

**SESSION TWO**

In this session we will look at another drawing tool – HATCH– and some more modifying / editing tools – EXTEND, FILLET, MIRROR, SCALE and RECTANGULAR ARRAY. We will also look at LAYERS, LINETYPE, BLOCKS and the use of the PROPERTIES function.

SCALE



This is an extremely useful tool and can be used on anything from small individual objects to whole cities. It is the tool we'd use to convert a plan with metres as the units to one measured in millimetres.

click on the SCALE icon or type SC and press enter

select the object / line / text to scale by clicking or by using the selection rectangle/marquee - you can select as much as you like. if you select something by mistake then simply type U and enter and it is deselected

press enter when you have them all

select a 'base point' - eg the centre of a circle or corner of a rectangle. This point will stay in the same position whilst the rest of it will be 'scaled' outwards .

AutoCAD now asks for the scale factor – 2 would make it twice as big; .5 would make it half as big. To convert from metres to millimetres we would type 1000 press enter.

MIRROR



Produces a 'mirror image' of a selection, with the option of keeping or removing the original selection.

click on the MIRROR icon or type MI and press enter

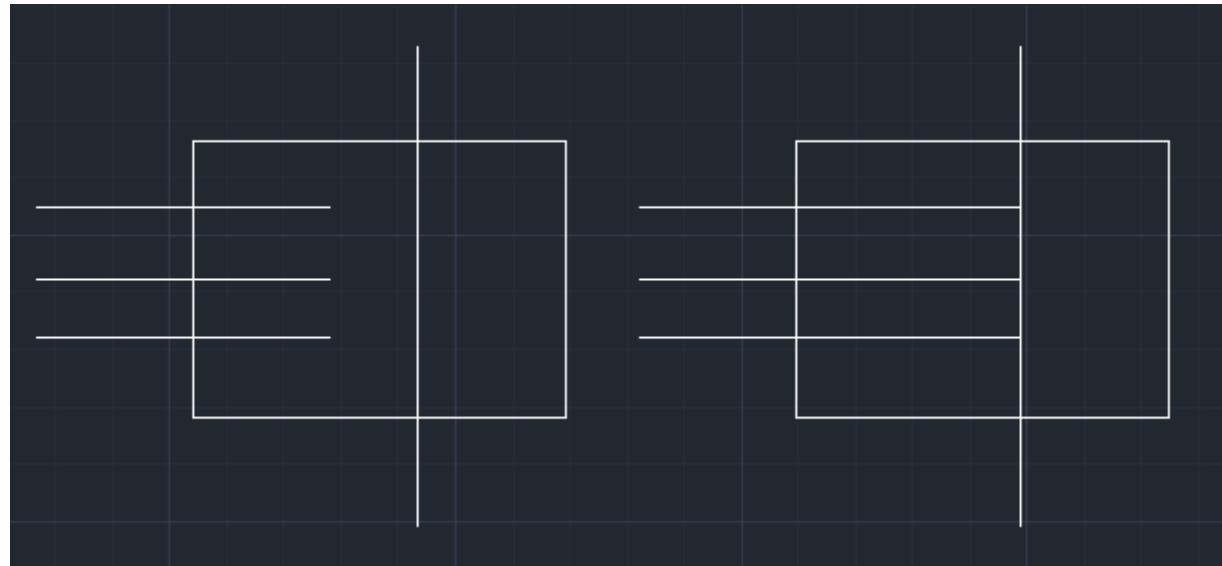
select the object / line / text to move by clicking or using the selection rectangle/marquee - you can select as many as you like - press enter to confirm your selection.

select the 'Mirror line' around which the original selection will be mirrored – this can be an existing line or an imaginary line which AutoCAD asks you to 'draw' by selecting the first and second (end) point

You are then asked if you want to erase the original or 'source' objects. Type Y for yes if you do or simply press enter and the default N is used.

