



**Elementary Science Olympiad at FAU
Rules Manual—April 26, 2025**

GENERAL INFORMATION

Thank you for registering for a 2024/2025 Elementary Florida Science Olympiad Program. Science Olympiad's goal is to provide students with a quality competition that links collaboration, inquiry, content understanding, and assessment. Science Olympiad has been highlighted in the 2007 National Governors Report as a national model for learning science and mathematics. Each year, we ensure that we select events that correlate well with Florida's current State Standards.

In the tradition of sporting events, Science Olympiad awards medals/ribbons to the top performing students in each event and trophies to the top performing teams. Students take pride not only in their performance but also to their contribution to the team's performance. Often, students depart the competition with a strong sense of accomplishment, looking forward to next year, yet their ranking may indicate a quite different response would have been expected! Science Olympiad builds a love of science and learning that goes beyond all other academic programs.

TEAM SPIRIT:

Although some events in the Science Olympiad are based on individual achievement, all events involve teamwork, group planning and cooperation. That is the real essence of the Science Olympiad. Our emphasis is on advanced learning in science through active, hands-on, group participation. Through the Olympiad, students, teachers, coaches, principals, business leaders, and parents are all bonded together as a team working toward a goal.

We would like to provide an alternative to the "isolated scientist" stereotype and remind students that science can be fun, exciting and challenging all at the same time. In college and beyond, students will find that the team spirit and good sportsmanship they develop during the Science Olympiad competition will be deciding factors in their success.

COACH PREPARATION:

The most important thing to remember is that this competition is for the students. It is strongly encouraged that the coach takes a facilitation role and accepts the fact that s/he cannot know everything about every event- put the onus on the student to do research and critically read the rules. The events change slightly annually so even long-term coaches will be faced with new challenges every year, which keeps the level of competition high. Many events require students to explain their design choices and/or complete lab work on their own. Teams who have a coach who takes a student-focused approach will have a stronger competitive team.

AREA TOURNAMENTS:

Each elementary level team of **15** will prepare throughout the school year to compete in a Science Olympiad tournament. These inter-scholastic competitions consist of a series of approximately 15 team events that encourage learning in life science, earth science, chemistry and physics, scientific inquiry, technology, and engineering/design.

Events in the Science Olympiad have been designed to recognize the wide variety of skills that students possess. While some events require knowledge of scientific facts and concepts, others rely on science processes, skills, or applications. This ensures that everyone can participate, including students from technology classes or advanced science classes.

Teams are welcome to compete in as many tournaments across the state as desired. However, the team must register and pay the \$180 (\$210) fee for each tournament.

Once you have registered your team, communication for that event will come from the tournament director. Information such as team number may vary from tournament to tournament.

Individual tournaments reserve the right to make rules clarifications or to set their schedule as needed. While most tournaments will run all the events listed in the rules manual, please be sure to see your specific tournament's schedule to confirm.

GENERAL EVENT INFORMATION:

The following apply to all events, even if not noted in the specific rules. Please read carefully:

1. For every event, **it is the responsibility of the competitors to bring their own writing utensils** along with any other items listed in the rules. Teams without eye protection will not be able to compete in any events that require eye protection. Please check the rules for details.
2. **Impound** means that some of your devices or boxes must be put in a holding area before the event begins. These must be turned into specific places at specific times. Anyone on the team can impound the device; parents and coaches are welcome to help the kids with this piece. The team will be penalized if this is not done on time.
3. In any open events where spectators are allowed, it is up to the discretion of the event supervisor as to the area where spectators are allowed. The event supervisor has the final right to ask spectators to leave and/or to disqualify teams for members (student, parent, coach, etc.) who are disrupting the flow of the competition.
4. Events are designed to allow for a range of results- some teams will find the event very difficult and some might find it easier. Since this is a competition, events are written for a wide range of final scores and to avoid ties in scores.
5. Chemistry/lab events require specific dress. Please check the manual to ensure that your students will be prepared to compete on the day of the tournament.

DIFFICULTY OF EVENTS: This is a competition, so expect that there will be questions on tests and tasks on labs that students may be unable to answer- competitors will be ranked and, therefore, we need a wide range of scores. Work with your students to understand that this is not a situation where they will know everything, and they should do their best. Tests/Labs are generally written at a 4th/5th grade level with a few questions below that level and a few questions above that level.

PARENT/CHAPERONE ROLE DURING COMPETITION :

1. Parents and chaperones may feel free to move about common areas as identified by the tournament director, but may not interfere with their activities or enter rooms when doors are closed.
2. Parents/chaperones may not yell out instructions to students during open events. Parents should not argue or discuss scoring with the judges. If a judge believes a parent has behaved in a disruptive manner, **this will be grounds for immediate disqualification of the entire team.** STUDENTS may arbitrate judging concerns using the arbitration process.
3. Parents and chaperones should not interact/argue with event supervisors/judges. There is an arbitration process that the STUDENT and coach should complete when concerns arise.
4. If a judge believes a parent has interfered or helped a student in any way, **this will be grounds for immediate disqualification of the entire team.**

COACH ROLE DURING COMPETITION :

Students will be in various rooms around campus. Feel free to move about the common areas as identified by the tournament director, but please do not interfere with their activities or enter rooms when doors are closed. If a judge believes a coach has interfered or helped a student in any way, **this will be grounds for immediate disqualification of the entire team.**

CODE OF CONDUCT :

As part of the paperwork that coaches need to bring to competition, there is a Code of Conduct form to complete by students and the coach. Student participants are expected to compete in tournament events with an honest effort to follow the rules and spirit of the competition. The goal of the competition is to give one's best effort while displaying honesty, integrity, and sportsmanship.

In addition to students, coaches and parents are expected to display courtesy and respect toward Olympiad officials, other teams, and guests of the Olympiad. Please remember all officials are volunteer specialists in their field and should be extended every courtesy.

Failure to show honesty and/or courtesy by a participant, coach, or guest of the team may result in disqualification of the team from that event and/or from the entire competition.

ARBITRATION/APPEALS:

At times, events might be run in a way that students feel violate the rules. While every effort is made to ensure high correlation with the published rules, there are times when errors by the event supervisor or other issues may arise. In an effort to ensure that all student competitors have an outlet to share their concerns with rules violations, students may complete the arbitration process during the competition.

See a sample Arbitration form in the Coach Forms section.

Here are a few notes:

- An arbitration form is found in the coach's envelope and more copies are available at the Help Desk.
- Arbitration forms **MUST** be completed within ONE HOUR of the end of the event block time where the issue occurred. If necessary, another team member may complete the arbitration process for their team mate if their schedule prohibits this.
- Students may not arbitrate against another team- ex. "The other team did not do". Arbitrations are related to the event's alignment with the rules. **These issues should be taken up with the supervisor during the event block in which something happened. We understand that might take a few moments out of your competition time, but these types of issues need to be solved in the event immediately.**
- There will be times when the tournament logistics or limitations of a supervisor will make the event unable to be run in alignment with the rules- we attempt to run all the events even if there may need to be adaptations. In this case, every team will be subject to the same parameters of the event to ensure consistency. Part of Science Olympiad is problem solving and adapting to situations. In these cases, arbitrations will likely end in no change to the procedure.

AERODYNAMICS

DESCRIPTION : Prior to the competition, teams design and build two paper airplanes using the materials listed below and then test the airplanes based on flight duration and distance to a target. Students **MUST** bring and wear impact resistant safety goggles.

This is a PRE-BUILT EVENT.

COMPETITORS BRING:

- impact resistant safety goggles
- pre-built airplanes (must be impounded in the morning...see schedule for times)

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: YES

THE COMPETITION:

1. Teams will construct **IN ADVANCE** four paper airplanes (two for part 1 and two for part 2) designed to meet the goals outlined.
2. Airplanes may be identical or nearly identical in design or they may be quite different (more details under Construction)
3. All teams will impound their devices in the morning (time shown on schedule) and then return at a later point in the day (as determined by the self-schedule time slot selected at morning checkin) to test their planes.

