Florida SCIENCE OLYMPIAD™

Exploring the World of Science

2016

ELEMENTARY SCIENCE OLYMPIAD RULES

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A IS FOR ANATOMY

Description: This event will consist of a written test in which the contestants will view models, slides, or pictures of the following organs in the human body: the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, major muscles, major bones of the skeleton, kidneys, bladder, and sensory organs. Both structure and function will be tested.

Number of Participants: 2

The Competition:

1. Every team will be given an answer sheet. Only one answer for each question will be accepted. Team members will move through stations answering at least 40 questions.

2. Teams should be able to identify any of the following structures and give explanations for their functions: The skin, brain, heart, lungs, stomach, liver, intestines, pancreas, major muscles, major bones in the skeleton, kidneys, bladder, and any of the sensory organs.

3. Teams are allowed to bring a 3-Ring binder, of any size, to the competition. 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 or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically, no materials will fall out.

Scoring:

1. **High score wins.**
2. At the end of the testing period, the questions and answer sheet will be collected from those teams who have not turned in their responses. Time is not a factor in scoring.
3. Test items predetermined by the event supervisors will be used as tie breakers.

BRIDGE BUILDING

Description: This event tests students' ability to build a lengthy, strong, stable, and reproducible bridge from common materials. This is an **ON SITE BUILD EVENT. Teams will be required to build during the building construction period as shown on the published schedule prior to the start of all events. Teams will test their devices later in the day.**

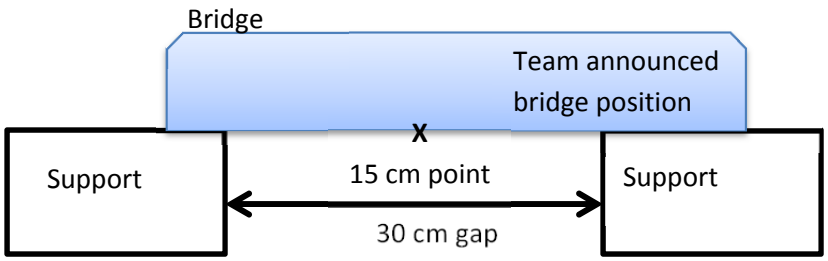
Number of Participants: 2

The Morning Construction:

1. **Teams will construct their device at the morning build time slot. All teams must be present at this time. Teams who are not present will be unable to test or build a device later in the day during the device testing time slot.**
2. Students will be given fifty plastic straws that may or may not be individually wrapped, 50 cm of masking tape, and a gallon-sized Ziploc type of bag. Masking tape width may be of any size. Students will construct a bridge that spans the **30 cm** distance while supporting a 200 gram mass placed by the students in the center of the bridge. Those bridges that survive 200 grams will then be tested again with 500 grams.
3. Teams will have 40 minutes to construct their bridge with provided materials **in the morning build time slot**.
4. Materials may be altered in any way. An example of an alteration would be that straws are crimped and slipped together.
5. Scissors will not be provided, but will be allowed. Each team must provide their own scissors. The scissors may NOT be used in the bridge's structure or as an anchor.
6. String or other materials NOT provided by the event supervisors cannot be used.
7. All teams will have access to the official set of supports to view and measure during the construction period.
8. Teams will not be provided with the masses, but the teams can bring along and use their own set of masses.
9. After construction is complete, teams will place all unused materials into the Ziploc bag and ensure the area is clean.

The Testing Time Slot:

1. Prior to testing, the mass of the unloaded bridge will be recorded.
2. The bridge will span a gap of 30 centimeters
3. The bridge will be suspended on two similar supporting structures—like two chairs or two tables.
4. The tape may NOT be used to tape the bridge to the supporting structures.
5. Teams will be given official sets of masses **which they use for testing the bridge. They cannot use the ones they brought with them for the official test.** Teams can ask to verify the mass of the official masses.
6. The teams may place their bridge at any location across the gap. The team may not adjust the bridge location after they place it and announce that it is in the final position. The teams will then be given a 200 gram mass and be told where to place the mass on the bridge so that the center of the mass is aligned with a 15 centimeter mark as measured by the gap opening and not from one end of the bridge. Teams may elect where to vertically place the mass. The mass will have a hook on it. The bridge must support the mass for 10 seconds.



7. Bridges failing this part of the test will be ranked behind all others that do not fail and will be ranked by mass of materials used.
8. For all teams that survive 200 grams, the bridges will be tested again, using a 500 gram mass. The bridge must support the mass for 10 seconds.

Scoring:

1. **Low score wins.**
2. Scores will be determined by the following criteria:
    a. Tier 1: Teams with bridges that survive 200 gram and 500 gram testing. The lightest bridge in this tier will receive the highest ranking. The mass of the bridge will be recorded as the score.
    b. Tier 2: Teams with bridges that survive 200 gram but not 500 gram testing. The lightest bridge in this tier will receive the highest ranking within this tier. The mass of the bridge will be recorded as the score.
    c. Tier 3: Teams that do not survive the 200 gram testing. The lightest bridge in this tier will receive the highest ranking within this tier. The mass of the bridge will be recorded as the score.
    d. Tier 4: Teams with bridges that cannot be tested because the bridge cannot span 30 centimeter gap or there is no place to position the mass at the 15 cm mark. The lightest bridge in this tier will receive the highest ranking within this tier. The mass of the bridge will be recorded as the score.

