

Mask Instructions

Team 1: Ryan and Alex

Assembly

Tools List


- 1 ruler
- A triangle
- Pencil
- Scissors
- Hot Glue Gun
- Hot glue sticks



Materials List

- Roughly a square foot of cotton fabric
- Roughly a square foot of mesh/comfortable fabric
- Hair Bands (**4x**)
- Pipe Cleaner (**1x**)

Note:

- (**1x**) stands for **one** of said object
 - (**4x**) stands for **four** of said object
- 

Tips For Cutting Fabric

Trace the cut with a pencil before you begin to cut. It is better to trim off too much fabric than having a cut with too little fabric.

If cutting a straight line, Cut the whole piece of fabric that you wish to discard off instead of moving on to your next cut with the excess fabric hanging.



Tips For Using a Hot Glue Gun

When using the hot glue gun, to get the best amount of output, try pumping multiple times in and out while pointing the nozzle where you want the glue to be. Using this pumping method, rather than holding down in one long pump on the hot glue gun, will get you more of the glue output when using the hot glue gun.

Be very careful to not touch the nozzle while gluing and to setup an area where excess glue from the nozzle can drip while the hot glue is not in use.

Lastly, make sure to remember to unplug the hot glue gun from the electrical outlet after you are done using it, to avoid any safety hazards and dangers while working.



Step 1:

Cut all required pieces

All Units are in **Inches**

Face Mask Components:

- Cotton Fabric: 10x8
- Mesh/Comfort Fabric: 10x8
- Hair band: *cut in half*
- Pipe Cleaner: 7

Remember to mark your cut on the fabric before making the cut

Repeat this step for your other piece of fabric

Your cut should be equivalent to the first piece connected to the large elastic



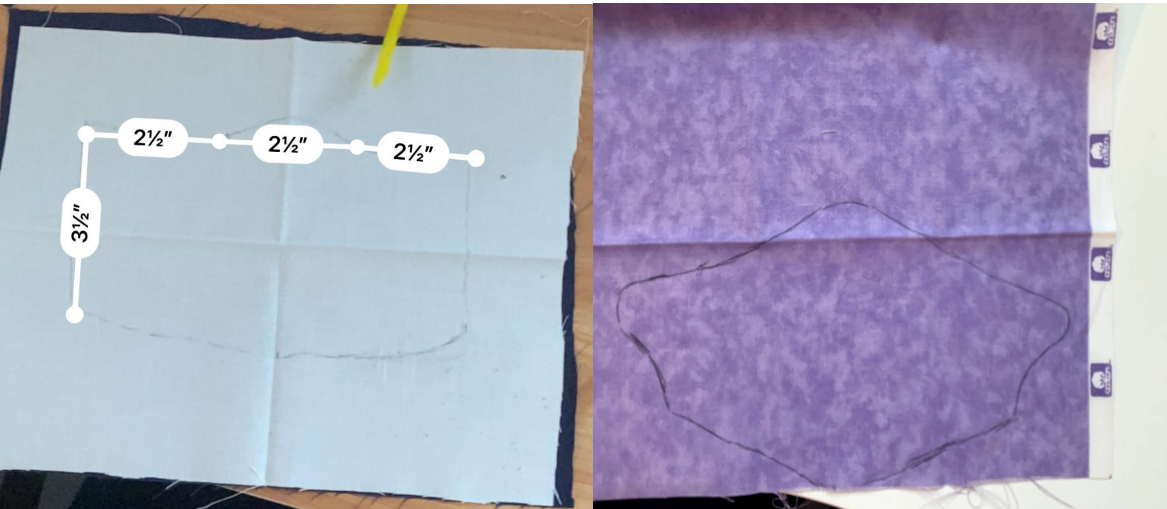
Step 2: Overlap Fabric Cuts

Now that you have your two separate pieces of fabric. Simply place the interior mesh fabric on top of the exterior cotton fabric.



Step 3: Fabric Cut Out - Trace

Using a pencil, trace where you plan to cut using the measurements provided. Note: these measurements are meant to fit a teenager or adult. It is also important to trace as symmetrically as possible.