CONSTRUCTION:

1. Each airplane is constructed in advance of the tournament date using:
 - up to two pieces of 20 lb copy paper (at least one full sheet must be used)
 - zero or one standard 1.25" paper clip (paper clip is optional)
 - up to 5 cm of 1" wide standard weight masking tape
2. Each team constructs four planes using at least one sheet of paper per plane, but not more than two sheets per plane, which will bear a resemblance to a winged object. **Helicopter designs are not permitted.**
3. Teams will write their team number on each plane.
4. Two planes will be used in Part 1 with the goal being to have the plane in the air the longest. These planes should be clearly labeled "Part 1". The planes may be identical or nearly identical to each other, or they may be of different design.
5. The other two planes will be used in Part 2 with the goal of accuracy to hitting a target. These planes should be clearly labeled "Part 2". The planes may be identical or nearly identical to each other, or they may be of different design.
6. It is suggested that the event supervisor/judge does not touch student planes and instead gives students instructions on where to place them during impound.

TESTING Part 1 (Duration of Flight)

1. The goal of this part is for the airplane to stay in the air the longest amount of time.
2. Each plane is launched by hand by one team member from a predetermined starting point, which is the same for all teams. This starting point will be designated by a 1 meter square taped on the floor.
3. Teams should be prepared to launch within 60 seconds of being called upon.
4. Teams may choose to launch one plane at a time (two launches) or launch both planes at once in a "piggyback fashion" one launch. If doing two separate launches, the same team member must launch both times.
5. If two planes are used at once (in piggyback fashion), the scored time will be for the plane which is aloft for the longer duration.
6. There is no time provided for a test run - a maximum of two launches are allowed to get a maximum of two scores for aloft time. The greater flight time will count as the score for Part 1.

7. Launching team member must give a warning by calling out “3, 2, 1, Launch” or something similar at the time of launch. Failure to do so may result in the loss of the attempt. If this happens, the Event Supervisor should provide a reminder before the next attempt.
8. The time aloft will cease when:
 - a. A plane becomes lodged in a permanent fixture (light, seat, etc)
 - b. A plane touches the floor.
 - c. The plane ceases moving in air or hits a hanging obstacle.

TESTING Part 2 (Accuracy of Flight)

1. The purpose of this part is for the airplane to fly accurately through targets and travel the longest distance.
2. The planes used in this part must be different from the planes used in Part 1
3. Each plane is launched by hand **by a different team member than the one who launched for part 1** from a predetermined starting point, which is the same for all teams. This starting point will be designated by a 1 meter square taped on the floor.
4. Teams should be prepared to launch within 60 seconds of being called upon.
9. Teams may choose to launch one plane at a time (two launches) or launch both planes at once in a “piggyback fashion” (one launch). If doing two separate launches, the same team member must launch both times.
5. If two planes are used at once (ie. in a piggyback fashion), the scored distance will be for the plane that goes the farthest distance.
6. There is no time provided for a test run - a maximum of two launches are allowed to get maximum score.
7. The distance will be determined:
 - a. In a straight line on the floor from the point of launch to the point where the plane initially touches the ground.
 - b. Distance traveled by the plane by sliding along the floor will not be counted.
 - c. Distance will be measured to the nearest centimeter.
 - d. Determination of the landing point by the judges is a final decision.
8. Two targets made from hoops will be erected. Bonus points will be awarded for each hoop through which the airplane passes during its flight.
 - a. The hoops may be of any size (from hula hoops to ones constructed from flexible PVC) but must be stationary and not held by a person. For example, hoops can be held up using purchased hula hoop holders or holders made from a 2-liter bottle with rocks or sand that is attached to the hoop with PVC.
 - b. The distance from the launch area to the initial hoop must be no greater than 4 meters and the distance to the final hoop should be no greater than 8 meters.
 - c. If two launches are made, the bonus points will only count for the launch that had the longest distance.

SCORING:

1. **High score wins.**
2. **Scoring as follows:**
 - a. **Score for Part 1 = Longest flight time in seconds X 100**
 - b. **Score for Part 2 = The distance in centimeters plus 20 bonus points for each target through which the plane passes (up to 2)**
 - c. **Tiebreaker = Longest flight time (duration)**

Team# _____

School Name: _____

Aerodynamics Scoring Sheet

BUILD:	TIER
1. Outside assistance violation? Yes= Tier 2	
2. Planes made only of allowable materials? No= Participation points only	
3. Planes have the team number and Part 1 or 2 on them? No= Tier 2	
4. Team impounded their device at the schedule time? No = Tier 2	
TIER?	

TEST:

Part 1: Duration of flight Launch 1: _____ seconds Launch 2: _____ seconds Score will be 100 times the greater of the two launches	
Part 2: Accuracy of flight Launch 1: _____ cm Launch 2: _____ cm Score will be the greater distance in cm.	
Part 2: Bonus Points for flying through targets Launch 1: _____ targets Launch 2: _____ targets Score will be given only for launch with the greatest distance. Teams will earn 20 points per target up to 40 points total.	
Total Testing Score=	

TESTING VIOLATIONS:

1. Outside assistance violation? Yes= Tier 2	
2. Design alteration violation during testing phase? Y= Participation points only	
3. Launch made outside the designated point? Yes= Tier 2	
Total Testing Score=	

PLEASE NOTE THAT THIS RUBRIC IS A SAMPLE AND GUIDE- IN CASES OF CONFLICT WITH THE RULES, THE RULES TAKE PRECEDENCE OVER THE RUBRIC.

CAN'T JUDGE A POWDER

DESCRIPTION: Students will test and characterize one pure substance and then, based only on the data they collect, answer a series of questions about that substance. Students will NOT be asked to identify the substance. The emphasis of the event is on the quality of the data collected, answering questions about the powder, and providing data to support their answers.

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: NO

SAFETY PARAMETERS:

Proper lab safety precautions MUST be used.

- Participants dress for the event must include close-toe shoes, long pants, and long sleeve shirt (or lab coat).
- Participants must wear safety goggles
- Participants should have a lab coat or apron.
- Shoulder length hair must be tied back.
- Taste testing is strictly prohibited.
- Students must wash their hands prior to leaving the event.

COMPETITORS BRING:

- Writing utensil;
- 2 copies of "Powder Properties Chart" (1 will be turned into the supervisor)
- Calculator
- Gloves (optional)
- Safety goggles (NOTE- See appropriate dress requirements above)

THE COMPETITION:

EVENT PARAMETERS:

1. Students will be collecting data on ONE unknown powder. Powders are limited to: granulated sugar, salt, flour, cornstarch, baking soda, calcium carbonate (chalk), or powdered Alka-Seltzer ©
2. The supervisor will provide the following tools for data collection:
 - a. Vinegar
 - b. Iodine
 - c. Water
 - d. 2 different writing instruments (2 different colored pens)
 - e. Waste container
 - f. Well plate/spot plate
 - g. Hand lens
 - h. Pipettes
 - i. Paper towels
 - j. Balance/scale
 - k. Other equipment (ex. Hot plate, microscope, probes, pH paper, etc.)

POWDER PROPERTIES CHART:

1. Prior to the tournament, students will create a "Powder Properties Chart" that has information describing the physical and chemical properties of each possible powder in this event. This may be a table that lists each powder and describes the properties.

2. One copy of the "Powder Properties Chart" will be provided to the supervisor upon entry into the event. The other copy may be used during the event.
3. The quality of the "Powder Properties Chart" will be used as a tie-breaker.

THE COMPETITION:

1. Teams will be given a sample of 1 powder and this will be the same for all teams. Teams will use the tools to collect data on this sample.
2. Teams will be provided approximately 30 minutes to complete relevant tests using the materials provided. The tests performed are determined by the competitors and NOT the supervisor. Some examples of data collected from tasks performed may be:
 - a. The density of the sample is 30 g/mL
 - b. The sample bubbles when mixed with vinegar.
 - c. The powder sample has a shiny luster.
 - d. The pH of the vinegar was 3.
 - e. The temperature of the water was 30° Celsius.
3. Data is to be recorded ONLY in Column 1 using the pen provided by the supervisor.
4. Number each observation. Each observation should have its own row- if you need more space, go to the next row and indent.
5. Data collected should be neat and organized. Any mistakes should be neatly crossed out.
6. Teams should record observations and not inferences. Inferences will score less points than observations
7. After 30 minutes, teams will be expected to have their station clean and ready to move on.
8. For the second part, the sample will be removed from students and no further testing may be completed.
9. The supervisor will provide the competitors with a list of questions and another color pen. Teams will NOT have access to these questions during part 1.
10. For this section, the ability to answer the questions provided by the supervisor will be dependent on the quality and thoroughness of the data collected during the investigation period. Questions will have answers that derive from student observations.
11. For each question, the competitor will find the answer on their observation sheet. If the team has sufficient data or observations to support the answer to the question, the participant should write ONLY the question number in Column 2 next to the proper observation.
12. Each question will have a point value of 5 points. The number of points will be awarded depending on the quality of the data and/or observation. Inferences can be awarded at most 3 points.
13. Topics for questions may include, but are not limited to:
 - a. Solubility and reactions with water
 - b. Density
 - c. Reactions with vinegar
 - d. Reactions with Iodine
 - e. Crystal properties
 - f. Mass
 - g. pH
14. Some **example** questions
 - a. Is the substance soluble in water?
 - b. Was there a reaction that occurred when the sample was mixed with water?
 - c. How does the density of the sample compare to the density of water?
 - d. Does the substance react with vinegar to produce a gas?

