Basic 2D drawing skills in AutoCAD 2017

This Tutorial is going to teach you the basic functions of AutoCAD and make you more efficient with the program. **Follow all the steps so you can learn all the skills.** They will help in in the long run, I promise!

Everything in AutoCAD is **EXACT**

**The most important thing in AutoCAD** is understanding how a UCS (Universal Coordinate System (also known as the Cartesian Plane)) Works and how to use it to your benefit.

The UCS system works on a grid system with the X,Y plane being the 2D plane and the Z axis being the 3D or Extrusion plane. When we work in 2D we ignore the Z axis completely.

To use a UCS we need to understand some basic Math Principals. Just like on a graph in Math we have a positive and a negative X axis and a positive and negative y axis.

The positive X axis is always 0° in AutoCAD and the positive Y axis is always 90° this would make the negative X axis 180° and the negative Y axis 270°. If you think of this as a complete circle you could also state that + X axis is 360°. If we were to work our way around the circle in reverse we would have the + X axis as 0° or 360° still but our – Y axis would become -90°, our –X axis would become -180° and our +Y axis would become -270° as shown below.

![UCS Diagram](image-url)
When we enter coordinates into AutoCAD we can do so in a few ways:

**Absolute Coordinates** – Always originate from 0,0 (also known as the origin point) and are expressed using the # symbol: \( #x,y \)

**Relative Coordinates** – Originate from the last point specified. This is used by typing the @ symbol before you enter your coordinates: \( @x,y \)

**NOTE:** Always remember to type in both an X coordinate and a Y coordinate even if the value is 0. You need to enter the values in this format to have it work properly: \( #x,y \) or \( @x,y \)

When you start a command the “first” or “start” point is always entered as an Absolute value and will start its travel from the origin. Every “next point” can be either an Absolute value by typing the # symbol in front of the x,y values \( (#x,y) \) or a Relative Coordinate by typing the @ symbol in front of the x,y values \( (@x,y) \)

Throughout this tutorial you will be asked to use both of these systems in order to get used to how they work 😊

![Diagram](image)

Another way to enter points in called **Polar Coordinates**. This method is used in conjunction with either Absolute or Relative coordinates to create a line a specific length in a specific direction. An example of this would be \( @10<45 \) this will give you a live 10 units long at an angle of 45°

If you make a mistake press F2 to see what you typed then press F2 again to go back to drawing :)
When going through this tutorial you will be using a wide variety of **SHORTCUTS**. A shortcut is used by **typing in individual letters, parts of words or abbreviate commands** rather than searching for the icon in the program. Getting used to using the shortcuts will make you much more efficient in AutoCAD.

Here are a large number (but not all) of the shortcuts you will want to remember:

<table>
<thead>
<tr>
<th>Shortcut</th>
<th>Command</th>
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<tr>
<td>Space bar</td>
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<td>SC</td>
<td>Scale</td>
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<td>TR</td>
<td>Trim</td>
</tr>
</tbody>
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**Helpful Hotkeys:** F3 - Osnap / F8 - Orthomode / F10 - Polor Tracking

Also note that using **the roller** in the middle of the mouse **zooms** in and out on your object(s) and pushing down and holding the roller allows you to **PAN** around within the work space.

Both of these features are used constantly when working in AutoCAD

**ALWAYS LOOK AT THE COMMAND LINE FOR INSTRUCTIONS ON WHAT AUTOCAD WANTS YOU TO DO NEXT.**

To Print you can type **PLOT** or **PRINT** or Press **Control + P** or go to **File then Print**
Now let’s put all of this useful information to work!

Start by opening AutoCAD 2017 - E... and selecting in the bottom right corner and make sure it is set to Drafting and Annotation.

Close the “Design Feed” Dialog box that pops up on the left of the screen

Click on the workspace switching icon in the bottom right corner and make sure it is set to Drafting and Annotation.

Click on the grid on the left of the command line and drag it down into the lower toolbar.

Before:

After:

I like to work with the grid off. To turn off the grid push F7 on the Keyboard (notice the blue icon at the bottom turns white when switched off)

Click on the “TOP” of the view cube in the top right corner of your screen to put yourself in a 2D workspace and then you can turn off the following two tools that will not be necessary for working in 2D:

Turn the left image off by clicking the x in the top corner

Turn the view cube off by going to the View tab and clicking on
Go back to your “home” tab and notice all of the icons in the RIBBON at the top of the screen.

