IMPORTANT! KEEP TRACK OF YOUR MEASUREMENTS!

WRIST COMFORT WIDTH: _____ MM   RADIUS: _____ MM
WRIST COMFORT HEIGHT: _____ MM   RADIUS: _____ MM
WRIST PINCH HEIGHT: _____ MM

*COMFORT WIDTH, COMFORT HEIGHT - USING A DIGITAL CALIPER, THE MEASURING GUIDES SHOULD BE FAR ENOUGH AWAY TO NOT SCRATCH OR PINCH YOUR WRIST.

3D PRINTING DESIGN LESSON: CREATE A CUFF BRACELET USING OFFSET & PATTERN TOOLS
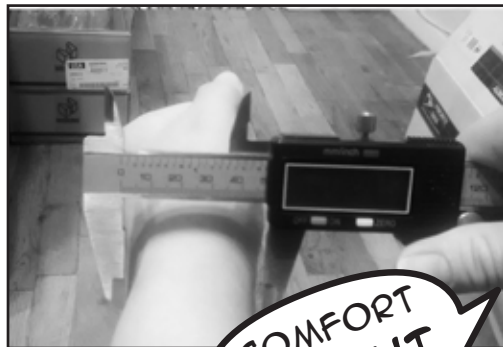

STEP 1: GATHER YOUR MEASUREMENTS

- Using a digital caliper, measure the "comfort width" of your wrist.
- Write your measurement in the space above.
- Using a digital caliper, measure the "comfort height" of your wrist.
- Write your measurement in the space above.
- Using a digital caliper, measure the "pinch height" of your wrist.
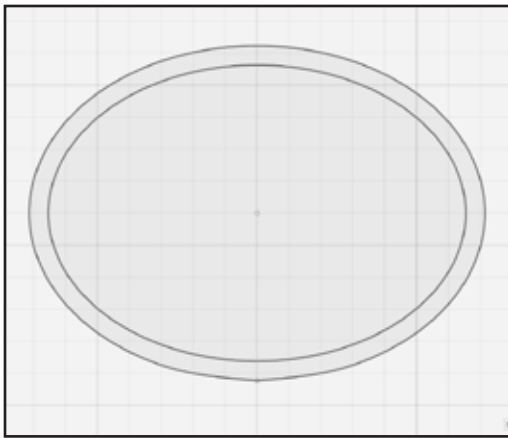- Write your measurement in the space above.

COMFORT WIDTH

COMFORT HEIGHT

PINCH HEIGHT

STEP 2: CALCULATE RADIUS FOR USE IN DEFINING INITIAL SKETCH

- Divide each your "comfort width" and "comfort height" measurement in half. Include your decimal points.
- Write each radius calculation in the space above.

STEP 3: CREATE YOUR REFERENCE SKETCH OF YOUR WRIST

- Create a new project in "123D Design", put your name and date in the file name, and save to the desktop.
- In the "Top View", using the "Ellipse" tool found in the "Primitives" menu at the top, create an ellipse with the "radius" values you wrote on the previous page.
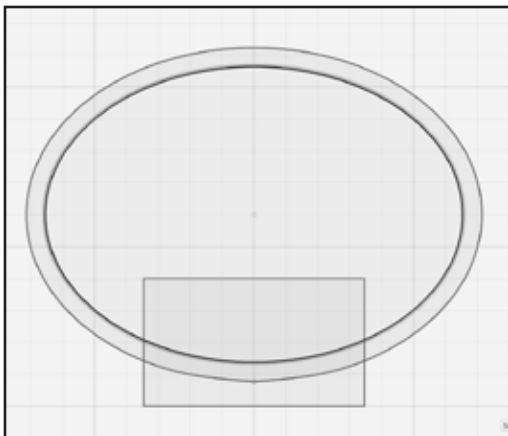
Wrist Comfort Width Radius = Major Axis

Wrist Comfort Height Radius = Minor Axis

- Hit "Enter/Return" or click in the workspace to place your ellipse.

STEP 4: CREATE THE REFERENCE THICKNESS OF YOUR CUFF BRACELET

- In the "Top View", go to the "Sketch" menu at the top and select the "Offset" tool.
- Select the line of your "Ellipse" sketch in your workspace.
- Move the cursor away to better see the input box.
- Set the "Offset" value to "3". (3mm)
- Hit "Enter/Return" to accept the offset value.