**EXTEND**

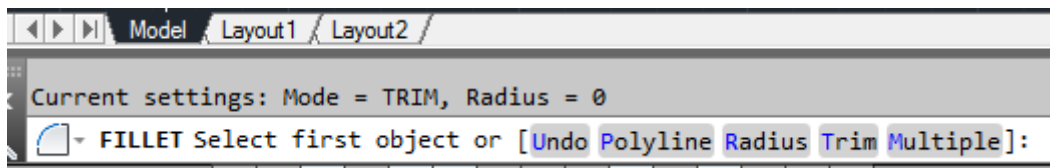
click on the EXTEND icon or type EXTEND and press enter  
 select the object / line to select the line to which you want the other objects extend to ( you can select as many as you like ) press enter to confirm your selection.  
 select the objects or lines to be extended - again as many as you want  
 press enter to end the command



NB you can select more than one object to extend by using the **Fence** tool - watch the Command line for when that option is available.

**FILLET**

This tool allows you to 'round' off corners

**FILLET / CHAMFER**

click on the FILLET icon or type FILLET and press enter

Look at the command line  
 type R for radius and then press enter  
 type the radius of the curve you want to add  
 select the first object / line and then the second - as per the instructions on the command line

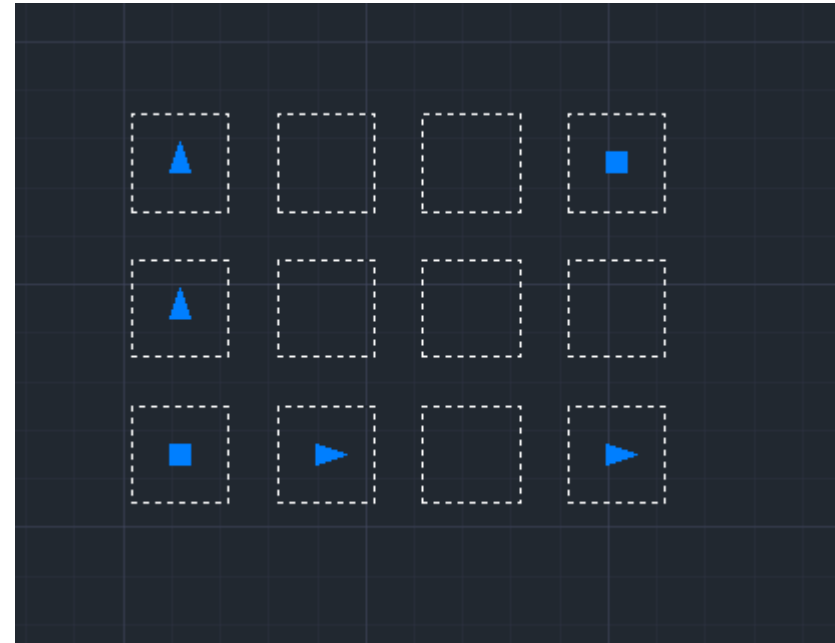
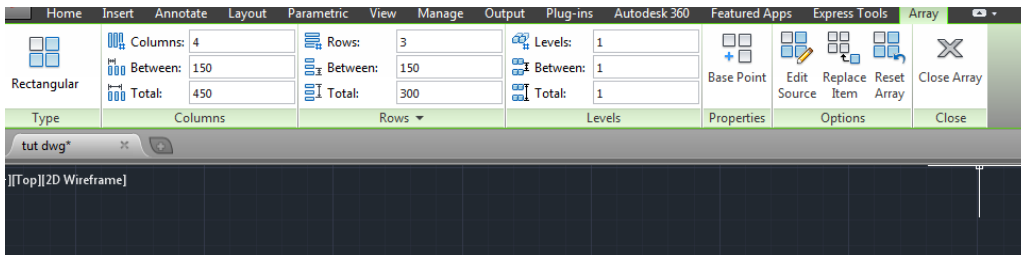




ARRAY

### ARRAY - RECTANGULAR

click on the down arrow on the ARRAY icon and select 'Rectangular' or type AR and select ARRAYRECT  
 select the object / line to be arrayed  
 manipulate the options on the new array tool bar at the top of the screen or move the blue handles on the array

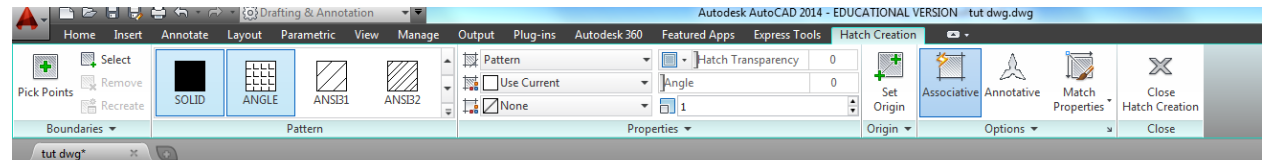


## HATCH



Hatching is a way of filling a space or an object with a pattern.

