



# WSO Coaching Workshop

October 12, 2024



# Outline

8:30- 10:00	Event overview (30min); Coach Q&A + Team building 101 (60 min)
10:00-10:30	Running an event 101 - Scott McComb (RAHS), Edie Lie (Northshore MS)
10:30-11:00	Sustainable Energy (B/C) Introduction - Scott McComb
11:00-11:30	Game Agent (B) - Ron Wright (Wahkiakum School District)
11:30-12:00	Mission Possible (B) - Jason Chang (UCSD)

# science OLYMPIAD 2024-2025



*Exploring the World of Science*

**Much of this presentation was made by Skyridge MS students**

# EVENT OVERVIEW:

- 23 events
- Types: Study, Build, Lab, Hybrid
- Most events rotate out or change topics
- **Life Science:** Anatomy & Physiology, Disease Detectives, Microbe Mission, Ecology, Entomology
- **Earth/Space Science:** Dynamic Planet, Road Scholar, Fossils, Meteorology, Reach for the Stars
- **Physics/Chemistry:** Air Trajectory, Can't Judge a Powder, Potions & Poisons, Sustainable Energy, Optics
- **Technology/Engineering:** Helicopter, Mission Possible, Tower, Scrambler
- **Inquiry:** Codebusters, Experimental Design, Metric Mastery, Write it Do it

# EVENT SCHEDULE

Event	Same School Same Block	Students	Impound	Required Eye Protection	8:15 AM– 8:45 AM	9:00 AM– 9:50 AM	10:05 AM– 10:55 AM	11:10 AM– 12:00 PM	12:15 PM– 1:05 PM	1:20 PM– 2:10 PM	2:25 PM– 3:15 PM
Air Trajectory		2	Y	B		*Block A	*Block B	*Block C	*Block D	*Block E	*Block F
Anatomy & Physiology	Y	2				Y	X				
Codebusters	Y	3**				*Block A	*Block B	*Block C	*Block D		
Crime Busters	Y	2		C				Y	X		
Disease Detectives	Y	2						X	Y		
Dynamic Planet	Y	2								Y	X
Ecology	Y	2								X	Y
Entomology	Y	2								Y	X
Experimental Design	Y	3**		C				X	Y		
Fossils	Y	2				X	Y				
Helicopter		2				*Block A	*Block B	*Block C	*Block D	*Block E	*Block F

Meteorology	Y	2								X	Y
Metric Mastery	Y	2								X	Y
Microbe Mission	Y	2		C				Y	X		
Mission Possible		2	N - Regional Y - State	B		*Block A	*Block B	*Block C	*Block D		
Optics	Y	2						X	Y		
Potions & Poisons	Y	2		C		Y	X				
Reach for the Stars	Y	2				Y	X				
Road Scholar	Y	2						Y	X		
Scrambler		2	Y	B		*Block A	*Block B	*Block C	*Block D	*Block E	*Block F
Sustainable Energy		2	Y	C	ATKT	*Block A	*Block B	*Block C	*Block D	*Block E	*Block F
Tower		2		B		*Block A	*Block B	*Block C	*Block D	*Block E	*Block F
Write It Do It	Y	2				X	Y				

Botany	Y	2				*Block A	*Block B	*Block C			
Fermi Questions	Y	2								Y	X
Game Agent	Y	2	Y		ATKT	*Block A	*Block B	*Block C	*Block D	*Block E	

# Anatomy & Physiology

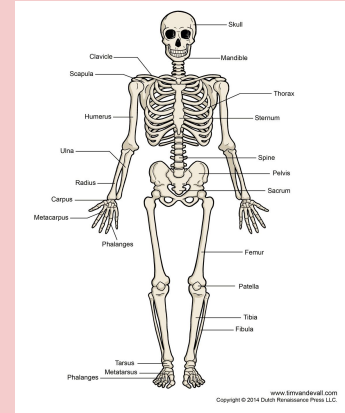
## Main target:

Study the structures & functions of:

- Integumentary system
- Skeletal system
- Muscular system

TYPE: STUDY, life science

- 2 people
- ~50 minutes
- 1 page of notes, double-sided
- Test is a multiple page test-packet or 10-20 stations
- Two stand-alone non-programmable, non-graphing calculators
- Topics rotate every year

