Squid Races – classroom activity

This activity explores the basic concepts behind squid swimming discussed in the **Locomotion** section and can be modified to fit students of many experience levels.

Objectives for younger students (elementary school, early middle school)

- Identify the four main body parts in squid swimming (mantle, siphon, fins, arms/tentacles)
- Describe the role of each body part in helping the squid move
- Enhance teamwork skills when constructing balloon squid
- Think critically about size and shapes of body parts

Objectives for more experienced students (late middle school, high school)

- Identify anatomical features and describe the role of the squid's anatomy in swimming
- Discuss the tradeoffs between thrust and drag
- Understand the effect of size, shape, and position of the squid's body and anatomical features on thrust and drag
- Think critically about changes to a squid's body plan to optimize speed vs. distance travelled

Activity

For this activity, students will divide into groups use their newfound knowledge of squid locomotion to design their own balloon squid. Students should take into account things including: shape and size of the mantle; size, shape, and position of the fins; size and posture of the arms/tentacles. A group may decide to design their squid to be the fastest, to travel the farthest, or both. At the end of the activity there will be a race. Because of the design of the balloon squid they can really only be used once, either divide the students into a speed race and a distance race, or have them all race at the same time and judge the two separately. Students should have ~ 20 min to create their squid.

Students will divide into groups of 3-4 individuals. Each group will have access to the following supplies. Each group's squid must have 10 arms/tentacles and 2 fins of some sort.

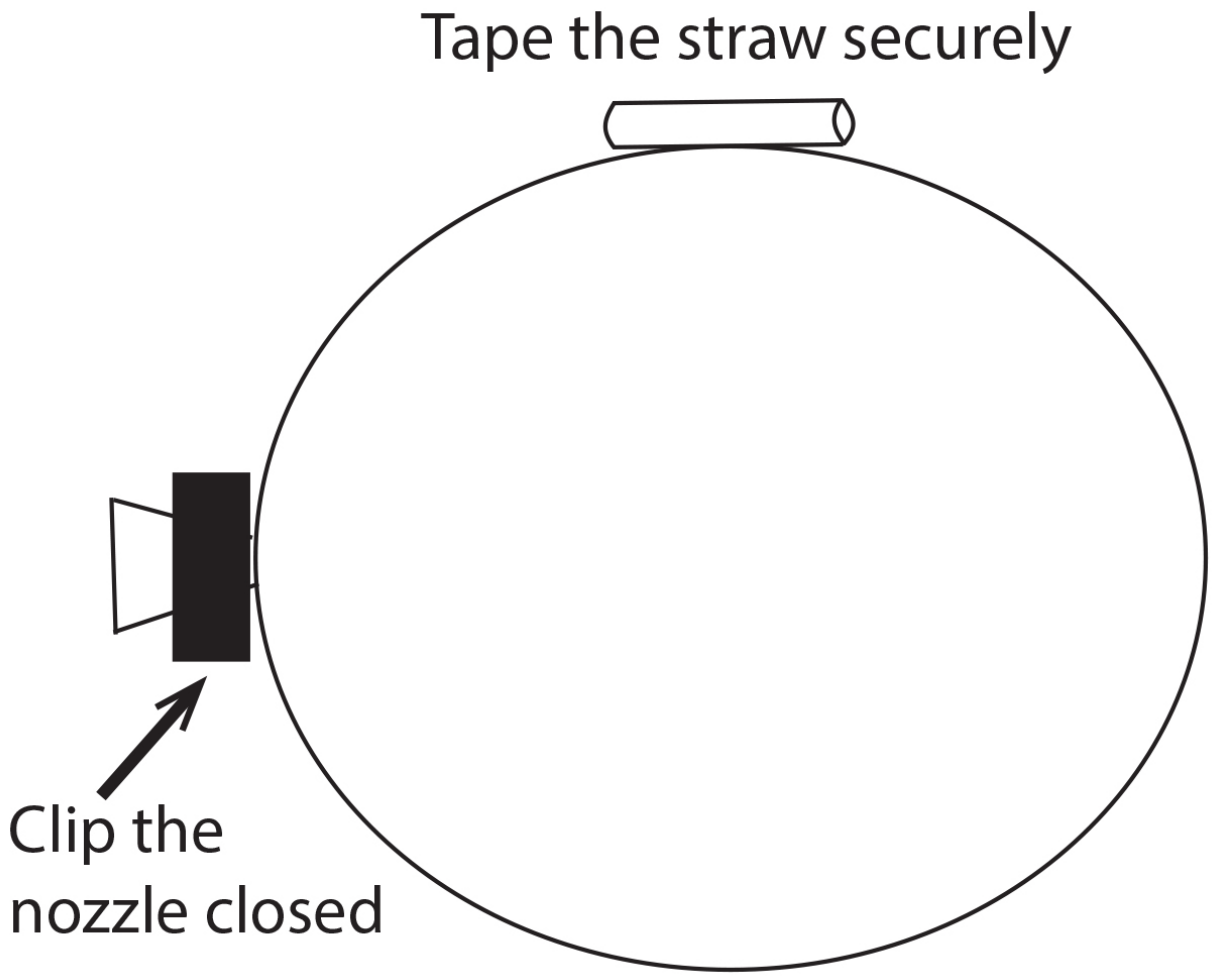
Supplies

- 1 balloon
- 1 piece of plastic drinking straw, cut to ~2 inches
- 1 small binder clip
- 1 piece of racing string, pre-cut to desired length of race (~10 ft for fastest race; >10 ft for farthest). String should ideally be something smooth, like fishing line.
- pipe cleaners or crepe paper for arms/tentacles
- paper to cut out fins
- markers
- tape
- scissors

Instructions

Students should select a balloon based on their new knowledge of how a squid swims. There should be a variety of sizes and shapes, and students are encouraged to choose the shape they think will let their squid "swim" the fastest/furthest.

A student should inflate the balloon and use the binder clip to hold the nozzle of the balloon closed so that air cannot escape. Then students should take their piece of straw and tape it to the top of their squid. This straw piece will be what keeps the squid on track during the race and so it is important it is very securely in place. More experienced students may realize that straw placement can have an effect on how well the balloon travels along the racing string.



Students may now decorate the squid with the markers and create other features such as fins and arms. Students should use what they've learned about the use of fins and arm posture in swimming to design their squids.

After the squids are complete, have the groups line up at one end of the classroom. They should now thread the racing string through the straw piece attached to their squid's back. One student holds the starting end where the squid is at waist height. Have one student from each group take one end of their racing string take opposite end of the classroom and kneel down. The downward string prevents everyone's squids from getting stuck. The teacher and any helpers should be at the side so that they can identify the fastest squid. Students should pinch the nozzle of the squid and remove the paper clip so that their fingers are the only thing keeping the air in the squid. At the teacher's command students should all let go of their squid at the same time.

After the race, a wrap-up discussion or small written assignment can take place. Were there unexpected outcomes? What could have led to the winning team's design to be the fastest or go the farthest? What differences in design would you expect in a squid that goes the fastest or goes the farthest?