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, 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 the Problem Solving/ Technology CD which contains resources about building and flying airplanes; other resources may be found on the Trial Event page at soinc.org.

GENERAL RULES

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

GENERAL RULES, CODE OF ETHICS, AND SPIRIT OF THE PROBLEM

The goal of competition is to give one's best effort while displaying honesty, integrity, and good sportsmanship. Everyone is expected to display courtesy and respect - see Science Olympiad Pledges. Teams are expected to make an honest effort to follow the rules and the spirit of the problem (not interpret the rules so they have an unfair advantage). Failure by a participant, coach, or guest to abide by these codes, accepted safety procedures, or rules below, may result in an assessment of penalty points or, in rare cases, disqualification by the tournament director from the event, the tournament, or future tournaments.

1. Actions and items (e.g., tools, notes, resources, supplies, electronics, etc.) are permitted, unless they are explicitly excluded in the rules, are unsafe, or violate the spirit of the problem.

2. While competing in an event, participants may not leave without the event supervisor's approval and must not receive any external assistance. All electronic devices capable of external communication as well as calculator applications on multipurpose devices (e.g., laptop, phone, tablet) are not permitted unless expressly permitted in the event rule or by an event supervisor. Cell phones, if not permitted, must be turned off. At the discretion of the event supervisor, participants may be required to place their cell phones in a designated location.

3. Participants, coaches and other adults are responsible for ensuring that any applicable school or Science Olympiad policy, law, or regulation is not broken. All Science Olympiad content such as policies, requirements, clarifications/changes and FAQs on www.soinc.org must be treated as if it were included in the printed rules.

4. All pre-built devices presented for judging must be constructed, impounded, and operated by one or more of the 15 current team members unless stated otherwise in the rules. If a device has been removed from the event area, appeals related to that device will not be considered.

5. Officials are encouraged to apply the least restrictive penalty for rules infractions - see examples in the Scoring Guidelines. Event supervisors must provide prompt notification of any penalty, disqualification or tier ranking.

6. State and regional tournament directors must notify teams of any site-dependent rule or other rule modification with as much notice as possible, ideally at least 30 days prior to the tournament.

COVID-19 PANDEMIC RULES MODIFICATIONS

The COVID-19 pandemic requires that some general modifications be made to the Event Rules listed in this manual in order to permit Science Olympiad competitions to continue in a way that reflects best public health, disease prevention, and personal safety practices. The modifications listed here will be in effect for all Science Olympiad competitions, regardless of level (e.g., Invitational, Regional, State, National), or type (e.g., In-Person, Satellite SO, mini SO). As the pandemic is evolves, these modifications may be amended or rescinded according to local conditions. If changes are made, the Tournament Director for the affected tournament will make an announcement to all participating teams as soon as possible.

1. **If not already allowed, each individual participant can have a personal set of reference materials (e.g., binders, single sheets of paper), calculator, or other academic resource as specified in the specific event rule for use during the competition to facilitate social distancing, isolation, and to prevent resource sharing. Personal sets of resource materials must meet all the criteria established in the specific event rule. This does not apply to Recommended Lab Equipment for Division B or Division C Chemistry Events or tool kits for Build Events.**

2. **Given local conditions, participants may not be able to be in the same location as their partner during competition. Tournaments will allow designated partners to compete from separate locations and competing teams will only need one device for Build or Hybrid with Build Events.**

3. **At the discretion of the Tournament Director, portions of Hybrid Events containing hands-on activities as well as Build and Lab Events may be dropped from the tournament or be conducted as trial events.**

4. **At the discretion of the Tournament Director and Event Supervisors, completion time may be used as a tiebreaker for Core Knowledge and other events where a written or online test is used.**

CHEMISTRY RECOMMENDED LAB EQUIP.

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

Each team may bring any or all of the items listed below for use in Division C Chemistry Events requiring laboratory equipment. Teams not bringing these items will be at a disadvantage as Event Supervisors will not provide Recommended Lab Equipment. A penalty of up to 10% may be given if a team brings prohibited lab equipment to the event.

Item & Expected Use	Likely to be used in:			
	Chemistry Lab	Forensics	Environmental Chemistry	Materials Science
Box - Containing all of the kit materials	X	X	X	X
10 ml Graduated Cylinder - Measuring volumes	X		X	
25 ml Graduated Cylinder - Measuring volumes	X		X	
100 ml Graduated Cylinder - Measuring volumes	X		X	
50 ml Beakers - Doing reactions, developing chromatograms	X	X	X	X
100 ml Beakers - Doing reactions, developing chromatograms	X	X	X	X
250 ml Beakers - Doing reactions, developing chromatograms	X	X	X	X
400 ml Beakers - Doing reactions, developing chromatograms	X	X	X	X
50 ml Erlenmeyer Flasks - Doing reactions	X		X	
125 ml Erlenmeyer Flasks - Doing reactions	X		X	
250 ml Erlenmeyer Flasks - Doing reactions	X		X	
Test Tubes - Mix Chemicals, heat chemicals	X	X	X	X
Test Tube Brush - Clean Test Tubes	X	X	X	X
Test Tube Holder - Holds test tubes for heating	X	X	X	
Test Tube Rack - Hold Test Tubes	X	X	X	X
Spot Plates - For semi-micro scale reactions, testing solubility, pH	X	X	X	
Petri Dishes - Doing reactions, developing chromatograms	X	X	X	X
Slides - To put hairs, crystals, or fibers on for use with a microscope		X		
Cover Slips - To cover & prevent items from coming off slides		X		
Droppers - Add small amounts of liquids to reactions	X	X	X	X
Spatulas or spoons - Getting small amounts of solids out of containers	X	X	X	X
Metal Tongs, Forceps, or Tweezers – Holding & retrieving objects	X	X	X	X
Stirring Rods - Stirring mixtures	X	X	X	X
Thermometer - Determining the temperature of a solution	X	X	X	
pH or Litmus paper - Test acidity or alkalinity of solution	X	X	X	
Hand Lens - Magnification of small items for identification		X		
Flame Loop – For identification of ions in a compound		X		
Cobalt Blue Glass – To filter out any sodium that might contaminate flame test from hands		X		
Filter Paper - Filter solids from liquids	X		X	
Funnel - Hold Filter Paper	X		X	
9V battery - Electrolysis	X		X	X
Alligator Clip Wires - Connecting meters to metals	X		X	X
Nail - Electrolysis	X		X	X
Piece of Cu metal - Electrolysis	X		X	X
Piece of Zn metal - Electrolysis	X		X	X
Multimeter - Measuring current, voltage, and resistivity	X		X	X
9V or less Battery Conductivity Tester - Determining ionic strength of solution	X	X	X	X
Calipers-mechanical, not digital - Measuring lengths very precisely	X			X
Paper Towels - Cleaning	X	X	X	X
Pencil - Writing, Marking Chromatogram		X		
Ruler - Measuring lengths		X		
Magnets – For extraction and identification of iron filings	X	X	X	X

