AERIAL SCRAMBLE

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** At the Tournament, teams will assemble, test, and fly up to two aircraft built on-site without using adhesives from unopened standardized model airplane kits.

   A TEAM OF UP TO: 2 **IMPOUND:** No **APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**
   a. For Invitational and Regional competitions, teams must bring two unopened kits for inspection and their use. Only kits that, by design, are assembled without adhesives (i.e., Guillows Skystreak, AMA Alpha) and can be disassembled and reassembled to fly again will be accepted.
   b. At the State and National competitions, event supervisors will provide all airplane kits used in the event. Organizers will stipulate the airplane kit to be used in competition at least 2 weeks prior to the competition. Teams will choose two kits for the event from a selection of unopened standardized kits provided by the Event Supervisor. All teams must use the tournament provided standardized kit.
   c. Teams may bring up to 4 rubber motors, each not exceeding 2.0 grams.
   d. Teams may bring winders, assembly tools, fixtures (freestanding from airplanes), sandpaper, adhesive systems, thread, pins, tape, rubber O-rings for motors, clay and their logbook. All items must fit inside a single clear sided container with an approximate footprint of no more than 12” x 12”.
   e. Teams must bring a first aid kit that should contain at least 3 adhesive band-aids and any other first aid equipment the team feels is necessary.
   f. Additionally, teams must bring cutting boards and wax paper to cover any and all work surfaces.
   g. The items in 2.e. and 2.f. do not need to be included in the above referenced (2.d.) tool box.
   h. Any team not using a cutting board will receive a 20% deduction on their final score.
   i. Each team is responsible for their work site. Any debris must be disposed of, and the site cleaned and inspected before official flights are attempted.
   j. Teams will be allowed to attempt two (2) official flights for scoring.
3. **CONSTRUCTION PARAMETERS:**
   a. Only those materials found as part of the two kits will be allowed in model assembly. Glue, tape, pins or clay ballast may be added by teams and are considered as parts of each model.
   b. Boron, carbon fiber, extra wood or foam plastic materials are not allowed in the construction of the aircraft.
   c. The stock rubber motor may be replaced by other rubber elastic loops.
   d. Total mass without motor must be more than 10.0 grams and cannot exceed 25.0 grams.
   e. The wingspan cannot exceed 50.0 cm.
   f. Airplanes must use the propeller provided in the kit, which may not exceed 14.0 cm in diameter.
   g. Motors may have rubber O-rings and be lubricated after check-in.
   h. Airplanes will be labeled in such a way that can be identified by the participants in reference for their logbooks.
4. **THE COMPETITION:**
   a. The event will be held indoors. Tournament officials will announce the room dimensions (approx. length, width and ceiling height) in advance of the competition. Tournament Officials and Event Supervisors are urged to minimize the effects of environmental factors such as air currents. Rooms with minimal ceiling obstructions are preferred over very high ceilings.
   b. The event will be scheduled in hour time slots with no more than 10 teams competing in a time slot. The first 30 minutes will be devoted to complete primary check-in, model assembly and trim flights. The final 20 minutes will be to accomplish the team’s two official flights. These flights will occur in 2-3 team mass launches within a 4-minute scheduled window.
   c. At their scheduled time a team will enter a cordoned off competition area to begin Primary Check-In, where they:
      i. Sign-in and are scheduled, in sequence of their arrival, for an official flight time-slot, as well as receive from or have their model kits inspected by from the Event Supervisors depending upon the type of competition being held.

ii. Teams will then submit their tools and materials kit (2.d.) as well as their first aid kit (2.e.) for inspection. Teams must show officials that they have at least a minimum of 3 adhesive band-aids as part of this kit or a 10% deduction will be applied to their final score.
iii. The team members remain in the competition area until their official flights are completed. No outside assistance is allowed.
iv. Teams will assemble up to two airplanes from the two kits and proceed to test/trim fly their models.
v. The first thirty minutes of the hour include check-in, model construction and flight trimming.
vi. At the Event Supervisor's Discretion:
(1) Test Flights may occur throughout the contest but will yield to official flights.
(2) Teams ready early can proceed to make their official flights in sequence.
(3) No Test Flights may occur in the last half hour of the event.
vii. A self-check inspection station may be made available to competitors for checking their airplanes prior to the Secondary Check-In for their Official Flights.
viii. Competitors may use any kind of winder, but electricity may not be available.