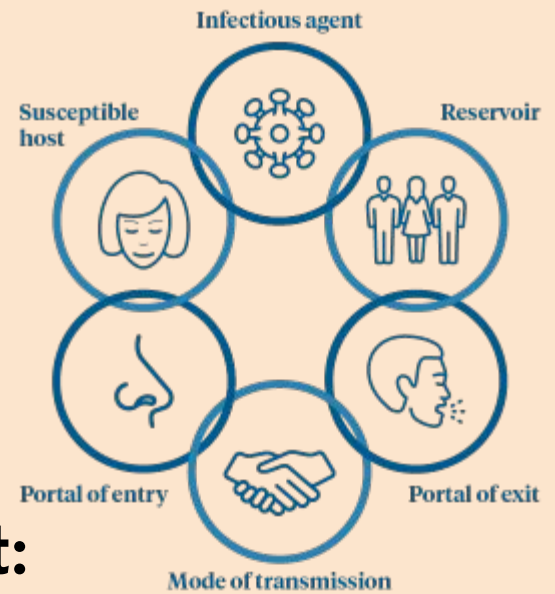




# Disease Detectives

TYPE: STUDY, life science

- 2 people
- ~50 minutes
- 1 page of notes, double-sided
- 2 non-programmable/graphing calculators



## Main target:

Participants use their investigative skills in the scientific study of disease, injury, health, disability in populations/groups of people.

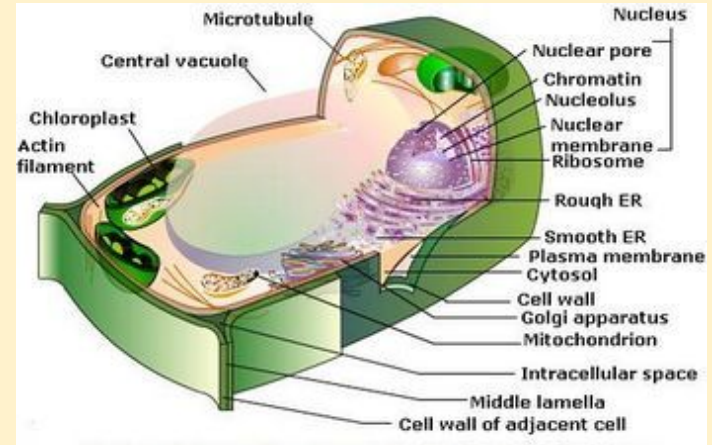
# Microbe Mission

TYPE: LAB/STUDY , life science

- 2 people
- ~50 minutes
- 1 page of notes, double-sided
- Student must wear goggles during the lab portion
- 2 non programmable/graphing calc.

## Main target:

Teams will answer questions, solve problems, analyze data about microbes, and describe function and life cycle of listed organisms and agents.



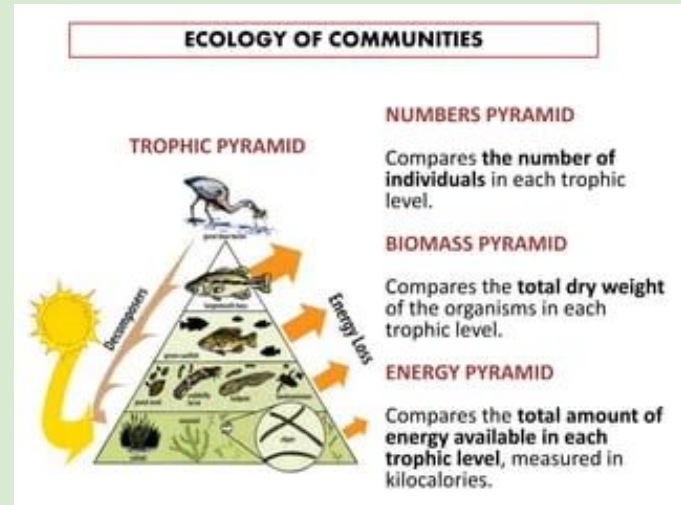
# Ecology

TYPE: STUDY, life science

- 2 people
- ~50 minutes
- 1 page of notes, double-sided
- 2 non-programmable/graphing calc.

