



Design out the box

Time 40-50 mins approx

Level of difficulty ★★☆☆☆

- CAD stands for **C**omputer **A**ided **D**esign.
- It is the use of computer technology to aid in the design of something.
- CAD can create 2D and 3D virtual models of goods and products.



Lesson Objectives...

- To understand the basic tools used in 2D Design.
- To understand the advantages of using CAD
- To be able to successfully use CAD independently to complete a range of tutorials in 2D and then in 3D
- To develop advanced skills and problem solving skills when using 2D Design

Skills to be used in this project...

Basic Skills	New and Higher Skills
Zoom tool	Rotate tool
Orbit tool	Move tool
Pan tool	Offset tool
Line tool	Arc tool
Rectangle tool	Text tool
Circle tool	Paint Bucket tool
Eraser tool	Bitmap tool
Delete part tool	Making Components

Basic skills are those required to do very basic drawings and are detailed as part of this presentation.

New and higher skills may be new to the novice and are the focus for learning in this presentation.

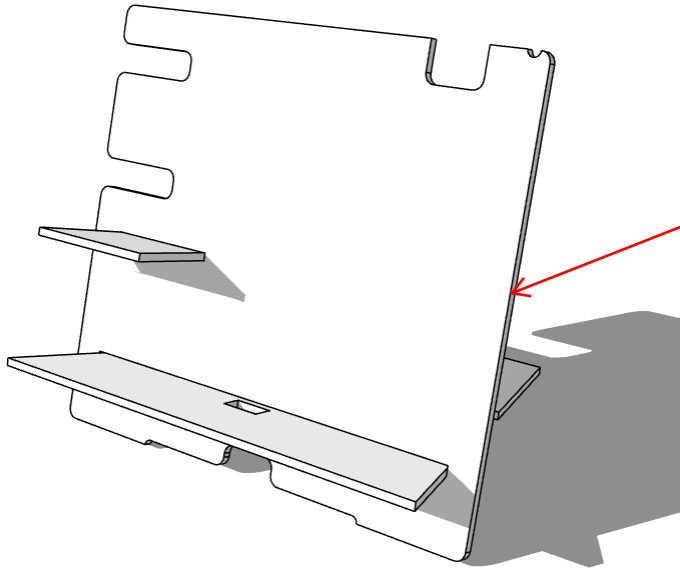
Skills to be used in this project...

Basic Skills	New and Higher Skills
Zoom tool	Construction lines and points
Orbit tool	Tape Measure tool
Pan tool	Arc tool
Line tool	Contour Tool
Rectangle tool	Bitmap Tool
Circle tool	Paint Bucket tool
Eraser tool	
Delete Part tool	

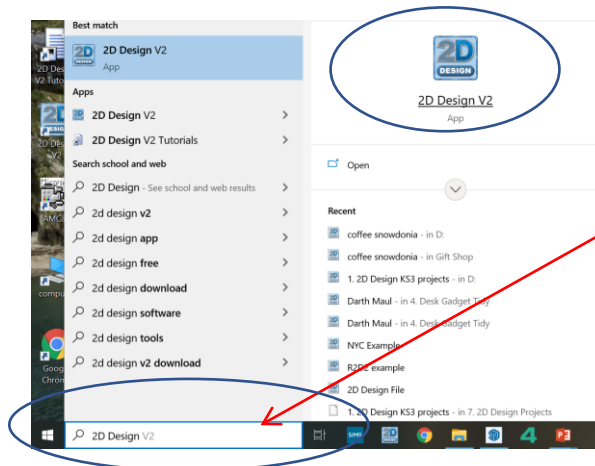
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2D Design Key Ring



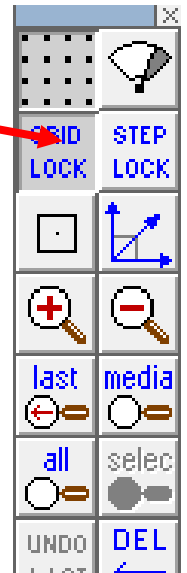
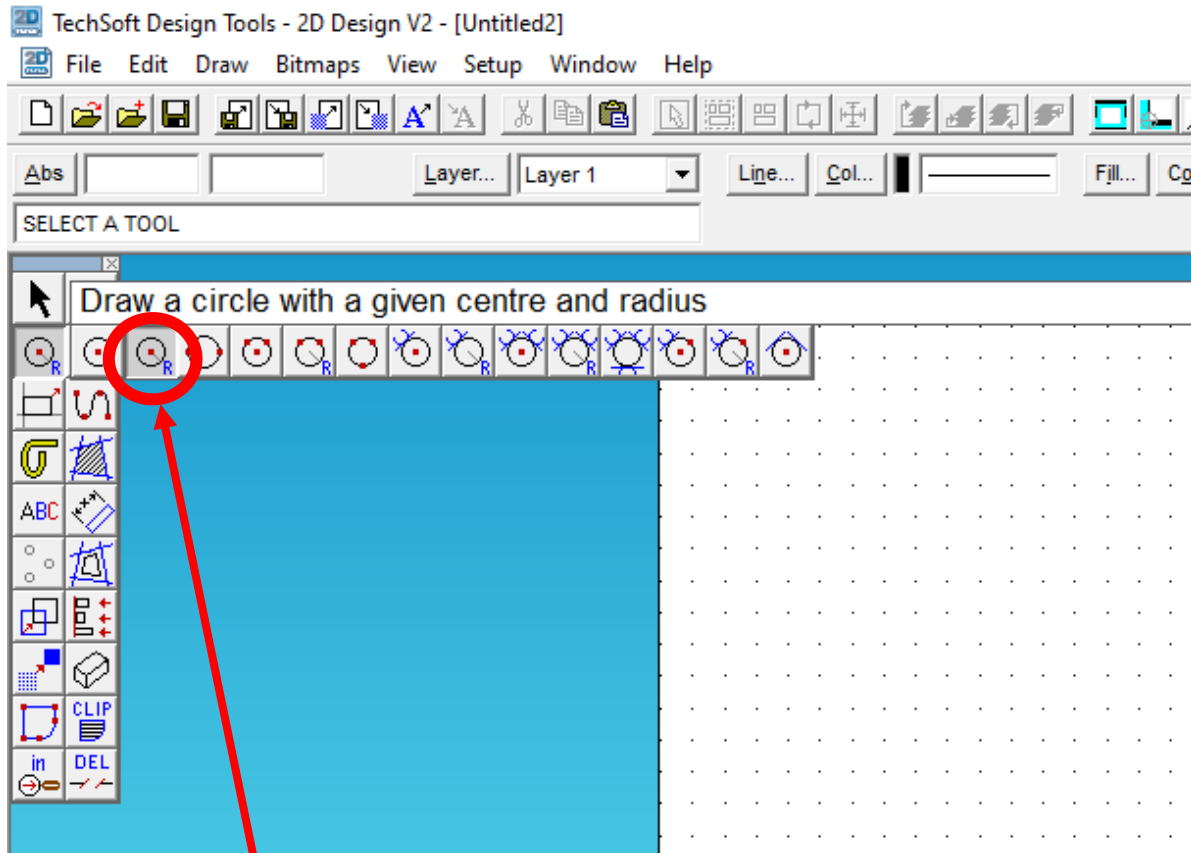
1. In **Sketch up** you have been using **3D** CAD to draw a desk tidy shown opposite. We are now going to use a **2D** piece of software to draw a design on it. First we need to learn the basics of 2D design....



2. Click **Start** and then use the search bar to search for 2D design



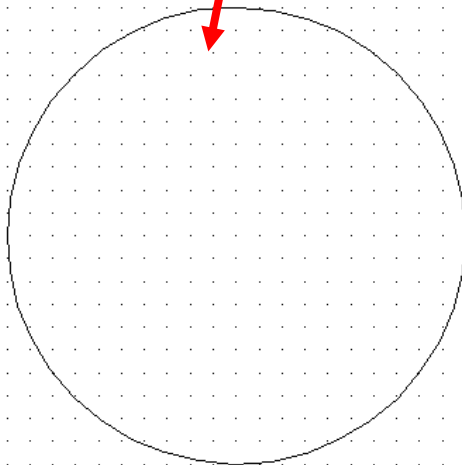
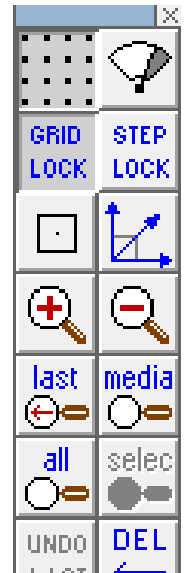
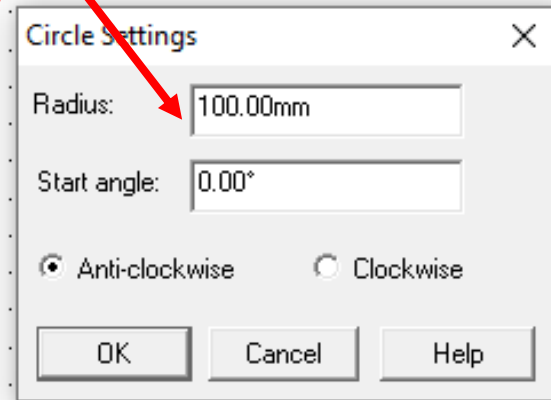
3. Click the **grid lock tool** shown on

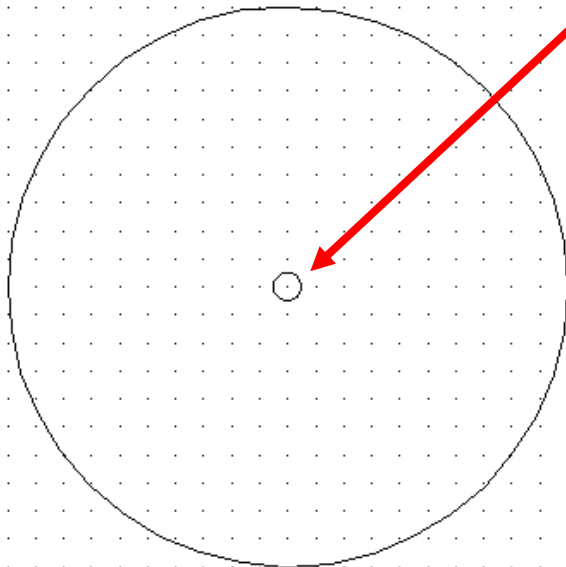
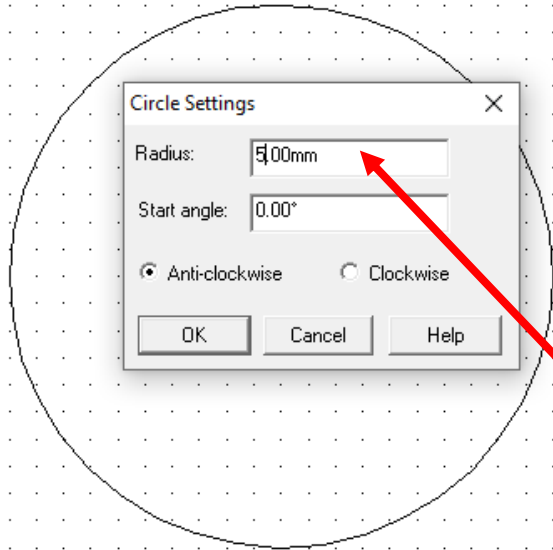


4. Click and **hold** the **Circle** toolbar down so it **extends** as shown. Click on **Draw a circle with a given radius**.

