

Trial/Pilot Event

Contact the organizers of your tournament to find out what trial/pilot events will be held.

WATER STRIDER

DESCRIPTION: The objective of this event is to design and build a device, using only the materials specified, that will travel the length of a water-filled trough, propelled solely by the carbon-dioxide produced from the chemical reaction between sodium bicarbonate and acetic acid.

THE COMPETITION: A TEAM OF UP TO: 2 APPROXIMATE TIME: 30 minutes
(set up time: 15 minutes)

Materials that contestants may use are limited to: (run time: 1 minute)
30 cm of thread One small transparent, colorless plastic bottle with plastic cap Silicon sealer
(for propulsion)
Two stoppers (rubber or cork) One clear plastic 2-liter bottle with plastic cap
5 rubber bands (for fins, rudders, troughs, etc.)
6 craft sticks (popsicle sticks) Facial Tissue paper, toilet paper or paper towels
6 plastic straws (any type) Splash goggles (worn during testing and setup)

Materials supplied by the supervisor:

Stopwatch Sodium bicarbonate or baking soda
Scissors Balance capable of measuring 1/10th of a gram
50 mL graduated cylinder (students should be prepared to use the balance)
Water-filled trough Funnel

Platform scale for judges massing the final, ready to run, device.

5% white distilled vinegar (acetic acid)

Construction:

1. Students will construct and test the device prior to the **day of** the competition. The device, minus the reactants, must be impounded at least 30 minutes prior to the beginning of the event **or as designated by the tournament director**. Students must place their name, school name and school number on the device. **No alterations to the device will be allowed after it has been impounded, other than to load the device with the chemicals provided by the judges.**
2. The entire assembled device, in its pre-launch configuration, must fit (**and remain**) into a 25 cm (**length**) X 15 cm (**width**) rectangle.
3. Each device will be given a pre-launch safety inspection to determine if the bottle can withstand the pressure of the reaction gas.
4. Any device containing materials not on the list will be disqualified.
5. **During the 15 minute allotted set-up time, the students will mass the sodium bicarbonate and measure the desired volume of acetic acid. Then the reactants will be placed into the device without mixing.**
6. **The judge will then mass the fully-assembled device, in pre-launch condition, on a scale without any support on the device. No alterations can be made after the mass is confirmed by the judge.** The mass of the total assembled device, including all reactants, must not exceed 150 grams.
7. For tie-breaking purposes, the students will supply the judges with the predicted time (in seconds) required by their device to **travel a specified distance which will be announced at impound (announced distances will be in 0.5 meter increments).**
8. All energy propelling the device must originate from the reaction of sodium bicarbonate and acetic acid. Any accessory equipment (such as rubber bands, sticks and straws) must initially be in a completely relaxed state at the start of the competition. **Accessory equipment used for structural purposes only are exempt.**
9. **Hint: consider placing the in-current and ex-current straw above and below the liquid to determine the best combination.**

Testing Conditions:

1. The trough in which the water strider event will be run **may be** formed by cutting a 6-inch PVC pipe lengthwise, or by using wall-paper trays or other troughs that are at approximately 7 cm deep (measured at the radius of the trough), 6 inches wide and three meters long including the 25 cm starting length. The trough will be marked at half-meter intervals.
2. On the supervisor's signal, **students will place the device in the water of the starting area of the trough. Then, without removing the device from the water, on the supervisor's signal, the student will count down 3-2-1 and initiate the chemical reaction by lowering the strider with a piece of the thread.**

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Shaking the device will not be allowed. Any violent chemical reaction occurring prior to the judge's command will disqualify the device.

3. Maximum running time is **1 minute**. The most forward distance traveled (**not where it stops**) in that time will be used in determining the score. Distances will be measured to the nearest **0.5 cm**.
4. No part of the structural device at any time during the run may exceed the total 25.0 cm length (**reactants and starting thread excluded**).
5. Any device that leaves the trough will be scored below all other devices. The distance at which the device left the trough, as determined by the judges, will be used in determining the score.

SCORING:

1. Students will be allowed only one run.
2. The total score will be determined by adding the distance traveled in centimeters plus 10% of the total mass of the device measured in grams (total mass equals the mass of the device plus the mass of all reactants prior to **the running of** the device).
3. In the event of a tie, students whose run time is closest to their predicted time will be declared the winner.