



**Objective:** Make an electric motorboat, by the rules, for 5 meter rain gutter drag races.

**Groups:** 1 or 2 students per boat. Write your names on or attach them to the boat.

**Due Date:** \_\_\_\_\_. The boats can be tested \_\_\_\_\_.

**Grading (50 points possible):** A boat built according to all of the restrictions earns 35 points. As a boat propels itself down the 5 meter track at one time, it earns +3 points per meter completed. The boat must meet all of the rules and propel itself 5 meters at one time to qualify for competition. The top 3 boats in the tournament will earn extra credit.

**Boat & Propeller Designs:** The boat design may be based upon a fan-boat, speedboat, submarine, paddle wheel, or jet-ski. Air and water propellers may be taken from an available toy or purchased for a few dollars at a hobby store (notify the teacher if neither option is possible). The boat must fit within and operate according to all of the following size, battery, motor, and material restrictions.

**Size Restrictions (+5 points):** The size of the rain-gutter limits the boat's size. The length of the entire boat must be less than 35 centimeters from tip to tip. The width of the boat must be less than 9 centimeters at all points at the water's surface-level. The rain-gutter has a "U" shaped cross-section and narrows at its base. It will be filled and have a depth of about 6 centimeters. Design the boat to fit and operate within these dimensions.

**Battery Restrictions (+10 points):** The boat may **not** use any high-amperage batteries or battery packs such as ones designed for remote-control vehicles, recreational vehicles, camping, or automobiles. The boat may **only** use the following unmodified common household batteries: **1)** one 9V battery **or 2)** up to six D, C, AA, or AAA batteries. Contact the teacher for any questions; use batteries only according to their instructions.

**Motor Restrictions (+10 points):** The boat must propel itself with **only** 1 or more electric motors. An electric motor can be of any type that meets all other restrictions. An electric motor can be taken from an available toy or purchased for about \$3 at a hobby store (notify the teacher if neither option is possible). These motors are often rated 1.5V to 3V, but they work fine with the higher voltages allowed by the battery restrictions.

**Material Restrictions (+10 points):** You may purchase propellers, motors, and batteries, but the boat may **not** use any manufactured toy boat body. You may use household, hardware, and hobby store materials **only** according to their instructions. Common materials include: plastic bottles, Styrofoam, balsa wood, wires, switches, battery holders, tape and glue. Contact the teacher for any questions.