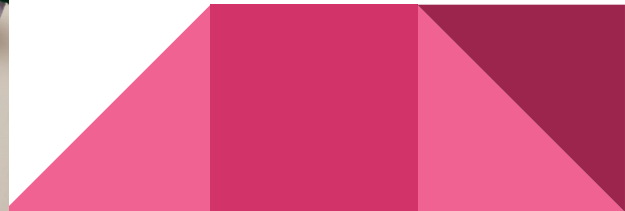
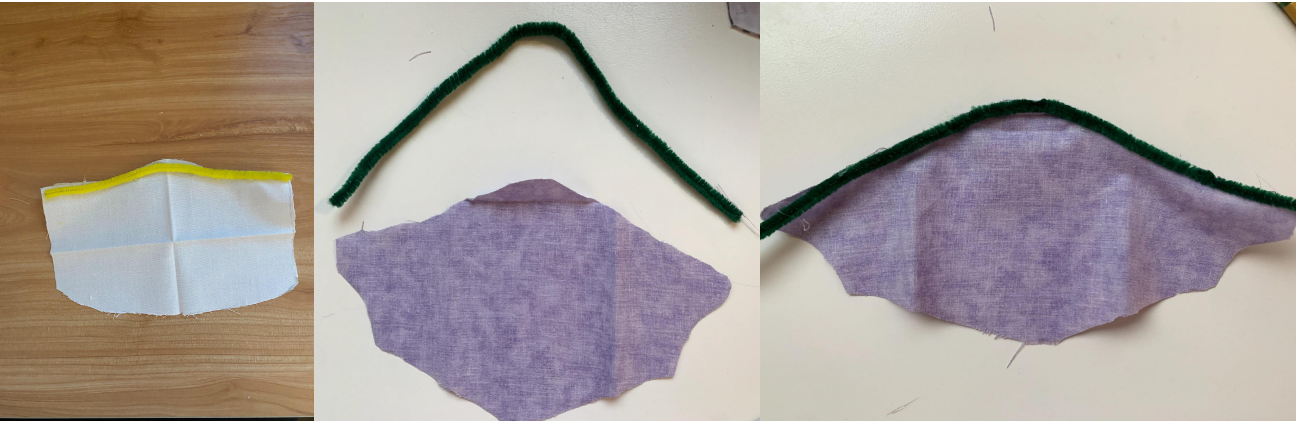
Step 3.1: Cut

Once you have finished tracing your mask's outline, cut through **BOTH** layers of fabric. Cut on the line to the best of your ability as it will limit trimming and cleaning up in the future. Once you cut through both of your layers completely, both layers should be close to identical.



Step 4: Attach Pipe Cleaner

Using your **7 inch pipe cleaner** you cut at the beginning, bend it to match the upper part of the mask. Once it's bent to match the upper edge of the mask, take your pipe cleaner off of the top of the mask. Dribble a little bit of glue along the line it will lay. Finally, place the pipe cleaner over the line of glue, securing it to your mask. **GLUE ATTACHMENTS ONLY TO THE MESH FABRIC!**



Step 5: Attach Elastic Bands

Using your **3 elastic hair bands** you prepared at the beginning, take a short one and tie it to a long one. Once you have 2 elastic strands pictured below, use your hot glue gun to dab a little glue on the top left and right edges of your fabric. Before it dries, connect the edges of the elastic strand you just tied to the dabs of glue you just placed on your fabric. Secondly, use your hot glue gun again to dab glue on the bottom left and right corners of the fabric. Using your remaining elastic band, connect the corresponding edges to the dabs of glue. Let glue dry. *



* This set of instructions is specific to using Ryan’s method of attaching the elastics

Step 5.1: Differences between our Elastics

Using Ryan's method with the elastics, the comfort aspect is improved. Instead of hugging your ears it wraps around your head making the mask fit more snug on your face. As far as adjustability, this design is less effective. It is more designed to fit a standard adult.

Using Alex's method with the elastics, the comfort aspect is also improved. While it does hug your ears, on the elastic bands themselves there are adjustable stoppers, which can also be easily removed and reattached quickly. As for adjustability purposes, the stoppers make this mask's design to fit the mask snugly for the majority of kids, teenagers, and adults, and with the exclusion of babies, toddlers, and other small children.

