Name: _____ Date: _____

Master 3-3

# Protocol for the Fuel Test

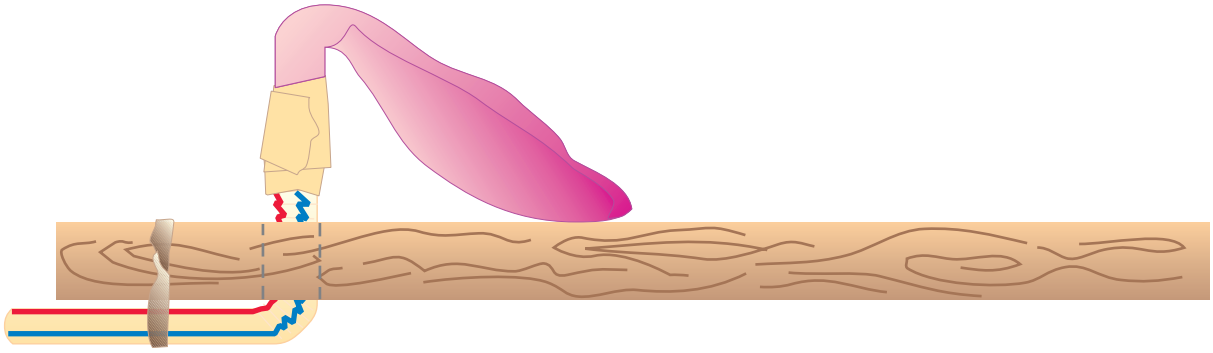
1. Blow up the balloon. Then let the air out. This will help loosen the balloon for the experiment.

   **If there are any holes or leaks in the balloon, get a new one.**

2. Break an antacid tablet into 4 pieces. Place all the pieces into the balloon.
3. Fit the neck of the balloon over the end of the straw that is nearest the joint.
4. Wrap tape around the straw and the neck of the balloon to seal the balloon. Wrap the tape 6 times.

   **Have one person hold the balloon on the straw very tightly. Another team member should wrap the tape.**

5. Test the seal by having 1 person blow into the other end of the straw. You should inflate the balloon about halfway. If you hear air leaking or cannot inflate the balloon, you need to tighten the seal. To do this, squeeze the tape tighter or add more tape. It is important that no air can leak out of the straw and the balloon.
6. Squeeze the balloon to remove the air.
7. Prepare the boat by following Steps 7a–d. Figure 3-3.1 shows what the boat should look like after these steps.
   - **a.** Insert the open end of the straw through the hole in the wood block. Start from the top of the block.
   - **b.** Bend the straw so that the joint is underneath the boat. The tail of the straw should be parallel to the underside of the block.
   - **c.** Wrap a rubber band around the wood block and the straw to hold the straw against the boat.
   - **d.** Cut off about 8 centimeters (3 inches) from the tail of the straw.



Side View

**Figure 3-3.1: The balloon, straw, and boat.** After Steps 7a–d, the boat should look like this.

8. Fill the 250-mL squeeze bottle with water.
9. Take the boat to the tub or sink of water. Then quickly but carefully squeeze water into the tail of the straw until the main part of the balloon is full of water. As soon as the balloon is filled with water without inflating, remove the squeeze bottle and seal the straw with a team member's finger.

   **This will be easiest if one person holds the boat so the straw is pointing upward, as shown in figure 3-3.2. Another person should squeeze water into the straw. If the water is added too slowly, the gas will escape too soon and none will be left to move the boat.**

Name: _____ Date: _____

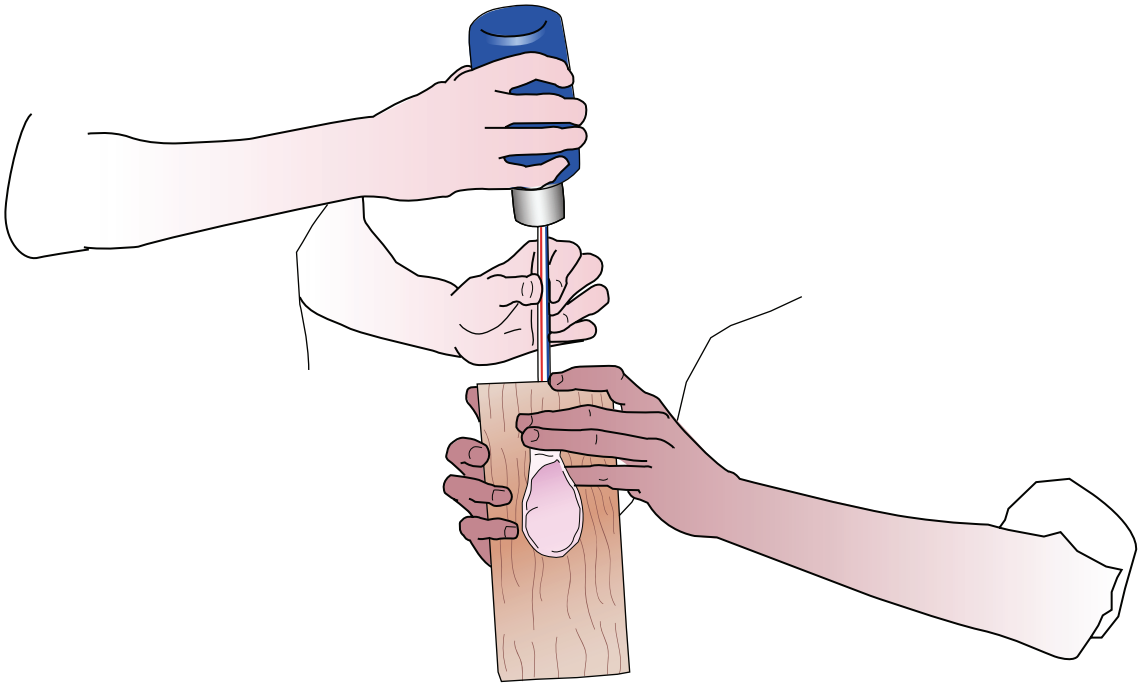


**Figure 3-3.2: Hold the boat with the straw facing upward.** Another team member should quickly but carefully squeeze water into the straw until the balloon is full of water.

10. Lower the boat into the water, balloon side up, still covering the end of the straw. Once the balloon is inflated about halfway, uncover the end of the straw.
11. With your team, decide what you will change in the next tests.

    **You might change how many tablets you use or how much water you use.**

12. Create a data table in your technology notebook. You will need to record the results of the tests. You will also need space for recording what you changed for these tests.

    **Remember what your class decided on for the criterion that describes the purpose of the boat. Make sure your data table is set up to record results related to that criterion.**

13. Run the additional tests. Be sure to record the data each time you try a new test.
14. Using a different color, put a star beside the conditions that worked best for the boat.
15. Return the materials to where they belong.