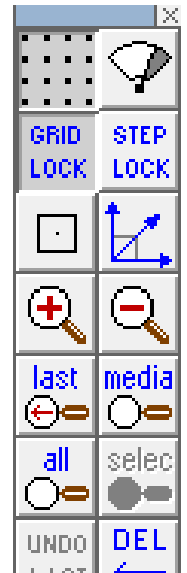


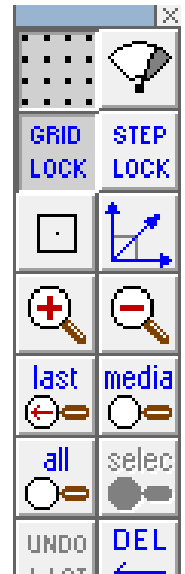
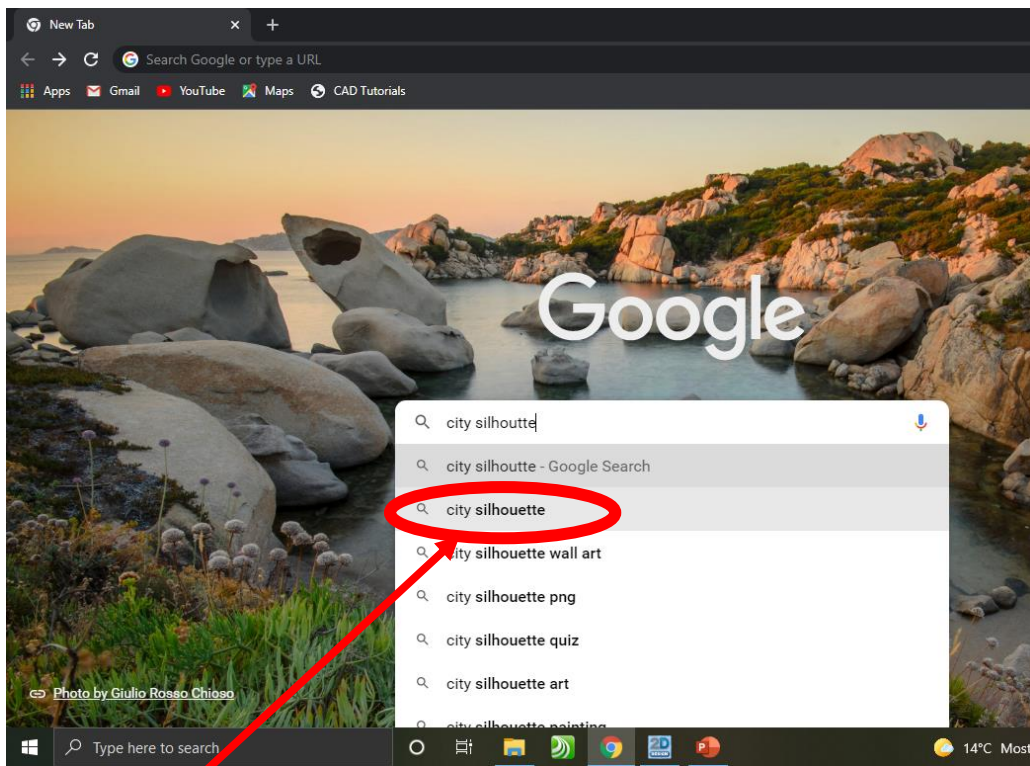
5. Click and **type 100mm** in the radius toolbar. Position the clock face on the page.



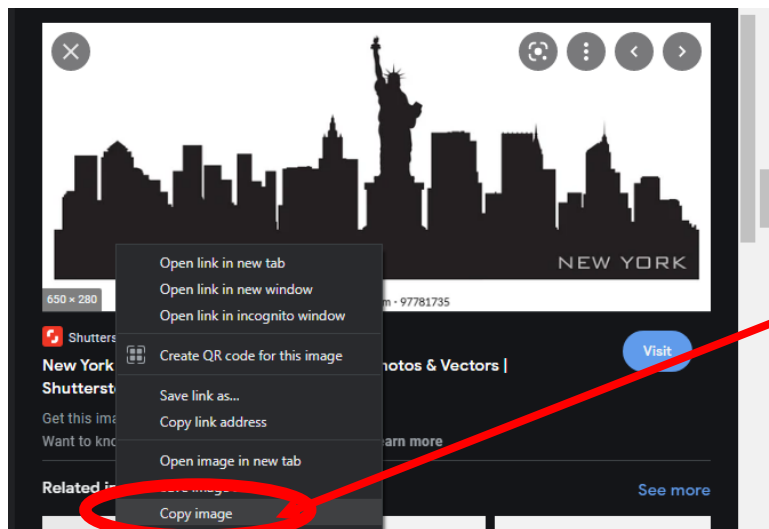


6. Click and **hold** the **Circle** toolbar down so it **extends** as shown. Click on **Draw a circle with a given radius**.
7. **type 5mm** in the **radius** toolbar. Position in the centre of the clock face. This is the hole for the clock mechanism and hands.

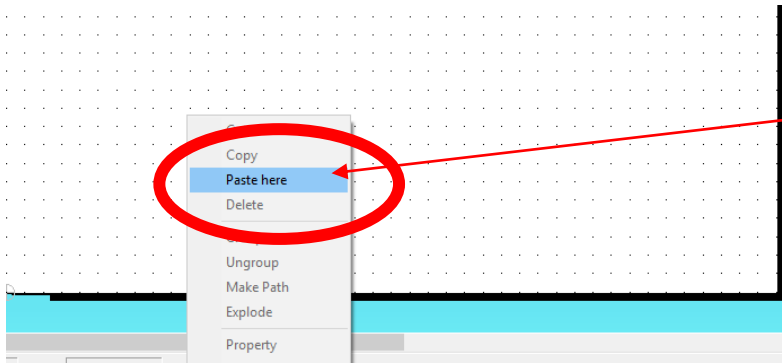




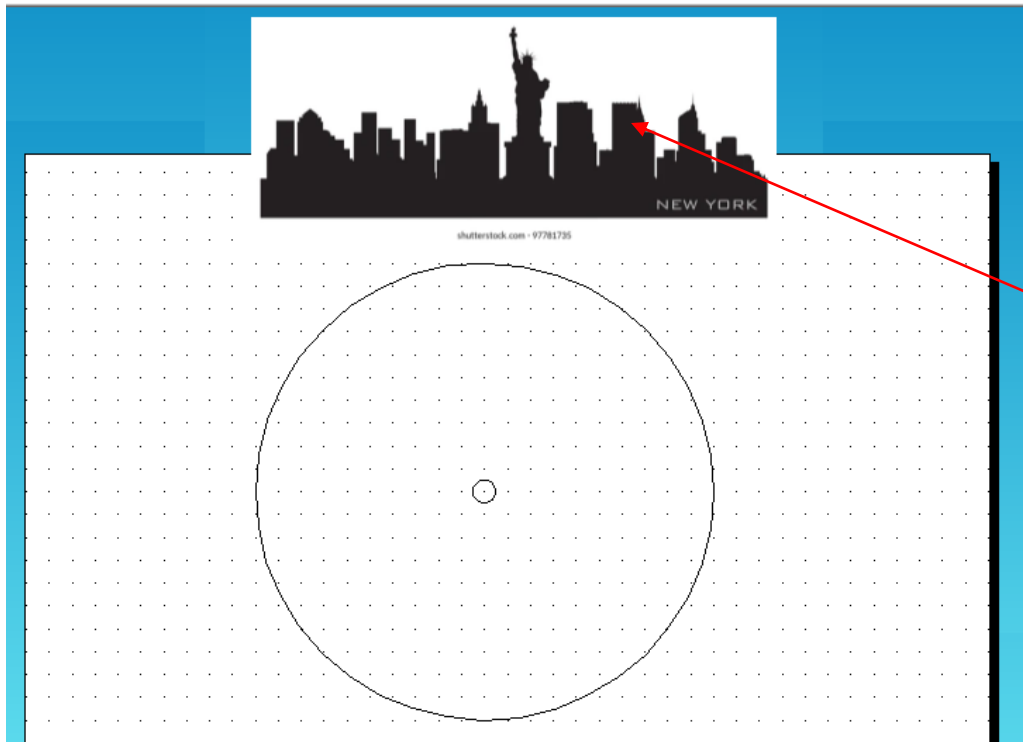
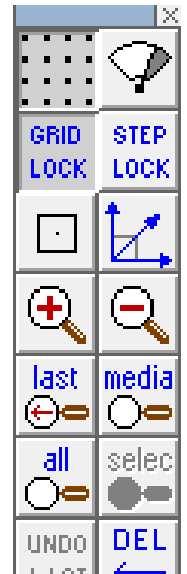
8. Search for a **city silhouette** images on the internet. Use NYC, London, Paris etc.



