For Event Supervisors Only - Do Not Post

CYBERSECURITY

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

1. **DESCRIPTION:** Competitors will be assessed on their knowledge of cybersecurity through hands-on tasks as well as theoretical questions focused in the areas of cryptography and web architecture.

   A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**
   a. Each team may bring up to two 8.5" x 11" sheets of paper, which may be in a 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.
   b. Each team may also bring tools, supplies, and writing utensils. Teams may use the internet during the competition only to access an online IDE, reference the official documentation for their programming language of choice, and visit any other website required for the event by the Event Supervisor. Teams may also provide their own mouse.
   c. Supervisors will provide a computer capable of accessing the internet. Tournament Directors are encouraged to provide computer specifications to the teams at least one month in advance.

3. **THE COMPETITION:**

   Both Part I and Part II of the event will be provided to the participants at the beginning of the event. Participants may work on both parts simultaneously during the entire event.

   Part I: Written Test (65%)
   a. Participants will complete a written test consisting of the topics Cryptography and Web Architecture, as well as general cybersecurity principles and concepts.
      i. Cryptography
         (1) The cryptographic protocols are limited to:
            (a) Hashing algorithms
            (b) The XOR operation
            (c) Classical Cryptography: Substitution Ciphers, Transposition Ciphers
            (d) Modern Cryptography: RSA, Diffie Hellman Key Exchange, Block Ciphers, Stream Ciphers, Elliptic Curve Cryptography
         (2) Identifying vulnerabilities in implementations of cryptosystems
         (3) Common applications of the topics in the Cryptography section (3.a.i)
         (4) Post-quantum cryptography
      ii. Web Architecture
         (1) History of the internet
         (2) Web page construction: HTML, CSS, JavaScript, APIs
         (3) HTTP: requests, responses, headers, query parameters, status codes, verbs
         (4) URL syntax and structure
         (5) Storage, session management, and cookies
         (6) Types of networks and connections including TCP/IP, WiFi, and SOHO and how information travels through these networks
         (7) Common web exploitation techniques
      iii. Principles of Cybersecurity
         (1) Authentication and security best practices
         (2) Cybersecurity ethics
         (3) Online safety

   Part II: Hands-On Tasks (35%)
   a. The programming portion of the hands-on tasks will consist of multiple programming problems. Competitors must use an online IDE to write code, and it is suggested that HackerRank is used to host the problems. Each problem must be solved using any of the following supported languages: C, C++, C++11, Java, Python 2, or Python 3. Only the standard library for these languages may be used.
      i. Competitors will write code to implement various common algorithms to a variety of problems and test cases. Topics may include, but are not limited to:
         (1) String manipulation
         (2) Boolean expressions
         (3) Control structures
         (4) Implementation of math operators and integer evaluation, such as primality tests and prime sieves

(5) Recursion

ii. Test cases for programming challenges will be provided to teams to test their program. The problem statement may include time and memory constraints, and these constraints may vary by language; any given test case will fail if these constraints are not met.

iii. Each problem will be checked against the answer and the code submitted. Point values may vary between questions based on difficulty and points given may be determined by the number of test cases passed.

iv. Teams will be required to submit their code to the event supervisor at the end of the event.

4. **SCORING:**

a. High score wins.

b. The written portion will account for 65% and the hands-on portion will account for 35% of the total number of available points.

c. In the written portion, points will be awarded based on accuracy of the responses. In the hands-on portion, points will be awarded based on accuracy of outputs.

d. Ties will be broken by 1) Part II score, 2) Selected questions from the written test.

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

Topic Rotation

Year	Topic 1	Topic 2
Year 1	Web Architecture	Cryptography
Year 2	Cryptography	Data Forensics
Year 3	Data Forensics	Web Architecture

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.

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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 the listed 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
Graduated Cylinders (10 - 100 mL) - Measuring volumes	X		X	
Beakers (50 - 500 mL) - Doing reactions, developing chromatograms	X	X	X	X
Erlenmeyer Flasks (10 - 250 mL) - 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 paper/meter - 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		
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
Cobalt Blue Glass – To filter out any sodium that might contaminate flame test from hands		X		

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CALCULATOR CLASS DESCRIPTIONS

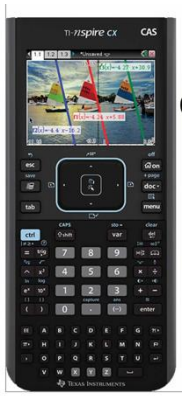
See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

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.

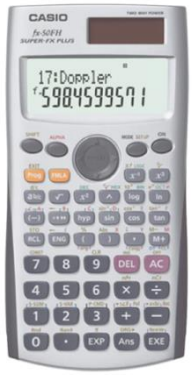
Class I - Stand-alone non-graphing, non-programmable, non-scientific 4-function or 5-function calculators
are the most basic type of calculators and often look like the one shown to the right. These calculators are limited to the four basic mathematics functions and sometimes square roots. These calculators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



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

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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

- Description: Non-impact protection. They provide basic particle protection only
- Corresponding ANSI designation/required marking: Z87
- Examples: 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

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

CATEGORY C

- Description: 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
- Corresponding ANSI designation/required marking: Z87 (followed by D3 is the most modern designation but, it is not a requirement)
- Example: 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

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