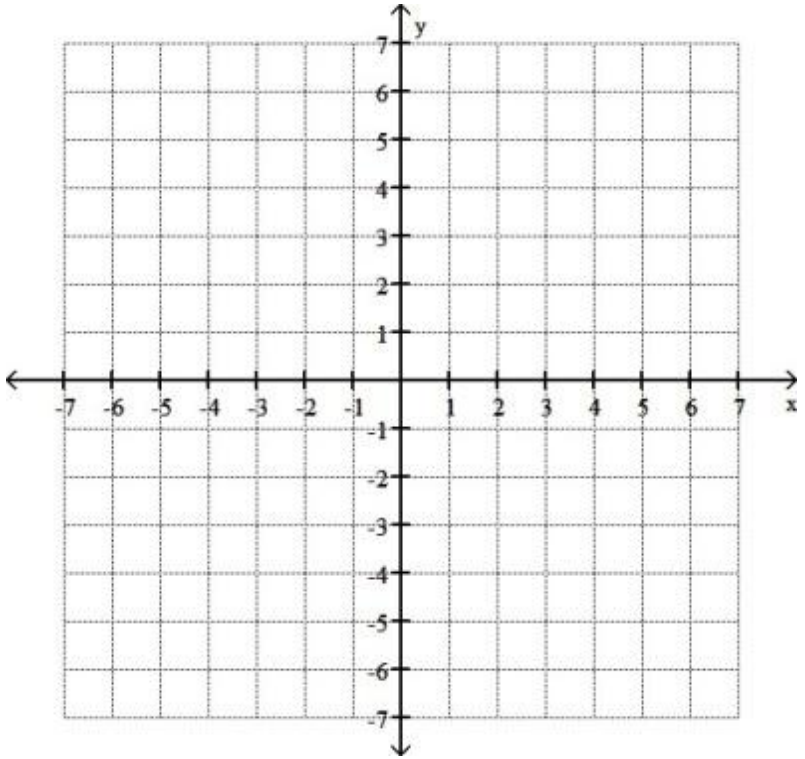
$$3x - 4y = 12$$



Example 4 (continued)

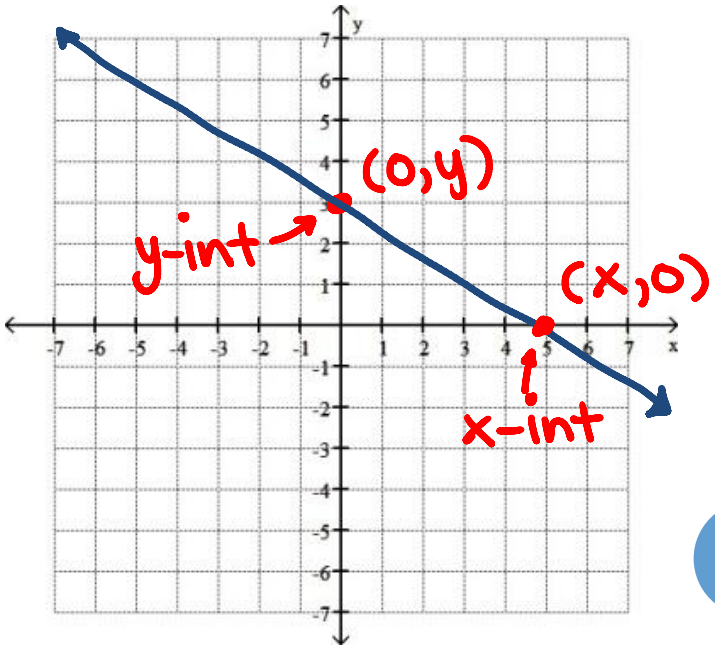
- Graph the following equation.

