

Prep Instructions

An example of a completely assembled *Glovely Digestion Model* is shown below (**Figure 1**).

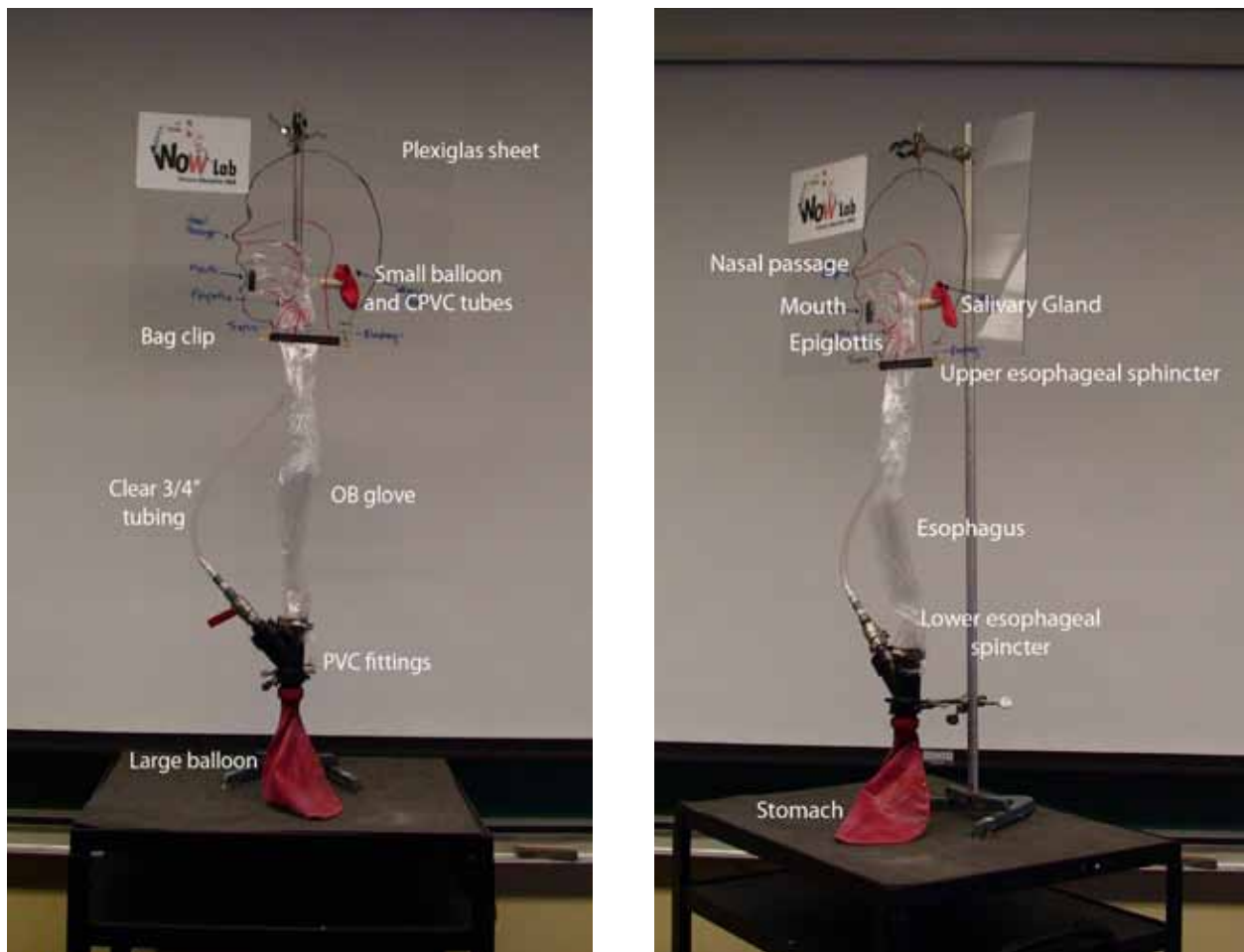


Figure 1

Part I - Plexiglas Preparation

The following items will be required for the prep of this part of the activity:

- drill with 1/2 in. bit
- Plexiglas
- clear packing tape
- projector
- dry erase marker
- ruler

Step 1

Drill a hole 1 in. from the top of one of the 24 in. sides of the Plexiglas sheet (**Figure 2**). To avoid cracking the Plexiglas, do not drill too hard or too quickly.

Step 2

Use packing tape to attach the Plexiglas sheet to the wall, with the hole at the top, at the approximate height of a student. Shine a projector lamp onto the area. Ask a student to stand a foot away from the Plexiglas, in profile, with his or her mouth open. Using a dry erase marker, trace around the student's profile (**Figure 3**).

Step 3

Label the image as suggested in **figure 2**.