SCORING :

- 1. High score wins.**
- Scoring is based on the sum of the point value of each question that was answered and identified in Column 2 of the answer sheet.
- Ties are broken by the quality of the "Powder Property Chart".
- Teams who do not have proper safety equipment cannot compete. They may leave to find someone to lend them the equipment but will not receive any time back to make up for lost time. Supervisor may provide safety equipment, if available, but there will be a penalty of 10% given. This penalty is taken off the overall score that the team gets.
- A penalty of 10% will be given if the lab station is not cleaned up as instructed by the event supervisor at the end of the event.

CHEW THE FAT

DESCRIPTION: Teams will demonstrate knowledge of the human digestive system and proper nutrition.

COMPETITORS BRING:

- Pencil/writing utensil;
- 3-ring binder of any size with any research/reference material. The binder may contain any item, such as a book, computer generated printout, or student created paperwork. No electronic materials are allowed. All materials must be securely bound inside the binder, so that when it is opened vertically (upside down) and given a light shake test no materials will fall out.

NUMBER OF PARTICIPANTS: 2

IMPOUND: NO

THE COMPETITION:

This event will be run in a station format. Teams will rotate through stations that assess any or all of the following topics:

1. Identify the major organs and body parts involved in the digestive process and understand the important job each body part has:
 - a. salivary glands
 - b. taste buds
 - c. teeth: incisors, premolars, molars, and canines
 - d. esophagus, stomach, liver, small intestine, large intestine
 - e. kidney, urine, bladder
2. Compare and contrast chemical and physical digestion.
3. Understand food and the benefits of vitamins & minerals.
 - a. Vitamin List: A, B, C, D, E, K
 - b. Minerals List: Calcium, Iron, Magnesium, Phosphorous, Sodium
4. Be able to test for the presence of fats and oils using the paper bag test and know which foods tend to contain high amounts of fats and oils.
5. Know what foods are considered starches and the result of an iodine test on starch and non starch foods. Students will not be required to perform this test but may be shown pictures of the results of this test and asked to draw conclusions about the results.
6. Know how to use food labels to make better food choices, specifically identifying serving size, vitamin and mineral content, overall caloric content plus identifying where the calories are coming from (fat, protein, carbohydrate).
7. Know common foods in the major food groups: fruits, vegetables, grains, protein, dairy and where they fit in the food pyramid and in the USDA My Food Plate.
8. Understand the relationship among the amount of food energy (calories) consumed, weight, and metabolism.

SCORING: High score wins. Points will be awarded for the accuracy of responses. Ties will be broken by the accuracy or quality of responses to pre-selected questions chosen by the event supervisor.

CIRCUIT LAB

DESCRIPTION : The event will challenge student's knowledge of direct current (DC) circuits using low voltage batteries. Wall socket (AC) current will not be used.

COMPETITORS BRING:

- Pencil/writing utensil;
- 3-ring binder of any size with any research/reference material. The binder may contain any item, such as a book, computer generated printout, or student created paperwork. No electronic materials are allowed. All materials must be securely bound inside the binder, so that when it is opened vertically (upside down) and given a light shake test no materials will fall out.

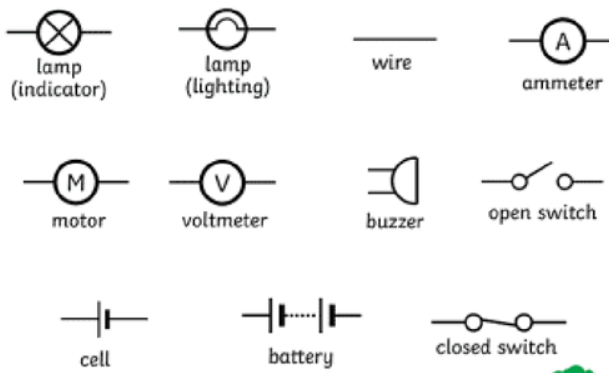
NUMBER OF PARTICIPANTS: Maximum of 3

IMPOUND : NO

THE COMPETITION:

1. The event may be run as a set of stations or a test that should include at least one hands-on task.
2. Questions and tasks shall **NOT** require students to calculate voltage, amperage, etc. but may ask comparative voltage questions (ex. which setup would include more voltage)
3. Questions may address the following topics.
 - a. Energy transfers between electricity and other energy forms
 - b. How electricity is generated and how it gets into households (basics of the power grid)
 - c. Parallel vs. series-parallel circuits
 - d. Circuit drawings including the symbols shown to the right
 - e. Conduction and insulation
4. Hands-on activities may include, but are not limited to:
 - a. Students will build a continuity tester from the materials provided (battery, lamp, and wires) and use it to complete tasks.
 - b. Given five different circuit cards or circuit boxes having contact points labeled A, B, C, etc. that are internally connected to form one or more multi-point circuits, determine which combinations or points on each card are connected together
 - c. Given a tray of common household items, classify them as conductors or insulators
 - d. Given circuits, draw each circuit using the schematic symbols and answer questions about the circuits.
 - e. Construct a circuit based on a series of instructions.

Electrical Circuit Symbols



SCORING:

- **High score wins.**
- Each question or station will be assigned a predetermined set of points, assigned by the event supervisor **and communicated to the teams.**
- Ties will be broken with pre-determined tie-breaker questions **which are communicated to teams.** Supervisors may use the time needed to complete a task as a tiebreaker, if that is communicated to teams prior to the event.

CODEBUSTERS

DESCRIPTION: Teams will cryptanalyze and decode encrypted messages using techniques for historical and advanced ciphers.

COMPETITORS BRING:

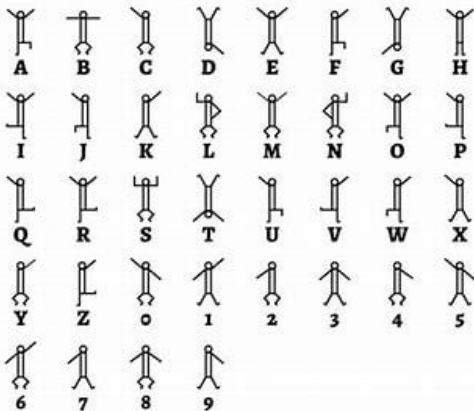
- Pencil/writing utensil;
- Calculators

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: NO

THE COMPETITION:

1. This event consists of participants using cryptanalysis techniques and ciphers to decrypt and encrypt messages on a written or computer-based exam.
2. Teams will be provided scratch paper and any tables needed for the questions on the exam.
3. The code types that can be used include:
 - a. Caesar’s cipher- a substitution cipher in which each letter in the plaintext is replaced by another letter some fixed positions down the alphabet. For example, with a left shift of 3, D would be replaced by A, E by B, etc.
 - b. Atbash – a monoalphabetic substitution cipher where the alphabet is mapped to its reverse, so that the first letter becomes the last letter, the second letter becomes the second to last letter, etc.
 - c. Tap Code- Encode text messages on a letter-by-letter basis in a very simple way. The message is transmitted using a series of tap sounds. In this case, the sounds will be shown as dots. See Latin alphabet tap code table and example of the tap code for the word “hello” below. Supervisor must provide the “Latin alphabet tap code table” to participants in the test.
 - d. **Dancing Men Cipher- The Dancing Men alphabet is a cypher created by Arthur Conan Doyle in 1903, and used in his Sherlock Holmes short story “The Adventure of the Dancing Men”. The event supervisor must provide a Dancing Men Cipher table.**



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Latin alphabet tap code table

	1	2	3	4	5
1	A	B	C/K	D	E
2	F	G	H	I	J
3	L	M	N	O	P
4	Q	R	S	T	U
5	V	W	X	Y	Z

4. The code that is to be used should be identified in the question. For example, “Solve this Caesar Cipher which is a quote by Enola Holmes and starts with the letter O” or “Albert Einstein left a message using the Tap Code cipher. What does it say?”
5. No more than 1/3 of the questions will require encryption, other questions will be decryption questions.
6. Questions may provide improperly decoded sample answers and require students to “debug” or provide the correct answer and an explanation of where the original decoder went wrong.

