



1st Annual Ornithopter Competition - Rules and Regulations

1. Eligibility
 - 1.1. Students from 4th grade through undergraduate college may compete.
 - 1.2. Students will compete based on their grade level: Group 1 (4th-8th), Group 2 (9th-12th), and Group 3 (undergraduate college)
 - 1.3. Students may enter the contest as an individual or as a team. Teams are limited to no more than four individuals.
 - 1.4. In this document, both individuals and teams are referred to as Competitors.
2. Competitors will design and build rubber band powered ornithopters similar to those found here: <https://ornithopter.org/plans.shtml>
 - 2.1. While the intent is for this to be a fun, hands-on activity, we also recognize that some of the tools needed to build the ornithopter will require parental supervision.
 - 2.2. ***Parents are encouraged to help students in Groups 1 and 2 with designing and building their ornithopters.***
3. What's an ornithopter?
 - 3.1. An ornithopter is a flapping wing airplane. Any aircraft that flaps its wings like a bird to achieve flight, instead of using a propeller, is considered an ornithopter.
4. Ornithopter design constraints:
 - 4.1. Ornithopters must fit inside an 18x18 inch square box when fully assembled and flight ready. This will be checked when you check-in on the day of the event. If an ornithopter does not meet this constraint, it will be disqualified from competing.
 - 4.2. Modifications are not permitted after the competitor has checked-in on the day of the competition.
 - 4.3. Any ornithopter design is permitted, and wacky styles and unique designs are encouraged.
 - 4.4. The ornithopter must fly on it's own using only the energy of a single rubber band. No onboard electronics are allowed.
 - 4.5. Ornithopters shall not be automatically controlled while in flight, via an autopilot or other electro-mechanical devices.

- 4.6. Ornithopters shall not be manually controlled while in flight, via radio control or other electro-mechanical devices.
- 4.7. Students are encouraged to bring tools, spare parts and accessories to make repairs as needed. However, any repairs made may not result in exceeding any constraints described above.
- 4.8. A help bar will be provided, which will include tools, some spare parts and materials, and assistants to help competitors.
 - 4.8.1. This service will be offered free of charge to competitors
 - 4.8.2. Assistants are not allowed to touch, modify, or perform the repairs. They can provide tips, ideas, or explain how to fix your ornithopter, and may assist with locating the proper tools and materials to make repairs.
5. Each competitor or team may enter **up to two ornithopters** for the competition.
 - 5.1. Competitors (or teams) will register themselves and their ornithopters on the morning of the competition.
 - 5.2. All ornithopters must meet the requirements described in **Part 4** above, and this will be inspected at check-in on the morning of the competition.
 - 5.3. The ornithopters **do not** need to be the same design. For example, a competitor (or team) may wish to enter one ornithopter for the speed competition, and a different ornithopter design for the endurance competition.
6. Competitors are expected to arrive with fully assembled and functioning ornithopters on the day of competition.
 - 6.1. Competitors are strongly encouraged to begin designing and building their ornithopter as soon as possible.
 - 6.2. Test-flying and tweaking your design prior to the day of competition is strongly encouraged.
 - 6.3. **Competitors will not have time to build their ornithopter on the day of competition.**
7. There will be two competition categories: **speed** and **endurance**.
 - 7.1. Individuals (or teams) may register to compete in either **speed**, **endurance**, or **both**.
 - 7.2. **Please indicate the category in which you expect to compete when you register (via email).**
8. Each category will be a double elimination style competition, meaning that a competitor (or team) must lose twice before being eliminated (**see Figure 1**)
9. Speed Category
 - 9.1. The speed competition is a double elimination event (**see Figure 1**)
 - 9.2. Competitors (or teams) will compete in one-on-one style (head-to-head) heats.