CALCULATOR CLASS DESCRIPTIONS

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

The following document was prepared to offer some guidance to teams as they select calculators for use in different Science Olympiad events. By no means are the calculators listed here inclusive of all possible calculators; instead they are offered as common examples. The decisions of the event supervisors will be final.

Class I - Stand-alone non-graphing, non-programmable, non-scientific 4-function or 5-function calculators
are the most basic type of calculators and often look like the one shown to the right. These calculators are limited to the four basic mathematics functions and sometimes square roots. These calculators can often be found at dollar stores.

Class II - Stand-alone non-programmable, non-graphing calculators look like the calculator to the right or simpler. There are hundreds of calculators in this category but some common examples include: CASIO FX-260, Sharp EL-501, and TI-30X.

Class III- Stand-alone, programmable, graphing calculators and **stand-alone non-graphing, programmable calculators,** often look like the calculator shown on the right. Some examples are: Casio 975 0/9850/9860, HP 40/50/PRIME, and TI 83/84/89/NSPIRE/VOYAGE.

To identify a stand-alone non-graphing, programmable calculators Are look for the presence of the 'EXE' button, the 'Prog' button, or a 'file' button. Examples include but are not limited to: Casio Super FXs, numerous older Casio models, and HP 35S. A calculator of this type with the buttons labeled is shown to the right.

PROG Button

EXE Button

Class IV - Calculator applications on multipurpose devices (e.g., laptop, phone, tablet, watch) are not allowed unless expressly permitted in the event rule.

EYE PROTECTION GUIDE

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

This resource was created to help teams comply with the Science Olympiad Policy on Eye Protection adopted on July 29, 2015 and posted on the Science Olympiad Website (soinc.org).

Participant/Coach Responsibilities: Participants are responsible for providing their own protective eyewear. Science Olympiad is unable to determine the degree of hazard presented by equipment, materials and devices brought by the teams. Coaches must ensure the eye protection participants bring is adequate for the hazard. All protective eyewear must bear the manufacturer's mark Z87. At a tournament, teams without adequate eye protection will be given a chance to obtain eye protection if their assigned time permits. If required by the event, participants will not be allowed to compete without adequate eye protection. This is **non-negotiable**.

Corresponding Standards: Protective eyewear used in Science Olympiad must be manufactured to meet the American National Standards Institute (ANSI) standard applicable at its time of manufacture. The current standard is ANSI/ISEA Z87.1-2015. Competitors, coaches and event supervisors are not required to acquire a copy of the standard. The information in this document is sufficient to comply with current standards. Water is not a hazardous liquid and its use does not require protective eyewear unless it is under pressure or substances that create a hazard are added.

Compliant Eyewear Categories: If an event requires eye protection, the rules will identify one of these three categories. Compliance is simple as ABC:

CATEGORY A
- <u>Description</u>: Non-impact protection. They provide basic particle protection only
- <u>Corresponding ANSI designation/required marking</u>: Z87
- <u>Examples</u>: Safety glasses; Safety spectacles with side shields; and Particle protection goggles (these seal tightly to the face completely around the eyes and have direct vents around the sides, consisting of several small holes or a screen that can be seen through in a straight line)

CATEGORY B
- <u>Description</u>: Impact protection. They provide protection from a high inertia particle hazard (high mass or velocity)
- <u>Corresponding ANSI designation/required marking</u>: Z87+
- <u>Example</u>: High impact safety goggles

CATEGORY C
- <u>Description</u>: Indirect vent chemical/splash protection goggles. These seal tightly to the face completely around the eyes and have indirect vents constructed so that liquids do not have a direct path into the eye (or no vents at all). If you are able to see through the vent holes from one side to the other, they are NOT indirect vents
- <u>Corresponding ANSI designation/required marking</u>: Z87 (followed by D3 is the most modern designation but, it is not a requirement)
- <u>Example</u>: Indirect vent chemical/splash protection goggles

Examples of Non-Compliant Eyewear:
- Face shields/visors are secondary protective devices and are not approved in lieu of the primary eye protection devices below regardless of the type of vents they have.
- Prescription Glasses containing safety glass should not be confused with safety spectacles. "Safety glass" indicates the glass is made to minimize shattering when it breaks. Unless these glasses bear the Z87 mark they are not approved for use.

Notes:

1. A goggle that bears the Z87+ mark and is an indirect vent chemical/splash protection goggle will qualify for all three Categories A, B & C

2. VisorGogs do not seal completely to the face, but are acceptable as indirect vent chemical/splash protection goggles