We will be using their functions but you will be using the **shortcuts** to use them rather than clicking on the icons.

We will also be using the **Absolute and relative coordinate systems** to create our objects.

Let’s start by creating the 2 boxes on the bottom of page 2 in this tutorial:

Type `L` for line & ENTER then type the starting coordinate `0,0` (always watch the command line for instructions) then the next point `#2,0` & ENTER and so on. (refer to page 2 for images) Press ENTER again when finished to end the command.

**NOTE:** You can “enter” back into the same command you were just in previously by pushing ENTER again. **TRY THIS NOW** to start a new line for the second box 😊

Type 4,0 as your starting point then @2,0 for your next point and so on. (refer to page 2 for images)

You should now have two boxes that look like this:

![Boxes](image)

Let’s now create a box that is 1 by 1.5 and has a starting point of .5,1.5 using Absolute Coordinates. `L` & ENTER to start then `.5,1.5` as the start point then `#1.5,1.5` as the next point then `#1.5,3` then `.5,3` then `.5,1.5` as your final point. (Remember that all points in Absolute start from the origin)

No we will create the same rectangle in the other large rectangle using Relative Coordinates. `L` & ENTER to start then `4.5,1.5` as the start point then @1,0 as the next point then @0,1.5 then @-1,0 then @0,-1.5 as your final point and ENTER to end the command. (Remember that all points in Relative start from the last point you were at)

After completing both small rectangles you should have the following (seen on next page):
Now let's work with the angles in AutoCAD.

We can make these same boxes yet another way! Let's create a third box beside these ones using **Relative distances and angles**.

L & ENTER to start a new line. Type 8,0 & ENTER as your start point. Then type @2<0 & ENTER for your next point. This will draw the line 2 units long in the direction of 0° (positive x) type @4<90 & ENTER as your next point; this will draw a line 4 units long in the 90° direction (positive y). Type @2<180 & ENTER & @4<270 & ENTER as your last two points ENTER to end the command.

You know now 3 of the ways that you can control where your lines are drawn and how long you want them to be. Get used to all methods as each of them will be useful depending on what you are drawing and how it is arranged.

Once you have an object on the screen you can use **Object Snap points** to start and finish lines and other Drawing commands. F3 on the keyboard is the shortcut for turning on & off the Object Snap Function. Let's explore this function.

Make sure OSnap (object snap) is turned on, let's make it the only blue icon in the bottom of your screen other than the Hardware Acceleration icon which we will leave on all the time.

Click the arrow beside the OSnap icon and turn on the following: **Endpoint, Midpoint, Center, Intersection & Perpendicular**

Type L & ENTER and draw a line diagonally from the top left corner to the bottom right corner of the far right rectangle; notice how the OSnaps show up when you hover near the Endpoint or Midpoint of a line.
Repeat this going from the top right to bottom left and make a circle with a Radius of 1 at the intersection of the two lines.

You should now have this on your screen:

![Circle Diagram]

SAVE this drawing! Go to your personal folder under your student #, then to “my documents” folder, create a new folder in here called “Drafting”.

SAVE AS “YOUR NAME_2D TUTORIAL” WE WILL COME BACK TO IT LATER

NOW TIME FOR A FEW SKILL BUILDING ASSIGNMENTS & SOME QUIZZES TO TEST WHAT YOU HAVE LEARNED

Remember that AutoCAD is a very sophisticated program and it takes years to master it. We are looking to develop a basic understanding of how the software functions and the best and easiest ways to go about a certain task.
AutoCAD Quiz #1

1) From which direction does AutoCAD start measuring angles?
   a) 12 O’Clock
   b) 3 O’Clock
   c) 6 O’Clock
   d) 9 O’Clock

2) What does UCS stand for?
   a) Unfortunate CAD System
   b) Uncontrolled Coordinate Sectors
   c) Universal Coordinate System
   d) Unbelievable CAD Settings

3) When drawing in 2D, what axis do you not work with?
   a) X
   b) Y
   c) Z
   d) UCS

4) Is 300° the same as -60° in a drawing?
   a) Yes
   b) No
   c) Not Always
   d) Never

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Assignment #1a

Creating objects using Exact points

Using Absolute coordinates, Relative coordinates and Polar coordinates recreate the drawing below in AutoCAD (no text or values needed, just the shapes including the border)