- 9.3. In each heat, competitors will race their ornithopter from the starting line to the finish line.
 - 9.3.1. The starting line will be designated as one of the baselines of the basketball court (**see Figure 2**)
 - 9.3.2. The finish line will be the freethrow line on the opposite side of the court from the starting line (**see Figure 2**)
 - 9.3.3. The resulting distance from starting line to finish line is approximately 75 feet.
- 9.4. The winner of each heat will be the first ornithopter to cross the finish line
- 9.5. If neither ornithopter crosses the finish line, the ornithopter that traveled the farthest is designated the winner of the heat. Distance is measured from the starting line to the point where the ornithopter first touched the ground. Any distance traveled beyond the point of first ground contact will be ignored, even if the ornithopter continues flapping. Judges will mark the location of ground contact.
 - 9.5.1. For example, if your ornithopter grazes the ground at the half-court line but continues flying (even if it crosses the finish line), the distance for that ornithopter is measured from the start line to the half court line.
- 9.6. Judges will use stopwatches to measure the time of flight between start and finish lines to estimate the speed of each ornithopter. This will be used to determine the winner of the fastest overall.
- 9.7. Once the ornithopters are airborne, they are free to travel anywhere within the confines of the gymnasium (there are no out-of-bounds areas).
- 9.8. Upon launching the ornithopter, competitors will be required to remain behind the starting line to observe the race.
- 9.9. If possible, basketball goals and other structure hanging from the ceiling will be retracted to help reduce the possibility of collisions.
 - 9.9.1. Some structures hanging from the ceiling are not retractable or removable, including audio speakers, a center-court scoreboard, and the ceiling rafters. These are all potential obstacles if ornithopters fly too high. Redos will not be granted if an ornithopter collides with any object, except mid-air collisions between two competing ornithopters (see section 11 below for more on mid-air collisions).
10. Endurance Category
 - 10.1. The endurance competition is a double elimination style competition (**see Figure 1**)
 - 10.2. Competitors will compete in one-on-one (head-to-head) style heats.

- 10.3. The winner of each heat will be the ornithopter that remains airborne for the longest amount of time.
- 10.4. Competitors will hand launch their ornithopters from opposite sides of the basketball court (*see Figure 3*).
- 10.5. Once the ornithopters are airborne, they are free to travel anywhere within the confines of the gymnasium (there are no out-of-bounds areas).
- 10.6. Once launching the ornithopter, competitors will be required to leave the basketball court to observe from the designated observation areas (*see Figure 3*).
- 10.7. Judges will measure time of flight for each competitor in each heat using stopwatches.
- 10.8. Time of flight is measured from the instant the ornithopter leaves the hand of the competitor until the ornithopter makes contact with the ground. For example, if the ornithopter grazes the ground but continues flying, time is stopped upon contact with the ground, and any time-of-flight beyond first ground contact does not count.
- 10.9. Basketball goals will be retracted, if possible, to reduce the possibility of collisions.
 - 10.9.1. Some structure hanging from the ceiling is not retractable or removable, including audio speakers, a center-court scoreboard, and ceiling rafters. These are all potential obstacles if ornithopters fly too high. Redos will not be granted if an ornithopter collides with any object, except mid-air collisions between two competing ornithopters. See section 11 below for more on mid-air collisions.
11. Mid-air Collisions between two competing ornithopters:
 - 11.1. In order to conduct the event in a timely manner, both the endurance and speed categories will be conducted using head-to-head heats, meaning that two ornithopters will be airborne at the same time. This means there is a small chance that the two competing ornithopters will have a mid-air collision during a heat. If this happens, a redo will be granted to both competitors. If either of the ornithopters are damaged as a result of the mid-air collision, competitors will be given an opportunity to make repairs.
 - 11.2. If a mid-air collision occurs. The heat will be granted a redo.
 - 11.3. Redos are described in Section 13 below.
 - 11.4. If NEITHER ornithopter requires repairs, the redo will occur immediately.
 - 11.5. If EITHER ornithopter requires repairs resulting from the mid-air collision, the redo will be delayed until the end of the current round allowing the remaining heats of the round to continue in a timely manner. If this is not possible, a time limit of ten (10) minutes will be allowed for repairs.
12. Race Procedures and Etiquette