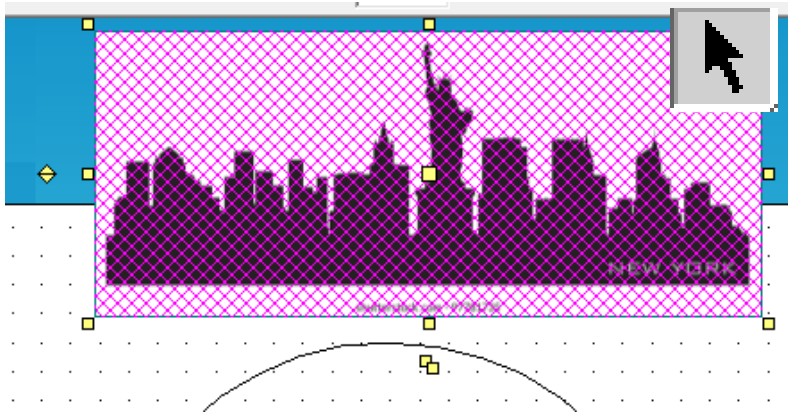
9. Once you have found a **city silhouette**. **Right click** on the mouse and **copy** the image



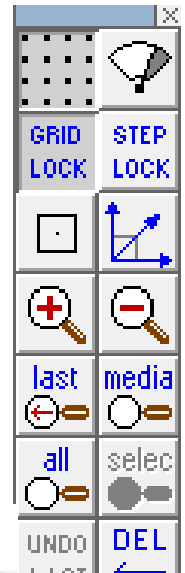
10. Go back to 2D design and **right click** on the mouse and click **paste here**.



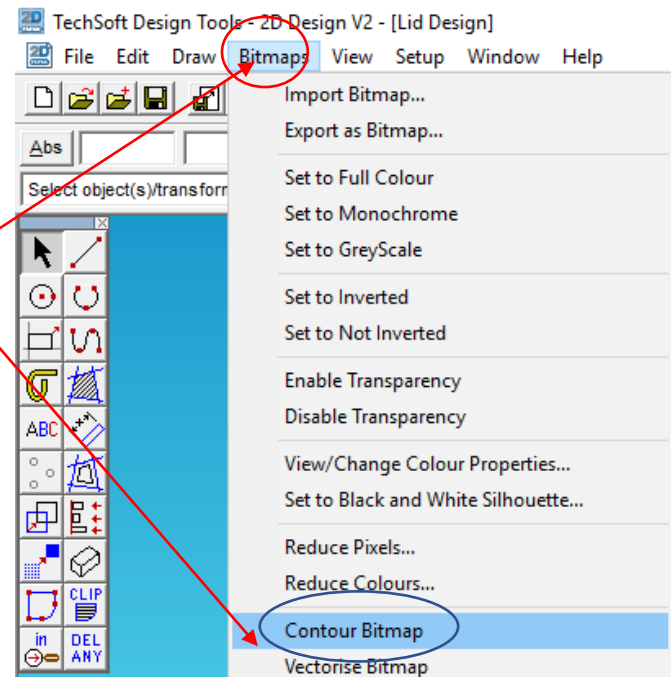
11. **Position** the image above the clock for now

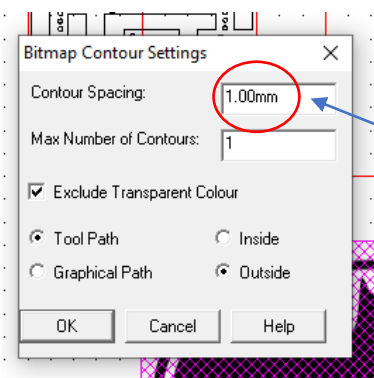


12. Using the ***select tool***, ***highlight*** the ***entire drawing by clicking on it.***

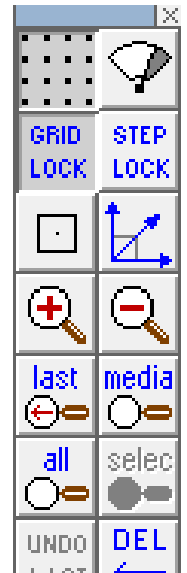


13. Select the ***Bitmaps toolbar***, ***at the top of the screen*** and scroll down until you come to ***Contour Bitmap*** and click on it.

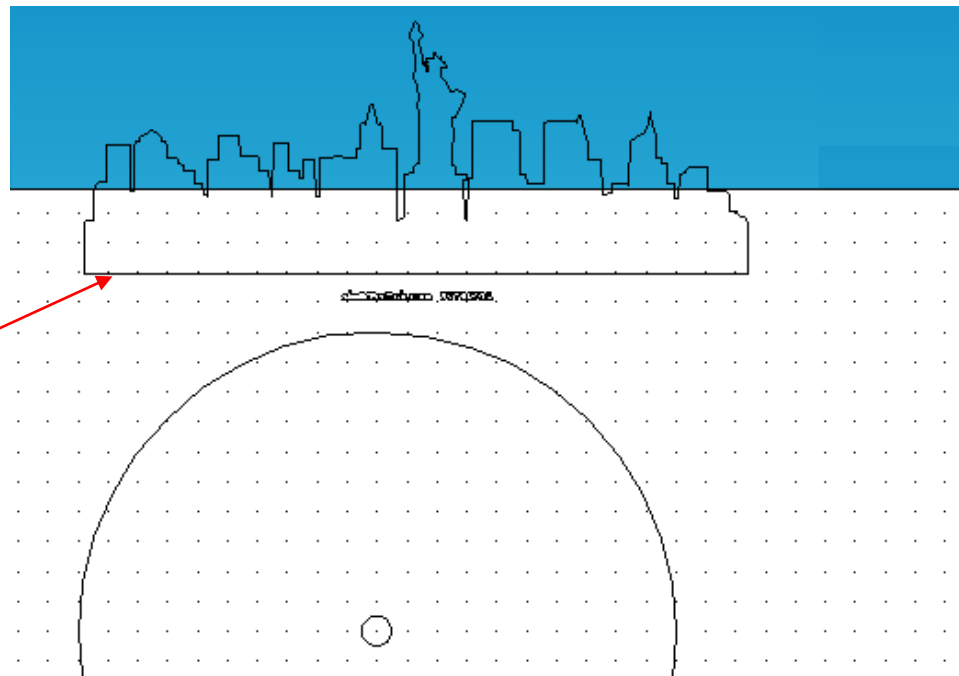


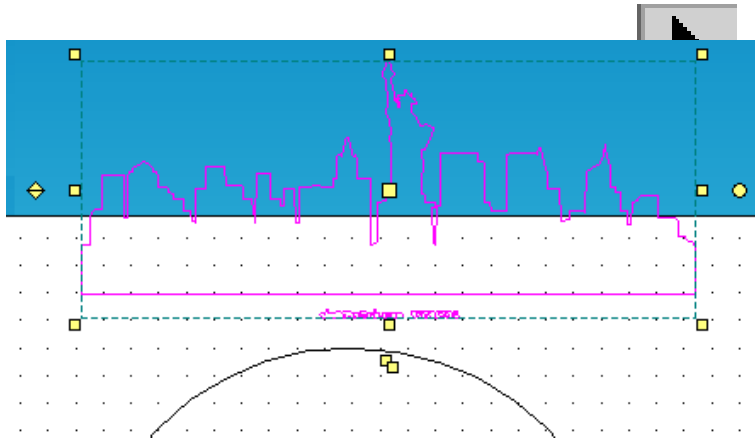


14. A Bitmap contour spacing pop up will appear. This basically traces the image. **Change the contour** from 5.00mm to **0.00mm**.

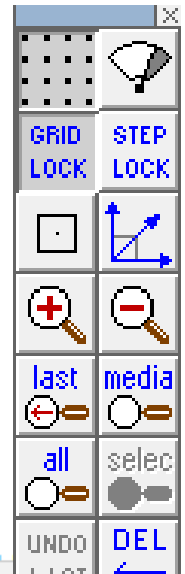


15. A contour or line should appear around your drawing. You need to click and delete the image to see if its worked. You should be left with a line drawing as shown