Once you have completed this drawing Save it in your new “Drafting” Folder

Save as: Your name_Assignment#1a
Assignment #1b

Using Absolute coordinates & Relative coordinates, a line and a circle re-create the drawing below in AutoCAD (no text or values needed, just the shapes including the border)

Once you have completed this drawing Save it in your new “Drafting” Folder

Save as: Your name_Assignment #1b
AutoCAD Quiz #2

1) Which one of these will NOT start the Print Command?
   a) Typing PLOT
   b) Typing PRINT
   c) Pressing Control + P
   d) Pressing Alt + P

2) What should you pay attention to when learning AutoCAD?
   a) The Command Line
   b) The Status Bar
   c) The Title Bar
   d) Tool Icons

3) Polar coordinates are used mostly for drawing...?
   a) Circles
   b) Arcs
   c) Vertical lines
   d) Angled lines

4) Which keystrokes will UNDO a command?
   a) Control + U
   b) Alt + U
   c) Control + Z
   d) Alt + Z

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Assignment #2a

Copy the drawing below using the steps provided below (no text or values needed, just the shapes including the border)

- **Absolute** coordinates for **BOX 1**
- **Relative** coordinates for **BOX 2**
- **Mline** for **BOX 3** with a **Scale** of .15 and **Justification** of **TOP** (Draw the box in a clockwise direction and use C (for close) as your last point)
- Create the lines next using the coordinates in the drawing (method of your choice)
- Create the inner circle Ø1 then use the **Offset** tool to create the second circle Ø1.25

Once you have created everything above:

- **Trim** the top of the vertical line above BOX 1 down to the horizontal line
- **Extend** the vertical line above BOX 2 up to the horizontal line
- Draw a line from the **center** of the circles to the **midpoint** of the vertical line above BOX 2

What your drawing should look like at the end is shown on the next page 😊
Final product for Assignment #2a

SAVE into your Drafting folder as Your name_Assignment #2a

Assignment #2b (SAVE as Your Name_Assignment#2b)

Copy the drawing below (no text or values needed, just the shapes including the border)

- Mline for box moving in a counterclockwise direction (use C for Close as your last point)
- Line tool and Osnaps to create the two lines perpendicular to each other
Assignment #2c (SAVE as Your Name_Assignment#2c)

Copy the drawing below using all the skills you have learned so far (no text or values needed, just the shapes including the border)

By now you should be feeling pretty comfortable using the 3 types of coordinate entry systems.

Keep up the good work and you will be proficient in AutoCAD in no time at all!

Here is another Quiz to see what you have learned 😊
AutoCAD Quiz #3

1) When using the TRIM Command, which do you select first
   a) The cutting edges
   b) The object to be trimmed
   c) Everything
   d) Nothing

2) How many snap points does an object have?
   a) One
   b) Two
   c) Depends on the object
   d) At least four

3) How many grips does an object have?
   a) One
   b) Two
   c) Depends on the object
   d) At least four

4) How many point do you need to define for the rectangle command?
   a) One
   b) Two
   c) Four
   d) None

5) How many AutoCAD objects are in a rectangle drawn with the rectangle command?
   a) None
   b) One
   c) Four
   d) Eight

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Assignment #3 (SAVE as Your Name_Assignment#3)

Accurate Input: This assignment will test how well you understand all of the 3 coordinate entry systems (Absolute, Relative & Polar)

Copy the drawing below using all the skills you have learned so far (no text or values needed, just the shape including the border)

Take your time and be precise with each keystroke

- Start in the bottom left corner and go around in a counterclockwise direction
Some More Skill Testing Questions

AutoCAD Quiz #4

1) If you draw a line at 270° it will point:
   a) Up
   b) Down
   c) Left
   d) Right

2) How long will a line from 1,4 to 4,4 be?
   a) 4 units
   b) 8 units
   c) Can’t from those coordinates
   d) 3 units

3) How long will a line from 1,4 to @4<5 be?
   a) 3 units
   b) 4 units
   c) 5 units
   d) 3.546 units

4) How many point do you need to draw a line using Absolute Coordinates?
   a) None
   b) 1
   c) 2
   d) 4

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
AutoCAD Quiz #5

1) When selecting objects, pressing ‘L’ will
   a) Select lines only
   b) Select objects when you move your mouse to the left
   c) Select the last object created
   d) Select the last object you modified