- 12.1. During each heat, competitors will be called by name to the basketball court.
 - 12.1.1. A five minute grace period will be given, during which a competitor or team name will be called 3 times.
 - 12.1.2. In order to conduct the event in a timely manner, any competitor who has not reported to the basketball court within the 5 minute grace period will forfeit the heat.
- 12.2. Once both competitors have arrived, the judges will ask them to line up in the launching areas (**Figures 2 and 3**).
- 12.3. The competitors will then be given one minute to prep their ornithopter. This time is used for winding the rubber band and making any final adjustments prior to flight.
- 12.4. Once the one-minute preparation period is over, the judges will verbally call “ready”, followed by “set”, and then a whistle or buzzer will sound indicating the start of the heat.
- 12.5. Upon hearing the whistle/buzzer, competitors will hand launch their ornithopters. Accommodations will be made for instances where a competitor cannot hand launch their ornithopter due to a disability or impairment.
- 12.6. A single judge will be assigned to each competitor, and the judge will be responsible for determining time-of-flight, ground contact, etc.
- 12.7. Upon releasing the ornithopters, the competitors will make way to their designated observation area, as shown in **Figures 2 and 3**
 - 12.7.1. For the speed competitions, this is the same area as the launch zone, and the competitor will simply need to remain behind the starting line until the heat is finished.
- 12.8. Only after **both** ornithopters have landed and the judges have declared the heat finished will competitors be allowed to retrieve their respective ornithopter.
 - 12.8.1. In order to avoid inadvertent or accidental damage, **DO NOT** retrieve or touch another competitor's ornithopter. Touching another competitor's ornithopter will be viewed as unsportsmanlike conduct and you will be disqualified. See **Part 15** below for more details.
- 12.9. False start
 - 12.9.1. A false start is any instance where an ornithopter is launched, dropped, or released prior to the sound of the buzzer/whistle.
 - 12.9.2. Each competitor will be allowed one false start per heat.
 - 12.9.3. Two consecutive false starts in a row result in a competitor forfeiting the heat.

- 12.9.4. In the event of a false start, redos will be granted except when the previous rule (12.9.3) is invoked.
 - 12.9.5. If an ornithopter is damaged as the result of a false start, the competitor WILL NOT be allowed time to make repairs prior to the redo.
13. Redos
- 13.1. A redo is any instance where judges deem that a heat should be retried due to extenuating circumstances as described in this document.
 - 13.2. Redos **will be granted** only for the following reasons.
 - 13.2.1. Mid-air collisions between two competing ornithopters during a heat as described in this document.
 - 13.2.2. Instances where a competitor impedes the launching or flight of another competitors ornithopter (examples are sabotage, throwing items at an airborne ornithopter, or other forms of unsportsmanlike conduct described in this document)
 - 13.2.3. Instances where a bystander or member of the audience interferes with the flight of an ornithopter. Examples include accidental collision with the ornithopter and an attendee, or purposeful attempts to sabotage the ornithopter by throwing objects or swatting at the ornithopter.
 - 13.2.4. False starts as described in this document.
 - 13.3. Redos **will not be granted** for instances of a bad hand launch, forgetting to wind-up the rubber band, mid-air collisions with objects hanging from the ceiling, or for any malfunctions that occur mid-flight (for example a broken rubber band).
 - 13.4. We understand that sometimes things happen that no one can foresee. Therefore, any events that occur not stated in this document will be left to the judges discretion to allow a redo.
14. Accessibility
- 14.1. The judges and organizers of this event will make every possible attempt to accommodate competitors with disabilities. These will be handled on a case-by-case basis. If you or a member of your team require assistance due to a disability, please let us know in advance so we can make appropriate accommodations.
15. Awards will be given for 1st, 2nd, and 3rd place finishers in each group and each category. Awards will also be given for fastest overall in the speed competition, longest overall flight in the endurance competition. Last but not least, judges awards will be given for the best design and best sportsmanship observed throughout the event.

