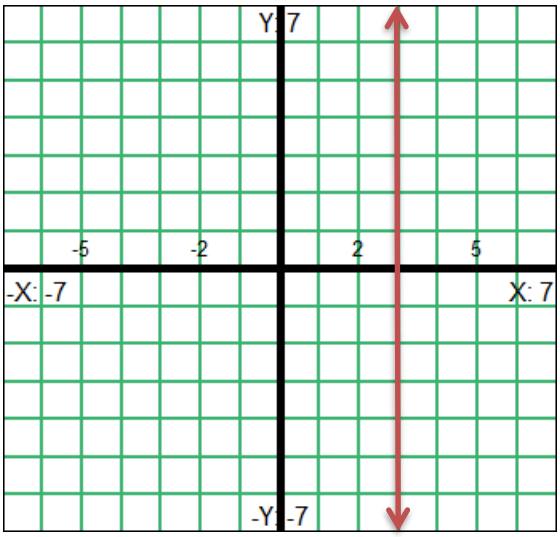
How to plot points in Two Dimensions

To plot a point in 2 dimensions, we need information on how to move away from the origin in 2 directions. In standard rectangular coordinates we are given information on how to move horizontally (the x-direction), and how to move vertically (the y-direction), in an ordered pair (x,y). A positive value means to go right horizontally or up vertically, and a negative value means to go left horizontally or down vertically, depending on which part of the pair it is in. This handout will illustrate the procedure in several steps and for several different kinds of points.

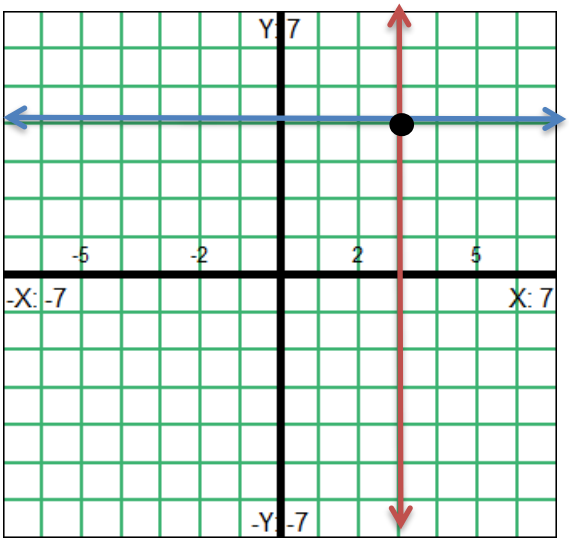
Example 1.
Let us consider the point (3,4). The coordinates of this point are three units to the right of the origin, and four units up from the origin. Let us start with a blank graph.



This graph has dimensions [-7,7]x[-7,7]. This means we can move up and down or left and right from the origin seven units in either direction before running off the graph. This will do. Our first step is to find out where the x-coordinate is telling us to go. This is three units to the right of the origin (the origin is the point (0,0) and is where the two black axes cross in the center of the graph). I have marked the line x=3 with a red line. Our point is somewhere on this line, since this is the line where all the points will have the correct x-coordinate.

Then we need to plot along this line for the second part of the point, the y-coordinate. For the point (3,4), we are being told to go up four units.

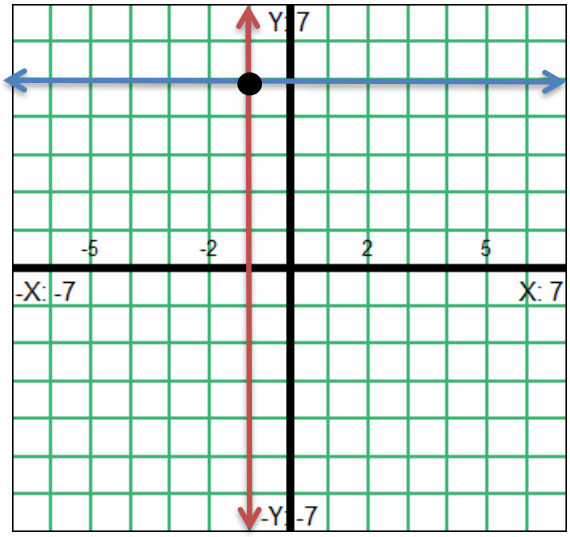
One common error some students make is to return to the origin to count up four units from there. This is fine if your gridlines don't cover the whole graph and you need to see how high you need to go on the axis, but remember that the point you are plotting is on the line obtained from the initial coordinate and you must move back to it to properly locate the point.