## Main target:

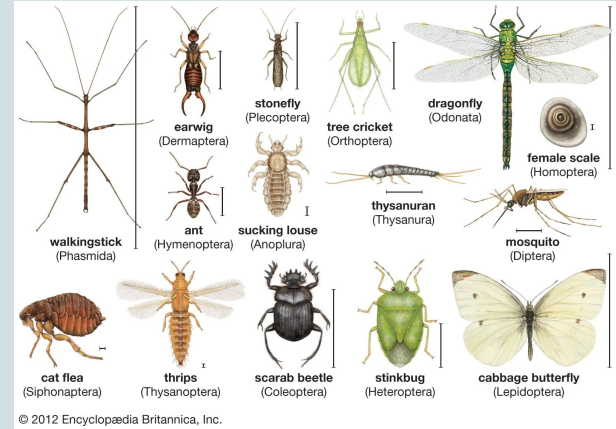
Students will answer questions involving content knowledge & process skills in the area of ecology and adaptations in featured North American biomes, Grassland and Desert...



# Entomology

TYPE: STUDY, life science

- 2 people
- ~50 min
- One 2" or smaller three-ring binder
- 1 field guide
- Can bring 1 copy of 2024 official Scioly national entomology list or state/regional list
- Magnifying glass



## Main target:

Students will be asked to identify insects and selected immature insects by order and family, answer questions about insects, and use or construct a dichotomous key.

# Crime Busters (B)

TYPE: STUDY, LAB, CHEMISTRY

- 2 people
- ~50 minutes
- Bring 1 sheet of paper (each participant)
- Bring any/all items on Div B chemistry events lab equipment list ([soinc.org](http://soinc.org))
- 1 non-programmable/graphing calc. per person
- Wear eye protection, apron/lab coat, gloves optional, tied back long hair



## Main target:

Given a scenario, a collection of evidence & possible suspects, students will perform a series of tests – test results with other evidence used to solve a crime & answer questions.

# Potions and Poisons (B)

TYPE: LAB, PHYSICAL SCIENCE

- 2 people
- ~50 minutes
- 1 non-programmable/graphing calc. per person
- 1 page of notes, double sided (each participant)
- bring any/all items on div b chem. Lab equipment list (soinc.org)
- Wear goggles, apron/lab coat

## Main target:

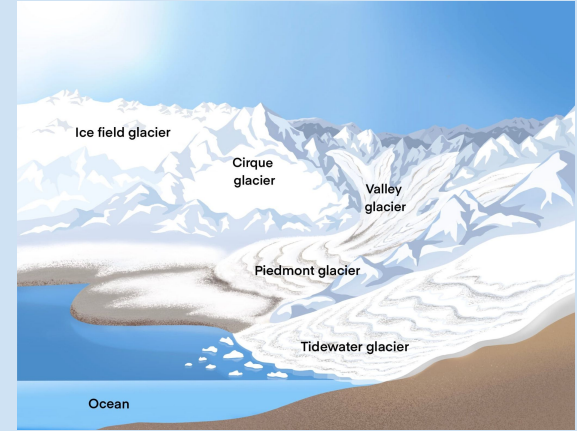
Demonstrate knowledge about chemical properties and effects of specified toxic and therapeutic chemical substances, with a focus on household and environmental toxins or poisons



# Dynamic Planet

TYPE: STUDY, earth science

- 2 people
- ~50 minutes
- 3-ring binder containing any info
- 2 non programmable/graphing calc.
- Topic changes every 2 yrs



## Main target:

Participants will demonstrate an understanding of the processes involving the cryosphere of the Earth, with an emphasis on glaciers.

# Fossils

TYPE: STUDY, earth science

- 2 people
- ~50 minutes
- 1 magnifying glass, 1 three ring binder, one field guide, 1 copy of 2024 Scioly fossil list, 2 non-programmable/graphing calc
- May include lab stations with samples, specimens, displays



## Main target:

Identify/classify fossils, answer questions on ancient life, past environments, ecosystems, adaptations, evolutionary relationships, geologic time scale events & use of fossils in dating/correlating rock units.