As soon as you click on the hatch icon the Hatch toolbar appears. Take a while to try out the different functions.



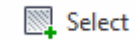
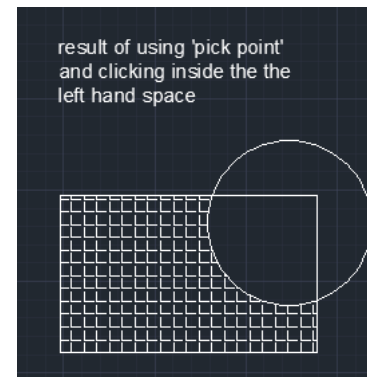
From left to right.... Boundaries

There are 2 ways of selecting the area to be filled / hatched – either select a space by 'Picking a point' within that space

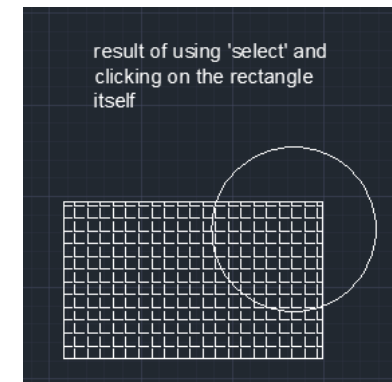
OR select an object to be hatched. The results are as seen on the right.



Pick Points



Select

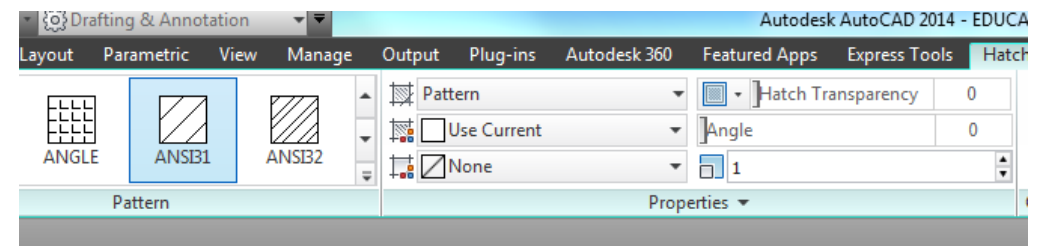


## Pattern

To the right of the 4 visible patterns there are 3 arrows. Click on the one at the bottom and the whole range of options appears. Many of these are 'standard' hatches eg earth or concrete. Select the pattern you want

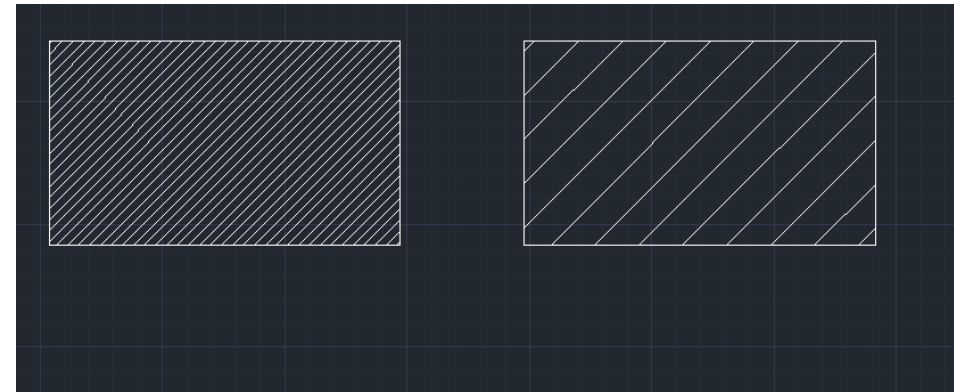
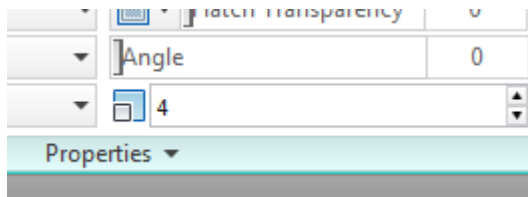
## Properties

You will become more used to how you can use this area later but for now the most important aspects are **angle** and **scale**. By adjusting the angle of a hatch you can make it fit to an object or use the same hatch pattern at different angles to show different materials.