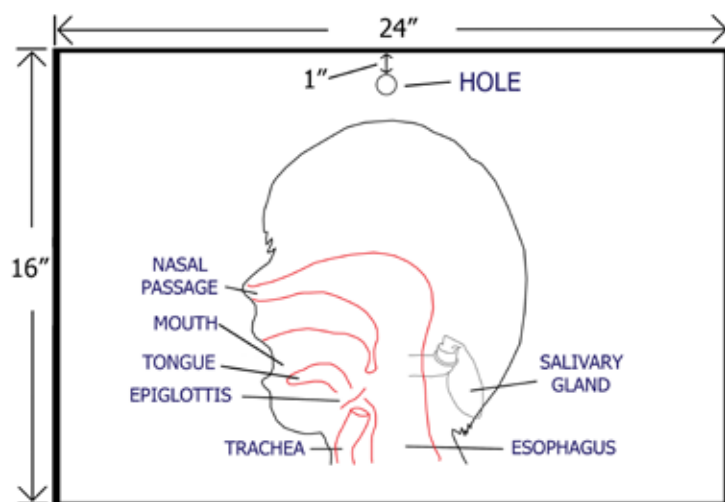


Figure 2

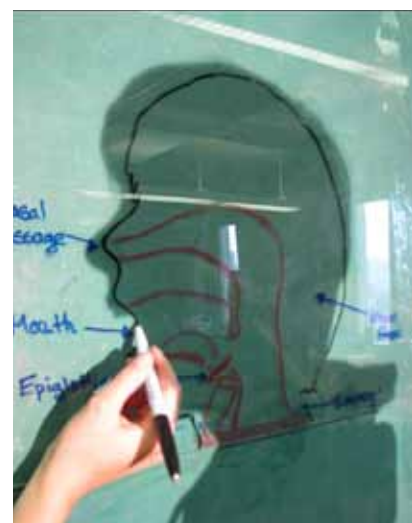


Figure 3

Part II - The Mouth, the Esophagus and the Salivary Glands

The following items will be required for the prep of this part of the activity:

- OB veterinary glove
- cardboard paper towel tube
- packing tape
- scissors
- magnetic tape
- CPVC 1/2 in. 90 degree elbow pipe
- CPVC 1/2 in. straight coupling pipe
- small balloon

Step 1

Slide the OB glove over the cardboard paper towel tube.



Figure 4

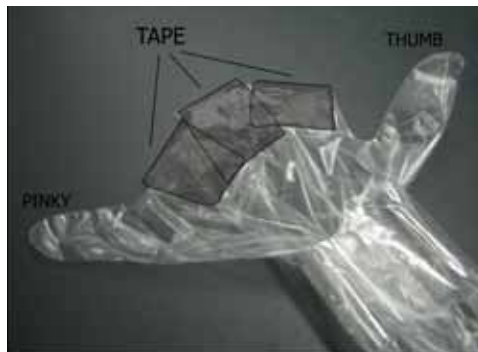


Figure 5

Step 2

Starting at the wrist, place rings of packing tape around the arm of the glove, 2 in. apart. Ensure that the tape bands extend along the entire length of the glove arm (**Figure 4**). This step will reduce the circumference of the arm. Remove the cardboard tube from the OB glove. The taped arm of the OB glove represents the esophagus.

Step 3

Cut off the ring finger of the glove and seal the opening with packing tape. Repeat this process for the middle and index fingers. The shaded squares in **figure 5** indicate where the glove was taped.

Step 4

Cut off the tip of the pinky finger (**Figure 6**).



Figure 6

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Step 5

Cut 1/2 in. along the inner and outer seams of the pinky, creating two flaps (**Figure 7**).

Step 6

Cut two 1 1/2 in. pieces of magnetic tape.

Step 7

Tape one of the magnetic tape pieces onto the outside of one of the flaps (**Figure 8**).

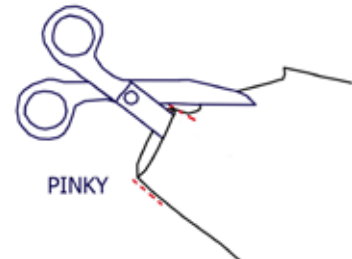


Figure 7

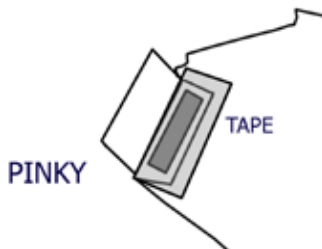


Figure 9

Step 8

Fold the flap over so that the magnet strip is now wrapped in plastic. Tape the flap in place. The light grey square in **figure 9** depicts the tape placed on top of the plastic.