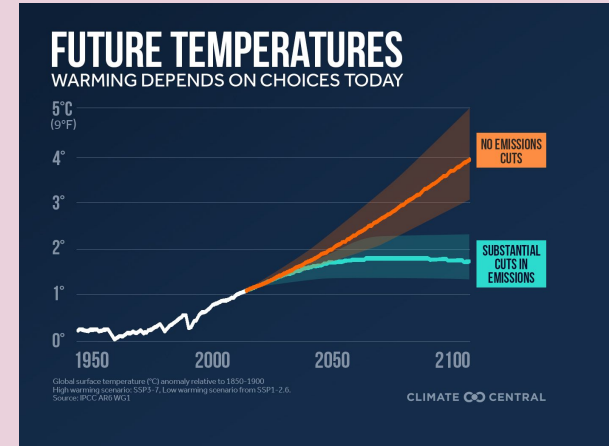
# Meteorology (B)

TYPE: STUDY, earth science

- 2 people
- ~50 minutes
- One 3 ring binder of any size
- 2 stand-alone calculators, non graphing and programmable
- Topic changes every 2 yrs

## Main target:

Use scientific process skills involving qualitative / quantitative analyses to demonstrate an understanding of the factors that influence world **climate and climate change** through the interpretation of climatological data, graphs, charts, and images.



# Reach For The Stars

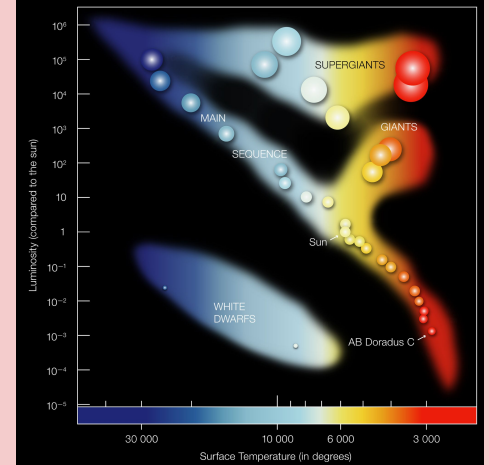
(B)

TYPE: STUDY, Space Science

- 2 people
- ~50 minutes
- 2 pages of notes, double-sided
- No Calculators

## Main target:

Participants will demonstrate an understanding of **late-stage stellar evolution and stellar remnants**, and their observation across the electromagnetic spectrum.



# Road Scholar (B)

TYPE: STUDY, earth science

- 2 people
- 2 non programmable/graphing calc., protractors, rulers, measuring devices, USGS Map Symbol Sheets, hand lenses, hard copies of info, marking devices
- Supervisor provides maps/images
- ~50 minutes

## Main target:

Answer interpretive questions that may use 1 or more state highway maps, USGS topographic maps, internet-generated maps, road atlas, or satellite/aerial images



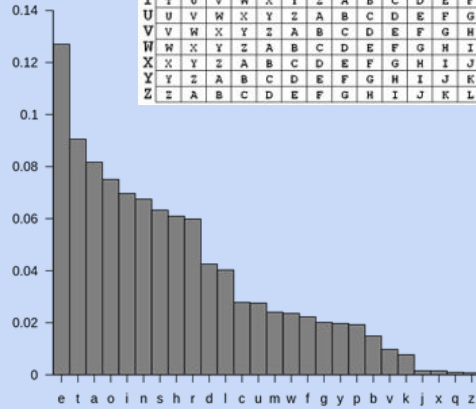
# Codebusters

TYPE: STUDY, inquiry

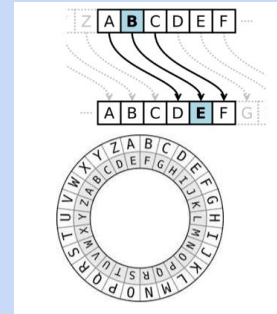
- 3 people
- ~50 minutes
- 4-function calculators (3)
- supervisor provides scratch paper

## Main target:

Analyze & decode encrypted messages using cryptanalysis techniques for historical/modern advanced ciphers



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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# Experimental Design

TYPE: LAB, inquiry

- 3 people
- ~50 min
- Bring goggles/writing utensils
- 1 timepiece, and 1 linear measuring device
- 1 non-programmable/graphing calc.
- supervisor will provide materials & a 2-part reporting packet



## Main target:

Event determines the participant's ability to design, conduct, report the findings of an experiment entirely on-site

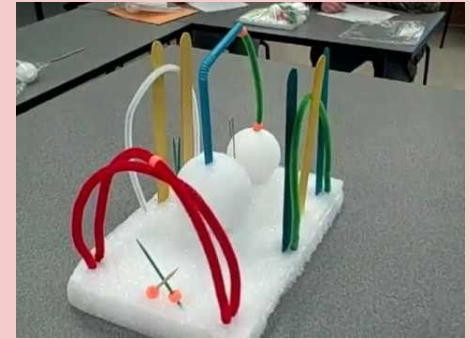
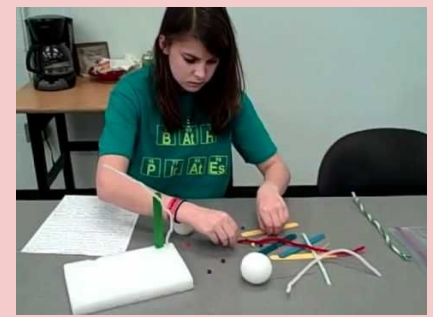
# Write It Do It