In the example on the right I increased the scale from 1 to 4.

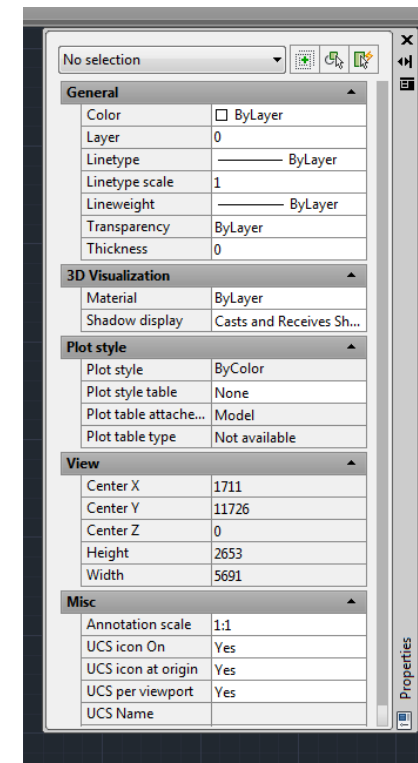
Sometimes the hatch does not appear- this is usually because the scale is too large. In that case try using lower scales eg 0.001. Often there is an element of trial and error with scale.



## PROPERTIES

**PROPERTIES**  
 click on the arrow in the bottom corner of the properties icon  
 drag the new window to the right hand side of your drawing space  
 to minimise - click on the side facing arrow and click again  
 click on any object and now look at the properties - everything in AutoCAD has properties. most of these can be amended - try changing the colour of an object by clicking on the down arrow next to the 'By layer' label next to the 'Color' label

We can use this method to make a number of changes to an object eg changing the width of a polyline.



## LAYERS

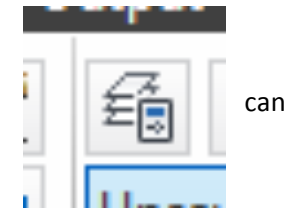
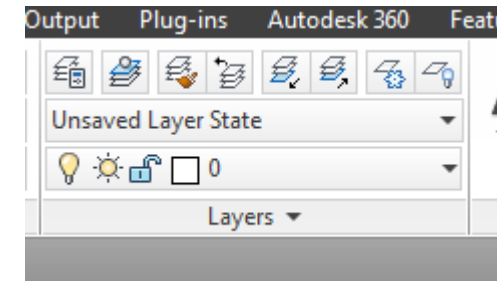
One of THE most useful aspects of AutoCAD!!

Layers are very important in AutoCAD for making a drawing easy to understand and edit, as well as enabling us to show and hide different parts of a design. A common example of this being applied in a working environment is the layering of hard and soft elements of a design, which can be “turned on and off” in different drawings to produce a series of plans that show, for example just the trees in one plan, just the paving in another etc.

Creating new layers and assigning different elements of a drawing to them is fairly simple, however it is important to try keep using them to ensure they can be used to their full extent.