2) Pressing Shift while you are selecting will?
   a) Allow you to draw a window
   b) Automatically dialect the object(s)
   c) Remove the nest selected object from the set
   d) Highlight the selected objects

3) Pressing ‘F’ when selecting objects will:
   a) Allow you to draw a fence
   b) Finish the selection set
   c) Limit you to five objects
   d) Allow you to find specific text

4) How do you select the last set of objects you selected?
   a) Type ‘L’
   b) Type ‘P’
   c) Type ‘H’ to highlight them
   d) You cannot do this

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Assignment #4a (SAVE as Your Name_Assignment#4a)

Modifying Commands: This assignment will allow you to become familiar with 4 main modifying commands: Move, Copy, Stretch & Mirror

Follow these steps in order to get the most out of this assignment:

- Create the border
- Draw the box on the far left with the bottom left corner at 0,0
- Move this box so the bottom left corner moves to 1,1 (be precise)
- Copy the box over to the right to the proper coordinates
- Stretch the top of the new box up 2 units (remember you must use the green crossing box (right to left)
- Draw the left side of the third object then mirror the first half to create a perfect mirror image for the second half.

Don’t be afraid of making a mistake. That is the beauty about computers ... UNDO! 😊
Assignment #4b (SAVE as Your Name_Assignment#4b)

Modifying Commands: This assignment will show you the TTR (Tangent, Tangent, Radius) command that can be helpful to create odd shaped curved objects.

Follow these steps in order to get the most out of this assignment:

- Create the border
- Draw the circle on the left with the center point of 3,3.25
- Draw the circle on the right
- Create the third and final circle using TTR (an option once you start the circle command (follow the instructions in the command line))
- Connect the bottoms of these circles using a line and the “quadrant” Osnap
- Trim out all unnecessary lines
- Voila you are done!
AutoCAD Quiz #6

1) What is the best way of drawing a rectangle?
   a) Using the line command
   b) Using the polyline command
   c) Using the rectangle command
   d) Using the multiline command

2) To move something 4 units to the right, what would be the 2\textsuperscript{nd} point of displacement?
   a) @4,0
   b) @4<0
   c) Neither a nor b work
   d) Both a and b work

3) How should you select objects when using the stretch command?
   a) With a crossing box (the green one)
   b) With a window (the blue one)
   c) Pick them one at a time
   d) Hold the shift key while selecting
   e) Type ‘S’

4) The origin of a drawing is at:
   a) The first point you select
   b) 0,0
   c) A random point in space
   d) 10,10

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Assignment #5a (SAVE as Your Name_Assignment#5a)

Modifying Commands: This assignment will have you preform new modifying commands focusing on Fillet, Chamfer and Array

Follow these steps in order to get the most out of this assignment:

- Create the border
- Create the bottom left box (your choice of technique)
- Copy this box up to create the next two above it (be precise with distances)
- Create only one of the small boxes (the one in the bottom left of the group)
- Array this box using the Rectangular Array modifier
- Draw the circle in the top right in the correct place
- Draw one of the lines shown inside the circle 1 unit long
- Array the line using the polar Array modifier
- Fillet the corners of the middle of the three boxes as shown
- Chamfer the corners of the top box as shown

Always remember to **pay attention to the Command Line** at the bottom of your screen for instructions on what the program wants next for the command to work properly 😊

Well Done that was a tough one!
Assignment #5b (SAVE as Your Name_Assignment#5b)

Modifying Commands: Let's see what you have learned so far

Create the drawing below using everything you have learned so far. Let's see what you’ve got!
AutoCAD Quiz #7

1) Objects are rotated around the:
   a) Base point
   b) Bottom right of the object
   c) Center of the object
   d) Origin

2) The fillet command creates:
   a) Sharp square corners
   b) Rounded corners to a desired radius
   c) A circle
   d) Both a and b can be done

3) A polar array creates new objects:
   a) In a grid pattern
   b) In a straight line
   c) In a circular pattern
   d) In an northern pattern

4) The distances of a chamfer are:
   a) Always different
   b) Always the same
   c) Sometimes different
   d) Never the same

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Assignment #6

Open “Your Name_Assignment#5a” and SAVE AS Your Name_Assignment#6 this copies all the same information of one file into a second file to modify

Layers, Text & Dimensioning: Brand new, very important skills to learn

Why do we have layers? Organization ... just like folders in a computer

Create 3 new layers by:

- Go to Layer Properties
- Click the new layer icon
- Create 3 layers called:
  - Text Change this layer to Green
  - Dims (for dimensions) Change the color of this one to Red
  - Object

Make the Text layer your current layer and lets make some text!

