

Ever since reports of hoarding of PPE (Personal Protective Equipment) including masks was publicized I've been working on various iterations of this DIY mask. The initial version was similar to a Procedure Mask / Surgical Mask. This was followed by the same model but with a double layer. Then came the duckbill and now the model shown here, which is a duckbill but a far more efficient build.

I approached the problem as I would any design project (I'm an architect); identify the problem and solve it. I read a lot of reports and countless of instances of DIY masks, the vast majority being similar to the Procedure Mask. Some were more like the typical N95 mask that is molded from non-woven material "painter's mask" but used air conditioning filter fabric sewn together, not efficient and costly.

My criteria was simplicity:

- 1) inexpensive material (under \$0.10)
- 2) non-latex rubber bands (but common rubber bands or elastic work as well)
- 3) no special skills or equipment necessary (only scissors, stapler, and a ruler)
- 4) ease of assembly
- 5) speed of assembly (3 to 5 minutes)
- 6) disposable

In contrast, the typical cloth masks, such as the ones that Memorial Hospital is receiving from the public, require a sewing machine and skill to operate it, more expensive material, and are non-disposable.

Feel free to contact me for more information.

Please note that my hours are limited while I [work on masks](#) for front line workers.

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The "Duckbill" Mask and DIY Assembly Instructions

This mask was developed to fill the need for masks for use by essential services personnel and healthcare providers in light of the lack of availability from the normal sources. I became concerned when I read a story about the CDC instructing health providers to use a bandana or scarf as a means of last resort.

I knew from my interactions with health providers that when not using disposable PPE (Personal Protective Equipment) one runs the risk of carrying disease from patient to patient. Bandanas and scarves, and the cloth masks currently being donated to hospitals, are not intended to be disposable. While this low-cost and disposable mask is not a substitute for tested and mass-produced PPE, it's far better than the alternatives.

In doing online research I found that a single ply paper towel blocks about 23% of particles the size of the Coronavirus (about 1 to 3 microns). Additional plies increase the protection by 10%, thus a double ply will block 33%. This is the extent of information I could gather. From that available information I deduced that a single layer of 4 ply will block 53% and a double layer of 4 ply will block 93%. That said, I want to emphasize that this mask hasn't been tested and is not intended to be a substitute for an N95 mask, instead it is presented as a better option for the bandana or scarf recommended by the CDC as a measure of last resort.

When fabricating this mask, whether at home for your own use or in a production facility, exercise necessary precautions to ensure the materials are being handled in a sanitized environment. All equipment must be sanitized. Materials are to be assembled and stored in a clean environment free of dust and contaminants. Workers must wear protective masks and gloves at all times and shall not work on the premises if exhibiting signs of any transmissible illness.

Materials used are as follows:

- Heavy duty 4-ply, polyester reinforced scrim wipes, available at HomeDepot.com, search: "blue wipes."
- Latex-free #19 rubber bands are available at Uline.com
- Tape in this example is blue masking tape. It has a high tack and is paper based.

The author accepts no responsibility for the use or misuse of these instructions or for the masks created as a result. By following these instructions you acknowledge you have read the above and agree to assume any and all responsibility for risks inherent in the use of untested protective equipment.

When using this mask as a health provider: Confirm the use of this mask (as a substitute for the CDC recommended measure of last resort) is allowed by your supervisor, and use at your own risk.

References:

Centers for Disease Control: bandanas: <https://bit.ly/39fHBXs>

National Institutes of Health: Cloth Masks: <https://bit.ly/33DA2sE>

Smartairfilters.com, DIY Masks: <https://bit.ly/2JbMgPC> and <https://bit.ly/3boNa7J>



The DIY Duckbill mask



Still from the Netflix series Pandemic showing a duckbill mask with a face shield

