



Diyala University
College of Engineering
Computer Engineering Department



Drawing by using Computer
AutoCAD
First Year

LECTURE 1

By

Lecturer. Abdullah Thair Abdulsattar

Eng. Sabreen abdellmajeed

2020-2021

1.1 GET AROUND IN AUTOCAD

Welcome to the AutoCAD's World. This AutoCAD tutorial will teach you the basics of using AutoCAD and create your first objects. AutoCAD is a robust tool for creating 2D and 3D objects, like architectural plans and constructions or engineering projects. It can also generate files for 3D printing. If you want to start this AutoCAD tutorial for beginners, you should have about an hour to do so.

In this first lecture, I'll introduce you to commands and AutoCAD's user interfaces. But first, you have to know why CAD software is now replacing traditional pencil drawing and now you don't have to use that big, drafting table to draw an advanced drawing.



Pic 1.1 Most of current engineering drafter do not have this “ancient” drafting table

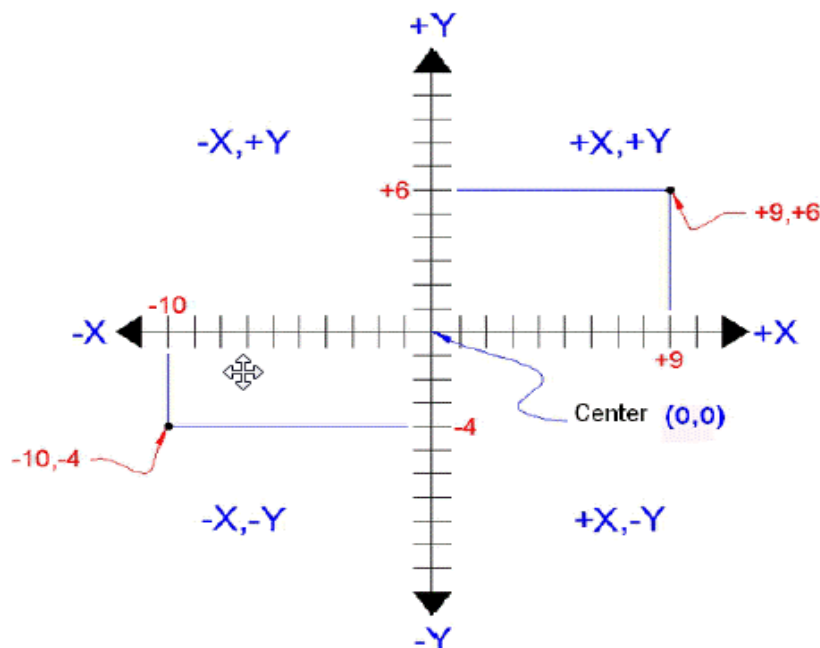
1.2 WHY AUTOCAD?

These are features of CAD's software that make drawing with software is better:

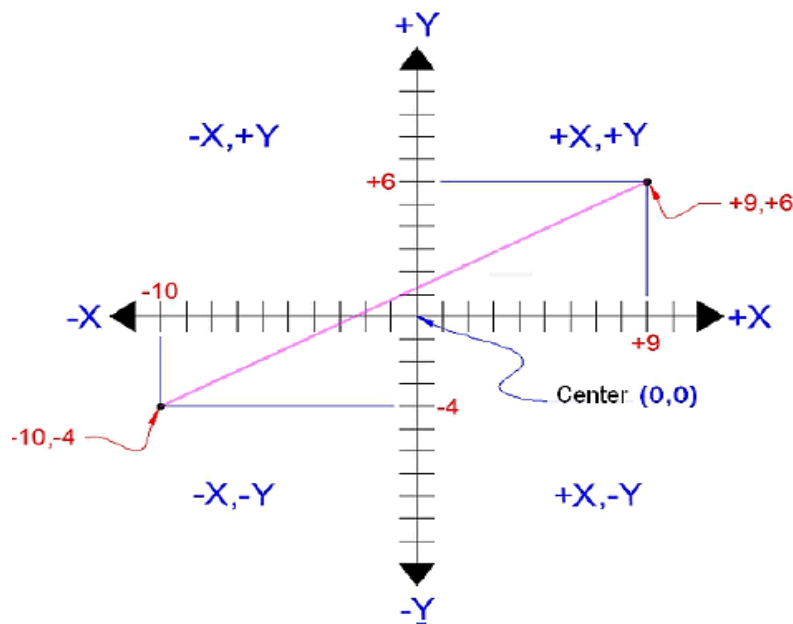
- **Precision:** You can draw a line, the arc, and other forms with incredible precision. Accuracy in AutoCAD is 14 decimal point.
- **Modifiable:** An advanced drawing created a long time ago can be modified again to draw a new drawing. While old drawing in pencil/pen cannot be updated and you have to create the new drawing from scratch.
- **Clean:** You don't have to own eraser to draw a drawing.
- **Efficiency:** You can create more drawing in the same time, and you can create drawing faster. Especially when you need
- **repetition**, like drawing a multi-story building, or floor tiles.
- **Popular:** Everyone uses it.
- **Easy to Publish:** Because it's digital, you can give the drawing on people across the globe just in a second.

1.2XY COORDINATE

All objects in AutoCAD are exactly positioned. For this reason, you need to understand how AutoCAD defines the position with simple X, coordinates. AutoCAD has the World Coordinate System (WCS). For the 3D drawing, there is an additional Z axis.



Pic 1.2 a Simple XY WCS coordinate used in AutoCAD



Pic 1.2 b A line from -10,4 to e +9, +6

The AutoCAD has x ,y point indicating where the point object is located. It also has an origin or center point (0.0) where all object positions use this point as their first reference.