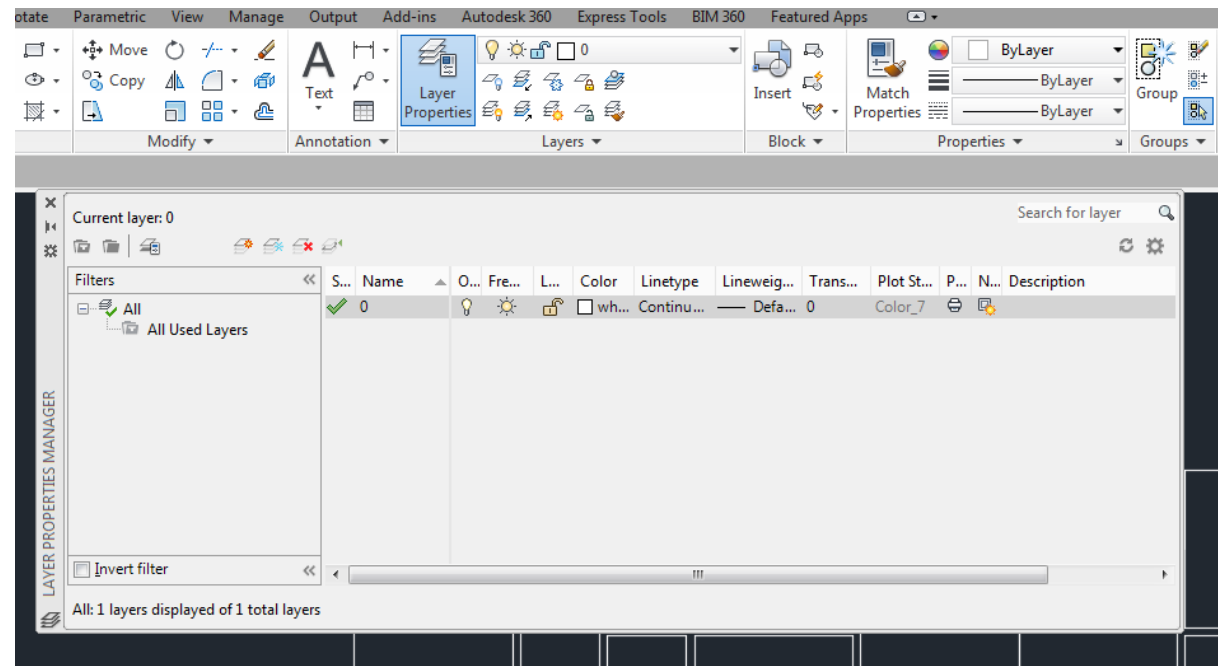
Open up the bicycle drawing you have done.

Click on ‘Layer Properties’ or type LA into the command line and the menu on the right should appear. As with the properties menu you ‘dock’ this tool to the side of your drawing and control its visibility by clicking on the arrow below the X for off button.



Click on the New layer icon or type ALT + N. This creates a new layer which you can name – say tyres. Click on the square below ‘Color’ and a palette appears. Choose a colour. Everything that is drawn on this layer or moved here will now be that colour. Create a few new layers in the same manner and when you are done ‘minimise’ the menu so it’s not in your way.

Open the properties menu. Highlight something from your drawing. Click on the 0 next to the word Layer. Click on the down arrow and then select one of the layers. The object is then moved to the new layer. Do this with all the objects in your bike drawing.