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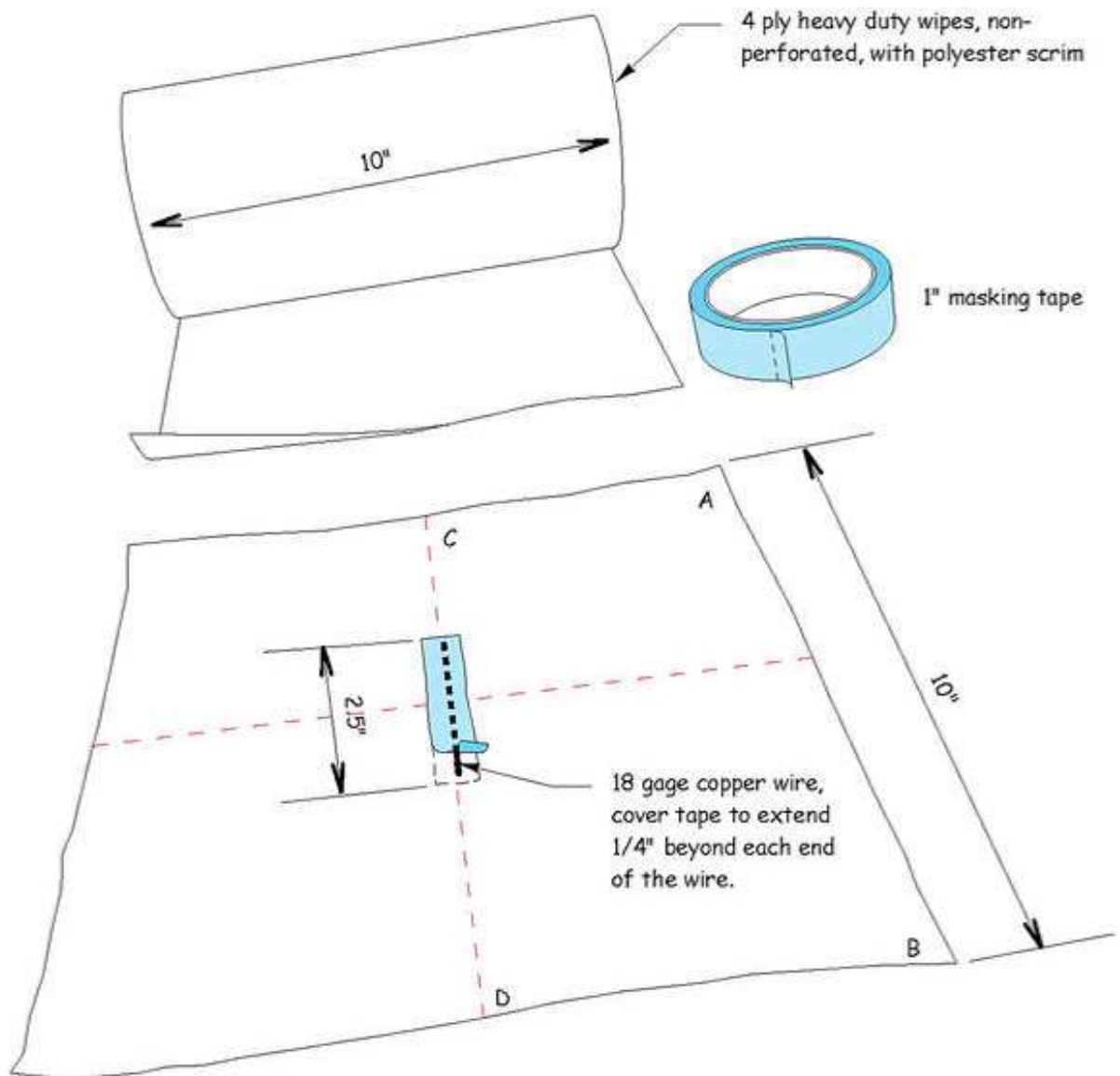
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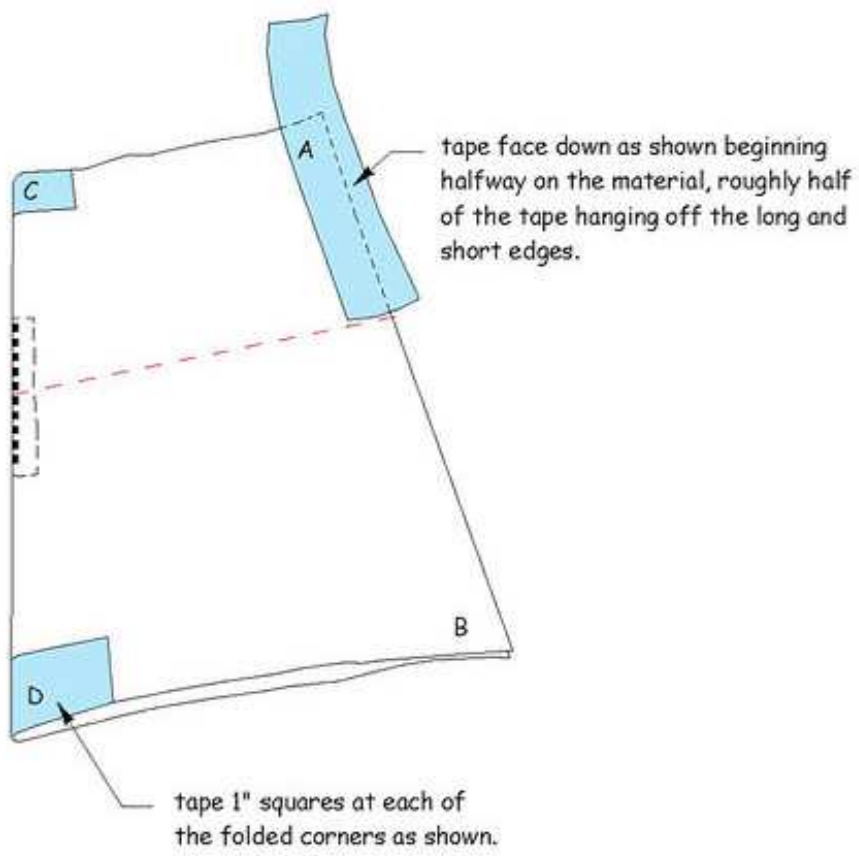
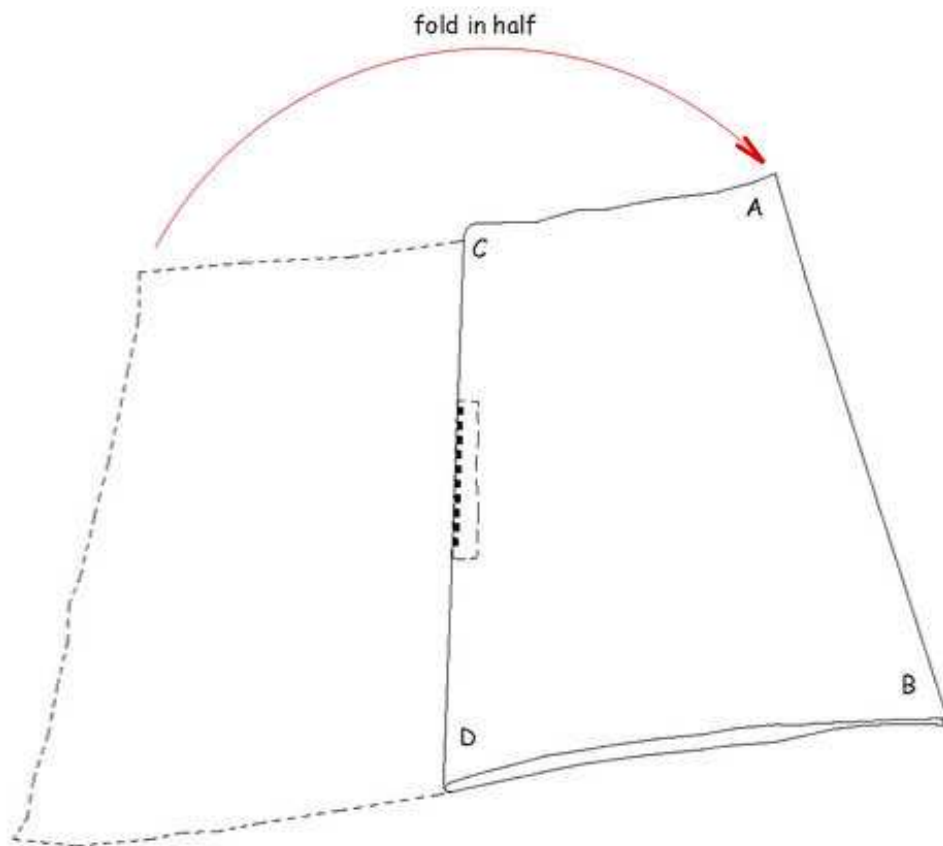
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the material I'm using is "prism scrim 4-ply blue reinforced wipers". I prefer this over similar roll goods because it doesn't have perforated seams. you can use any available fabric as long as it's as relatively tight weave but preference should be given to non-woven felt. if using cloth try to use a cotton blend.