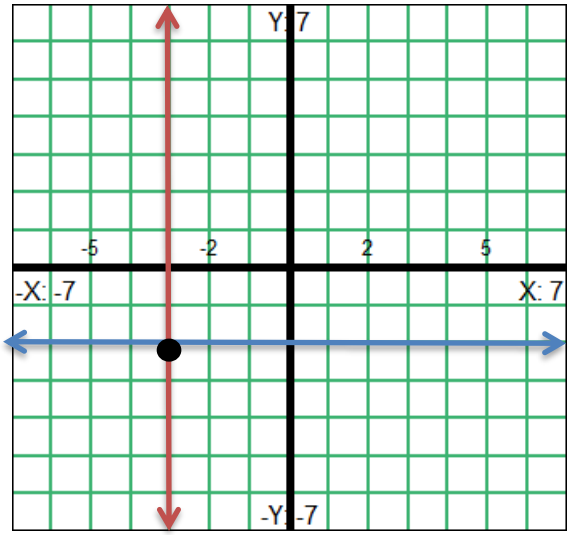


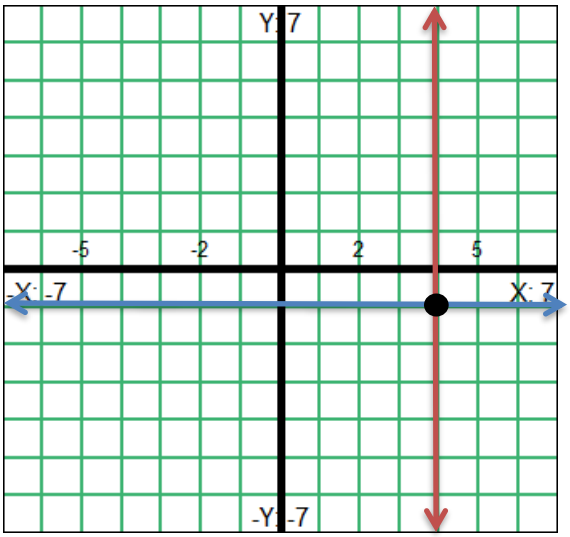
On this second graph, I will mark the line y=4 in blue. Any point with a second coordinate equal to 4 will be on this line. The two lines overlap where the single point equivalent to (3,4) is located, since it's the one point that satisfies both conditions. I have marked this intersection with a black dot.

We can copy this procedure for points with different coordinates.

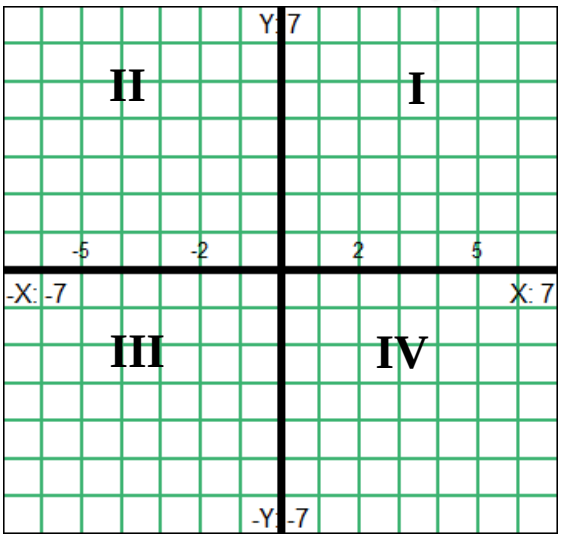
Example 2.
Plot the points (-1,5), (-3,-2), and (4,-1) on three separate graphs.