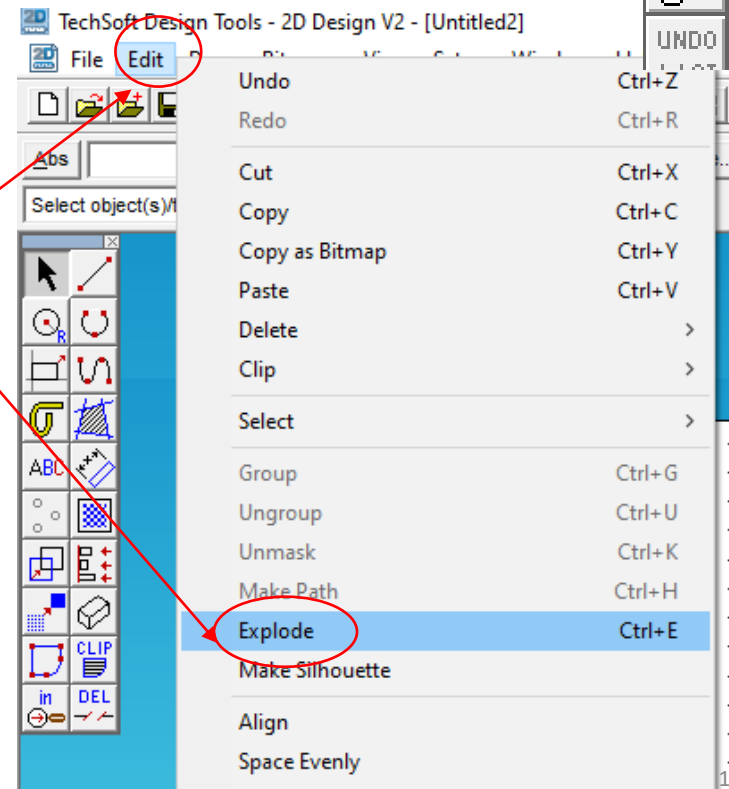


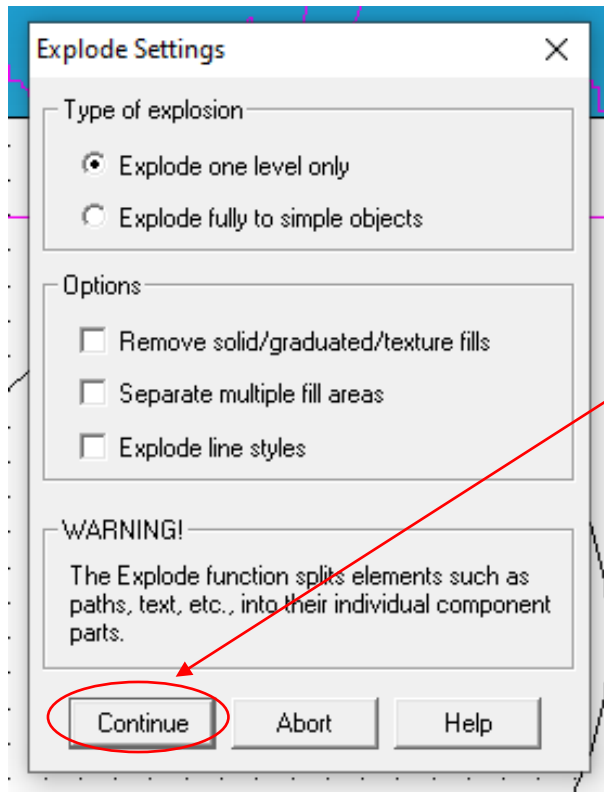


16. Using the ***select tool***, ***highlight*** the ***entire drawing*** by clicking on it.

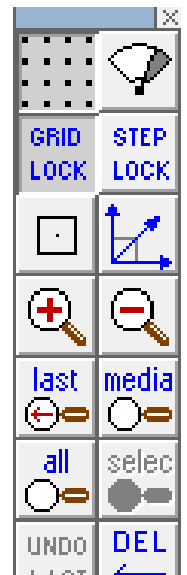


17. Select the ***edit toolbar***, at the ***top of the screen*** and scroll down until you come to ***explode***.

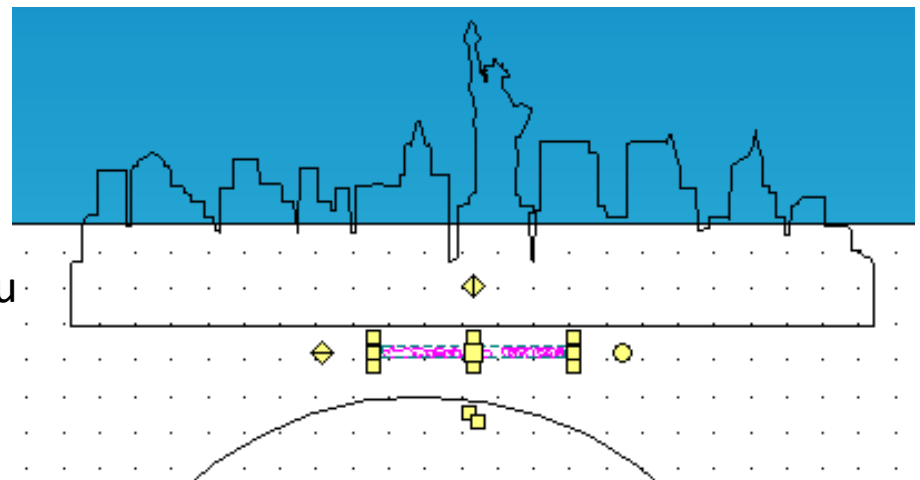


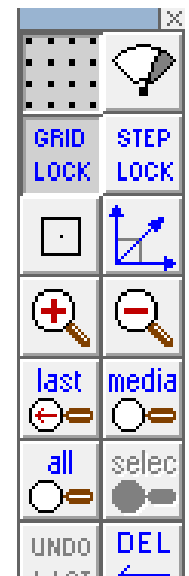
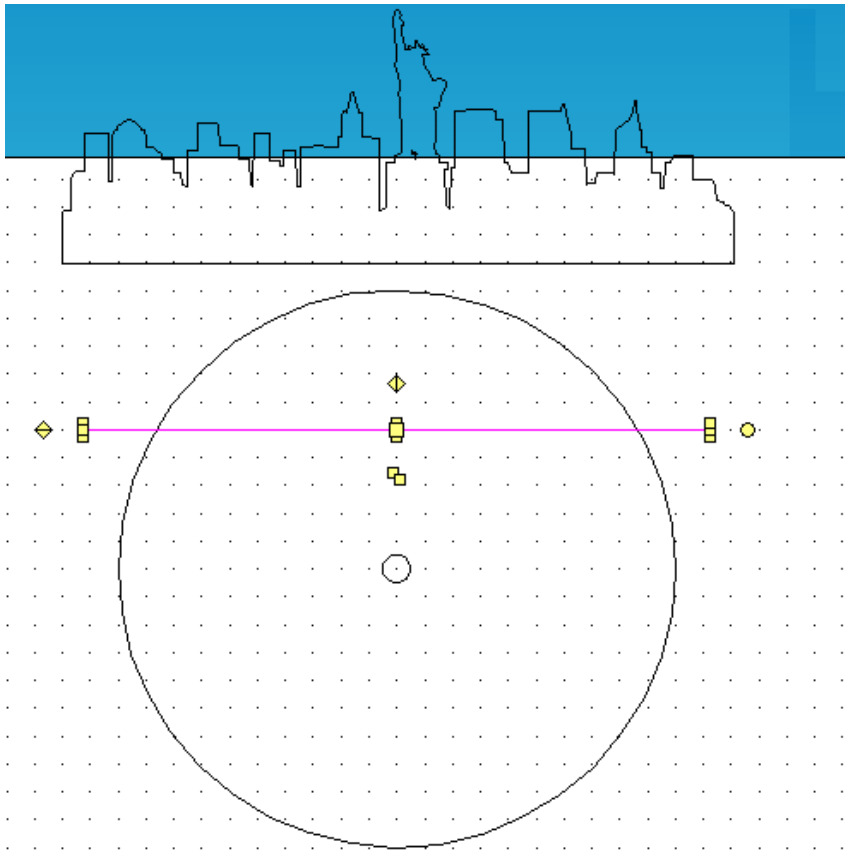


18. Select the *continue*.



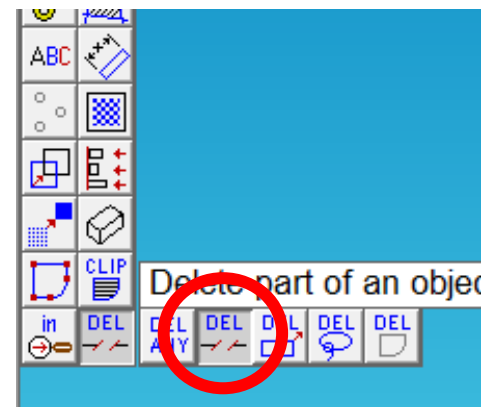
19. Using the *Select tool* **highlight** any writing that you don't want and **delete** them.

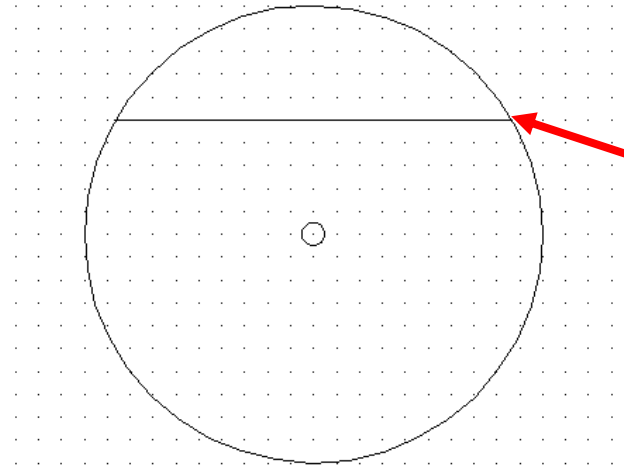
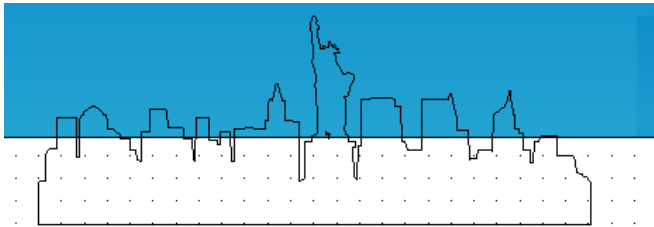




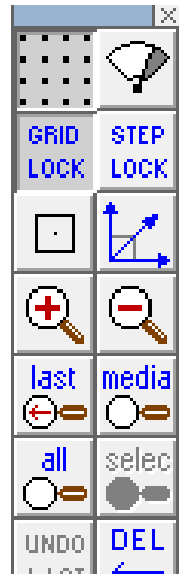
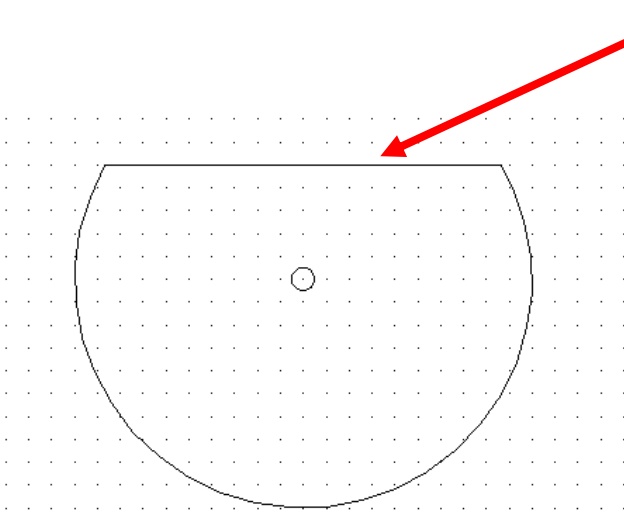
21. Click and **hold** the **DEL ANY** toolbar down so it **extends** as shown. Click on **DEL PART**.