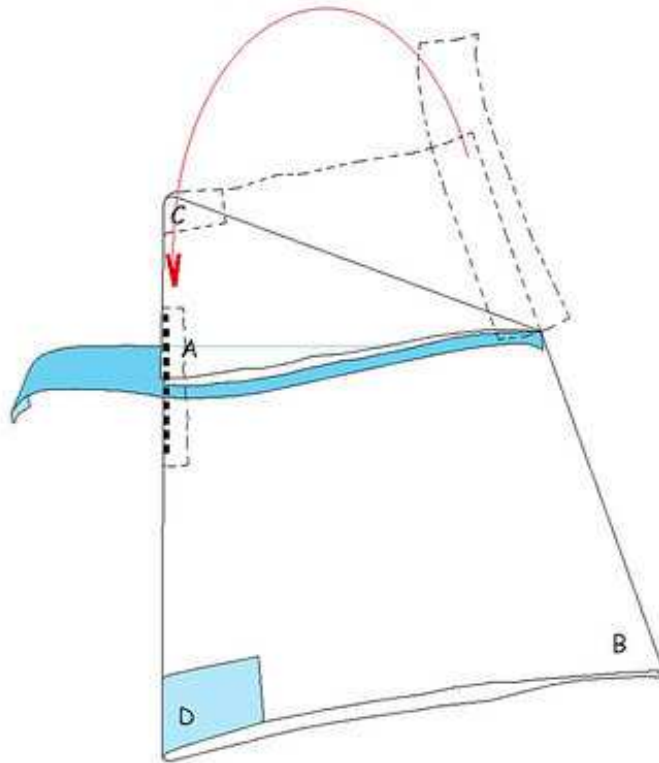


when i work on my masks i work under the cleanest condition possible. i clean my countertop with 409 and then wipe it down with rubbing alcohol. i also clean my tools very carefully with alcohol. before starting work i wash my hands thoroughly and i wear gloves. the first mask i make i use for myself, this way i protect the rest of the masks from contamination.

I experimented with different sizes for the masks and found the dimensions i'm giving here to give the best fit for my anatomy. for smaller faces start with a 9" x 9" square, even smaller for children.