16. Sportsmanship
 - 16.1. All competitors and attendees are expected to maintain good sportsmanship behavior throughout the competition.
 - 16.2. Any competitor that is observed behaving in an unsportsmanlike manner will be disqualified without question and will forfeit any awards they may have been entitled to receive. This includes, but is not limited to:
 - 16.2.1. Lude or rude gestures
 - 16.2.2. Attempts to sabotage another competitor or their ornithopter
 - 16.2.3. Attempts of knocking another competitor's ornithopter out of the air (including throwing objects or swatting at the ornithopter).
 - 16.2.4. Obscene language
 - 16.2.5. Making threats of physical harm
 - 16.2.6. Bullying
17. Event check-in will begin at 8:00AM with competitions beginning at 9AM.
18. Detailed schedule and brackets will be decided prior to the competition and provided to contestants in advance.
19. ***For all Attendees, including parents, guardians, family, spectators, bystanders, and competitors in the audience.***
 - 19.1. Attendees are expected to observe good sportsmanship behavior throughout the competition. Any attendee that is observed behaving in an unsportsmanlike manner as described in this document, will be asked to leave.
 - 19.2. Cheering, clapping, and supportive feedback during the competition is encouraged.
 - 19.3. Jeering, booing, or any other forms of negative-cheering will be considered unsportsmanlike conduct and will not be tolerated.
 - 19.4. Attendees will be allowed to sit on the bleachers within the gymnasium to observe the competition.
 - 19.5. Attendees must sign a liability waiver upon arriving at the event.
 - 19.6. Once airborne the ornithopters are not controllable, and as a result, may take unexpected or unintended trajectories. Attendees must remain vigilant throughout the competition and should be prepared to make their best effort to avoid accidental contact with airborne ornithopters, so long as avoidance can be done in a safe manner to them and other attendees in their immediate vicinity.
 - 19.7. In order to avoid inadvertent or accidental damage, ***DO NOT*** retrieve or touch a competitor's ornithopter. This act will be viewed as unsportsmanlike conduct and you will be asked to leave.
 - 19.8. The audience capacity will be limited based on the fire code capacity limit for the gymnasium.

20. COVID-19

20.1. At this time there are no covid related restrictions on this event. However, we understand that new variants are possible and the situation is always evolving, and we will communicate any changes and updates to all pre-registered competitors as needed.

21. Please pre-register by emailing distribution@hsv-aiaa.org.

21.1. The deadline to pre-register is **Monday, January 31st at 11:59PM Central Time**

21.2. Please use the following text in the **subject line** of the email:
Registration for Ornithopter Competition

21.3. In the body of the email, please include the **student's full name, grade level, school where student is enrolled**, and whether you intend to compete in the **speed, endurance**, or **both** categories.

21.4. If registering as a team, please include the **Name, Grade, and School** above for all team members (maximum of four per team).