d. For Secondary Check-in and their Official Flight Time-Slot, teams must present up to two airplanes, their logbook, and up to 4 motors for inspection immediately prior to their Official Flight Time-Slot. Logbooks must describe at least 4 tasks that were used in either model construction or test flying their models prior to the competition. The logbooks may contain numerical data.
e. During Secondary Check-in, Timers will collect the motors presented for inspection. Allowable motors will be returned to the team just prior to their Official Flight Time-Slot.
f. After Secondary Check-in, teams will be taken in groups of 2 or 3 to make official flights:
i. Teams may make up to two (2) official flights using 1 or 2 airplanes.
ii. Teams will be instructed to put their airplanes on the floor then asked to pick them up.
iii. All motors that meet specifications and were collected during Secondary Check-in will be returned to the teams for their official flights.
iv. When picked-up, teams will have one minute to wind airplanes.
v. Timers will follow and observe teams as they are winding their motors.
vi. In the last 10 seconds of that minute, a timer will audibly announce the countdown. At "3-2-1 Launch!" all models in the group will be launched and timed independently.
vii. When the last model lands, teams will again be instructed to pick-up their models starting a one minute countdown for the second official flight. These flights will be timed to conclusion.
viii. Time aloft for each flight starts when the model leaves the competitor's hands and stops when any part of the model touches the floor, the lifting surfaces no longer support the weight of the model (such as the airplane landing on a girder or basketball hoop) or the Event Supervisors otherwise determine the flight is over.
ix. In an unlikely event of a collision, the two teams involved will re-fly the round.
x. Event Supervisors are strongly encouraged to utilize three (3) timers on all flights. The median flight time in seconds to the precision of the device used is the official time aloft.

5. **SCORING:**

a. The final score is made by adding the two flight times together.
b. Ties will be broken by the longest single official flight time per team.
c. Teams with incomplete flight logs will have each flight time multiplied by 0.90.
d. Teams that worked without a cutting board will have each flight time multiplied by 0.80 after other penalties have been applied.
e. Teams without flight logs will have each flight time multiplied by 0.70.

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries a variety of resources to purchase; other resources are on the Event Pages at soinc.org.

TRIAL EVENT: ANIMAL GROUP 2025

DESCRIPTION: Teams will be given a list of animals, and they will need to provide the correct group name.

A TEAM OF UP TO: 2 **IMPOUND:** NO **EYE PROTECTION**: NO

EVENT PARAMETERS:

a. Teams will not be allowed to bring any material except a writing utensil.

b. The Event Supervisor will provide the Test and Answer Sheet.

c. The test will involve knowing the group name given for any group of animals

THE COMPETITION

a. Teams will fill in the group name of the animals listed. Legible writing will be important in this event.

SCORING:

a. High score wins.

b. Ties will be broken by time.

BOTANY

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION**: Participants will demonstrate their knowledge of plant life and general botany principles.
   A TEAM OF UP TO: 2 **EYE PROTECTION:** A
   CALCULATOR: Class II **APPROXIMATE TIME:** 50 minutes
2. **EVENT PARAMETERS:**
   a. Each participant may bring one 8.5" x 11" sheet of paper, which may be in sheet protector sealed by tape or laminated, that may contain information on both sides in any form and from any source without any annotations or labels affixed as well as a stand-alone, non-programmable, non-graphing calculator.
   b. Each participant must wear a lab coat and googles when dealing with specimens.
   c. Event Supervisors will provide live/preserved specimens, pictures, tables, graphs of data, microscopes, slides, and any other required equipment for the event. If used, toxic/irritating plants or specimens in liquid (e.g., Algae, protists) must be in closed, non-breakable containers.
3. **THE COMPETITION:**
   a. This event may be run as either a sit-down exam or a series of laboratory stations with questions.
   b. Participants will be expected to master the structure of plant cells, roots, stems, leaves, spore forming bodies and flowers, aspects of plant growth and differentiation, and the transport and storage of gases, water, and nutrition throughout the plant body.
   c. Participants should also have a broad knowledge of the major divisions between groups of plants (i.e., algae vs. multicellular plants, monocot vs. dicot, embryophytes vs. cryptogams, woody vs. herbaceous plants).
   d. In addition to the above listed topics, participants should know:
      i. The history of botany
      ii. Basic plant genetics and reproduction
      iii. Photosynthesis
      iv. Differences between the major taxonomic groups of plants
      v. Paleo-botany and plant evolution
      vi. The role of plants in global energy and nutrient cycles
      vii. Use of plant materials by animals and humans
      viii. Competition in the plant community
      ix. Genetically Modified Organisms (GMOs)
      x. Production of foodstuffs and plant products
      xi. Plant diseases; including nutrient deficiencies and infections
   e. For Division C Only, participants are expected to know:
      i. Principles of horticulture and aquaculture
      ii. Plant biochemistry
      iii. The roles of plants in medicine and environmental management
      iv. Importance of plant diversity
4. **SAMPLE QUESTIONS/TASKS:**
   a. What leaf structure is being shown on this microscope slide?
   b. Using the graph, identify the peak wavelength for chlorophyll absorbance.
   c. Identify three key differences between flowering plants and ferns.
   d. Which plants would be in the next wave of plant succession for the region shown?
   e. Describe the role plants play in the nitrogen cycle.
5. **SCORING:**
   a. High Score wins.
   b. Selected questions will be used to break ties.