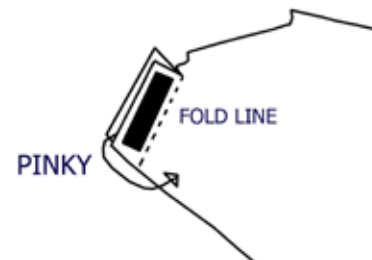


Figure 8

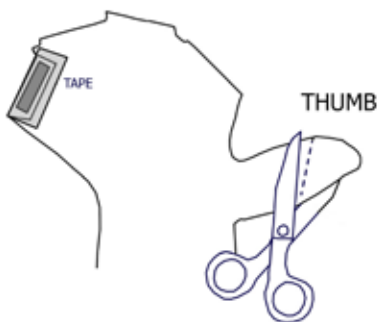


Figure 10

Step 9

Repeat Steps 7 and 8 for the other piece of magnetic tape and pinky flap. The opening made by the two magnetic strips forms the mouth of the model.

Step 10

Cut off the top 2 in. of the thumb (**Figure 10**). Insert the CPVC straight coupling pipe halfway into the thumb hole of the OB glove and secure it firmly in place with packing tape.



Figure 11

Step 11

Slide the CPVC elbow tube into the CPVC straight tube. Place the neck of a small balloon over the wider portion of the CPVC elbow tube (**Figure 11**).

Part III - Assembly of the PVC Fittings

The following items will be required for the prep of this part of the activity:

- 2 in. trap adapter
- wye fitting
- 2 in. male head adapter reducing to 1/2 in. threaded female adapter
- 1/2 in. ball valve
- 1/2 in. male pipe thread by 1/4 in. barb
- 1/4 in. straight tubing connector
- 2 ft. of 3/4 in. diameter rubber tubing
- thick elastic band
- party blower
- large balloon
- clamp stand
- three-pronged laboratory clamp

Step 1

Assemble the PVC fittings in the following way (**figure 12**)

- Attach the male piece of the trap adapter (e) to the single part of the wye fitting (a).
- Attach the 2 in. male portion of the head adapter (f) to the straight branch of the wye fitting (a).
- Twist the ball valve (c) into the 1/2 in. female portion of the head adapter (f).
- Twist the 1/2 in. portion of male pipe thread barb (d) into the ball valve (c).
- Attach the straight tubing connector (g) to the 1/4 in. portion of the barb (d).
- Attach other end of the 1/4 in. straight tubing connector (g) to 2 ft. of clear plastic 3/4 in. tubing.

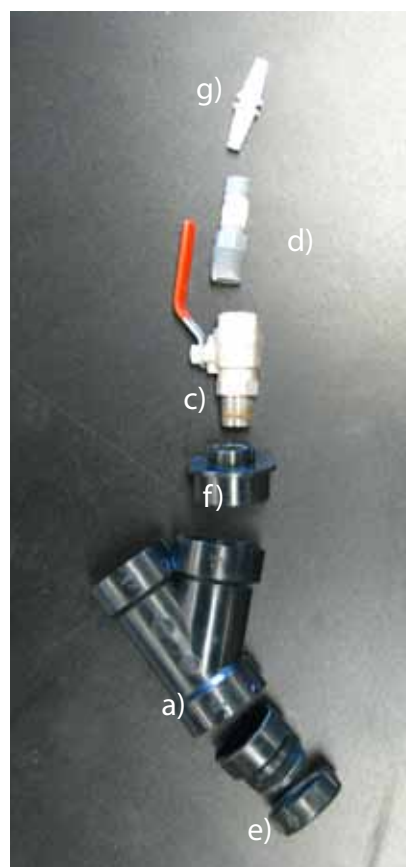


Figure 12

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Step 2

Wrap a thick elastic band around the free end of the wye fitting (a).

Step 3

Insert a party blower into the open end of the clear plastic tubing. **Figure 13** shows a green one.



Figure 13



Figure 14

Step 4

Place the neck of the large balloon (stomach) over the female end of the trap adapter (e) (**Figure 14**). Screw the female end of the trap adapter onto the male end of the trap adapter (e).

Step 5

Clamp the base of the wye fitting (a) near the bottom of the clamp stand using a three-pronged laboratory clamp.

Part IV - Assembly of the Entire Model

The following items will be required for the prep of this part of the activity:

- packing tape
- prepared OB glove (see Part II)
- prepared Plexiglas (see Part I)
- CPVC coupling pipes with balloon attached (see Part II)
- 2 chip bag clips
- three-pronged laboratory clamp
- prepared clamp stand (see Part III)
- stainless steel worm gear clamp with adjustable diameter between 9/16 in. and 2 1/2 in.

Step 1

Make a loop out of packing tape such that the sticky side is on the outside. Hold the modified OB glove up to the model drawn on the Plexiglas, matching the glove pinky and glove arm to the model's mouth and esophagus, respectively. Use the sticky loop to secure the OB glove to the Plexiglas sheet. Tape the CPVC straight coupling pipe onto the Plexiglas using packing tape. **Figure 15** shows the mouth and the esophagus of the OB glove lined up with the mouth and esophagus drawn on the Plexiglas.