$$3x = 6 - y$$



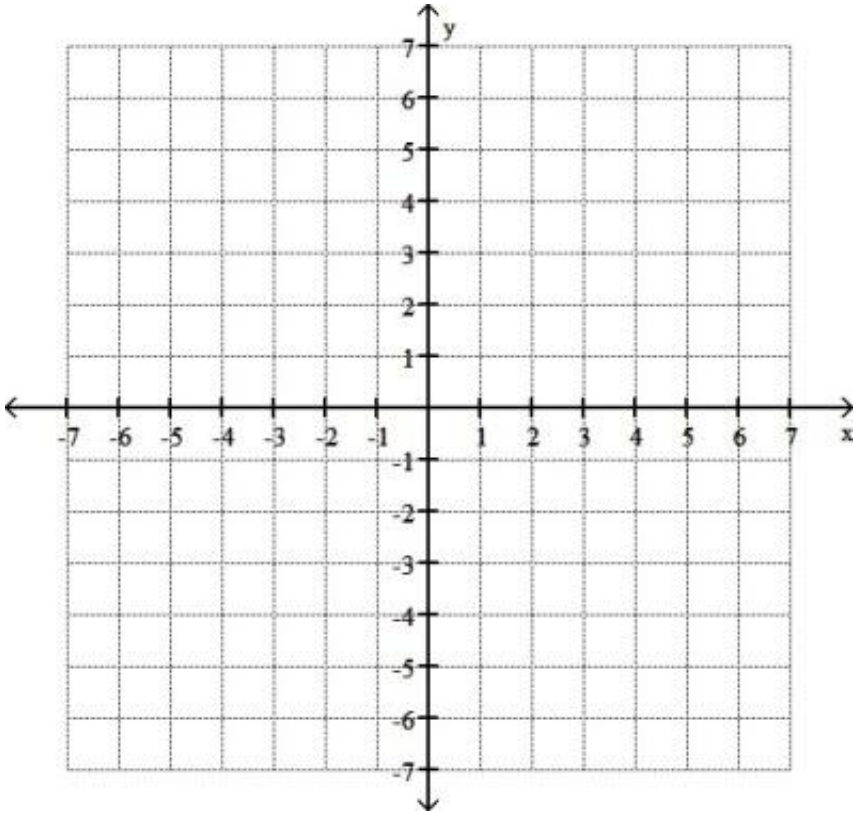
Finding Intercepts

When graphing the equation of a line, find the intercepts as follows.



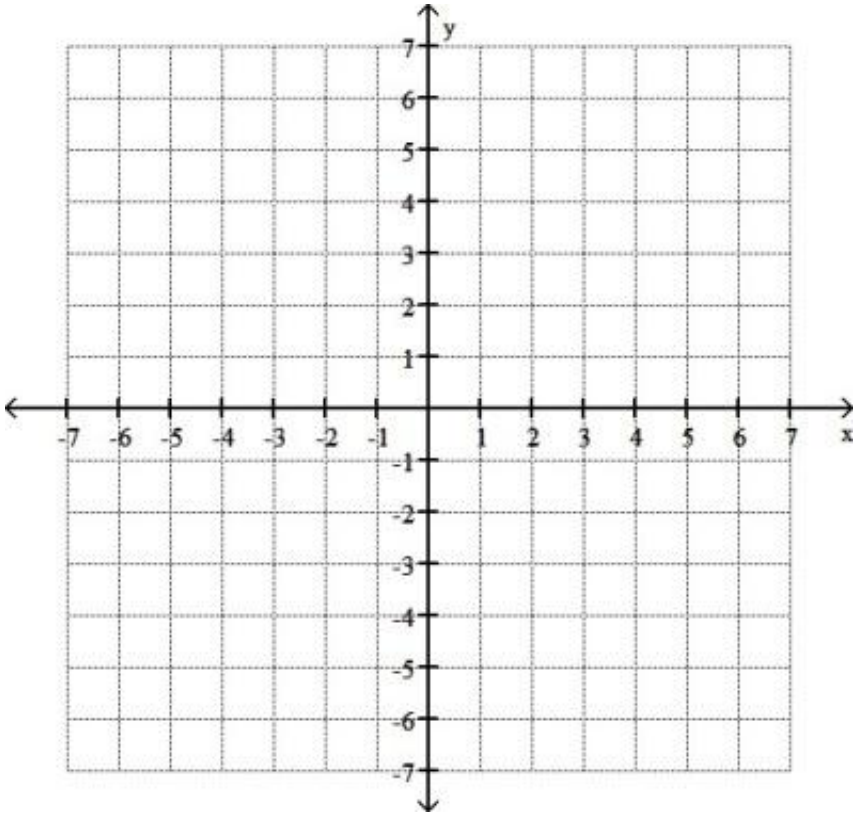
Example 5

- Find the x-and y-intercepts of $2x - y = 4$ and graph the equation.