See the image above to see the AutoCAD x, y coordinates and how to draw a line between two coordinates. For example, the xy coordinate 9.6 represents x = 9 and y = 6.

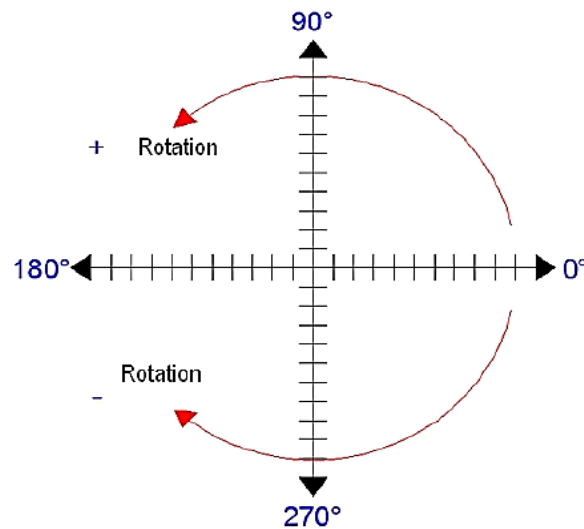
Coordinate (-10,-4) means x = 10 units negative (left side) and y = 4 units negative (bottom). In some cases, you don't know the exact starting position. You just know that you want to draw to the next point relative to that position. You can use the relative coordinate by adding the @ (SHIFT + 2) icon to tell AutoCAD that the next point is relative to the last point. Here are some important points about X, Y coordinate.

- The absolute point is the exact position of a point, relative to 0,0.
- The relative point is relative to the last point.

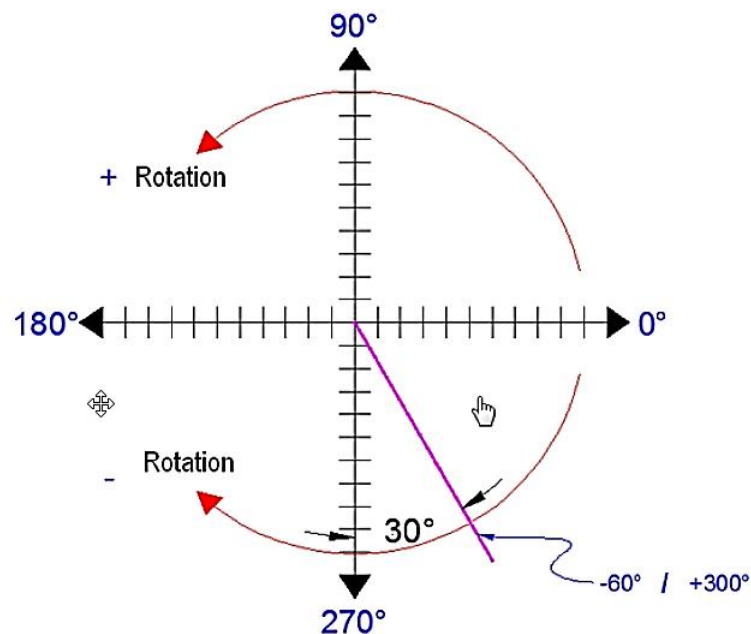
1.3 ANGLE IN AUTOCAD

AutoCAD also has angle to draw. Here's how to specify the angle in AutoCAD:

- ✓ The X positive is the 0 degree.
- ✓ Counter clock wise is positive
- ✓ Clockwise is negative.



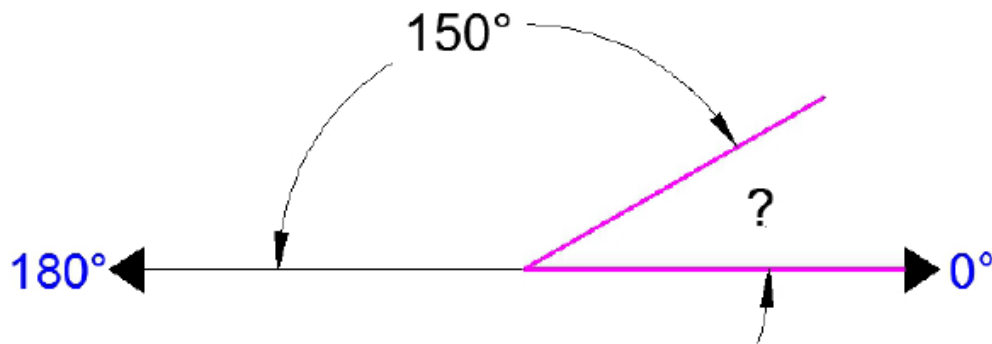
Pic1.3 Angle measurement in AutoCAD



Pic 1.4 Pic 2.4 Line example created using angle.

For example, 90 degrees = Y positive.

You can measure angle based on other angle.



Pic 1.5 Calculating an angle from another angle

From above examples, some important notes:

- 0 degrees on hour = 3 position.
- 180 degrees on hour = 9 position

1.4 INSERTING POINT IN AUTOCAD

Here are three methods to insert point in AutoCAD:

- **Absolute coordinate:** Just insert the x y point relative to the center point (0,0). Insert x value first, and then y value.
- **Relative coordinate:** Insert by adding prefix @ so you enter @X, Y. This will put point x, y points relative to the last position.
- **Polar coordinate:** Insert by using template @D<A. Which D is the length and A being the angle: For example, @10<90 will draw a line with length = 10 units and 90 degrees' direction.

Notes:

- The three methods are the only methods for inserting point in AutoCAD, there are no other methods to draw AutoCAD. X value has to be inserted first, then Y value.
- Don't forget the '@' symbol when you insert relative value. All mistakes in inserting input will generate unintended results.
- If you want to do checking, click F2, and then click F2 again.