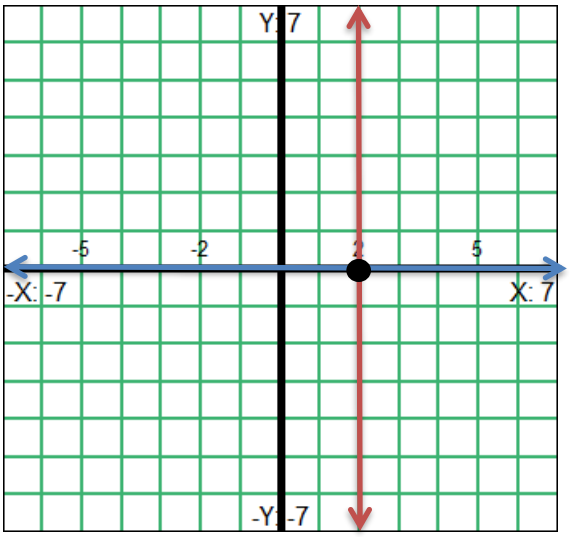
In the case of the first two points, notice that since the x-coordinate was negative, I moved my red line to the left of the main axis. In the last two points, my y-coordinate was negative, so I moved my blue line down below the main axis.

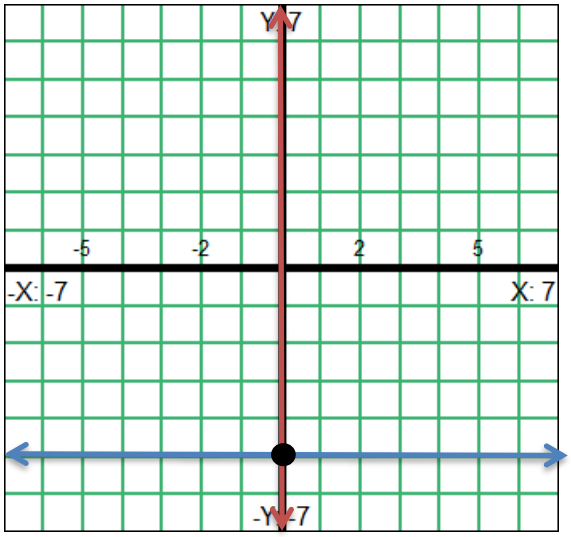


These 4 points we've plotted, one in each quarter of the graph, are representative of the typical kinds of points you will be asked to plot. The quadrants are numbered in the order I've done the examples for them. That numbering system starts in the quadrant where both coordinates are positive (the first quadrant), and then goes counterclockwise around. The numbers are shown in Roman numerals below.

There are two more scenarios that we can illustrate, and that is where one of the coordinates is zero, and so lies on one of the main axes.

Example 3.
Plot the points (2,0) and (0,-5) on the graphs below.





For the point (2,0), notice that our red line is on the line x=2, but because the y-coordinate is zero, we don't move up from that point at all, zero units vertically. Similarly, when we plot the point (0,-5), the red line remains on the axis where x=0, and only the red line moves down five units vertically. Counting 'zero units' can be a bit confusing at first, but you get used to it. Notice the location of the points. When one coordinate is zero, the point will lie on one of the axes. These points aren't considered to be in any of the 4 quadrants mentioned in Example 2.

Practice Problems.

1. Plot the points and say which quadrant they are in, if any. If not in any quadrant, say which axis they lie on.
   a. (2,7)
   b. (5,-2)
   c. (-4,1)
   d. (0,3)
   e. (-4,-5)
   f. (-7,0)
   g. (0,0)
2. Say which quadrant (or axis) these points are in (on) without plotting them.
   a. (11,-3)
   b. (-4,4)
   c. (0,25)
   d. (5,5)
   e. (-3,-11)
   f. (-16,0)