Click in the Annotate tab or type “TEXT” to start the command

Follow the directions in the command line filling out the information as follows:

Start point: 0.125, 0.125

Text height: 0.25

Text rotation angle: 0

Type in ALL CAPS: YOUR NAME ASSIGNMENT #6

PRESS ENTER TWICE (this ends the command, pressing enter once allows you to add another line of text that will be a separate object one the command is completed)

Almost Done!
Now time for some Dimensions

Dimensions have many properties and it takes some time to understand how the work. In this tutorial you will set them up the way that is outlined below. Try to take note of what you are changing so it is easier next time you have to do it.

- Go to the **Annotate** tab and click the little arrow beside
- Make sure you are on the STANDARD Style and click MODIFY

Follow the setup in each tab (seen on the next page) to set up all your dimensioning details for this drawing.

Basic Dimensioning Terminology
Note: This setup is very basic and will change when we do our other projects. You will eventually have to become familiar with all of the options in all of these tabs so that you are able to adjust what your dimensions look like so that they are appropriate for your drawing.
Now that all your dimensions are set up properly for this drawing lets place our dimensions 😊

Place a combination of different dimensions using the following options:

- Linear
- Aligned
- Angular
- Diameter
- Baseline (use this for the 2.0 and the 2.5 in the bottom right directly after placing the 1.0)

When you have finished your assignment should look like the one below

![Diagram of dimensioned drawing]

Make sure to SAVE AS one last time when you are finished as Your Name_Assignment#6

If you saved it as this earlier then you will be told that the file already exists and if you want to replace it, this is ok, click YES.
AutoCAD Quiz #8

1) You should use Osnaps when you dimension:
   a) Never
   b) Always
   c) Only on lines
   d) Only on arcs and circles

2) How many layers should a drawing have?
   a) 1
   b) 10
   c) One for each object
   d) As many as are needed to clearly display the objects

3) When can you change the height of your text?
   a) Only when you start a new drawing
   b) Only in a special text dialog box
   c) When you are starting the Text command
   d) You can’t, it is pre-set by AutoCAD

4) Scaling objects makes them:
   a) Bigger
   b) Smaller
   c) It only stretches them
   d) Both Bigger and Smaller

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Congratulations you have now completed all of the Basic AutoCAD Assignments.
Only a few more tips and tricks to cover and 2 more quick quizzes before starting your First Design Project.

**TIP #1**

**Direct Distance Entry**

So far you have learned Absolute, Relative & Polar Coordinate Entry. **DDE** is another way of entering distances that is much faster and, depending on what you are doing, just as accurate.

It is important to know and remember the 3 manual entry techniques (Absolute, Relative & Polar) as they are necessary in many situations.

DDE allows you to only type a distance (value) and bypass the usual way of entering coordinates.

It is important that either Ortho Mode or Polar Mode is turned on!

Here is how it works:

- Start the line command
- Pick your “Start Point” as you normally would with either coordinates or using an Osnap.
- Drag your mouse in the direction you want the line to go (make sure you are snapped in on a Polar or Ortho line)
- Type the distance you want the line to be
- Voila! All done.

This method makes it very fast to draw objects that have square corners or are at simple angles or any increments of 5°

Try it out and see how fast you can draw the box on the next page
Use a Polyline with DDE to create the object above

Start from the UCS Icon at 0,0 and go in a clockwise direction

Use C for Close function to draw the last line and end the command

You probably notice that this is a much easier way of entering information, but remember that it can not always be used and we do need to know the 3 other styles (Absolute, Relative & Polar)
OBJECT SNAP TRACKING
USING OBJECT SNAP

Uses reference points such as midpoints, endpoints etc. and tracks from them to other objects or to each other

Let’s try it out

Create the rectangle below and then using Object Snap tracking, track from the midpoints of the rectangle to draw the circle in the exact middle.
AutoCAD Quiz #9

1) DDE (Direct Distance Entry) can be used in which direction?
   a) Right
   b) Left
   c) All
   d) Any that are set with Ortho or Polar tracking

2) When using Object Snap Tracking, you should turn on:
   a) Osnap
   b) Otrack
   c) Neither
   d) Both Osnap and Otrack

3) When setting up Polar Tracking, the Increment Angle:
   a) Locks you into one angle
   b) Sets multiples of the selected angle
   c) Doesn’t really do anything
   d) Makes you a master of drafting

4) Object tracking works only with:
   a) Midpoints
   b) Endpoints
   c) Any osnap
   d) Anywhere on the screen

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
TIP # 3

OBJECT PROPERTIES

Now that you have learned how to draw object and modify them using special commands, you need to know one more way of changing the properties of an object.