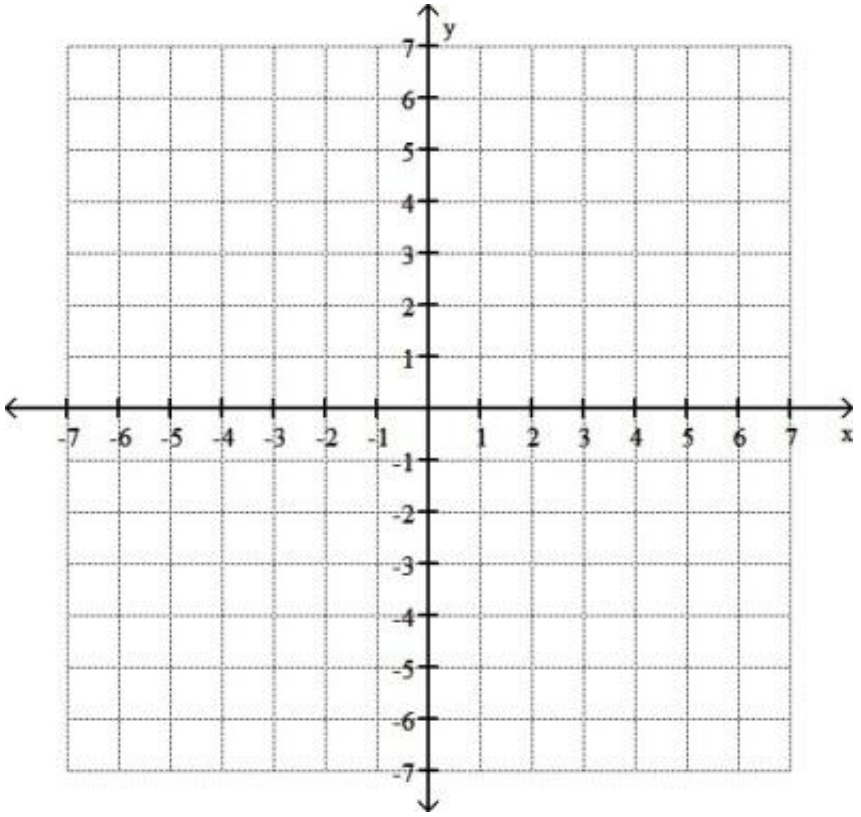
Example 6

- Graph $y = 3$.



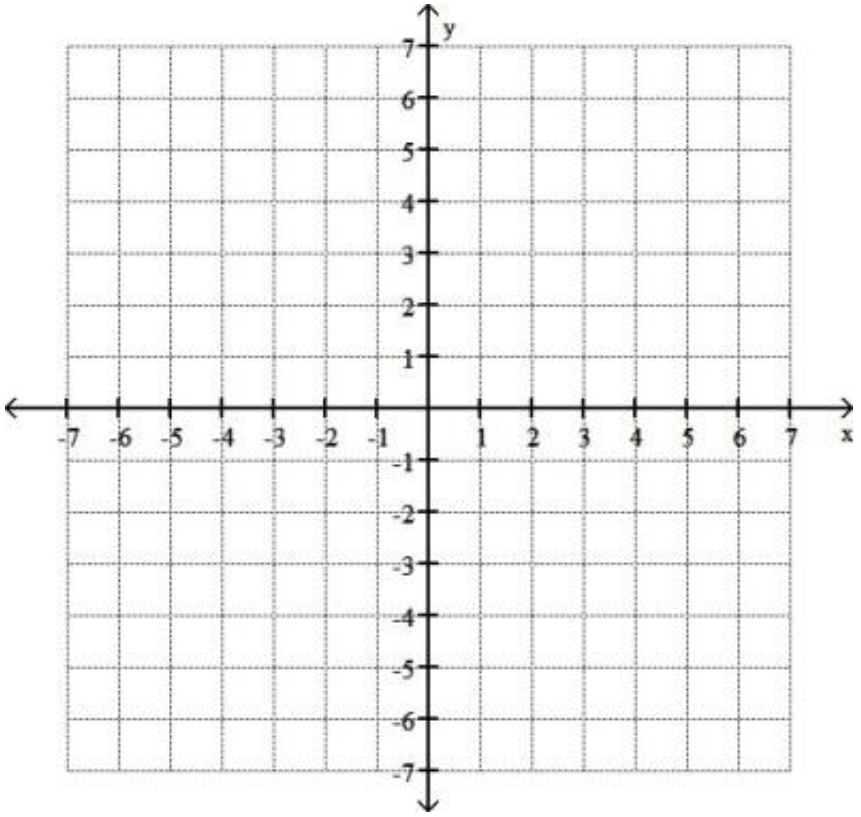
Example 7

- Graph $x + 2 = 0$.

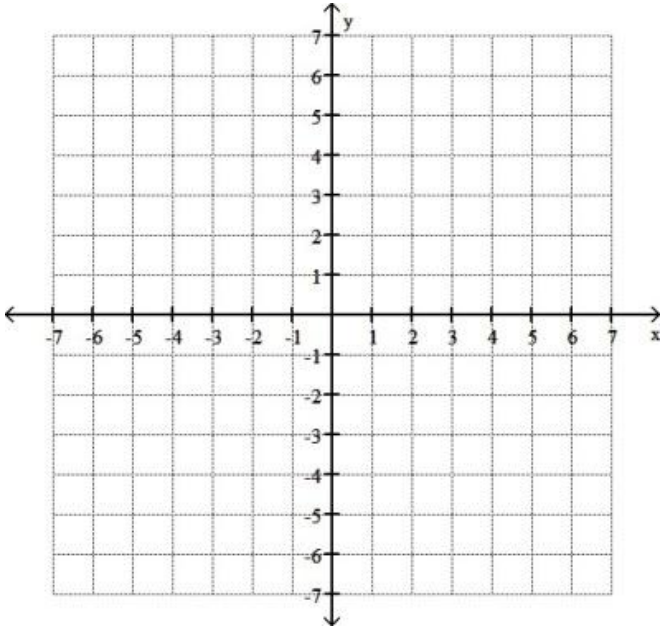


Example 8

- Graph $4x - 2y = 0$.



Midpoint



Midpoint Formula

If the endpoints of a line segment PQ are (x_1, y_1) and (x_2, y_2), its midpoint M is

Example 9

- Find the coordinates of the midpoint of line segment PQ with endpoints $P(-5,8)$ and $Q(2,4)$.