7. Supervisors will identify a “Timing Bonus” question. This question may be completed with a judge/supervisor at a separate station while the rest of the teams are completing the paper/pencil test OR should be the first question in the test. In this case, the “Timing Bonus” question should be a separate sheet of paper only provided when the team is called to that station.
8. Questions should be given point values that correspond with the number of letters in the plaintext and/or the difficulty of the problem. (see scoring information below)

SCORING:

- **High score wins.**
- Each question will be assigned a predetermined set of points, assigned by the event supervisor and communicated to the teams (preferably- points are identified on the test/station paperwork).
 - For questions such as cryptograms, with answers composed of letters, the final points will be determined based on the number of correct letters from the decoded plaintext or the encoded ciphertext.
- A timing bonus is earned based on the number of seconds it takes a team to correctly decode/encode the identified question. The timing bonus is equal to 2 X (point value of the question – number of seconds). Students will earn the number of points for the question itself and for the timing bonus. The timing bonus may only be awarded if the students correctly decode/encode the entire phrase/quote.
- Ties will be broken with predetermined questions as identified by the supervisors.

RESOURCES: Use <https://toebes.com/codebusters/> to make practice tests and find information about this event.

[Cryptoclub](#)

[CIA – break the code](#)

[Cryptograms.org](#)

[Test Builder Demo](#)

DEEP BLUE SEA (Atlantic Flora and fauna)

DESCRIPTION: Teams will be assessed on their knowledge of oceanography, the flora and fauna of the Atlantic Ocean, and aquatic animal life cycles.

COMPETITORS BRING/NEED:

- Writing utensil;
- 3-ring binder of any size with any research/reference material. The binder may contain any item, such as a book, computer generated printout, or student created paperwork. No electronic materials are allowed, such as a computer, calculator or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically (upside down) and given a light shake test no materials will fall out.

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: NO

THE COMPETITION:

1. **The competition may include timed stations and/or timed slides/PowerPoint presentation(s).**
2. In **Part I** the contestants will view pictures and answer questions relating to identifying Atlantic Ocean flora or fauna. They may also be asked questions about the Atlantic Ocean organism's habitat or life cycle.
3. The list of flora and fauna will come from the following list:

FLORA:	Algae	Seaweed	turtle-grass
	Kelp	sea oats	paddle-grass
	Johnson's seagrass	pennyworts	Thong weed
FAUNA:	Bottlenose Dolphin	Green Sea Turtle	Atlantic Sturgeon
	Blue Mussel	Leatherback Sea Turtle	Acadian Red Fish
	Longfin Squid	Hawksbill Sea Turtle	Atlantic Cod
	Northern Quahog Clam	Loggerhead Sea Turtle	Red Hake
	Atlantic surf clam	Atlantic Spiny Dogfish	North Atlantic Swordfish
	Grooved carpet shell clam	Atlantic Shortfin Mako Shark	Atlantic Blue Fin Tuna
	Starfish	Right Whales	Atlantic Hairy Triton
	Sand Dollars	Beluga Whale	Atlantic Triton's Trumpet
	Blue Sea Slug	Blue Whale	Summer Flounder
	Atlantic Sea Scallop	Bowhead Whale	Winter Flounder
	Manatee	Humpback Whale	Winter Skate
	Black Sea Bass	Commerson's dolphin	Atlantic Salmon
	Monkfish	Heaviside's dolphin	King Mackerel
			Scup

4. In **Part II** the contestants will respond to a series of questions related to the following topics:
 - a. Physical features of oceans (trenches, seamounts, etc.)
 - b. Phenomena (tidal waves, currents, surface current, longshore currents, etc.)
 - c. Geography (location and identification of oceans, seas, major bays, etc.)
 - d. Conservation efforts to protect ocean animals and sea floor

SCORING:

- **High score wins.**
- Each question or station will be assigned a predetermined set of points by the event supervisor **and communicated to the teams.**
- Ties will be broken with pre-determined tie-breaker questions **which are communicated to teams.**

ENERGY MATTERS

DESCRIPTION: Teams will be asked questions and/or will conduct experiments at stations as they relate to the properties of energy. **Safety goggles are required.**

COMPETITORS BRING/NEED:

- Safety goggles;
- Writing utensil;
- 3-ring binder of any size with any research/reference material. The binder may contain any item, such as a book, computer generated printout, or student created paperwork. No electronic materials are allowed, such as a computer, calculator or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically (upside down) and given a light shake test no materials will fall out.

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: NO

THE COMPETITION:

1. **The competition may be run as timed stations and/or a written test.**
2. Teams will either be asked questions or will be required to complete experiments or make observations as they relate to forms of energy such as light, heat, sound, electrical, chemical, and mechanical.
3. Topics are limited to:
 - a. Descriptions of light, heat, sound, electrical, chemical, and mechanical energy. Topics may include:
 - i. Characteristics of sound waves: Wavelength, amplitude, frequency, time period, velocity
 - ii. Sound waves begin with vibrating matter
 - iii. Sound waves need a medium to travel through
 - iv. Heat can move via conduction, convection, and radiation
 - v. Friction
 - vi. The Sun provides heat energy through radiation
 - vii. Light moves in a straight line unless it strikes matter
 - viii. Light can be reflected, refracted, or absorbed
 - ix. Law of Conservation of Energy
 - x. Energy can transfer from one form to another
 - xi. Kinetic versus potential energy
 - b. Analysis of data from experiments on light, heat, sound, electrical, or mechanical energy

SCORING :

1. **High score wins.**
2. Each question or station will be assigned a predetermined set of points, assigned by the event supervisor **and communicated to the teams (preferably- points are identified on the test/station paperwork).**
3. Ties will be broken with pre-determined tie-breaker questions **which are communicated to teams.**

FAST FACTS (Plants and Animals)

DESCRIPTION : Teams will fill in a grid of terms that begin with a given letter to match given science categories.

COMPETITORS BRING/NEED :

- Writing utensil

NUMBER OF PARTICIPANTS : Maximum of 2

IMPOUND : NO

THE COMPETITION :

1. Teams are not allowed to bring any information resources or other material into the event.
2. The event supervisor will provide each team answer/scoresheets.
3. Each competition will consist of three rounds. Each round will begin with the supervisor giving each team the same scoresheet that contains a grid which has 5 different science categories listed along the horizontal axis and 5 different letters listed along the vertical axis. The supervisor will determine the categories to be used in each round, ensuring that there is at least one valid answer for each category/letter combination. Categories must not be repeated within a grid or among the three grids used in competition. No letter can be repeated more than twice within the three grids.
4. Teams will have 6 minutes to complete each round. Teams will write a term, corresponding to the given category and beginning with the given letter, in each of the 25 boxes of the grid. At the end of 6 minutes the event supervisor will stop the round. For each round all students should start and stop writing at the same time as directed by the event supervisor. Students beginning before or working after the event supervisor starts/stops the round will have their scoresheet not scored for that round.
5. Students are to write their names and team number on the scoresheet for each round. A scoresheet without student names and/or school will not be scored for that round.
6. At the end of each round the supervisor will collect all scoresheets. Then a new set of scoresheets will be distributed to students. This will repeat for each of the three rounds.
7. Names of the categories must not be used in the answer.
8. If a correct response has more than one word, the first letter of the first word will be used (e.g., "D" is the first letter of "Doppler Radar"), Exceptions: the first letter of a word following articles, "the", "a/an" will be considered the first letter of the term (e.g., "The Grand Canyon" would be considered to begin with "G".)
9. Students may not write two or more different forms of a response within a category to get credit for two or more different answers (e.g., Category - "Human Organs", Letters "I", "L", "S", and the student writes "small intestine", "large intestine", and "intestine". The student would only get credit for the more precise terms "small intestine" and "large intestine".
10. Incorrect spelling of words will be allowed if the event supervisor is able to determine the intended term. However, the first letter must be correct. All words must be found in an English based science dictionary.