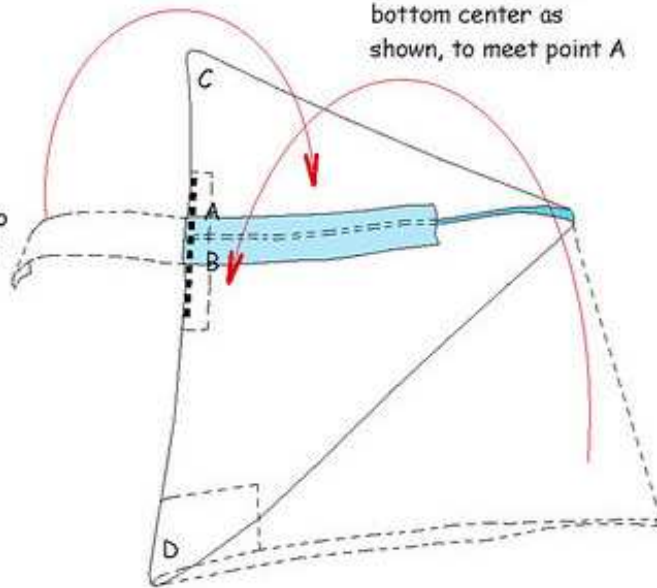


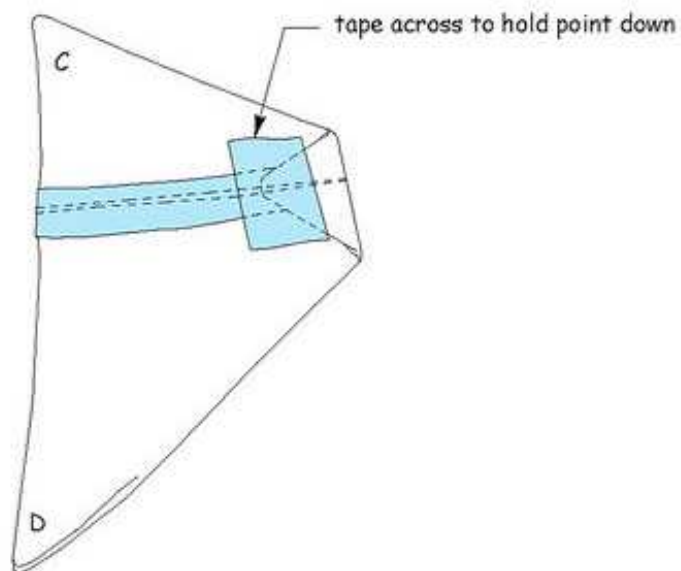
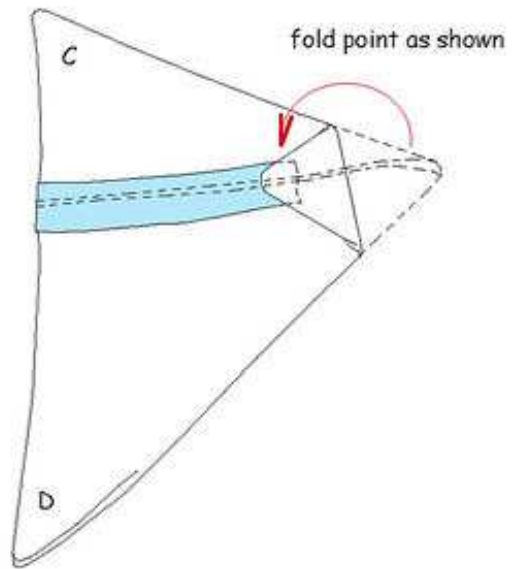
fold corner A towards
bottom center as shown