* This step is specific to using Ryan's method of attaching the elastics

Step 6: Cut the Bottom Band*

Now that your mask is almost done, cut the bottom elastic band in half so you can easily adjust your mask. After cut, your mask should look like this. **DO NOT CUT UPPER ELASTIC BAND!**

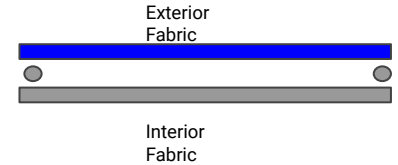


* This step is specific to using Ryan's method of attaching the elastics

** Refer to "Tips for Using a Hot Glue Gun" for more detailed advice**

Step 7: Connect Cotton Fabric*

Place the exterior cotton fabric cut out on top of your interior mesh fabric. Make sure you place it **ON TOP** of the side you just glued the attachments on. Refer to the diagram on the right. Dab glue around the edges of your interior fabric. Before it dries, align the exterior fabric so it sits perfectly on top of the interior fabric. Let the glue dry before trying on your new mask!



Directions: User Instructions + Size Adjustment

Take the mask in front of you and make sure that the interior fabric is facing toward you and your face. Next, put the mask up to your face, with the nose hump of the mask right below your nose bridge, and make sure the rest of the mask covers your nose, cheeks, mouth and hugs your chin. Then, take the elastic bands located on the left and right edges of the mask.

If you are using Ryan's model, then tie the top elastics around your head and the bottom elastics around the back of your neck a bit below earlobe height, and adjust the comfort of the mask by tying and tightening the elastics according to your head size.

If you plan to use Alex's model, then take either the left or the right ear loop and hook it around the back of your ear, and do the same with the remaining ear loop. Once both ear loops are hooked on, then for comfort purposes, if necessary you can choose to move the adjustable stopper toward the ear to tighten the mask's fit or away from the ear, to loosen the mask's fit to your face.



Testing Plan

Factor to Test	Testing Plan
Aerobic Test	<p>Ride a bike at a steady (not too tiring rate) for 10 min for each mask</p> <p>Scale the mask fabric from 1 (dry) - 5 (Soaking wet) or use a probe if you have access to one</p> <p>Important that same person does the whole experiment</p>
Reusability Test	<p>Find some sort of colored liquid to pour a consistent amount of on each mask.</p> <p>Pour roughly an ounce of such liquid on each mask in same area.</p> <p>Perform a standard wash (machine or hand).</p> <p>Measure surface area of material that is still stained.</p>
Surface Area Test	<p>Measure the surface area of each mask being tested</p> <p>Scale the comfort fit with the same individual testing it from 1 (not comfortable) - 5 (very comfortable)</p> <p>Note which mask is still comfortable while having the least amount of surface area of fabric covering</p>
Window Test	<p>Exhale while wearing each mask and standing in front of glass or a window</p> <p>Note the size and area of how much the glass is fogged up with each mask respectively</p> <p>Measure the fogged up area on a scale from 1 (thumb sized area) to 5 (being larger than palm sized area)</p>
Stretch Test	<p>Stretch the ear loops as far as you can with each mask to test how stretchy and durable it can be.</p> <p>Measure the length it can stretch to before it breaks.</p>

Testing Results in comparison to CDC Mask

	CDC Fold Standard Mask	Our Mask
Aerobic Test	<i>Very Damp</i>	<i>Mildly Damp ✓</i>
Reusability Test	<i>10 square inches*</i>	<i>4 square inches* ✓</i>
Surface Area Test	3	4 ✓
Window Test	2	2
Stretch Test	<i>7 in ✓</i>	<i>5 in**</i>

✓ = *Category Winner*

* With an ounce of stainable substance poured onto each mask, after washing ___ square inches were stained.

** 5 inches when using hair ties as the elastics and 6-7 inches when using the non hair tie elastics

Effects of our Changes

Change we made:	Reason why we made this change:
Elastic bands are tied and adjustable around head and/or ears	We wanted the mask to be adjustable for all head and ear sizes, as well as having the elastics made from hair bands, made it so that was still comfortable
Inclusion of mesh material as a second layer under exterior fabric, rather than just many layers of one non-mesh and uncomfortable fabric	We wanted to make the mask more comfortable for anxious athletes. Making the mask less noticeable.
The variety of colors for the tightly woven exterior fabric	We tried to make our mask more fashionable. To appeal to athletes who wanted to represent their school/team colors etc.
Hugs bottom of chin, rather than simply covering it loosely	We tried to design a mask that would prevent the most moisture from exiting the mask.
Covers full nose, rather than just the nostrils	This would make the mask more comfortable and more safe. Kills two birds with one stone.

Final Result Images





Thanks!