STEP 5: CREATE SKETCH REFERENCE FOR OPENING OF CUFF

- In the "Top View", go to the "Primitives" menu at the top and select "Rectangle".
- Move mouse over input box located in lower portion of your screen and change the "width" value to "Wrist Pinch Height" gathered earlier.
- Move your cursor to be on the center point of "Ellipse", then move your cursor slightly down so the "Rectangle" intersects both "Ellipse" sketches.
- Once you have the position set, click the mouse button or hit "Enter/Return" to place the rectangle.

STEP 6: TURN ELLIPSE SKETCHES INTO SOLID GEOMETRY
- Select the section where the two "Ellipse" sketches create a ring.
  It will turn dark blue.
- In the pop-up "Gear" menu, select the "Extrude" tool.
- In the input box, set the value to "30.00mm". Hit "Enter/Return" to accept.

STEP 7: CUT OUT WHERE YOUR WRIST WILL GO INSIDE THE CUFF
- In the "Top+Front+Right Corner View", click the middle of the rectangle.
- In the pop-up "Gear" menu, select the "Extrude" tool.
  It should turn dark blue.
- "Click & Drag" the arrow from the rectangle, pull the rectangle completely
  through the "Solid Ellipse Object".
- Hit "Enter/Return" to accept.

STEP 8: CURVE THE EDGES ON THE CUFF OPENING
- Click the "Solid Ellipse Object".
- Move the cursor away from the object and then back over the object.
- Using the "Top+Front+Right Corner View" and "Top+Front+Left Corner
  View", while holding "Shift" click all "Four" edges on opening of the cuff.
- In the pop-up "Gear" menu, select the "Fillet" tool.
- "Click & Drag" the arrow on the edge, pulling to curve the edges.
  Unclick the mouse button when desired curve is reached.
  Or input "1.5" for the "Fillet Radius".
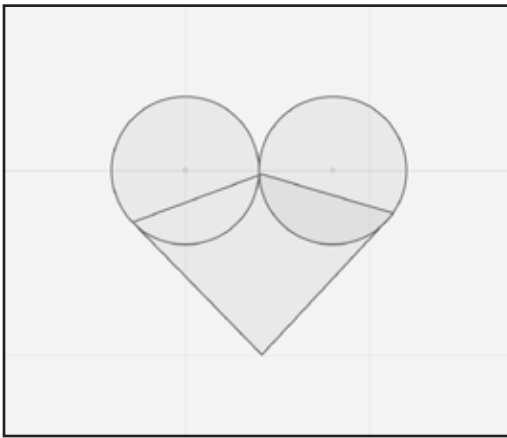- Hit "Enter/Return" to accept.

SAVE YOUR WORK! CMD+S

DECORATE YOUR CUFF
BELOW ARE SUGGESTIONS TO CUSTOMIZE YOUR CUFF
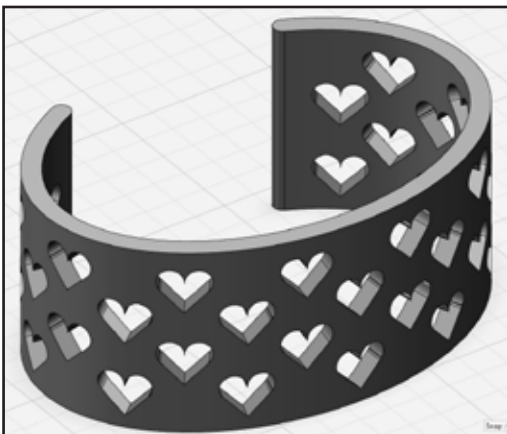
ADD TEXT TO YOUR CUFF
- In the "Top View", select the "Text" tool on the top menu.
- Click the plane, then click the plane to set anchor point.
- Input text of choice in the "Text" input box.
- Change the other values as desired and click "OK" to accept.
- In the "Top View", select the "Text". It will turn orange when selected.
- In the pop-up "Gear" menu, select the "Extrude Text" and set the value.
  Between "3.00mm-5.00mm" is good.
- Using the "Move/Rotate" tool, position your "Solid Text Geometry"
  onto your cuff. Make sure your text is touching the "Solid Cuff Object".
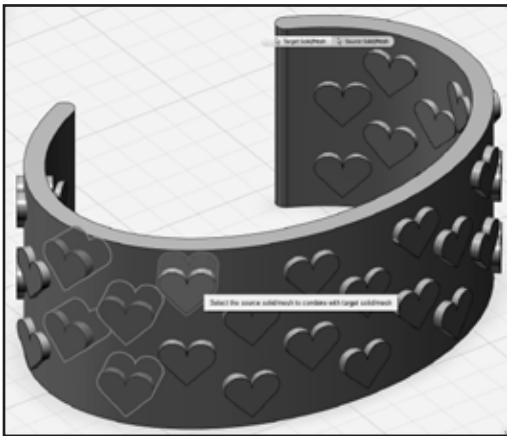
ADD A HEART TO YOUR CUFF