SCORING :

- **Total score will be determined by adding the scores from each row and column from each of the three rounds. Highest total score wins.**
- **The number of points earned depends upon the number of correct terms listed in a row and in a column. Points will be awarded as follows:**
 - **One correct term in a row = 1 point**
 - **Two correct terms in a row = 4 points**
 - **Three correct terms in a row = 9 points**
 - **Four correct terms in a row = 16 points**
 - **Five correct terms in a row = 25 points**
 - **One correct term in a column = 1 point**

- **Two correct terms in a column = 4 points**
- **Three correct terms in a column = 9 points**
- **Four correct terms in a column = 16 points**
- **Five correct terms in a column = 25 points**
- **Ties will be broken in the following sequence**
 - **Highest individual round score**
 - **Second highest individual round score**
 - **Most columns/rows with 5 correct answers**
 - **Most columns/rows with 4 correct answers**
 - **Most columns/rows with 3 correct answers**
 - **Most columns/rows with 2 correct answers**

FOSSIL FRENZY

DESCRIPTION: This event focused on **their knowledge of geologic time, dinosaur fossils and the process of fossilization.**

COMPETITORS BRING/NEED:

- Writing utensil;
- A cheat sheet which can be either ONE sheet of 8.5 X 11" paper with notes (handwritten or printed) on both sides or **2 sheets of 8.5 X 11" paper with notes (handwritten or printed) on a single side**; This may be in a page protector, but there cannot be additional notes or post-its on the page protector that would add the amount of notes. **This is per team.**

NUMBER OF PARTICIPANTS : Maximum of 2

IMPOUND : NO

THE COMPETITION :

1. The competition may be run as timed stations, a slideshow and/or a written test.
2. Identification of fossils is limited to 50% of the total score. Students will be able to identify fossils of the Clade Dinosauria from pictures, replicas, actual specimens, etc. and answer questions on the following:
 - a. If the dinosaur was a carnivore, omnivore, and herbivore
 - b. The specific environment that the dinosaur lived in- marine, terrestrial, freshwater, etc.
 - c. The geologic time period the dinosaur is from (Triassic, Jurassic, or Cretaceous)
 - d. Specific physical adaptations
3. Students may be asked to answer question on the following in regards to prehistoric plants:
 - a. The geologic time period the plant is from (Triassic, Jurassic, or Cretaceous)
 - b. Leaf arrangement
 - c.
4. Fossil identification is limited to the following.
 - a. Order Saurischia (lizard-hipped dinosaurs) to include **Afrovenator, Alamosaurus, Avimimus, Bambiraptor, Buitreraptor, Ceratosaurus, Dilong, Guanlong, Plateosaurus, Saltosaurus**
 - b. Order Ornithischia (bird-hipped dinosaurs) to include **Anchiceratops, Chasmosaurus, Heterodontosaurus, Kentrosaurus, Pachycephalosaurus, Pentaceratops, Prenocephale, Saichania, Styacosaurus, Zalmoxes**
 - c. **The following plants: Cladophlebis, Ginkgoites, Otozamites, Ptilophyllum, Sagenopteris**
5. Teams may also be assessed in any of the following topics:
 - a. The conditions required for a plant or animal to become fossilized.
 - b. Distinguish between modes of preservation: petrification, mineral replacement, cast/mold, imprint, encasement in amber/copal, mummification, freezing, entrapment in tar/asphalt.
 - c. Make inferences about dinosaurs from footprints, teeth, and body structures.
 - d. Understand the Geologic Time Scale and be able to distinguish between era, period, and epoch and know where dinosaurs and humans fit on that time scale.
 - e. Describe possible causes of extinction

SCORING :

- **High score wins.**
- Each question or station will be assigned a predetermined set of points, assigned by the event supervisor **and communicated to the teams (preferably- points are identified on the test/station paperwork).**
- Ties will be broken with pre-determined tie-breaker questions **which are communicated to teams.**

METRIC MANIA

DESCRIPTION: Teams will demonstrate their understanding of metric measurements by estimating and measuring length (meter), mass (gram), fluid volume (liter), angles, and temperature (Celsius) and making calculations based on these measurements.

COMPETITORS BRING:

- Pencil/writing utensil;
- Calculator, metric ruler, protractor

NUMBER OF PARTICIPANTS: 2

IMPOUND : NO

THE COMPETITION:

1. The event may be run as a set of stations or a test that should include at least one hands-on task.
2. In addition to the tools that the teams may bring, supervisors may provide the following tools to be used during the event:
 - a. Meter stick/meter tape
 - b. Electronic or triple beam balance
 - c. Beakers
 - d. Erlenmeyer flasks
 - e. Graduated cylinders
 - f. Caliper
 - g. Thermometer
3. Questions/tasks may relate to the following topics:
 - a. Scale of metric units (ex. 10 mm = 1 cm)
 - b. Appropriate units to measure various items, or for calculations
 - c. How to make measurement estimations
 - d. Drawing and identifying lines and angles
 - e. Analyzing shapes based on lines and angles
 - f. Measuring and calculating volume of rectangular prisms, liquid in a container, irregular objects using displacement
4. Hands-on activities may include, but are not limited to:
 - a. Given a protractor, draw and label a 58° angle (angle ABC) and classify the angle as obtuse, acute, or right
 - b. Use two blocks at the station and measure the mass and volume of each.
 - c. Given a pencil, estimate how many pencils would be in a pile that had a mass of 10 kg.
 - d. Use a caliper to measure the outside diameter of a ring and then the thickness of the metal ring in mm.

SCORING:

- **High score wins.**
- Each question or station will be assigned a predetermined set of points, assigned by the event supervisor **and communicated to the teams.**
- Ties will be broken with pre-determined tie-breaker questions which are communicated to teams. Supervisors may use the time needed to complete a task as a tiebreaker, if that is communicated to teams prior to the event.

MYSTERY ARCHITECTURE

DESCRIPTION: At the beginning of the event, teams will be given a bag of building materials and instructions for designing and building a device that can be tested. This is an **ON-SITE BUILD EVENT**.

NUMBER OF PARTICIPANTS: Maximum of 3

IMPOUND: NO but all teams will build at the same time.

COMPETITORS BRING:

- Writing utensil;
- Scissors;
- Ruler;
- Safety goggles

THE COMPETITION:

BUILD:

1. All teams will build at the same time. Teams will have 25-minutes to build. Once teams enter the area to build, they may not leave the area or receive outside assistance, materials, or communication until after they are finished building. Violation of this rule places a team in Tier 2.
2. Once participants arrive at their build area, they must put their safety goggles on. These goggles must stay on for the entire build period. Supervisors will give one goggle warning. Additional warnings will place the team in Tier 2 and/or remove them from competition.
3. Each team will be given a bag containing the same materials and a working area.
 - a. Examples of materials are: paper cups, drinking straws, paper clips, string, tape, paper, Play Doh ©, and Popsicle sticks. Materials are not limited to this list but will not include anything potentially hazardous.
 - b. Teams may not use any outside materials, other than what is provided to them by the event supervisor or their scissors and ruler.
 - c. The bag that the materials come in cannot be part of the package and should be used to hold all waste at the end of the build.
 - d. The materials provided may be altered as needed, using the allowable tools.
 - e. The allowable materials (scissors, pencil, ruler) may NOT be part of the package.
4. The team will create a device based on the instructions of the supervisor. The information will be provided during the morning build time.
 - a. Samples of devices to be built are limited to a tower, a bridge, a floatation device such as a boat, or a cantilever.
 - b. The supervisor's directions must include at least one primary dimension and must include whether the device must support a load and the duration of the load supported. This must be provided prior to building and must be the same for all teams. Sample directions may be:
 - i. Build the tallest tower that is freestanding for at least 30 seconds when a tennis ball is placed on top.
 - ii. Build the shortest bridge that spans at least 30 cm and can hold a load of at least 500 g for a minimum of 10 seconds.
 - iii. Build the longest cantilever that attaches to a given backpiece at the provided hook. This cantilever will hold 500 g for a minimum of 10 seconds.
 - iv. Build the smallest floatation device that can hold a specific mass of marbles for a minimum of 10 seconds.
 - c. If the device is to support a load, a separate and identical load of the same dimensions and weight used for testing will be provided for teams to view and feel. Teams may not take the sample load back to their building location.
 - d. Unless specifically stated by the supervisor, devices must be freestanding and must not be attached to a tabletop, floor, ceiling, or other support.