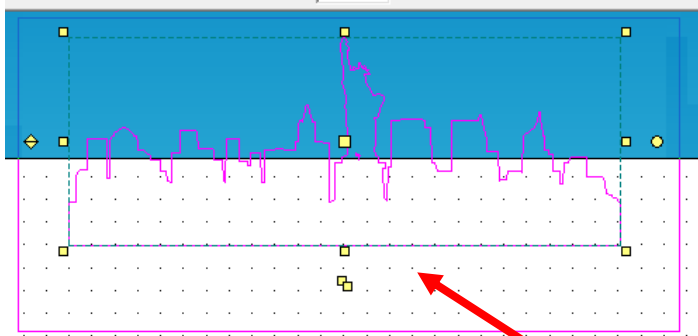
20. Using the **line tool** draw a line across the top quarter of the clock as shown. Ensure the line crosses over the edge of the clock.



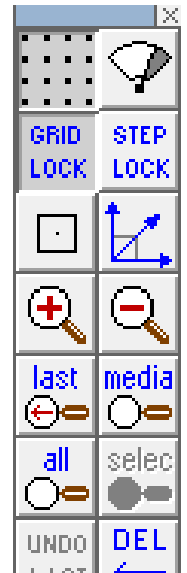
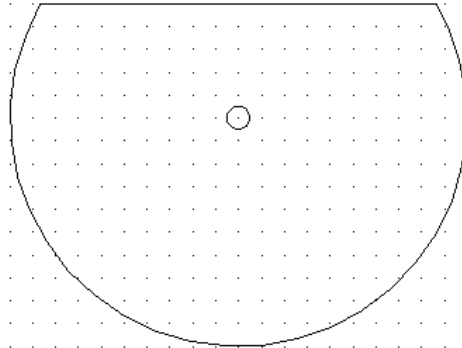


22. Using the *delete part tool delete* the lines sticking out and then delete the top quarter of the clock as shown.

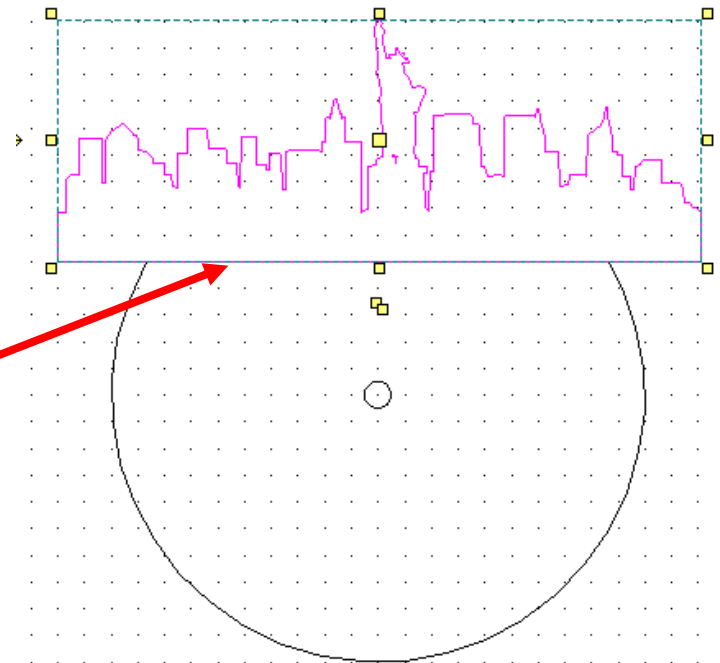


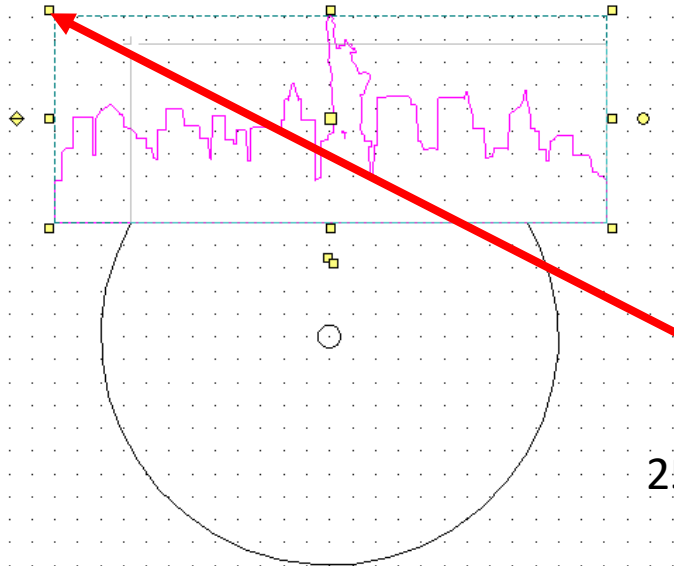


23. Using the **Select tool** highlight the city.

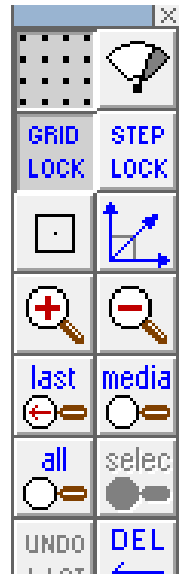
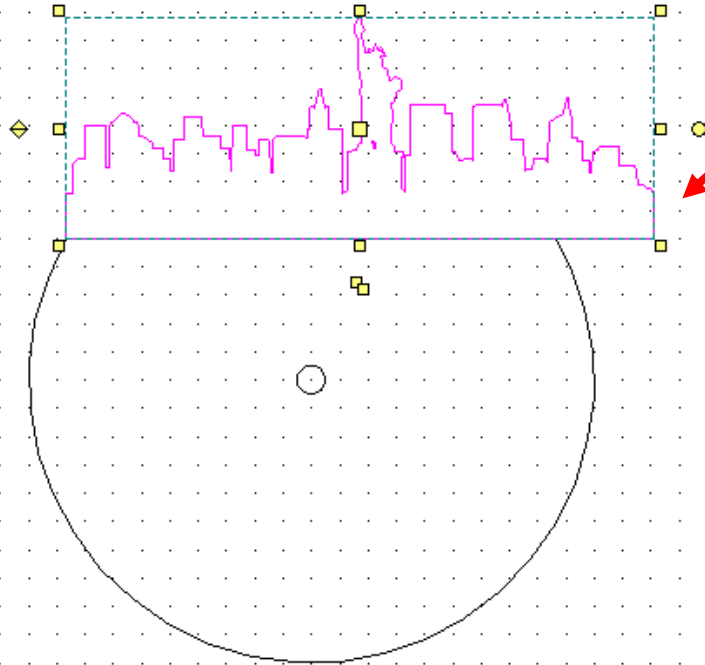


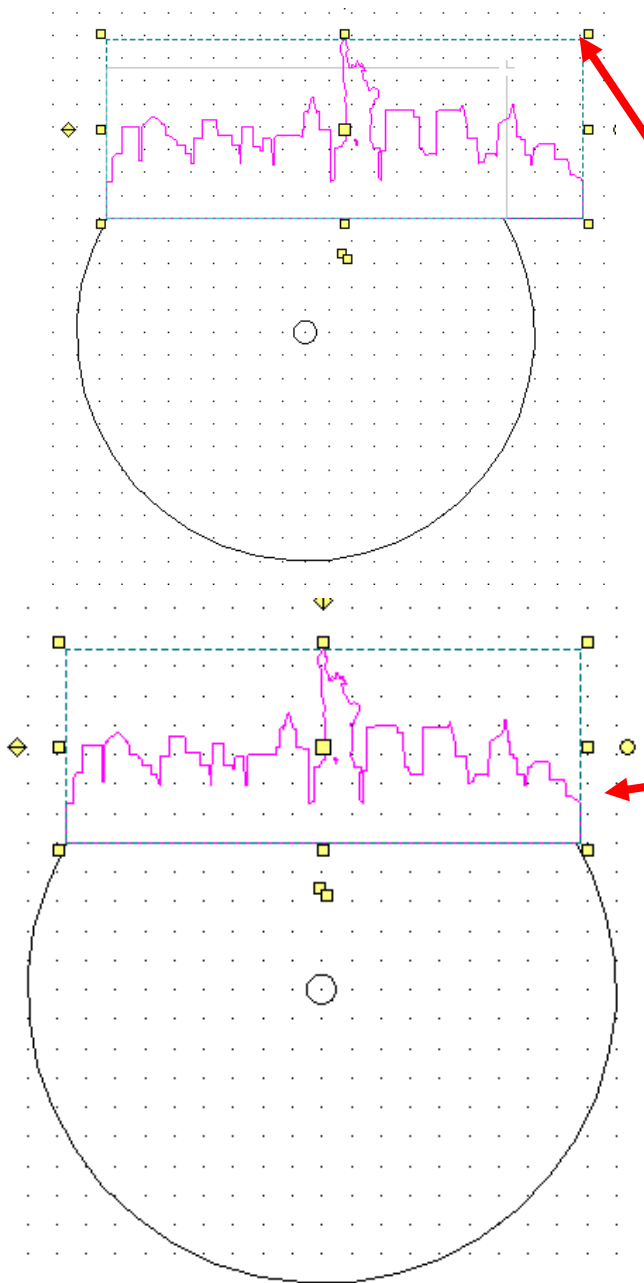
24. Using the **Select tool** move the city onto the **top of the clock**.