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries a variety of resources to purchase; other resources are on the Event Pages at soinc.org.

This event is sponsored by Corteva Agriscience

TRIAL EVENT: BOTTLE ROCKETS 2025

DESCRIPTION: Teams will build up to two bottle rockets of the size of their choice to stay aloft as long as possible.

A TEAM OF UP TO: 2 **IMPOUND:** NO **EYE PROTECTION**: YES

EVENT PARAMETERS:

a. Each team may either bring up to 2 pre-built bottle rockets or may construct them onsite with materials they bring with them.

b. The bottle may be either one or two liters. Team choice.

c. The bottles must be unaltered with any punctures or glue. Any alterations must protect the integrity of the bottle structure.

d. The rockets may have no additional materials, they may have fins, they may have nose extensions, they may have parachutes. Team choice.

e. Any nose extensions must be rounded at the top and non-dangerous to anyone as the rocket lands.

f. If time permits, teams may make changes to their bottle rocket and have another launch in an effort to increase their time aloft.

THE COMPETITION

a. Teams must present their rockets for inspection by the Event Supervisors.

b. Teams must wear goggles.

c. Teams must bring their own water to load into the rocket.

d. The rockets will be allowed to be pressurized up to 60 psi.

e. Teams must follow all safety instructions from the event supervisors with regard to the rockets.

f. The bottle rocket assembly must stay intact during the flight. If any pieces of the assembly leave the rocket, that flight will be disqualified.

g. Teams must gather up their rockets and any other equipment at the end of the event.

SCORING:

The team whose rocket stays aloft the longest wins. There will be a winner in both the B Division and the C Division.

Any bottle rocket deemed unsafe for launch, may be replaced by that team with a safe rocket before the end of the event.

TRIAL EVENT: BRIDGE 2025

DESCRIPTION: Prior to the competition, teams will design and build a Bridge meeting requirement specified in these rules to achieve the highest structural efficiency.

A TEAM OF UP TO: 2 **IMPOUND:** NO **EYE PROTECTION**: YES

EVENT PARAMETERS:

a. Each team is allowed to enter up to two bridges as time permits, **built prior to the competition.**

b. All participants must properly wear eye protection at all times. Participants without proper eye protection must be immediately informed and given a chance to obtain eye protection if time allows. **Participants without eye protection will not be allowed to compete.**

c. The Event Supervisor will provide the Test Apparatus.

CONSTRUCTION PARAMETERS:

a. The Bridge must be a single structure with no separate or detachable pieces.

b. The Bridge must be constructed of wood and bonded by adhesive. The definition of "wood" is the same in the rules for Towers. The definition of "adhesive" is the same in the rules for Towers.

c. The Bridge for both Division B and Division C must span an opening of 20cm x 20 cm square on a test base. The Bridge for the high school must span an opening of 45 cm and the Bridge for the middle school must span an opening of 35cm. In both cases the Bridge will rest on blocks either 45cm or 35cm apart.

d. The Bridge must be designed in such a way that it can hold the loading block, which is 5cm x 5cm x 2cm. Only the loading block may support the chain and bucket. The block/load must be suspended in the center of the 20cm x 20cm opening.

e. The Bridge must not be braced against any edge of the test base.