TYPE: BUILD/HYBRID, inquiry

- 2 people
- ~50 minutes
- Bring a writing utensil for writer
- Supervisor provides materials for doer

## Main target:

1 participant will write a description of an object & how to build it – other participant will attempt to construct the object from this description.



# Sustainable Energy

TYPE: BUILD/STUDY, physics

- 2 people
- Impound required
- ~50 minutes
- 3 ring binder
- Bring tools, supplies, writing utensils, 2 calculators, device & a design log
- NO EYE PROTECTION

## Main target:

Teams construct and calibrate a device that can store energy. Additionally, teams complete a written test on the principles of sustainable energy with an emphasis on solar and wind power.



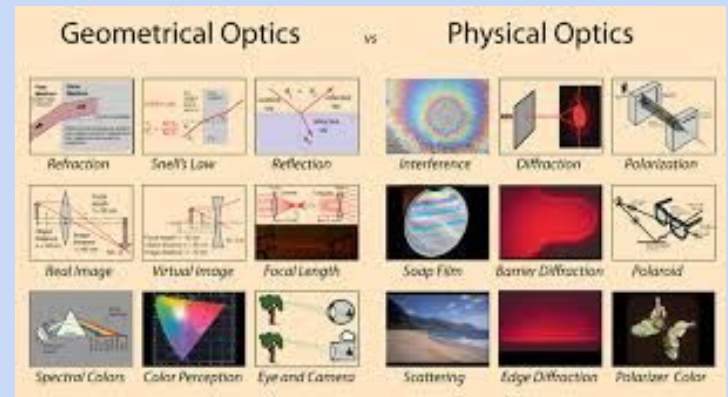
# Optics

TYPE: HYBRID, Physics

- 2 people
- ~50 minutes
- 2 graphing/programmable calculator
- NO EYE PROTECTION
- One 3 ring binder of any size
- Bring tools, supplies, writing utensils
- Supervisor provides laser shoot box

## Main target:

Positioning mirrors to direct a laser beam towards a target and complete a written test on the principles of geometric and physical optics.





# Metric Mastery (B)

TYPE: STUDY, physics

- 2 people
- ~50 minutes
- Non graphing, non programmable calculator

Name \_\_\_\_\_ Date \_\_\_\_\_

METRIC CONVERSION CHART



The chart is a grid of conversion factors for various metric units. It is organized into sections: Length, Area, Volume, Weight, and Liquid Volume (Capacity). Each section has a header row in a different color. The units are listed in columns, and conversion factors are provided between them.

METRIC LENGTH CONVERSIONS			
1 centimeter	=	10 millimeters	1 cm = 10 mm
1 decimeter	=	10 centimeters	1 dm = 10 cm
1 meter	=	100 centimeters	1 m = 100 cm
1 meter	=	10 decimeters	1 m = 10 dm
1 kilometer	=	1000 meters	1 km = 1000 m

METRIC AREA CONVERSIONS			
1 sq. centimeter	=	100 sq. millimeters	1 sq. cm = 100 sq. mm
1 sq. meter	=	10,000 sq. centimeters	1 sq. m = 10,000 sq. cm
1 hectare	=	10,000 sq. meters	1 ha = 10,000 sq. m
1 sq. km	=	100 hectares	1 sq. km = 100 ha
1 sq. km	=	1 million sq. meters	1 sq. km = 1,000,000 sq. m

METRIC VOLUME CONVERSIONS			
1 cubic centimeter	=	1000 cubic millimeters	1 cu cm = 1000 cu mm
1 cubic decimeter	=	1000 cubic centimeters	1 cu dm = 1000 cu cm
1 cubic meter	=	1 million cubic centimeters	1 cu m = 1,000,000 cu cm
1 cubic meter	=	1000 cubic decimeters	1 cu m = 1000 cu dm

