

1. DESCRIPTION:

Prior to the tournament, participants will construct and test, to achieve maximum flight times, up to two rubber-powered mechanical flying birds, called ornithopters, which are propelled solely by flapping wings. The event must occur inside and the room dimensions (approximate length, width and ceiling height) should be made available to teams in advance of the competition. Directors and supervisors are urged to minimize the effects of environmental factors such as air currents (e.g., doors, fans, etc.).

A TEAM OF UP TO: 2

IMPOUND: No

TIME: 8 minutes

2. CONSTRUCTION PARAMETERS:

- a. A rubber-motor-powered, flapping-wing-driven bird may be constructed from published plan(s), commercial kit and/or a student's design as long as all specifications under Construction Parameters are satisfied.
- b. Birds must be constructed only from wood, tungsten, tissue paper, plastic film covering and glue, except as follows:
 - i. Metal may be used in the flapping mechanism, wing hinges, and motor hooks.
 - ii. Joints may be reinforced with tissue paper or thread soaked in glue.
 - iii. Rubber o-rings may be used to attach the motor to the bird.
 - iv. Plastic sleeves or beads maybe used.
- c. Materials such as carbon fiber and Kevlar are not allowed
- d. The mass of the bird without the motor must be greater than ($>$) 3 grams.
- e. The mass of the motor may not exceed (\leq) 4 grams.
- f. The bird(s) must be clearly marked so that the judges can identify to which team they belong.

3. THE COMPETITION:

- a. Once teams enter the testing/flying area to compete, they may not leave the area or receive outside assistance, materials or communication until they are finished competing. Only competitors and judges will be allowed in the testing/flying areas. Any team violating this paragraph shall be disqualified.
- b. At the event supervisor's discretion, test flights may occur throughout the contest but will yield to any official flight. Before beginning their test flights, teams must have an official stamp or mark on their log confirming it shows data for 10 previous flights. No test flights will occur in the last half-hour of the event. Multiple birds may test fly at once. A self-checking inspection station may be made available to students for checking their birds. The use of any type of winder is permitted.
- c. Each team must present a flight log of recorded data for at least 6 parameters for at least ten test flights prior to the competition. The three required parameters to be recorded are: 1) motor size before windup, 2) number of turns on the motor at launch, 3) flight time. The team may choose the 3 additional data parameters beyond those required, for example, turns remaining after landing, estimated/recorded peak flight height, estimated flight path diameter, the torque at launch, any attributes of the flapping mechanism that can be adjusted, etc.
- d. Teams will be given 8 minutes to launch 2 official flights. Any flight beginning within the 8-minute period will be permitted to fly to completion. Participants will be permitted to make adjustments to the bird; however, time for such adjustments will be part of the 8 minute flight period. Teams must elect to fly their second bird (if available) if their first gets hung up on an obstruction or is catastrophically damaged during the competition. Teams will not be given extra time to recover or to repair their bird.
- e. Timing for each flight starts when the bird leaves the student's hand and will stop when any part of the bird touches the floor. If the model comes to rest on something other than the floor, another timer will be started. If the model comes free within ten seconds, timing continues. If not, timing ceases and ten seconds are deducted from the time for the official score. The timing official will measure and record the time aloft to the nearest tenth of a second for each flight.

- f. During the flight of one team's bird, other official flights may be permitted by the event supervisor once the prior bird has started its descent. In the unlikely event of a collision, a team may elect a re-flight. The decision to re-fly may be made after their bird lands. The eight-minute period does not apply to such flights.
4. **SCORING:** Score will equal the time aloft in seconds, minus any applicable points for whichever flight gives the greater score:
- a. Teams with incomplete flight logs will have 30% of the actual flight time deducted from each flight.
 - b. Teams without flight logs will have 50% of the actual flight time deducted from each flight.
 - c. Teams that violate a rule under "CONSTRUCTION" or "THE COMPETITION" that does not have a specific penalty will be ranked after all teams that do not violate the rules.
 - d. Ties will be broken in favor of the team with the greater score of the lesser flight.