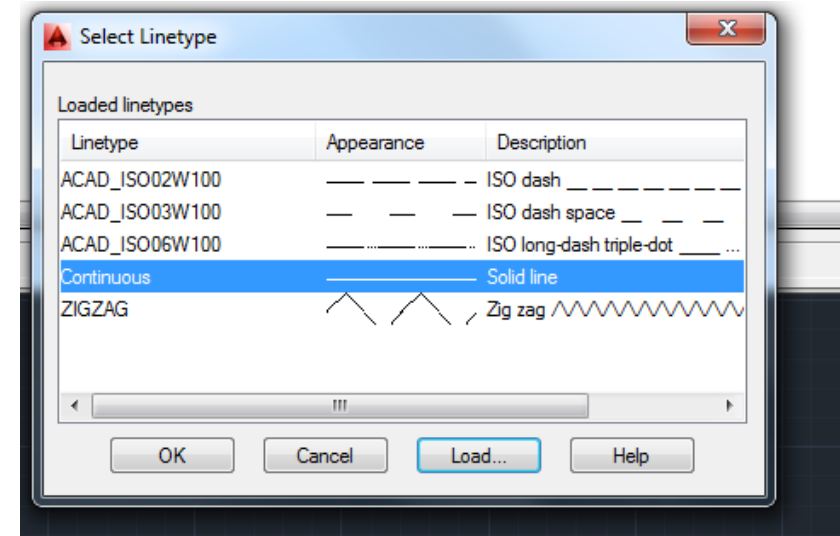
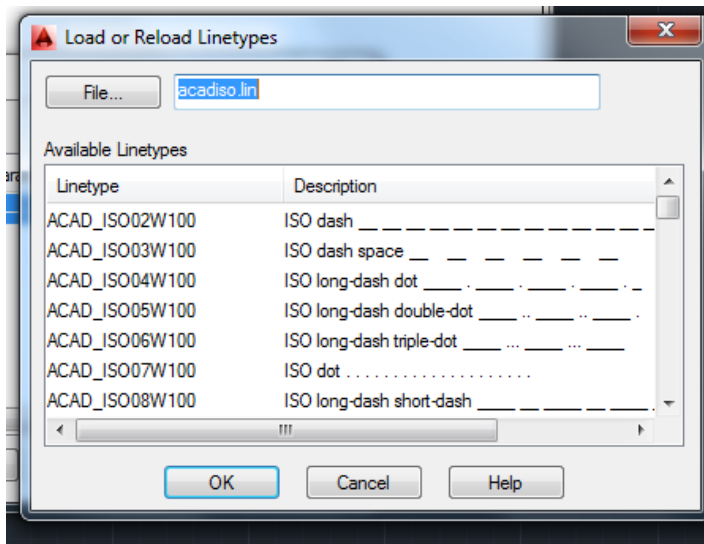
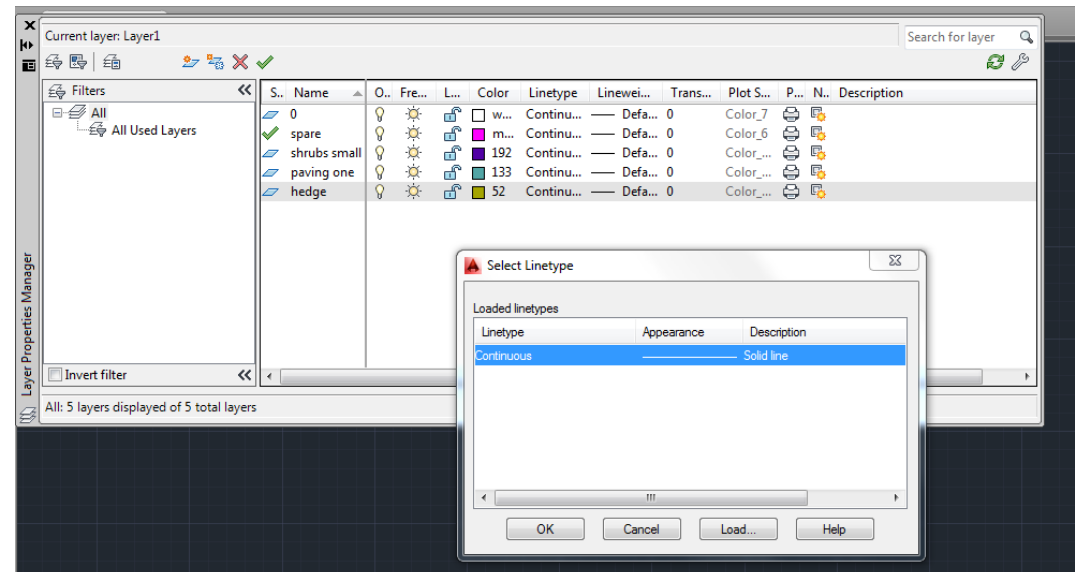


## LINETYPES

Loading and allocating new linetypes into the layers.

As well as giving each layer a different colour we can change the linetype of everything drawn on or moved to that layer. To do this :-

- open the Layer Properties manager as before.
- Click on the word "continuous" under the heading 'Linetype' and the 'select Linetype' menu will appear – as shown on the right. The default starting position is with just one linetype – ie 'continuous.'
- Click on the 'Load' button and the 'Load Linetypes' window will open – see image on bottom left
- Select the linetypes you want to use in the drawing and press "OK" (you can select as many as you need or you can return later and add more linetypes)
- After OK you will be returned to the 'Select Linetype' window where your new linetypes will be available in the list.
- In the background the layer we originally selected is still highlighted in grey.
- Click on the style of linetype you want to allocate to that layer and then press OK and the select linetype window disappears.
- You will see that the previously selected layer now has this new linetype allocated to it. Everything now drawn on that layer will be drawn using that linetype.