METRIC WEIGHT CONVERSIONS			
1 gram	=	1000 milligrams	1 g = 1000 mg
1 decagram	=	10 grams	1 dag = 10g
1 kilogram	=	1000 grams	1 kg = 1000 g
1 tonne (1 megagram)	=	1000 kilograms	1 tonne = 1000 kg
1 gigagram	=	1000 megagrams	1 Gg = 1000 Mg

METRIC LIQUID VOLUME (CAPACITY) CONVERSIONS			
1 centiliter	=	10 milliliters	1 cl = 10 ml
1 deciliter	=	10 centiliters	1 dl = 10cl
1 liter	=	1000 milliliters	1 l = 1000 ml
1 liter	=	10 deciliters	1 l = 10dl
1 kiloliter	=	1000 liters	1 kl = 1000 l

Free Math Sheets, Math games and Math tools  
MATH-SHEETS-MANIPERS.COM

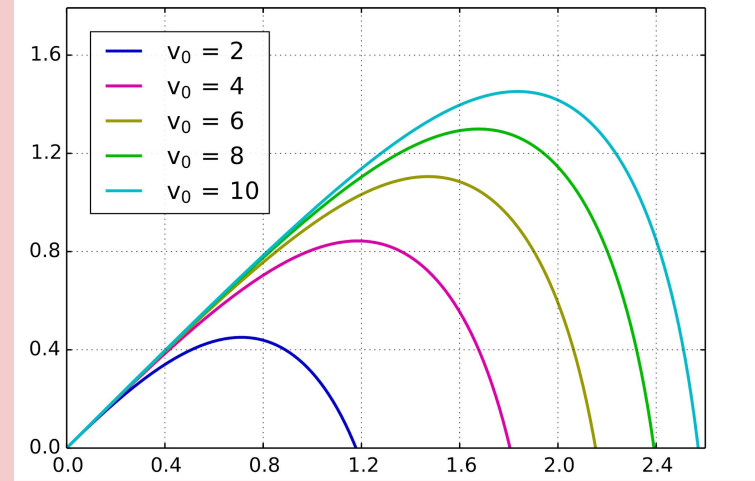
## Main target:

Teams will estimate and then measure properties of identical objects including mass, area, volume, density, force, distance, time, and temperature. Teams will also perform metric unit conversions.

# Air Trajectory

## TYPE: BUILD

- 2 people
- ~10 minutes
- Wear eye protection
- 2 Programmable/graphing calculator
- Impound



## Main Target:

Prior to the competition, teams will design, construct, and calibrate a single device capable of launching projectiles onto a target.

# Helicopte

TYPE: BUILD

- 2 people
- Impound
- ~ 15 minutes
- NO EYE PROTECTION

## Main Target:

Prior to the tournament, teams will construct, collect data on test flights, analyze and optimize free flight rubber-powered helicopters to achieve maximum time aloft.



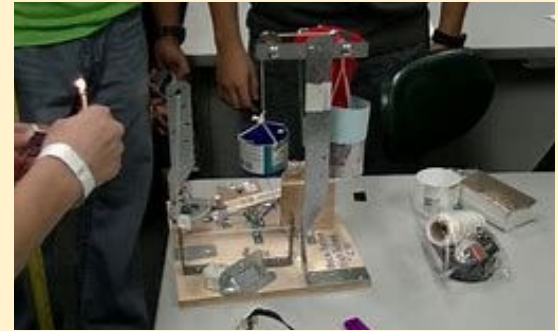
# Mission Possible (B)

TYPE:  
BUILD

- 2 people
- Impound: State and National only
- Wear eye protection
- ~40 minutes

## Main Target:

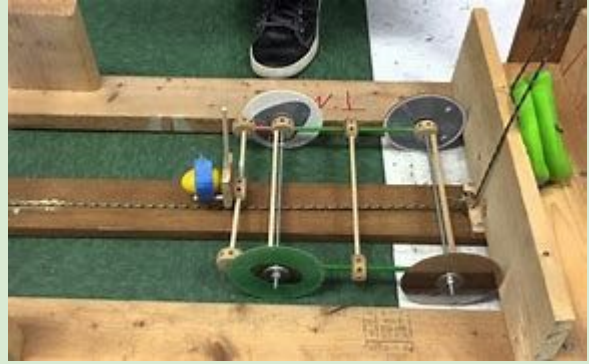
Prior to the competition, participants design, build, test, and document a Rube Goldberg®- like Device that completes required Start and Final Actions through a series of specific actions.