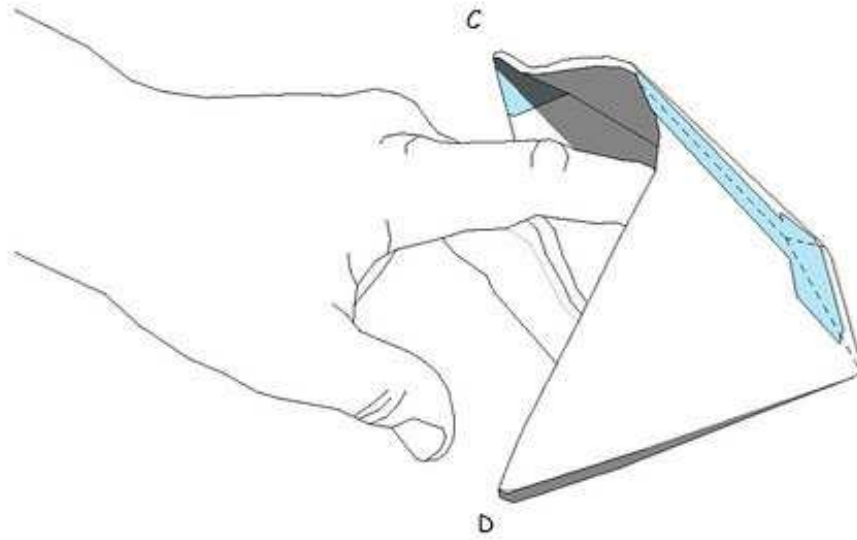


fold corner B towards
bottom center as
shown, to meet point A

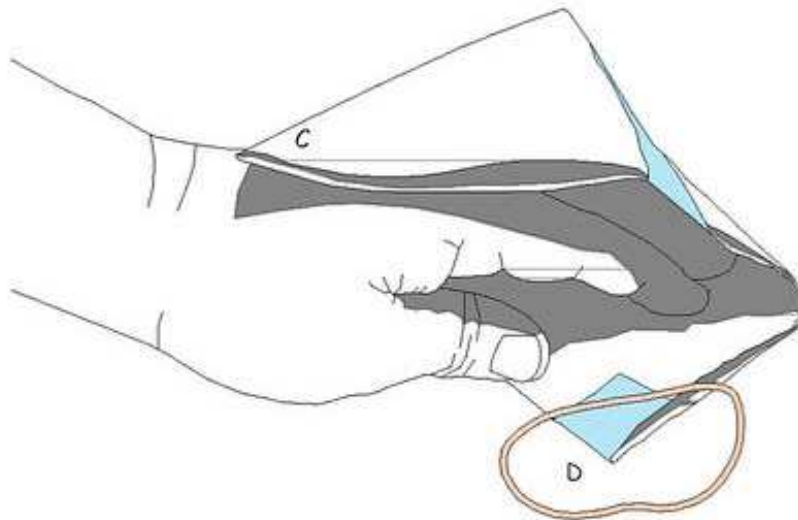
fold tape to
cover seam
as shown



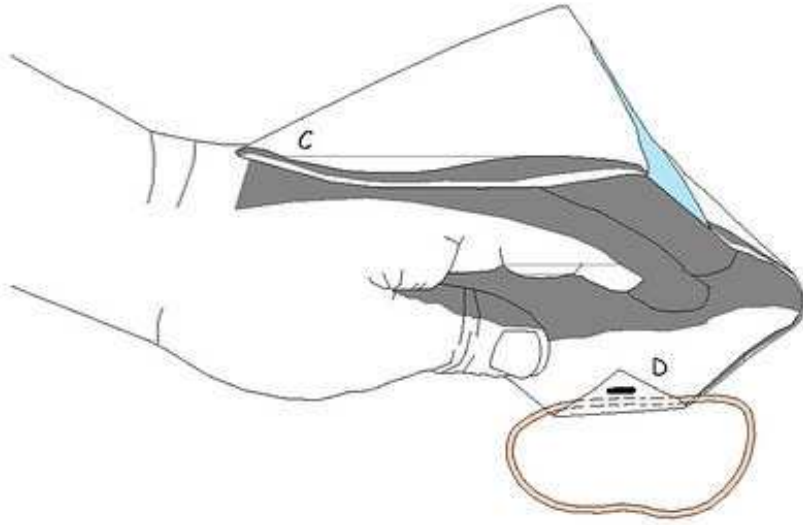




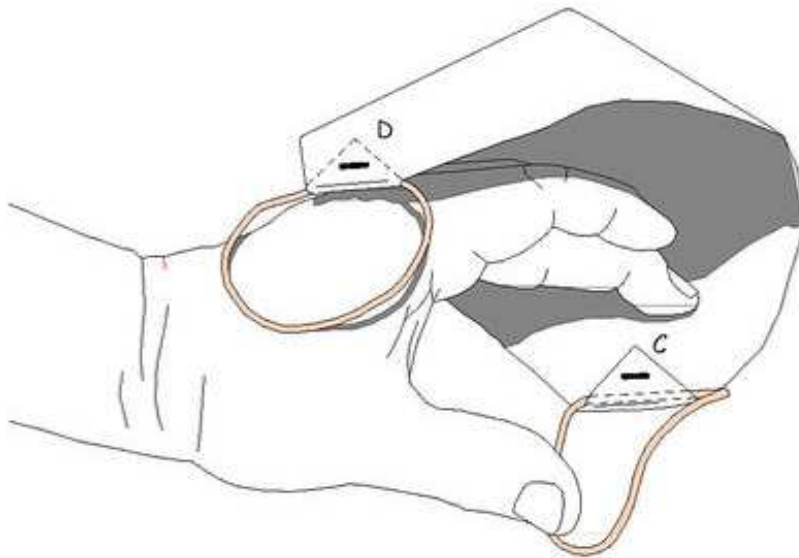
open back side of mask to expose the inside of corner D



lay rubber band across corner D



fold corner D over rubber band and staple the corner in place. careful not to staple through the rubber band.



turn the mask over and do the same on corner C



this is the completed mask seen from the back side. in this prototype corners C and D were taped over the rubber band instead of stapling. This works just as well but not very efficient for assembly.

the completed mask seen from the front.