Figure 15

Step 2

Attach a chip bag clip across the wrist section of the OB glove to represent the upper sphincter.

Step 3

Attach a three-pronged laboratory clamp near the top of the clamp stand. Hang the Plexiglas from the clamp stand by placing the single prong through the drilled hole. Tighten the prongs in order to secure the Plexiglas sheet. **Figure 16** shows the most stable arrangement when using a standard three-pronged laboratory clamp.

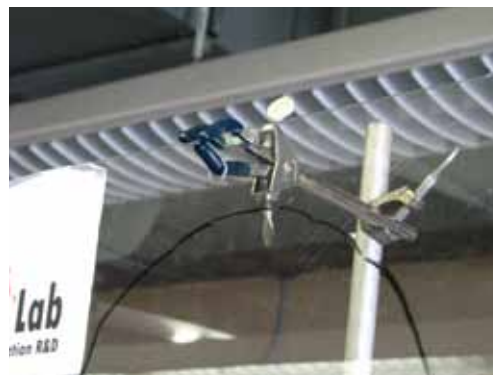


Figure 16

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Step 4

Place the worm gear clamp over the bottom of the OB glove and place the OB glove over the free end of the wye fitting. Secure the OB glove to the wye fitting by sliding the worm gear down so it fits around the thick elastic (**Figure 17**). Tighten the worm gear. The thick elastic will provide a good seal.

Step 5

Clamp the second chip bag clip onto the OB glove, above the attachment of the OB glove to the wye fitting. This chip bag clip represents the lower sphincter.

Step 6

Tape the top of the clear rubber tubing to the Plexiglas where the mouth is drawn.

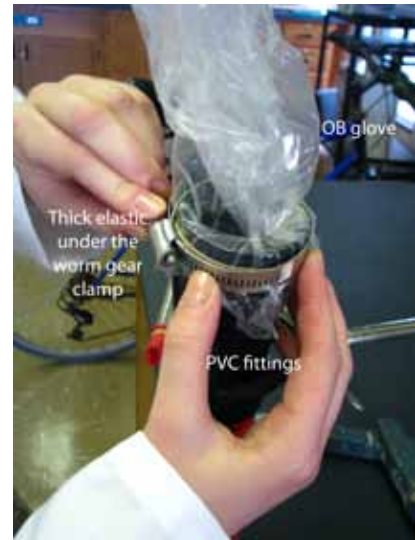


Figure 17

Part V - Prep for the In-Class Demonstration

The following items will be required for the prep of this part of the activity:

- baking soda
- water
- cookies
- *Glovely Digestion* model (see Parts I-IV)
- vinegar
- measuring cup

Step 1

Prepare a thick mixture of four parts baking soda and one part water. Make a cookie sandwich, using the baking soda paste as the filling and spreading it as thickly as possible (**Figure 18**). Cut the cookie sandwich in half. Prepare at least two sandwiches in this way. Sandwiches should be made a few hours prior to the activity.



Figure 18

Step 2

Unscrew the female part of the trap adapter attached to the large balloon and fill the balloon with 250 mL (1 cup) of vinegar (**Figure 19**). Reattach the female part of the trap adapter to the male part of the trap adapter.



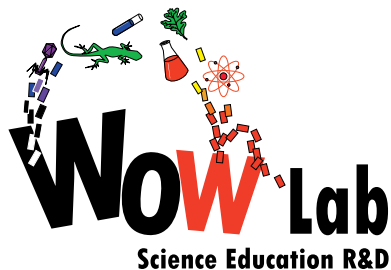
Figure 19



Figure 20

Step 3

Remove the straight coupling tube with the small balloon. Fill the small balloon with 80 mL (1/3 cup) of water (**Figure 20**). Reattach the straight coupling tube to the elbow tube.



a WOW Lab

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Appendix A

Equipment Alternatives

Plexiglas Preparation:

An acetate sheet may be used in place of the Plexiglas. Tape the acetate sheet to the wall and place the OB glove on the front side of the sheet (instead of the back side of the Plexiglas). The wye fitting will also have to be attached to the wall. To retain the hands-on aspect of the model, do not attach the esophagus or stomach balloon to the wall.

Assembly of the PVC fittings:

As stated above, use of an acetate sheet requires that the PVC fittings be taped to the wall.

Assembly of the entire model:

The clamp and clamp stand are not necessary when using an acetate sheet, since the sheet is taped directly to the wall. If using a Plexiglas sheet, the clamp stand can be replaced by a long broomstick placed into a bucket of sand, or by hooks drilled into the wall.