# Scrambler

(B)  
TYPE:  
BUILD

- 2 people
- Wear eye protection
- Impound
- ~12 minutes
- Programmable/graphing calculator



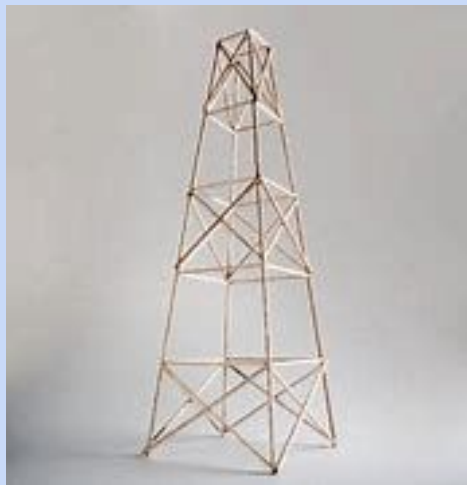
## Main Target:

Teams design, build, and test a mechanical device, which uses the energy from a falling mass to transport an egg along a track as quickly as possible and stop as close to the center of a Terminal Barrier (TB) without breaking the egg.

# Tower

TYPE: BUILD

- 2 people
- Wear eye protection
- ~6 minutes



## Main Target (B)

Teams will design and build a Tower (Structure) constructed of wood, bonded by adhesive, spanning a 20 cm square opening, able to support the loading block at least 50 cm above the test base and allow an 8 cm diameter ring gauge to pass over the top of the tower and lowered down to a point 25 cm above the test base.

# Division C Events



# Astronomy (C)

TYPE: Study

- 2 people
- Each team can bring any combination of a computer or a three-ring binder
- No Generative AI tools (highlighted in a few other event rules)
- Class-IV stand-alone calculators (allow using the computer for calculations)

## Main Target:

Stellar Evolution: Star Formation and exoplanets

New (vs 2023-24): Neptune, sub-Neptunes, super-Earth

DSO: Orion Nebula, 30 Doradus, HD 80606b, WASP-17b, -121b, LTT 9779b, GJ1214b, K2-18b, TOI-270d, LJS 3844b; Six other systems;



# Chemistry Lab (C)

TYPE: Study/Lab

- 2 people
- One sheet of paper note (each person)
- Chemical kit, 2 stand-alone calculators (Class III)
- Goggles, apron or lab coat (skin covered from neck down to toes)
- Loose fitting pants, long hair must be tied back

## Main Target:

Chemical reactions/stoichiometry, equilibrium

# Electrical Vehicle (C)

TYPE: Build

- 2 people
- Impound one vehicle (batteries disconnected), alignment devices, spare parts, logs; Maximum eight AA 1.2-1.5V batteries (individual) - no Li-battery
- No communication over WiFi/Bluetooth allowed if using microprocessor
- **Practical log recommended but not required**

## Main Target:

Teams design, build, and test one vehicles that uses electrical energy as its sole means of propulsion to travel as **quickly** as possible, and stop **close** to a Target point. Team has 8 minutes of event time to set up and start up to 2 runs.

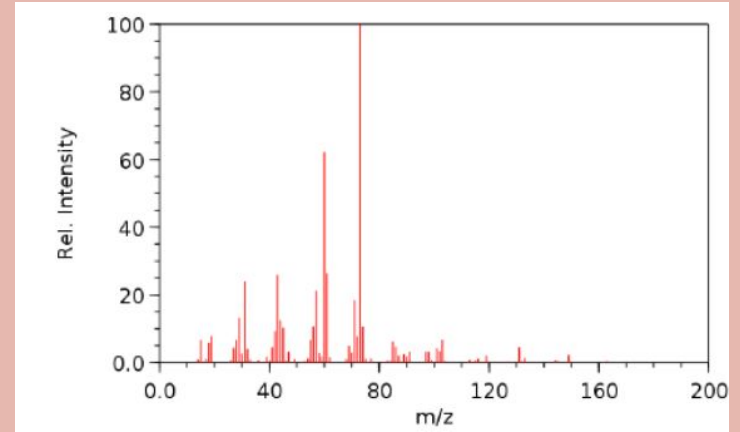
# Forensics (C)