- In the "Top View", go to the "Primitives" menu at the top and select the "Circle" sketch.
- Change the "Radius" value to something between "3.00mm-5.oomm".
- Move your cursor, so the "Circle" sketch is positioned to be alone.
- Hit "Enter/Return" to accept.
- Click the "Circle" sketch. It should turn dark blue.
- Hit "Ctrl+C" to "Copy" and "Ctrl+V" to "Paste".
- In the "Top View", "Click & Drag" the "Horizontal" arrow, position the copied "Circle" sketch so the edges of both "Circle" sketches are touching.
- Hit "Enter/Return" to accept.
- In the "Top View", go to the "Sketch" menu and select the "Polyline" tool.
- Click the "Left Circle" sketch.
- Click the "Lower Left Edge" of the "Left Circle" sketch.
- Position the next point "Centered" between the two "Circle" sketches.
- Click the "Lower Right Edge" of the "Right Circle" sketch.
- Click inside the middle of the two "Circle" sketches.
- Click the "First" point to close the sketch.
- Hit "Enter/Return" or click the "Green Check box" to accept.
- In the "Top View", holding "Shift", click inside each sketch of heart shape.
- In the pop-up "Gear" menu, select the "Extrude" tool.
- Set the extrude value, "3.00mm-5.00mm" is good.
- Hit "Enter/Return" to accept.
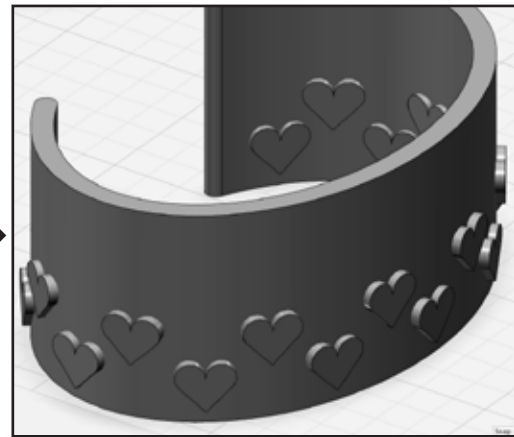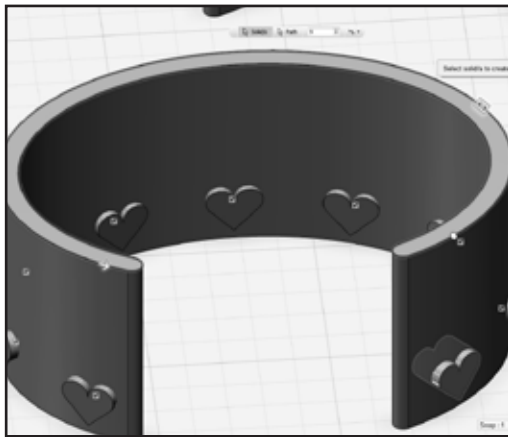- Using the "Move/Rotate" tool, position the "Solid Heart Geometry" onto your "Solid Cuff Geometry".

CUT OUT SHAPES ON YOUR CUFF

- In the "Combine" menu at the top, select the "Subtract" tool.
- Select the "Solid Cuff Geometry" first, then select the shape to cut out.
- Hit "Enter/Return" to accept.
  Remember, you can hit "Ctrl+Z" to undo.

MERGE SHAPES TO YOUR CUFF

- In the "Combine" menu at the top, select the "Merge" tool.
- Click the "Solid Cuff Geometry" first, then select the shape to merge.
- Hit "Enter/Return" to accept.
  Use this step to prepare your work for printing.

CREATE A PATTERN ON YOUR CUFF

- Using the "Move/Rotate" tool, position a shape onto your cuff.
- In the "Pattern" menu at the top, select the "Path Pattern" tool.
- Click the shape you wish to use to make a pattern.
- Click the "Path" button on the tool pop-up.
- In the "Top View", select the "Edge" on your "Solid Cuff Geometry".
- "Click & Drag" the arrow to where you want the pattern to extend.
- "Click & Drag" the "<|>" to change amount of copies in the pattern.
  Or click the "<|>" and input amount of copies in the text box.
- Hit "Enter/Return" to accept.

SAVE YOUR WORK!