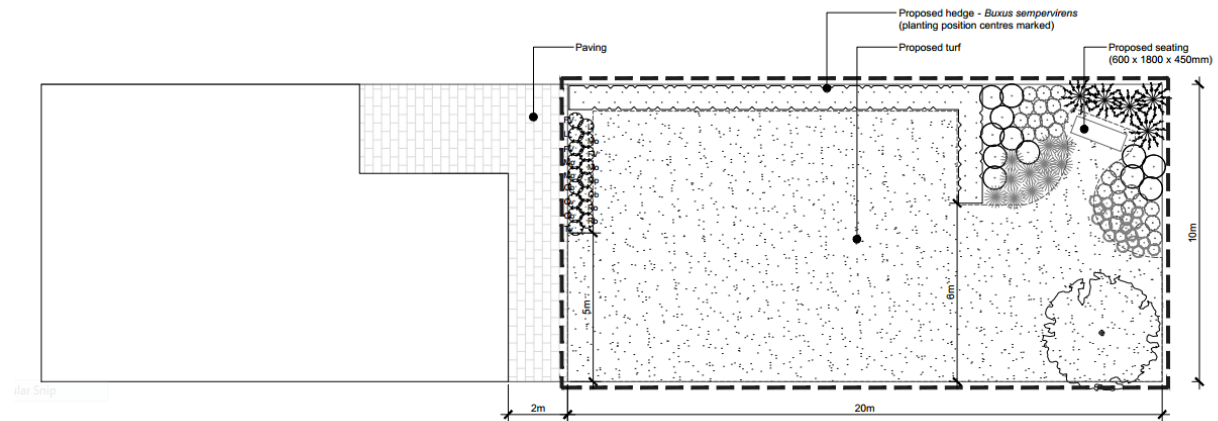


## GARDEN PROJECT

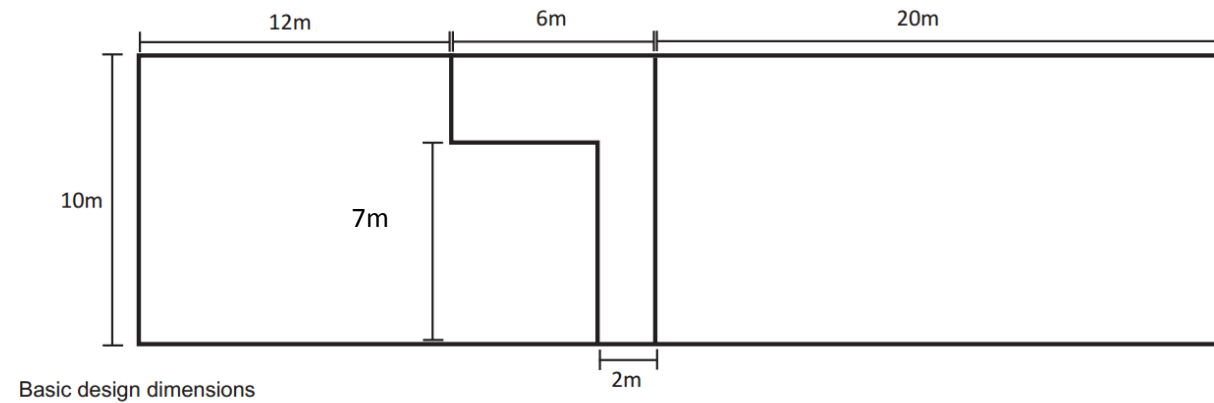
To practice some of our techniques and to try out new ones next week you are required to recreate the drawing on the right.

Basic dimensions are given below.

First set up a new drawing as described before – click on the red A for AutoCAD; select New; on the select template window click next to the open button and select 'Open with no Template – Metric'; set the units to millimetres; create a number of layers to cover the different elements in the drawing.



NB I usually try to have the hatches on separate layers from the objects they are 'filling'. I also have a brightly coloured 'SPARE' layer for testing out elements or laying out grids.





If you want to challenge yourself further try recreating this house and garden, adding more vegetation around the seating area.