TYPE: Study/Lab

- 2 people
- One sheet of paper note (per person)
- Chemical kit, 2 stand-alone calculators (Class III)
- Goggles, apron or lab coat (skin covered from neck down to toes)
- Loose fitting pants, long hair must be tied back

## Main Target:

Given a scenario and possible suspects, perform a series of tests. Use test data and other evidence to solve a crime. Very specific list of substances (no mixtures), specific rubric on scoring per evidence section and analysis; burn test allowed



# Geologic Mapping (C)

TYPE: Study

- 2 people
- One three-ringed binder (any size)
- 2 protractors; 2 rulers; 2 Class II non-programmable calculator
- Colored pencils
- Event supervisor may provide stereonet with tracing paper and pin

## Main Target:

construction and use of topographic maps, geologic maps, and cross sections, and their use in forming interpretations regarding subsurface structures and past depositional environments on Earth and other planetary bodies



# Materials Science (C)

TYPE: Study/Lab/Build

- 2 people
- Wear eye protection (Lab and testing of pre-made concrete puck)
- N95 mask in the room where cement testing is being done
- 50 minutes

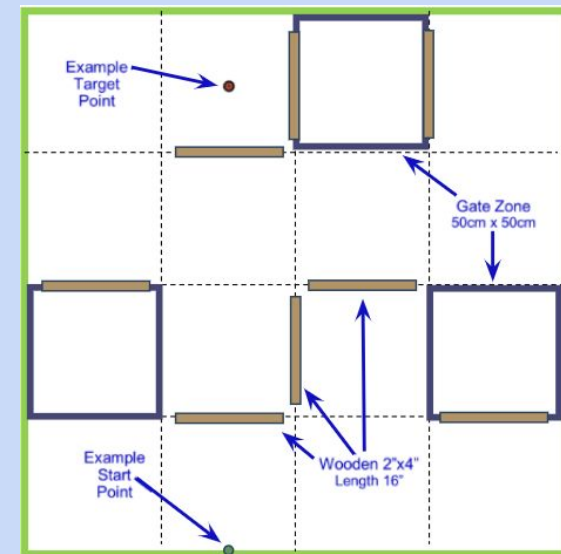
## **Main Target:**

Teams will build and bring 1 puck, complete lab activities and complete test related to the materials science of ceramics. Focus on chemical and crystalline structure and behaviors [Puck: 18 / Test: 50 / Lab: 32] points

# Robot Tour (C)

TYPE: Build

- 2 people; ~ 18 minutes (10 min for setup, 8 min for track)
- Impound one Robot, practice log, alignment device, robot programs, spares
- **Six AA or AAA 1.2-1.5-volt batteries (individual)**
- **Multiple programs and/or microprocessors allowed**
- **USB cable, Bluetooth, SD card allowed. WiFi not allowed**



## Main Target:

Teams design, build, program, and test one Robot to navigate a track to reach a target at a set amount of time as accurately and efficiently as possible

# Resources:

- [Scioly.org](https://www.scioly.org) (use [Wiki - Scioly.org](https://www.scioly.org/wiki) as an introduction to your events, use [Tests - Scioly.org](https://www.scioly.org/tests) to do some practice tests, check out [Gallery](https://www.scioly.org/gallery) for pics of build events)
- SOINC.org has many practice tests per event from past invitationals
- Workshop hosted by National SO (e.g. Wed tech session webinars)
- WA specific: <https://scilympiad.com/wa>
  - Rules for WA unique events and trial events (to be updated) in Unified schedule:
  - Quantum Quandaries, Sustainable Energy
  - Trials: CyberSecurity (C), Botany (B/C), Game Agent, Fermi (B)
- State official website going through renovations!



# Team Building and Coaching Q&A

## Panelist:

Scott McComb (Raisbeck Aviation HS, WSO board Vice Chair)  
Matthew Chase (Camas High School)

Edie Lie (Northshore Middle School, WSO board member)  
Betty Biswell (Beaver Lake Middle School)





## WSO Coach/Team Survey

### Top challenges on team building

1. Parent involvement on regular basis
2. Finance travel and build
3. Event scheduling (small vs. large team)
4. School support and coach pay

### Top challenges on student coaching

1. Difficult to find students on certain events
2. Students overwhelmed with school
3. Keep students on track for build events
4. Lack of local in-person invitationals
5. Vertical event preparation between teams

**Based on response from 13 schools, covering 600 students!  
Thank you to coaches who filled out the team survey!**