For instance, you may have made a spelling error in your text. You could erase it and re-create it, or you could double-click on it and correct the error.

DON’T REDRAW AN OBJECT – CHANGE ITS PROPERTIES

There are two ways to change the properties of an object:

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<th>Symbol</th>
<th>Result</th>
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<tbody>
<tr>
<td>Modify Properties</td>
<td>PR</td>
<td><img src="image" alt="Properties" /></td>
</tr>
<tr>
<td></td>
<td>Display the properties of the object in the properties palette</td>
<td></td>
</tr>
<tr>
<td>Match Properties</td>
<td>MA</td>
<td><img src="image" alt="Match Properties" /></td>
</tr>
<tr>
<td></td>
<td>Copies the properties from one object to others</td>
<td></td>
</tr>
</tbody>
</table>

Try changing the properties of the object you have drawn.
AutoCAD Quiz #10

1) How can you change an object’s properties?
   a) Select it and press the properties icon
   b) Select, right click and choose properties
   c) Double click the object
   d) All of the above

2) Double clicking on a text object allows you to change its layer.
   a) Yes
   b) No
   c) Only if it is on the TEST layer
   d) Only if you have 2 layers

3) If you select a line and a rectangle and view the properties:
   a) You will see only limited properties
   b) You will see all the properties
   c) You will see the properties of the first selected object
   d) You will not see any properties

4) When you want to close the properties palette:
   a) Type CLOSE
   b) Move it off the screen
   c) Click the X in the top left of the palette
   d) Deselect the object

5) How many AutoCAD objects are in a rectangle drawn with the line command?
   a) None
   b) One
   c) Four
   d) Eight

Feel free to have AutoCAD open and try different things to help you answer these questions. 😊
Now let’s have some fun using shortcuts on the keyboard to modify our blocks and create new objects using all of the skills you have just learned!

**Open your drawing named “Your Name_2D Tutorial”**

**And SAVE AS “Your Name_2D Tutorial Complete”**

See if you can make your drawing look like the one on the next page using only shortcuts on the keyboard and in-putting coordinates in either Absolute or Relative (whichever makes your life easier – We all like to make our lives easier and knowing how all of these little things work will make all the difference)

**USEFUL TOOLS INCLUDE:**

**DI (measure / distance)**

**S (Stretch)** Use a Crossing box (the green one) and place the corners you want to stretch within the box.

**MI (Mirror)** Select the object you want to make a mirror image of & ENTER then select the line (plane) you want to mirror them across (use your OSnaps).

**TR (Trim)** Select the lines you want to trim with first & ENTER then the line segments or parts you want to get rid of.

**EX (Extend)** Select the line you want to extend to & ENTER then the line you want to extend

**RO (Rotate)** Select the object you want to rotate & ENTER then select the base point you want to rotate the object around.

**F (Fillet)** Type R (for Radius) and type the radius you want to use & ENTER then select the two lines you want to fillet together.

**M (Move)** Select the objects you want to move & ENTER then select a base point and type in the appropriate coordinates.

**NOTE: you may want to create a line or two to use temporarily to make things easier and then Erase (E) them after.**
IMPORTANT NOTES:
- The two end rectangles are mirror images or each other.
- The Middle set of blocks is centered between the outer two
- Use the STRETCH, MIRROR, TRIM, EXTEND & FILLET tools along with others to modify what you have into this. **USE THE KEYBOARD SHORTCUTS**
- Create a DIM layer and setup the dimension properties so they look appropriate
- Change the properties of all the line to have a line weight of 0.30

Remember to SAVE when you are done 😊

You should now be quite proficient at using the shortcuts and understanding how the coordinate systems and other functions work in AutoCAD, but don’t worry you will get lots more practice throughout the rest of the course.

**Excellent Work!**

Let’s use these skills, and continue to improve them as we start our next assignment:

**CREATING FLOOR PLAN SYMBOLS, FIXTURES & APPLIANCES**