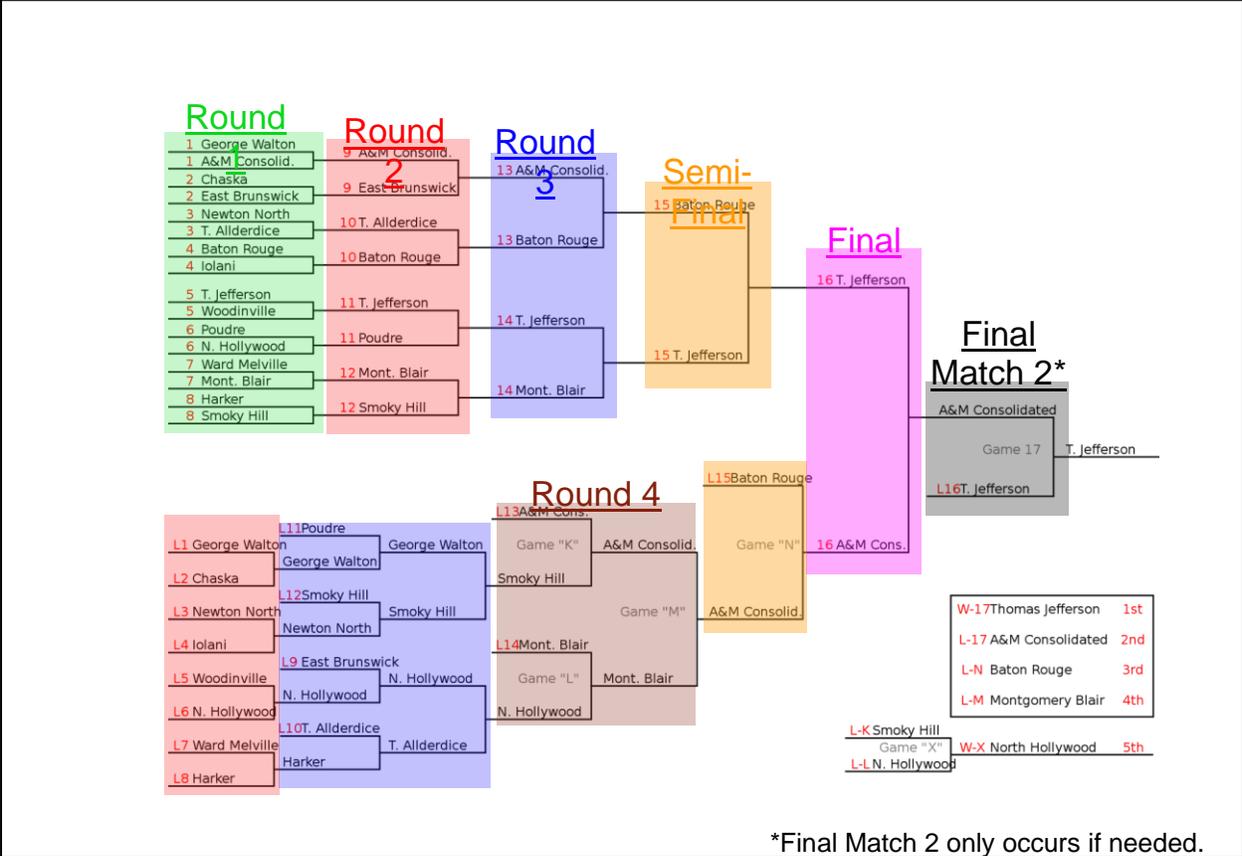


Figure 1: Example Double Elimination contest bracket. The contest will occur in a series of rounds, with each round made up of several head-to-head heats. In the image above, the first round (green) is made up of 16 competitors divided into 8 head-to-head heats. The top branch of the bracket is referred to as the winners bracket, while the bottom branch is referred to as the elimination bracket. The contest will begin with Round 1. Round 2 will begin once all heats from Round 1 are complete.