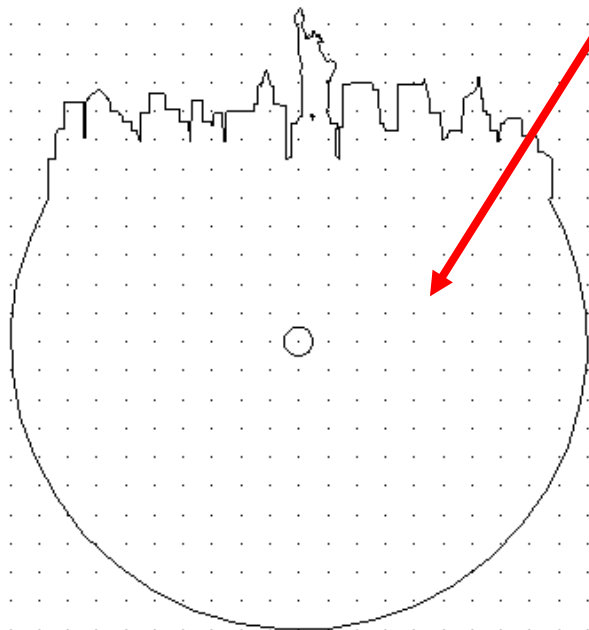
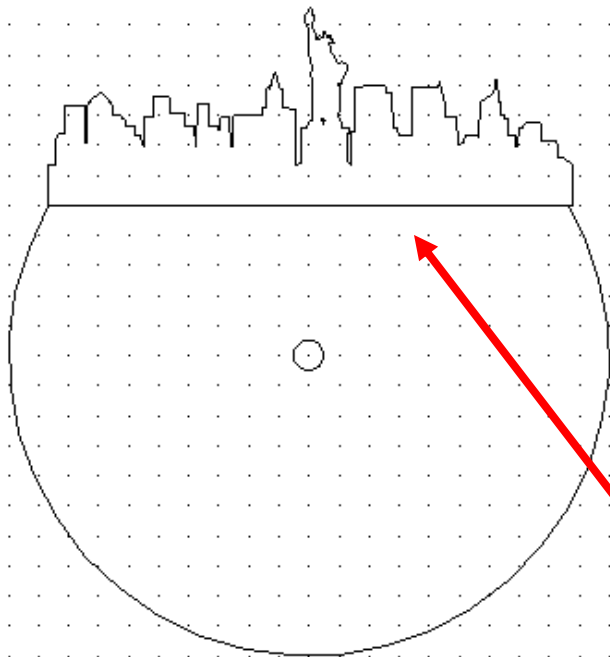
25. Using the **Select tool** click on **the top left square** of the city. Resize it as shown.



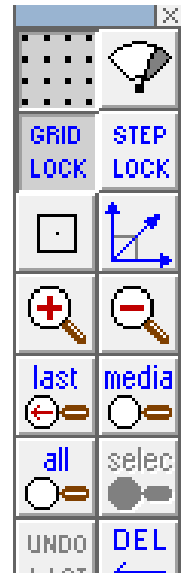


25. Using the **Select tool** click on **the top right square of the city**. Resize it as shown.





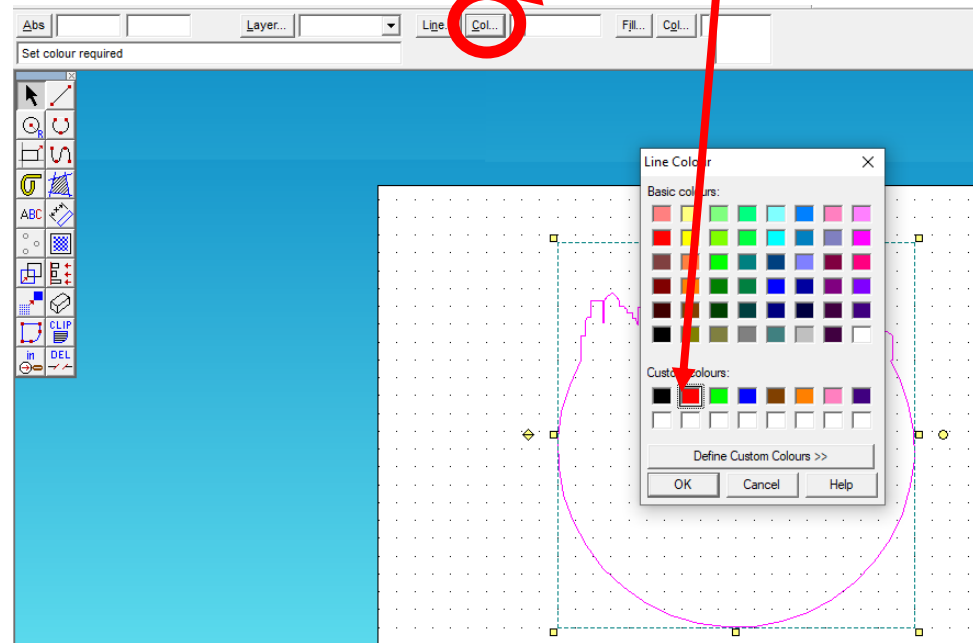
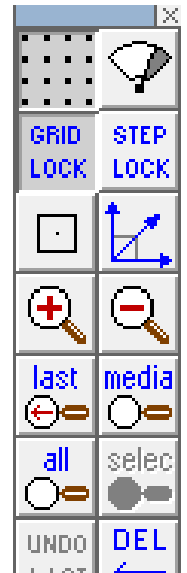
26. Using the ***delete part tool*** and ***delete*** the line separating the top and bottom of the clock to join the two parts together as shown.





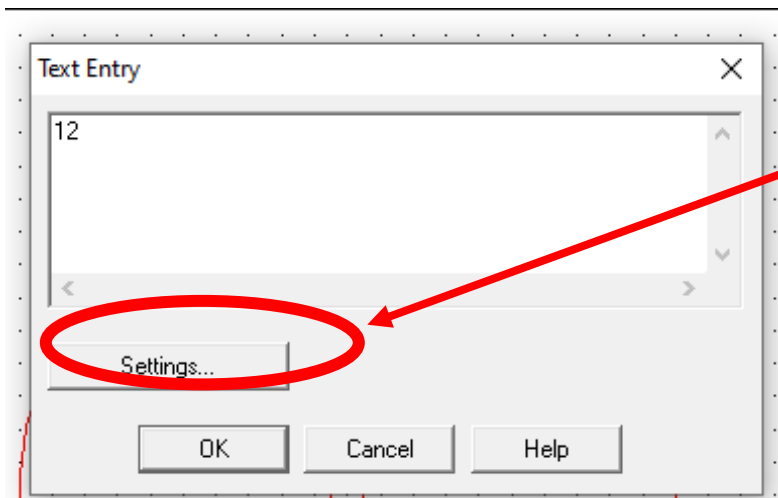
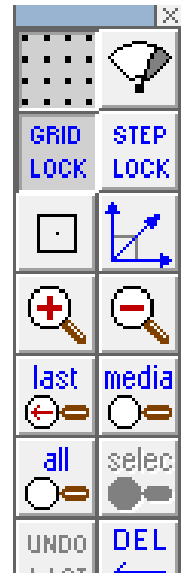
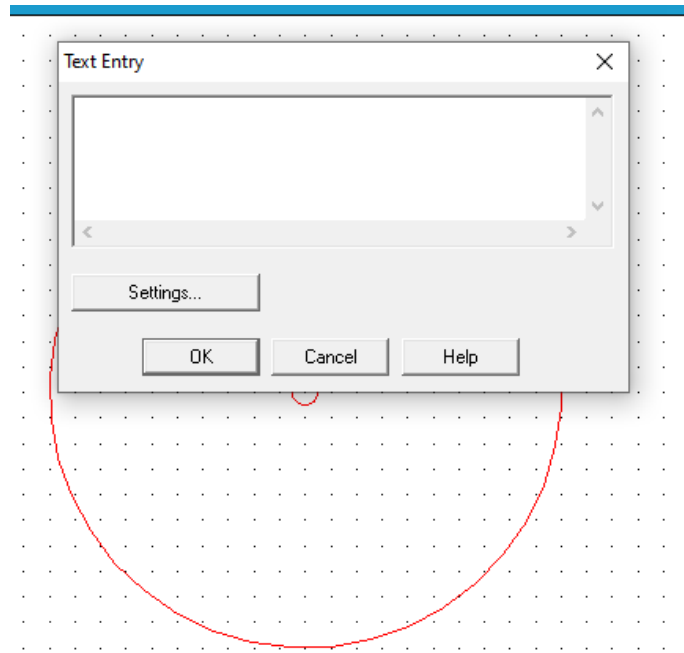
27. Using the **Select tool** *highlight* the entire clock.

28. Click on the line **Col tool** shown to bring up the line **colour palette** shown. Click on **red** as this is to **cut** on the laser cutter.

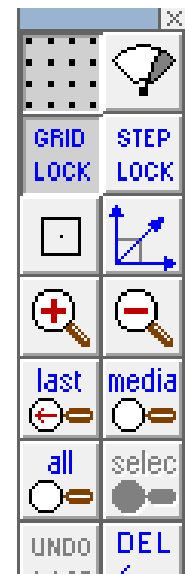
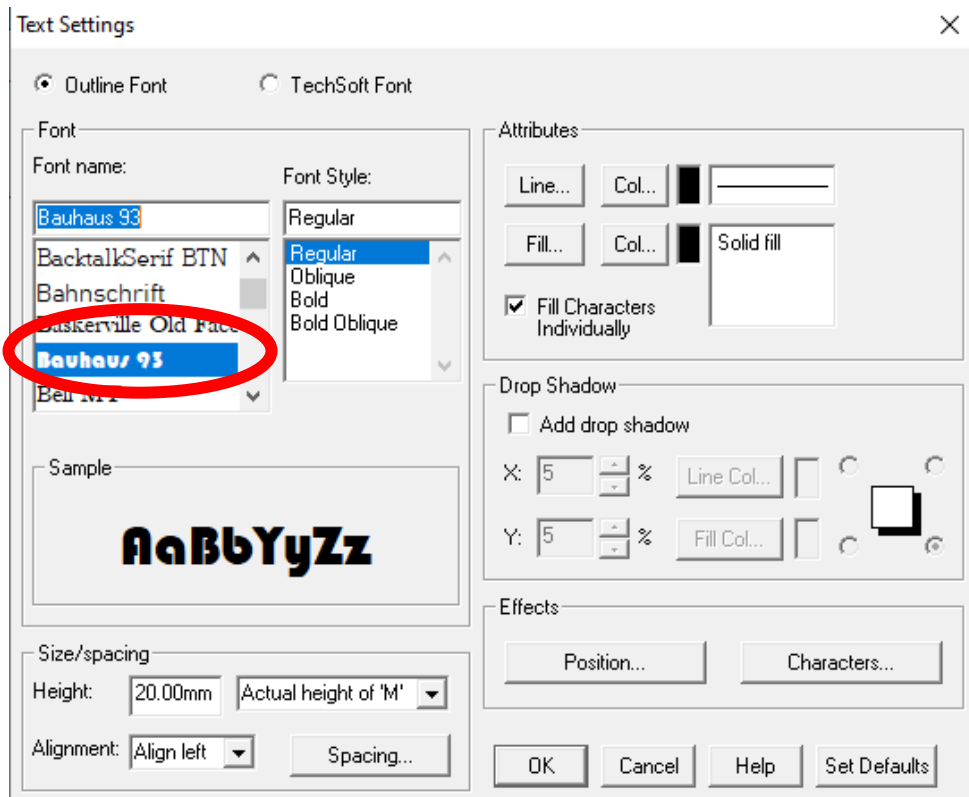