THE COMPETITION

a. The Bridge will be tested on the same device as the Towers with modification.

b. Once participants enter the check-in area, they may no longer make any changes to their Bridge and may not receive any outside help. The Bridge will be massed by the team and they will place the Bridge on the testing device and set up the block and chain.

c. Loading of the Bridge stops immediately when a failure occurs.

SCORING:

a. Score = (Load Scored (g) / Mass of Tower (g): High score wins. Example: Bridge held 12,000g and massed at 24g= score 500 efficiency.

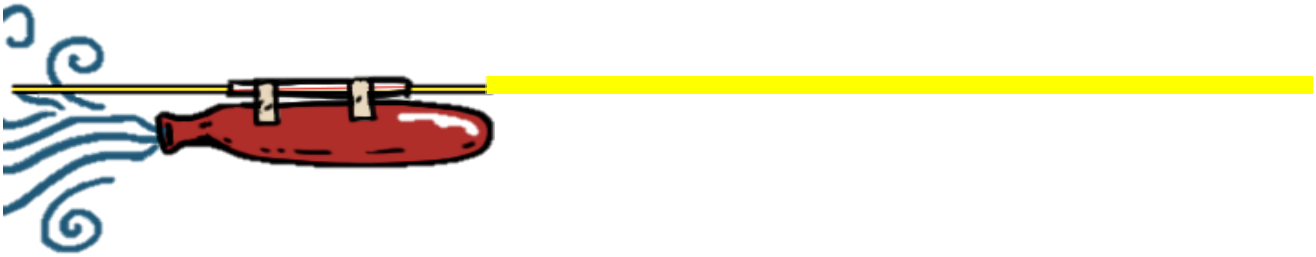
b. The Load Score is the measured load supported, including the Loading Block Assembly, bucket, and sand/material, but may not exceed 15,000 g.

c. Bridges not meeting construction parameters will be tested if possible, however they will score below those Bridges that meet the construction parameters.

We will be following the 2023 Event Rules.

For more directions, see the following two pages for the 2023 Event Rules.

Also go to https://www.soinc.org/bridge-b for more help.



2025 Nebraska Science Olympiad Trial Event (B & C Divisions)

Horizontal Balloon Rocket Design, Build and Launch Challenge

Challenge: Given a length of fishing line stretched across the room, teams will design, build and launch an air-powered tram to carry as many provided items the farthest distance possible.

All supplies will be provided by Event Supervisor, including:

- Fishing line stretched taut across the room, parallel to the floor, fastened at each end of the line
- 2 Balloons (*note: potential latex allergy exposure*)
- A variety of materials, including drinking straws, paper clips, plastic bags, paper bags, tape
- A defined cargo item announced at the event (could be pennies, washers, pencils, or another item)

Participating teams must provide:

- Up to 3 team members to design, build and launch

Rules:

1. Specifications will be announced prior to the start of the design and build period.
2. Teams will have up to 15 minutes to design and build one tram.
3. At the end of the build period, all entries are impounded. The total length of the device will be measured.
4. Each entry will be randomly assigned a place in the que to launch their tram device.
5. Participating team will have 2 minutes to retrieve their tram device and load their tram device on the fishing line system. The line can be detached and reattached.
6. The tram device must fit into the “starting area” that is 60 cm from the object holding the line in place. The farthest forward solid connection (“the reference point”) to the fishing line must align with the “starting line” 60 cm from the object holding the line in place.
7. The team will release the hold on the balloon.
8. The distance the front of the reference point travels on the fishing line will be used to measure back to the starting line for total distance.

Scoring:

- The distance traveled multiplied by the number of cargo items after coming to rest. High score wins.
- Ties will be broken by the higher total number of cargo items attached to the rocket in its final resting location. If still tied, the shortest total length of the uninflated device will rank higher
- Points will be deducted if a team pops more than two balloons, disfigures the cargo items and/or exceeds 2 minutes to prepare for launch

Resources:

- Highlight video from previous year: https://youtu.be/FSfKWWG_wCA
- How to make a balloon rocket: https://sciencebob.com/make-a-balloon-rocket/ and https://www.scientificamerican.com/article/under-pressure-launch-a-balloon-rocket/