- e. Any loading should be able to be completed and device ready to test within 1-minute of the testing time.
 - f. The device must have the team number on it. Devices without team numbers will be placed in Tier 2.
5. At the end of the build time, teams must clean up their build area by placing all trash and extra materials in the bag.
- a. The remaining supplies will be massed and this will be used as a tie-breaker (those with more supplies left over will place higher in the tie).
 - b. Prior to leaving the build area, teams must ensure that their area is clean and all instructions have been followed. Failure to follow this rule will place teams in Tier 2.
 - c. Teams should store their devices in a location noted by the event supervisor. It is suggested that the event supervisor/judges do not touch student devices and instead have them place them in a location that will be monitored throughout the day.

TEST:

1. Teams will return to test at some point later in the day- this may be via self-scheduling or based on a set schedule.
2. Once participants arrive at their test area, supervisors will have them collect their device and give instructions for measuring the primary dimension and the mass of the waste baggie. This will be noted on the score sheet.
3. Teams will then be provided the load, if applicable, and they have 1-minute to load and call for timing to begin. Teams who cannot test within 1-minute will earn only Participation points.
4. Teams whose device cannot hold the load will earn Participation points.
5. The supervisor/judge will time to determine if the device was able to hold the load for the minimum time requirement. Teams whose devices cannot hold the load for the minimum time but whose devices hold the load will be placed in Tier 2.
6. Teams have one chance to test their device. There are no trial runs or do-overs.
7. Teams will remove the load according to the supervisor's instructions and return their device to the location where they are being stored. Teams may pick up devices at the end of the day, if desired.

SCORING :

1. **High or low score wins depending on instructions.**
2. The primary dimension will be measured to the nearest 0.1 cm by the event supervisor. Devices will be ranked as follows:
 - a. Devices that held the load for the duration will be ranked in order of the primary dimension. (ex. If the instructions are to build the shortest bridge that spans 30 cm and holds 1 kg, the bridges will be ranked with the shortest bridge being in 1st place and the longest bridge in last place for this tier)
 - b. Devices that held the load but not for the duration will be ranked within Tier 2 in order of primary dimension.

Team# _____

School Name: _____

Mystery Architecture Scoring Sheet

BUILD:	TIER
1. Outside assistance violation? Y= Tier 2; Repeated violations may result in DQ	
2. Safety goggles violation? 1st time= Warning; 2nd time = Tier 2; Repeated violations may result in DQ	
3. Device made only of allowable materials? N= Participation points only	
4f. Device has team number on it? N= Tier 2	
5b. Building area cleaned up as instructed? N = Tier 2	
Team did not show up at build time? Y= Participation points only	
TIER?	

TEST:	
Primary Dimension: _____	Measurement: _____
Mass of bag with "waste" _____ g (TIE-BREAKER)	
3. Loaded within 1-minute? N= Participation points only	
4. Device held the load? N= Participation points only	
5. Device held load but not for required time N = Tier 2	
MEASUREMENT OF PRIMARY DIMENSION=	

PLEASE NOTE THAT THIS RUBRIC IS A SAMPLE AND GUIDE- IN CASES OF CONFLICT WITH THE RULES, THE RULES TAKE PRECEDENCE OVER THE RUBRIC.

ROLLER COASTER

DESCRIPTION: Prior to the competition, teams design, build, and test a roller coaster track to guide a sphere that uses gravitational potential energy as its sole means of propulsion to travel as close as possible to a target time. Students **MUST** bring and wear impact resistant safety goggles. This is a **PRE-BUILT EVENT**.

COMPETITORS BRING:

- Roller Coaster device;
- Tools needed to adjust the device, if necessary;
- Design log including technical diagrams and data;
- Safety goggles
- Clear glass marbles

NUMBER OF PARTICIPANTS: Maximum of 3

IMPOUND: YES

THE COMPETITION:

CONSTRUCTION:

DEVICE CONSTRUCTION

1. Teams will design and build a roller coaster that allows a ball to travel from a starting point to an ending point in **60 seconds**.
2. The device should be designed and built by the students (adult construction assistance is OK). Each device should be designed to operate safely at all times. No points will be awarded for design.
3. Students may not use metal or any sharp material in their build. The device must be safe to move and use. Suggested materials for building include foam pipes, pool noodles, pvc pipe, cardboard, manila folders, paper, etc.
4. Students may not use any pre-fabricated roller coaster kits such as K'nect. Teams may use paper templates that they have to cut and assemble themselves as part of the design. The supervisor should be able to ask questions of the students to determine that they designed the roller coaster for the challenge.
5. The entire device must fit in a **80 cm square taped area on the floor** of the testing area and **must be no taller than 1.25 meters**.
6. The device must be freestanding and the students must be able to move the device from impound to the testing site with ease.
7. Team members may not stand on chairs, tables or anything else to release the ball.
8. The team number must be marked prominently on the roller coaster. Teams without their team number on the device will be given an initial warning prior to penalty. Devices without a team number will be placed in Tier 2.
9. Teams from the same school may **NOT** use the same device for a tournament.
10. The marble must run through the track using only gravitational energy. (i.e. no rubber bands or motors)
11. Teams will earn 20-points for each of the following elements that are incorporated into their coaster. In order for these to count toward the score, the marble must successfully pass through the element on the way to the end. Each of these can only count toward the score once but may be used as many times as desired to reach the target time.
 - a. **INCLINE-** this is an upward portion of track of at least 10 cm in length that forms at least a 45-degree angle.
 - b. **INVERSION-** portion of the track that turns the marble upside down
 - c. **HELIX-** portion of track that turns at least 360 degrees in an upward or downward spiral.
 - d. **JUMP-** track breaks and track marble passes over open portion of at least 10 cm to the other "side"
12. The marble must stay in the device at the end of the run. **This will earn the team 10 points.**



13. Teams may earn up to 20 bonus points as follows:
 - a. 1 point for each cm of incline beyond the required 10 cm distance up to 10 bonus points.
 - b. 1 point for each cm of jump beyond the required 10 cm distance up to 10 bonus points.
14. The total run score will be out of 110 points including any bonus points earned.

DESIGN LOG

1. The design log should include technical diagrams and a graph/chart showing the speed/time of the marble.
2. Students must create labeled, technical diagrams of the device. These should include:
 - a. At least 2 diagrams showing different views and details of the track
 - b. Accurate metric measurements
 - c. Labels of any scorable elements (incline, jump, etc.)
3. Prior to the competition, teams should prepare a graph or data chart, with data on the **speed/time** of the marble using various track adjustments.
4. Teams without a graph or data chart will be placed in Tier 3 and scored below all other teams.

IMPOUND

1. Teams will impound their Roller Coaster, marbles, any tools that may be needed for adjustments before testing (this includes things like tape and rubber bands), and a completed design log. Teams may pick up their design log after testing, as long as there are no arbitrations.
2. During impound, Event Supervisors will evaluate all devices for safety and determine if the device is suitable for testing.
3. Supervisors should note to students possible violations prior to testing so students may arbitrate, if necessary.
4. Event supervisor will measure and record the height of each device for use as tiebreaker.

TESTING :

1. At testing time, supervisors may request teams move their device to a location other than impound. Students should be able to do this without adult supervision or assistance.
2. Once the team is called to set up for testing, no coaching or support from outside is allowed.
3. Any adjustments to the device can only be made with impounded materials. Any adjustments must take less than **3 minutes**. **During these 3 minutes, the team may test their device or portions thereof.**
4. Impact-resistant safety goggles (or glasses) are required during launch time. If team members do not wear safety goggles while they are setting up and running their device, they will be given an initial warning and allowed to correct. If a second warning is given, the team will not be allowed to compete **and will receive participation points only**.
5. Teams should show the supervisor where the start and end points are.
6. Teams must give ample warning to the supervisors/timers prior to launch. Warning may be "3,2,1 launching..." etc.
7. Using their marble, the students will release it at the "beginning point". The ball must be released and not pushed. The event supervisor may have the team redo a launch if pushing is determined.
8. The timers will time the entire run of the device until the marble stops at the "end".
9. If the ball falls off the track or stops during the run, the students may touch or put the ball back **in the same spot** to continue the motion. Each touch earns a penalty.
10. If possible, the supervisor will announce their run time to the students.
11. **Each team should get only one run.**

SCORING:

1. High score wins.
2. Score is the sum of the RUN SCORE, the LOG SCORE, and the TIME SCORE.
3. Penalties may be assessed as listed in the rules.
4. Ties will be broken by the lowest vertical height of the Roller Coaster.