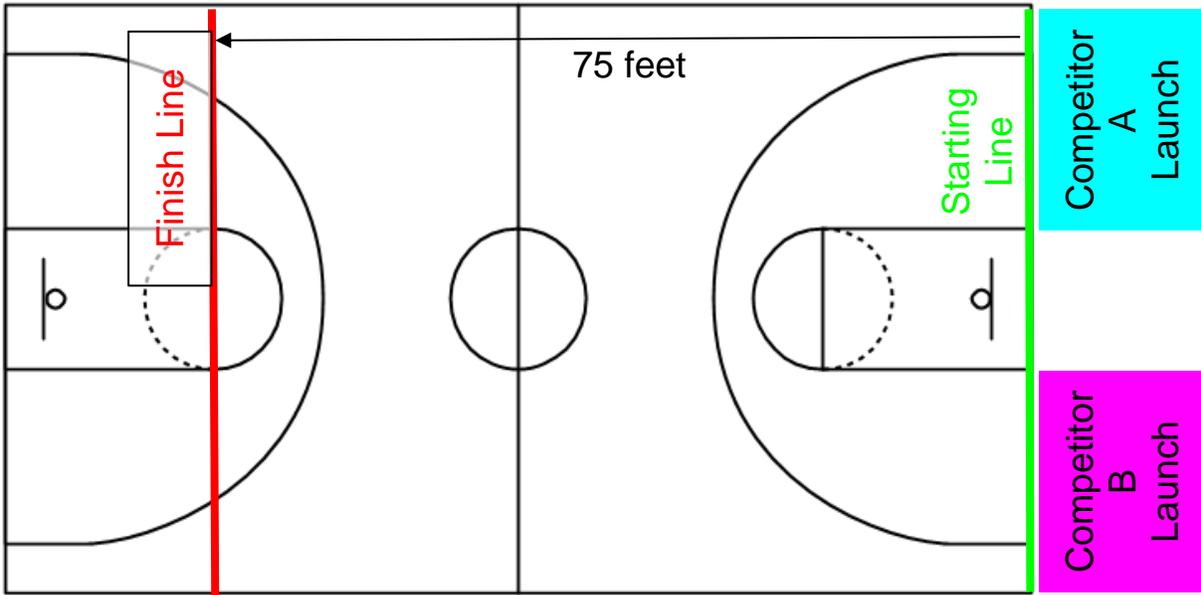


Figure 2: Diagram of a basketball court indicating the starting and finish lines for the SPEED competition. The blue and magenta areas are the designated areas where competitors will launch their ornithopters. After launching, competitors shall remain in that zone until the heat is over. The distance from starting line to finish is approximately 75 feet.

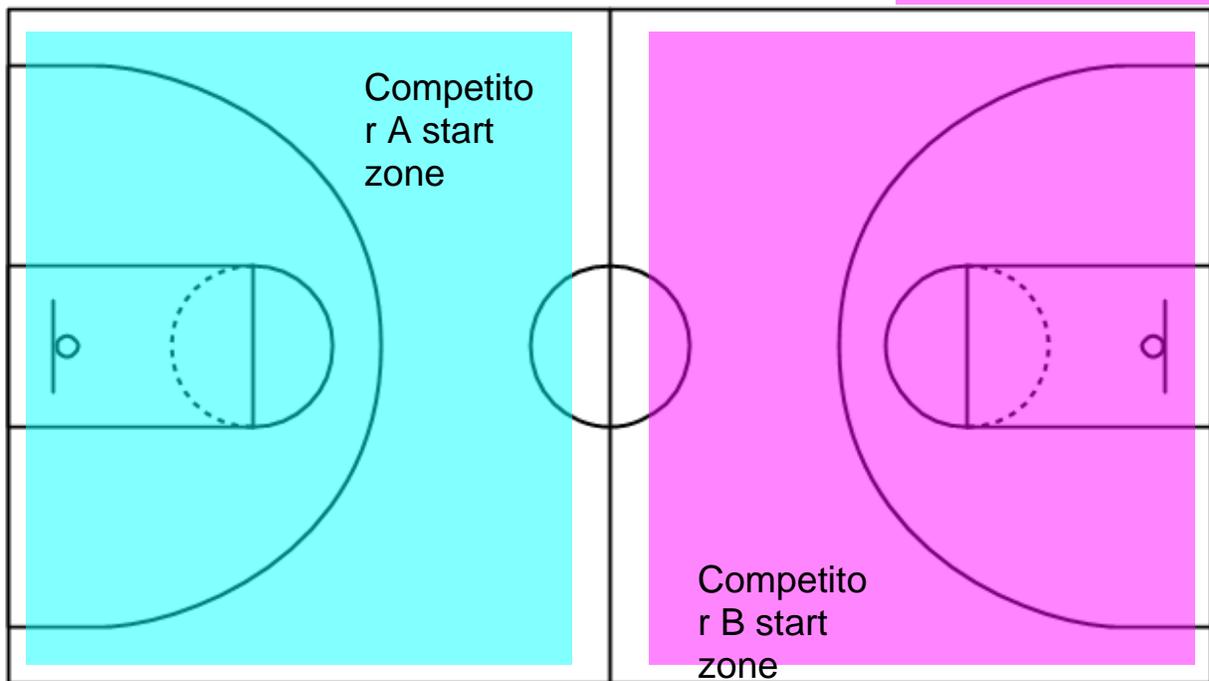


Figure 3: During the ENDURANCE competitions, two students will compete against each other in head-to-head matches (referred to as heats). One competitor will launch from the blue zone, while the other competitor launches from the magenta zone. After the competitor hand launches their ornithopter, they will be asked to leave the basketball court and observe from the designated observation areas. Once both ornithopters have landed, the competitors will be allowed to retrieve their ornithopter. The competitor with the longest time-of-flight wins the heat.