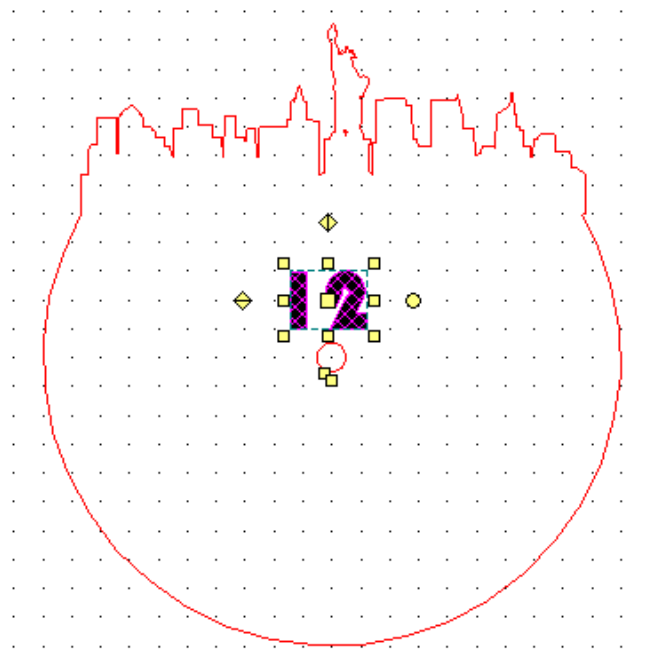
29. Click on the line **ABC (text) tool** shown to bring up the **text entry window** shown.



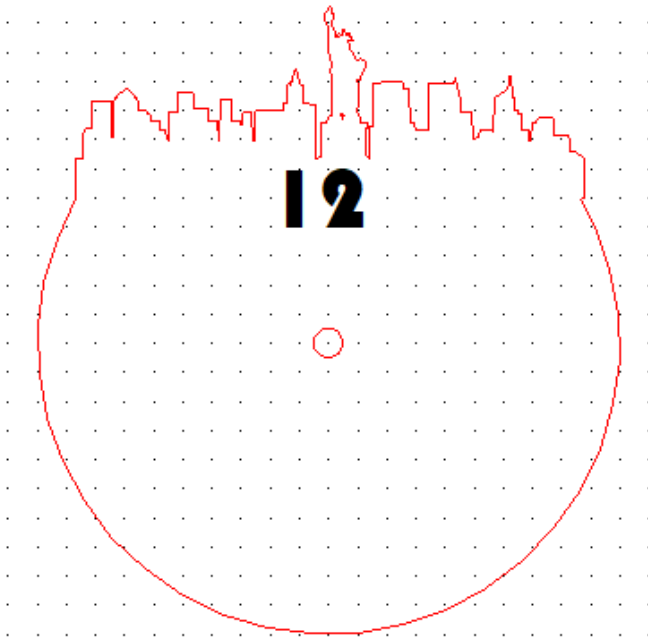
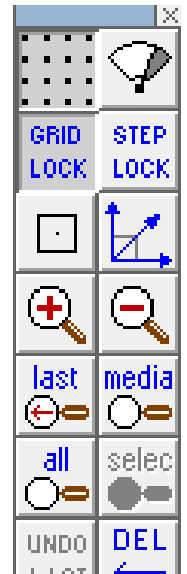
30. Type in the **number 12**. Then click on settings to choose your favourite font etc.....



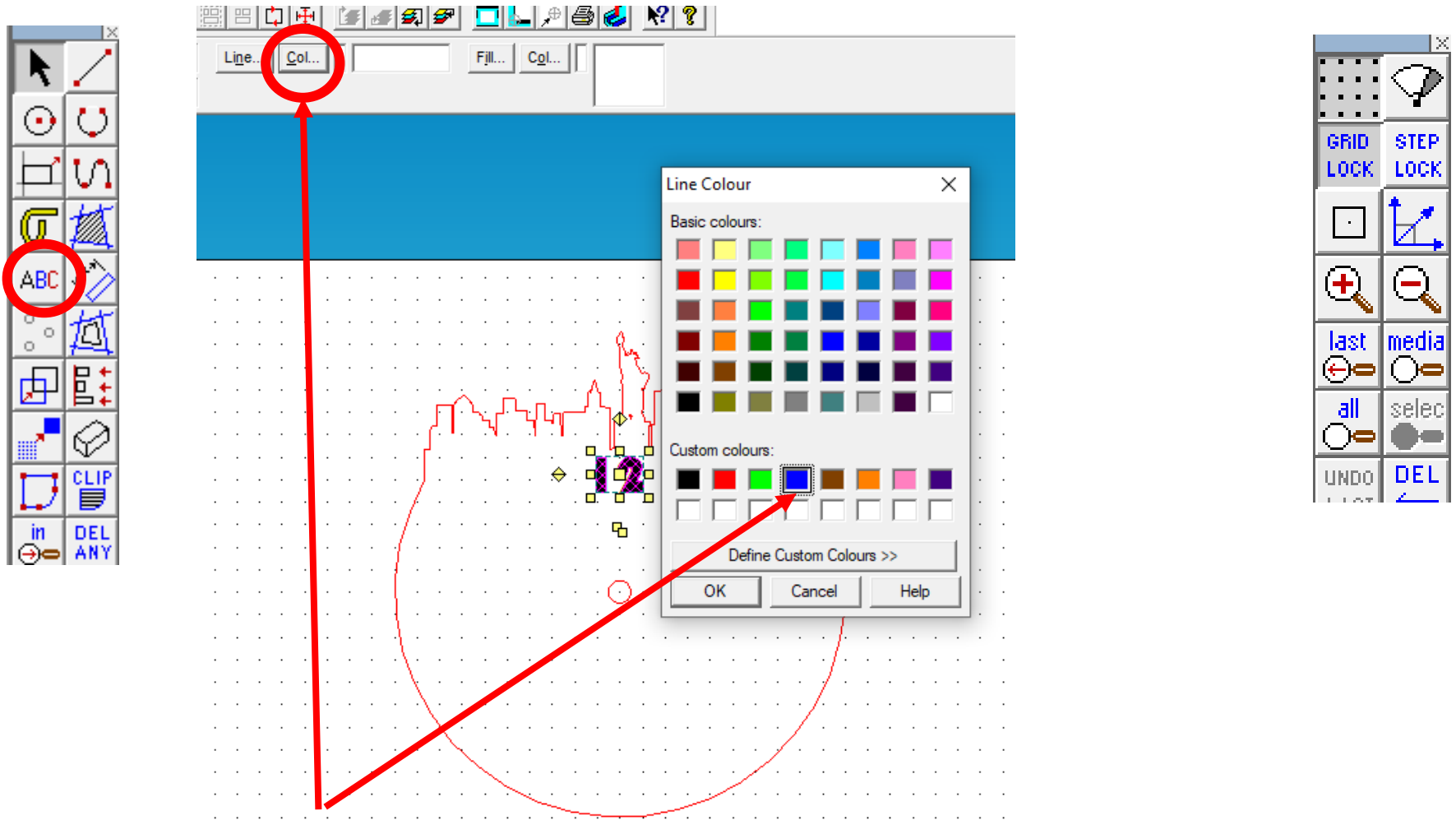
31. Once you have chosen your font click **OK** and then **OK** again..



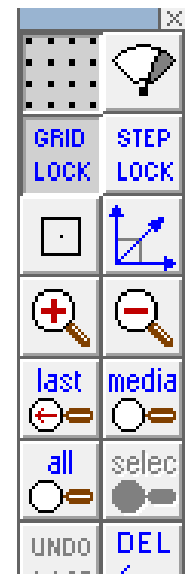
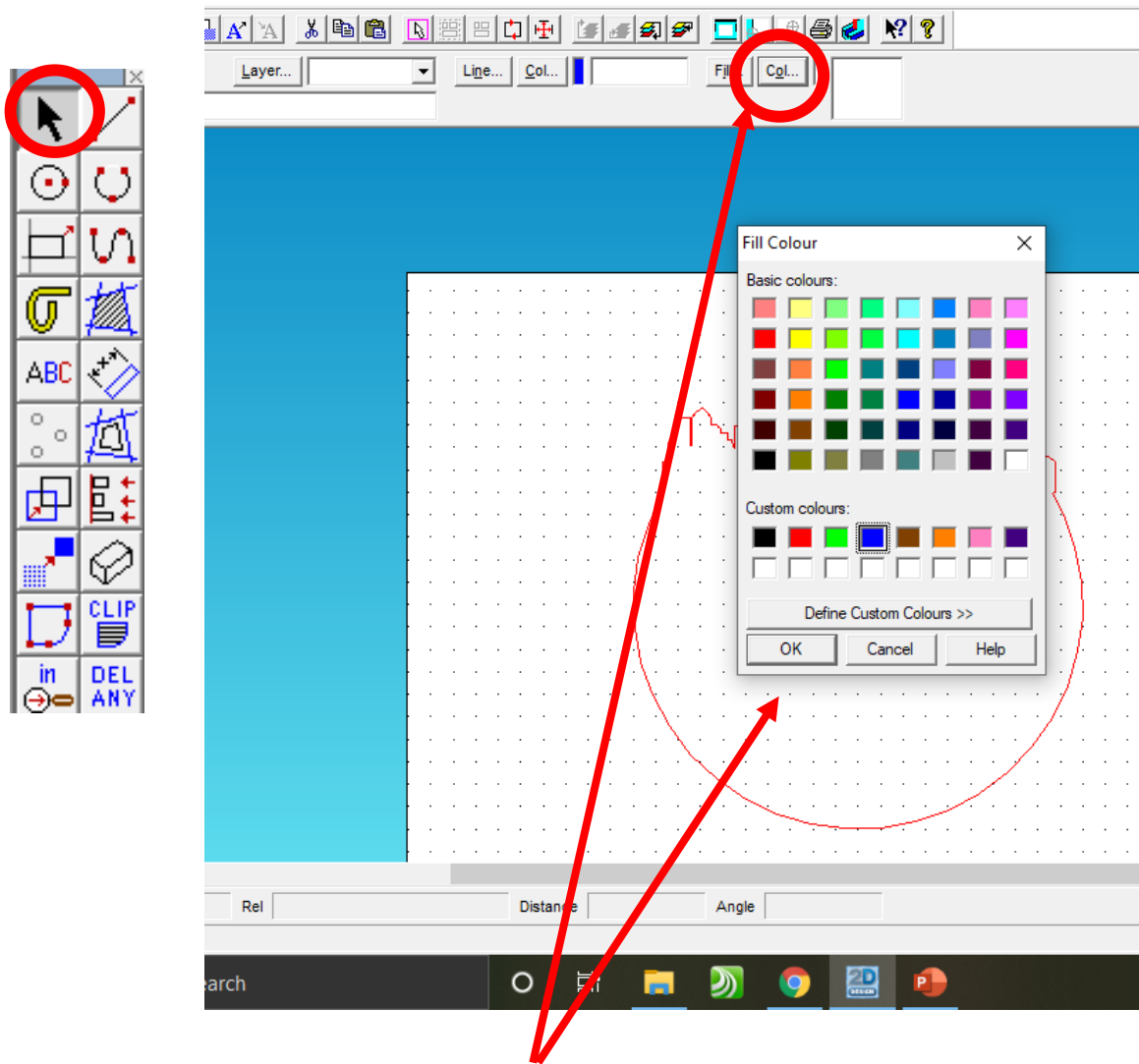
32. Using the ***select tool*** click on the number. It should then be highlighted