Roller Coaster Scoring Rubric

Team Number: A _____

Team Name: _____

Student Names: _____

TIER- DID STUDENTS FOLLOW ALL DIRECTIONS AND SAFETY REQUIREMENTS ?

Were the device and design log impounded before the deadline?	N= Tier 3	Y	N
Dimensions of the device are no larger than 80 cm X 80 cm X 1.25 meters	N=Tier 3		
Vertical height: _____ (used as tiebreaker)		Y	N
Device has the team number clearly marked on it.	N=Tier 2	Y	N
Device is safe but has other construction violations.	Y=Tier 2	Y	N
Device was inspected and determined to be safe	N= CANNOT RUN (Tier 3 and earn participation points only)	Y	N
Teams received outside assistance during set up or run.	Y=DQ	Y	N
		Tier ____	

SCORING

RUN SCORE	POINTS
SCORABLE ELEMENTS (Check each element included and successfully completed) _____ INCLINE- an upward portion of the track that forms at least a 45 degree angle and is at least 5 cm long _____ INVERSION- portion of the track that turns the marble upside down _____ HELIX- portion of track that turns at least 360 degrees in an upward or downward spiral _____ JUMP- track breaks and marble passes over open portion of track at least 10 cm to the other "side" _____ X 20 = _____	
At the end of the coaster, did the marble stay in the device? Y= 10 pts; N= 0 points	_____
Number of times device had to be restarted (MAX penalty of -15 points) _____ X -5 = _____	_____
Bonus points: _____ for extended length of jump in cm (up to 10 points) Bonus points _____ for extended length of incline in cm (up to 10 points)	_____
TOTAL RUN SCORE	_____
TIME SCORE: Teams will run their device one time.	POINTS
What was the run time? AVG TIME: _____ + 1 point for each second up to 60 seconds; -1 point for each second longer than 60 seconds and up to 1.5 min. TIMER 1: _____ TIMER 2: _____ TIMER 3: _____	_____ (MAY BE NEGATIVE)
LOG SCORE	POINTS
_____ Quality of Diagram 1 including measurements and labels of any scorable elements (helix, jump, etc.) (up to 20 pts) _____ Quality of Diagram 2 including measurements and labels of any scorable elements (helix, jump, etc.) (up to 20 pts) _____ Graph or data chart, with data on the speed/time of the marble using various track adjustments (up to 20 pts)	_____

FINAL SCORE= RUN SCORE (_____) + TIME SCORE (_____) + LOG SCORE (_____) = _____

TENNIS BALL CATAPULT

Description: Students will build and calibrate their own free-standing (not handheld) trajectory device that must be capable of “lobbing” a tennis ball at a target placed between 3 and 6 meters. Students MUST bring and wear impact-resistant safety goggles. **This is a PRE-BUILT EVENT.**

Number of Participants: 2

Impound: YES

The Competition:

1. Prior to the competition, teams should prepare a graph or data chart, clearly labeled with the school and students' names, graph title, labeled x- and y- axes and graduated using appropriate units for usage of their device. Students should be prepared to answer questions about their device and graph.
2. One graph should be submitted during impound. The graph may be used during competition time.
3. During impound, Event Supervisors will evaluate all devices for safety and determine if the device is suitable for testing.
4. Each team will bring their own homemade catapult or trebuchet and their own standard unaltered regulation tennis ball to the competition. Please print your team number prominently on the catapult and ball. If the team fails to bring their own tennis ball, they may be supplied by the judge at a penalty of +3 points.
5. A data chart showing the launching characteristics of the catapult using various settings will be required for the competition.
6. Launch force must be provided by gravity or elastic solids (such as springs, rubber bands, etc.). The device may not be more than 50 cm above the ground before, during or after launching. Total weight of device must be under 50 pounds.
7. Each device should be designed and built by the students (adult construction assistance is OK). Each device should be designed to operate safely at all times. No points will be awarded for design.
8. The device sit upon rubber or soft material “feet” to prevent floor damage when moving and launching.
9. The device will sit on a level area of ground and fire at the target area that will also be at ground level. The target area will be a freshly raked sand pile of at least 1 meter in diameter. A small object level with the sand will mark the center.
10. The event may take place outside.

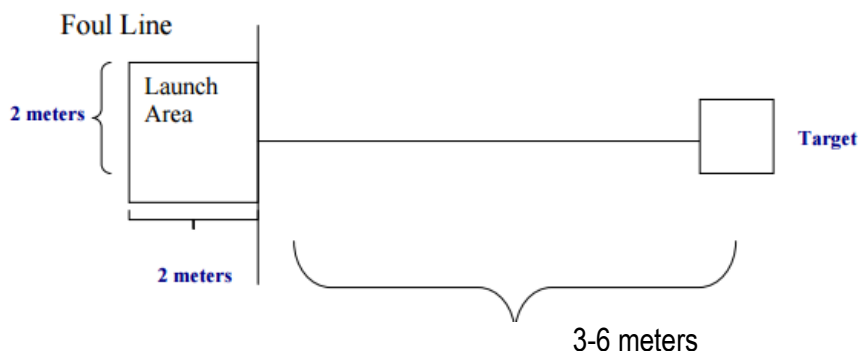
Impound:

1. During the designated impound period, the team must impound their catapult/trebuchet, any materials needed to alter the device during the testing phase, a tennis ball, and their data chart/graph. All items should be clearly marked with the team number.

Testing:

1. Once the team is called to set up for testing, no coaching or support from outside is allowed.
2. Impact-resistant safety goggles (or glasses) are required during launch time. If team members do not wear safety goggles while they are setting up and running their device, they will be given an initial warning and a penalty of +3 points. If a second warning is given, the team will immediately be placed in Tier 2.
3. Once teams enter the event area to compete, they may not leave the area or receive outside assistance, materials or communications until they are finished competing. A violation of this rule will result in the team being placed in Tier 2.

4. The distance from the “foul line” to the center of the target will be announced at the start of the competition. Students may place their catapult at any point behind the foul line up to 2 meters. See image below.



5. Total time once the team has placed their device into the Launch Area is 5 minutes. Each team will have a one-shot practice round after which they will shoot at the target three times. The first two shots will count toward the score. The third shot will only be used in the case of a tie.
6. Teams must give ample warning to the supervisors prior to launch. Warning may be “3,2,1 launching...” etc. Following an initial warning, a penalty of +3 points will be assessed for failure to warn supervisors before each launch.
7. Only successful launches will be measured. Launches are successful when a Tennis Ball first bounce goes beyond the foul line. Only 3 shots fired are allowed, beyond the practice shot, regardless if they are successful or not.
8. The device may be moved by the participants within the 2-meter square launch area after each attempted launch. Teams may make adjustments to their device, between shots, while in the launch area using only materials that were impounded with the device. They may not change the device in any way that would violate impound rules.
9. The distance from the target will be measured after each shot, including the practice shot, and announced to the team to allow them to make adjustments based on their data chart.
10. The distance from the center of the target will be measured to the tennis ball’s initial point of impact as determined by the supervisor. Tennis balls landing outside of the sand pile area, less than 8 meters from the launch area, will also be measured according to the initial point of impact as determined by the judge. Tennis balls hitting the target on initial impact will receive a score of zero.
11. No tennis balls should be shot before or during the catapult event except during the specified practice round or actual competition. Each team must bring their catapult to the competition site at a time posted at the registration table, and leave it there for safekeeping until their turn. This rule is meant to provide safety and fairness so teams will not be practicing during the day of the competition after the distance is announced.

Scoring:

1. Low score wins.
2. Score is the average of the distance from the target in meters, measured to a single centimeter precision for the first two trials. 1 meter is 1 point (i.e. 1.23 m)
3. Penalties may be assessed as listed in the rules.
4. Ties will be broken by the distance from the target from the second (final) official launch.

Tennis Ball Catapult Scoring Rubric

Team #: _____

School/Team Name: _____

		Does the Catapult meet the requirements? (Y/N)
IMPOUND :		
a. Catapult determined to be safe?	N= Cannot compete;	
b. Catapult sits upon rubber or soft material soas to not damage floor?	N = Cannot compete	
c. Catapult labeled with team #?	N= -Tier 2	
d. Tennis ball impounded and labeled	N= Tier 2	
e. Graph provided?	N = Tier 2	
f. Impound on time?	N = Tier 2	
	TIER?	

Points

LAUNCH SCORE :

Practice Launch - will be measured and announced to team but not scored.	
Launch #1 distance from target in meters __.____	
Launch #2 distance from target in meters __.____	
Average of the two Launches=	

LAUNCH PENALTIES :

Penalty

Failure to announce launch (3,2,1 ...launching)?	Y = -2 points	
Student or device crosses launch line?	Y = -2 points	
Outside interference?	Y= Tier 3	
	TOTAL=	

Average Launch Score	-	Penalties	=	FINAL SCORE (High score Wins) _____ Tier # _____
_____		_____		

WEATHER PERMITTING

DESCRIPTION: This event will test the team's knowledge of conducting investigations and using appropriate technology to build an understanding of weather.

COMPETITORS BRING:

- Pencil/writing utensil
- 3-ring binder of any size with any research/reference material. The binder may contain any item, such as a book, computer generated printout, or student created paperwork. No electronic materials are allowed, such as a computer, calculator or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically (upside down) and given a light shake test no materials will fall out.

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: NO

THE COMPETITION:

1. The event may be run as a sit-down test, station or a combination of the two. Teams will answer questions and/or complete tasks to assess any of the following topics:
 - a. Water Cycle, including
 - i. Processes of evaporation, condensation, precipitation, and run off
 - ii. Types of precipitation
 - iii. Location of major sources of water and the water cycle
 - b. Clouds, including
 - i. Types of clouds - identification from images or descriptions. Cloud types are limited to cirrus, cirrostratus, cirrocumulus, altostratus, stratus, stratocumulus, nimbostratus, cumulus, mammatus, lenticular, fog, and contrails.
 - ii. Processes of cloud formation
 - iii. Cloud relationships to weather conditions
 - c. Identification and description of the function of weather instruments (thermometer, barometer, rain gauge, hygrometer, sling psychrometer, wind vane, anemometer, weather balloon, radar, satellite)
 - d. Weather forecasting - using weather data to identify, describe, and/or predict weather conditions. To include:
 - i. Description/definitions of weather-related terms (dew point, front, humidity, relative humidity, pressure, air mass, windspeed, etc.)
 - ii. Identification of weather station and weather map symbols
 - iii. Reading weather maps/weather station data
 - iv. Using weather maps/weather station data to describe expected weather conditions
 - v. Using weather maps/weather station data over time to predict weather

SCORING:

- High score wins.
- Points will be awarded for the accuracy of responses.
- Ties will be broken by the accuracy or quality of preselected questions chosen by the event supervisor.

WRITE IT, DO IT

DESCRIPTION: One participant will write a description of an object and how to build it. The other participant will attempt to construct the object from this description.

COMPETITORS BRING:

- Pencil/writing utensil

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: NO

THE COMPETITION:

1. One participant is shown an object, which may be abstract, but is the same for all teams. Example materials may be: drinking straws, paper cups, pipe cleaners, string, popsicle sticks, paper, etc.
 - a) Materials are not limited to this list.
 - b) The participant is not allowed to touch the object unless permitted by the Event Supervisor.
2. The participant viewing the object has 20 minutes to write a detailed description of the object and how to build it.
 - a) Drawings and diagrams of the model are not allowed
 - b) Numerals, words, and single letters that fit within the content of the description are allowed
 - c) Participants may use abbreviations or punctuation that fit within the context of the description
3. The Event Supervisor will then pass the description to the second team member who will take the description and attempt to recreate the original object in 20 minutes

SCORING:

- High score wins
- Points will be awarded for proper size, color, location, orientation, and/or connection.
- Pieces connected beyond an incorrect connection will be counted in the score. No penalty for unused parts.
- Students will be ranked Tier 2 if a subsection of the model is drawn.
- Drawing a complete picture of the model will result in disqualification.
- Time for construction will be the tiebreaker.

SPECIAL EVENT: PROFESSOR JENSEN'S POTIONS

DESCRIPTION: This event is in memory of Mrs. Samantha Jensen, a supporter of Florida Science Olympiad and a coach from Orlando Science Schools. Ms. Jensen's passing was a huge loss to the Florida Science Olympiad community. **This event does not count toward overall team standings.** Special themed awards will be given for this event.

Teams will be asked questions and/or will conduct experiments at stations as they relate to **science laboratory equipment, chemical reactions, toxins and antidotes.** **Safety goggles are required.**

COMPETITORS BRING/NEED:

- Safety goggles
- Writing utensil;
- 3-ring binder of any size with any research/reference material. The binder may contain any item, such as a book, computer generated printout, or student created paperwork. No electronic materials are allowed, such as a computer, calculator or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically (upside down) and given a light shake test no materials will fall out.

NUMBER OF PARTICIPANTS: Maximum of 2

IMPOUND: NO

THE COMPETITION:

1. This event leans heavily on elements from the [Harry Potter](#) series, a favorite of Ms. Jensen.
2. Each team will move from one station to another. There will be 5 stations that can be completed in any order even though they have numbers. Each station should take approximately the same amount of time.

Station 1: First Year Potions Class

- a. This station focuses on activities related to lab safety and laboratory equipment such as:
 - i. What is the importance of PPE in the laboratory?
 - ii. What are standard safety expectations in a laboratory?
 - iii. What are the uses of common laboratory equipment, including graduated cylinders, beakers, flasks, hot water baths, bunsen burners, mortar and pestle, pipettes, pH paper, microscopes, test tubes, well plates, gloves, goggles, aprons, eye wash stations, etc..

Station 2: Second Year Potions Class

- a. At Hogwarts, second-year students focused on a specific element of potions and brewed simple potions.
- b. This station focuses on simple chemical reactions that include Sodium Bicarbonate (baking soda), Acetic Acid (vinegar), Calcium Carbonate (egg shells), Calcium Chloride, water, and/or Ascorbic Acid (Vitamin C). Sample tasks may include:
 - i. Describing the physical and chemical properties of the compounds listed above.
 - ii. Performing simple experiments and collecting data using the compounds above
 - iii. Identifying the characteristics of a chemical change
 - iv. Writing simple chemical equations using the compounds listed above.

Station 3: Third Year Potions Class

- a. At Hogwarts, third-year students focused on "Undetectable Poisons".
- b. This station focuses on toxic plants. Students will need to be able to identify these plants from images, explain the symptoms of poisoning from these plants, and describe possible remedies/antidotes. The plants that students may be tested on are:
 - i. Wolfsbane (*aconitum sp.*)
 - ii. Jack-in-the-pulpit (*Arum maculatum*)
 - iii. Lily of the Valley (*Convallaria majalis*)
 - iv. Poison sumac (*Toxicodendron vernix*)
 - v. Poison Ivy (*Toxicodendron radicans*)
 - vi. Water Hemlock (*Cicuta maculata*)
 - vii. Tobacco (*Nicotiana tabacum*)
 - viii. Mistletoe (*Viscum album*)

Station 4: Fourth Year Potions Class

- a. At Hogwarts, fourth-year students focused on “Poison Antidotes”
- b. This station focuses on toxic animals. Students will need to be able to identify these animals from images, explain the symptoms of poisoning/envenomation from these animals, and describe possible remedies/antidotes. The animals that students may be tested on are:
 - i. Poison dart frogs (*Dendrobates sp*)
 - ii. Portuguese man o’ war (*Physalia physalis*)
 - iii. Fattail scorpion (*Androctonus australis*)
 - iv. Cone snails (Class *Conoidea*)
 - v. Cane toad (*Rhinella marina*)
 - vi. Box jellyfish (*Carukia barnesi*)
 - vii. Fire salamander (*Salamandra salamandra*)
 - viii. Olive Sea Snake (*Aipysurus laevis*)

Station 5: Fifth Year Potions Class

- a. At Hogwarts, fifth-year students focused on properly brewing potions using directions.
- b. Students will be asked to complete a lab activity following directions from the supervisor which may include:
 - i. Mixing reagents and measuring: reaction rate, production of gas, color change, development of a precipitate
 - ii. Separating mixtures
 - iii. Determination of pH

SCORING:

- 1. **High score wins.**
- 2. Each question or station will be assigned a predetermined set of points, assigned by the event supervisor **and communicated to the teams (preferably- points are identified on the test/station paperwork).**
- 3. Ties will be broken by predetermined questions.