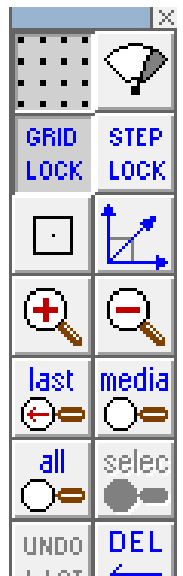
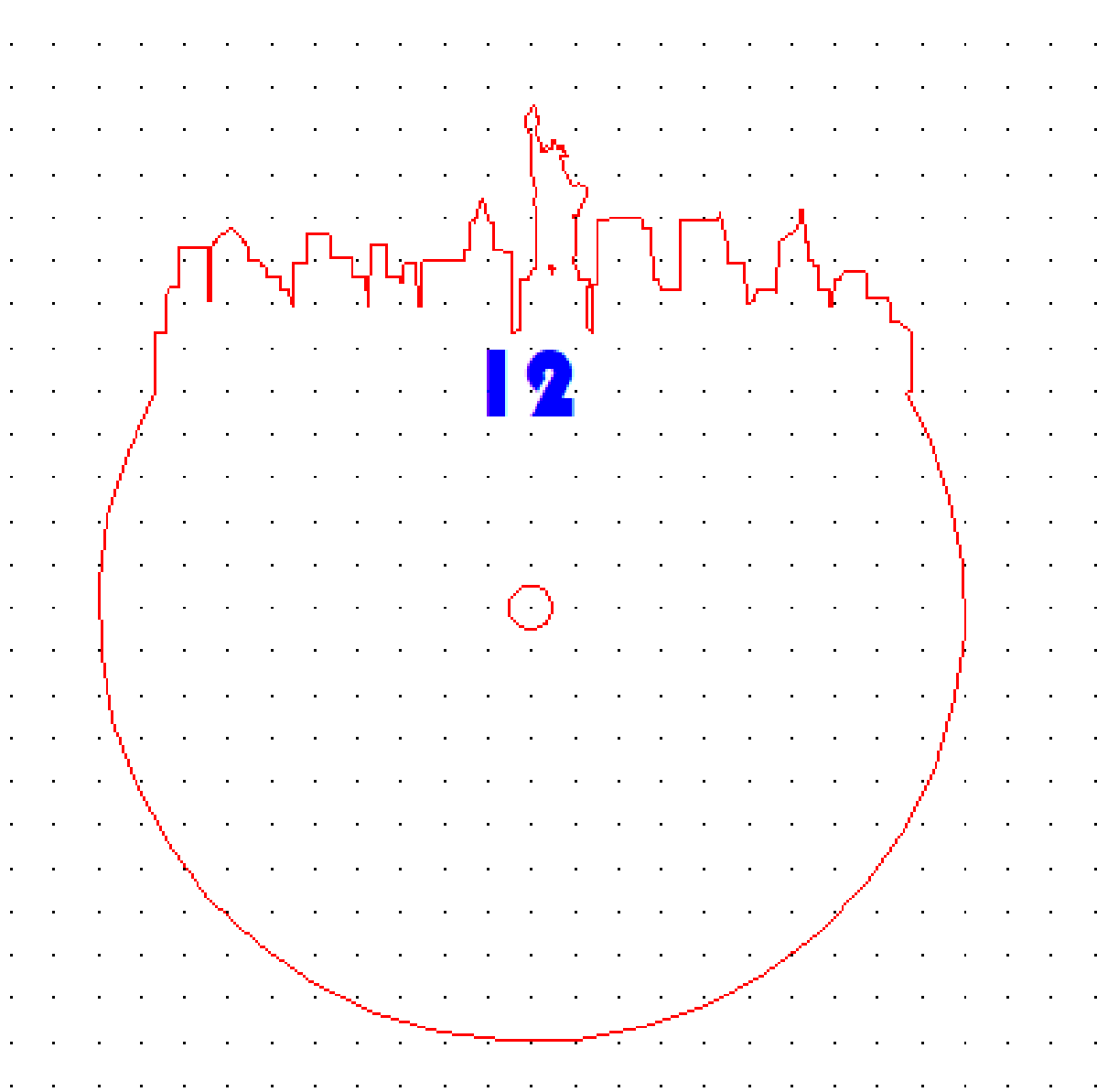
33. Using the ***select tool*** move it using the centre and near to the top of the clock. ***Position and resize.*** You may have to take grid lock off...

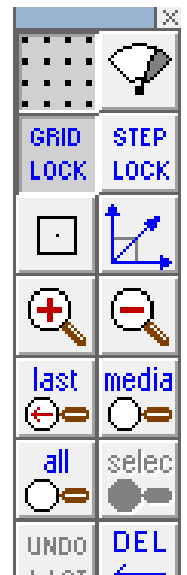
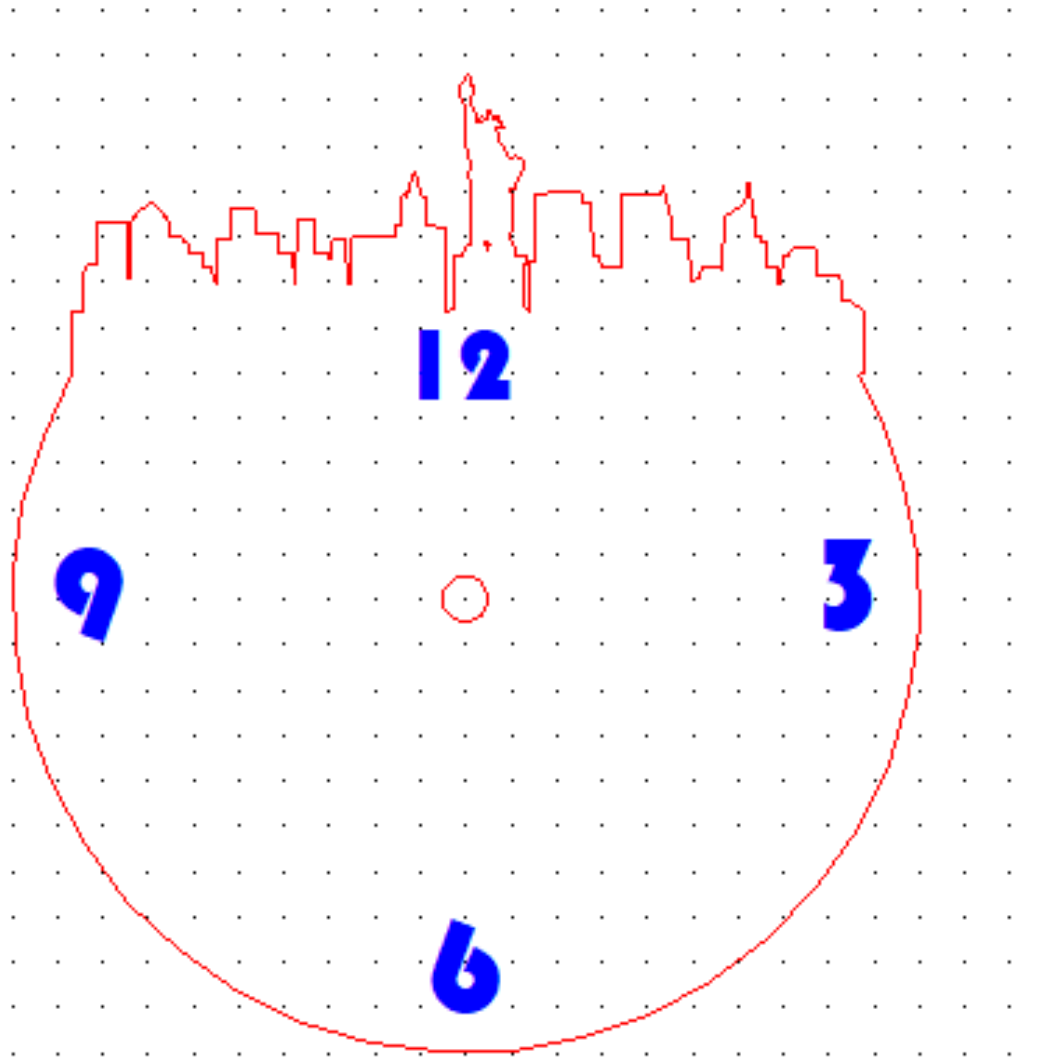


34. Whilst the number is highlighted Click on the line **Col tool** shown to bring up the line **colour palette** shown. Click on **blue** as this is to **engrave** on the laser cutter.



35. Whilst the number is highlighted Click on the fill **Col tool** shown to bring up the fill **colour palette** shown. Click on **blue** as this is to **engrave** on the laser cutter.





36. Repeat the instructions for the other numbers on your clock. Complete your own design using a different city, movie, film character etc..