3. If a tiebreaker is required, the Ziploc bags will be measured. The team with the most left over construction material in the bag will receive more favorable rank.

4. If a team leaves behind trash or debris, the team will be penalized moving them into the next lower tier.

EGG DROP

Description: The objective is to have a two-person team construct and bring to the competition a package to protect an egg from breaking after being dropped in a free fall from a high spot selected by the tournament director. **This is a PRE-BUILT EVENT.**

Number of Participants: 2 **Impound: YES**

The Competition:

1. Teams will take the package to the location where the event will be run during the impound window. The mass and dimensions of the package will be measured before the egg has been added to the package. The egg will be added after the team arrives later in the day during the time in which the team is assigned to compete.

2. All loading of large, supervisor-inspected Grade A eggs will occur during the assigned competition time, not during the impound window. Teams will have 10 minutes to load the egg and be prepared to drop. Students are responsible for the egg during loading, dropping, and unloading. The student must hand the egg to the supervisor once the drop is complete. Each package should be labeled with team name and number.

3. The package size and mass limitation is to be no more than 30 cm on a side and no more than 500 grams. Glass and metal may not be used. The package must be constructed by the competitors and brought to the tournament. The package may not contain anything that would aid in the package adhering to the target.

4. The package will be dropped free fall by one student from a height determined by the tournament director and announced in the morning of the competition. There will be only one drop with a time limit of three minutes to prepare for the drop from the time the event supervisor says to begin. A plumb line may be used to measure the vertical alignment of the package to the target. When the students use the plumb line, they must keep both feet flat on the floor or a provided stepstool, and not stand or lean on the railing.

5. The package may not have anything that would aid in slowing the free fall. Examples include: parachutes, streamers, etc.

6. The drop area will be approximately 60 cm x 60 cm and made of solid material (e.g., ½" plywood, tile floor, etc.) with a target in the center of the area.

Scoring:

1. **Low score wins.**
2. Packages will be ranked in the following way:
    a. Tier 1: Eggs that do not break or show cracks will be ranked first.
    b. Tier 2: Those that break or crack will be ranked after those that do not.
3. The farthest distance of any part of the package to the center of the target will determine the score. The package with the shortest distance wins.
4. Ties will be broken by the lighter package measured without the egg.

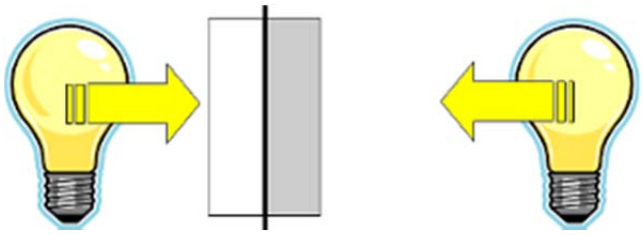
ENERGY LAB

Description: The objective is to build a reflecting device that most efficiently uses and focuses the energy supplied to a light bulb. **This is a PRE-BUILT EVENT.**

Number of Participants: 2

The Competition:

1. Teams will construct a device to reflect or transmit light from a light bulb onto a wax photometer. A wax photometer is a simple way to compare light from two sources and is made of two slabs of wax with a sheet of aluminum foil in between. When light shines on both sides, one wax block will look darker if the lighting is not balanced.



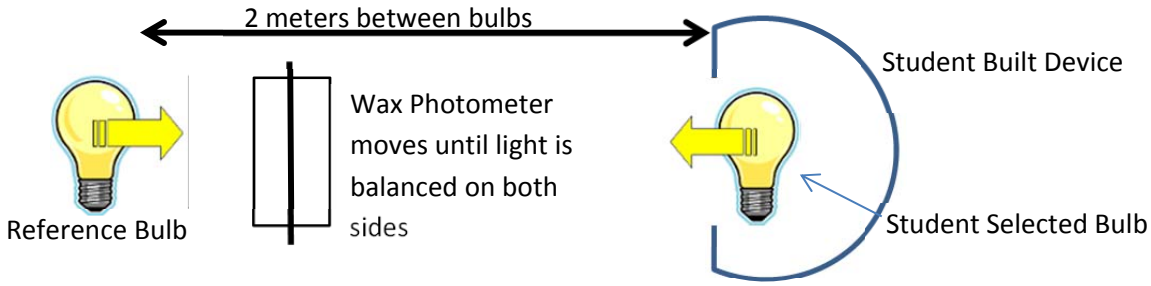
2. Teams will construct and bring a device which can be made out of the following materials: White and black paper, aluminum foil, cardboard, plastic reflectors, mirrors, lenses, clear plastic, tape, or glue. No metal is allowed other than the metal found in mirrors or aluminum foil. No sharp edges are permitted.

3. The device must be able to accommodate the various light bulbs and will be plugged into a table top free standing light socket, like shown here. The socket and light bulbs will be provided by the event supervisor. The socket height is approximately 9 cm tall.

4. There will be an event reference bulb (for example, a 60 watt bulb or 800 lumens) and then three additional bulbs from which teams can select for insertion into their device: A bulb with greater wattage, lower wattage, and the same wattage. All bulbs will be compact fluorescent light bulbs. The compact fluorescent bulbs are approximately 5" tall.

5. During the testing, no part of their constructed device may be any closer than 2 inches to any part of the light bulb. The device can be handheld or free standing, but if at any point the device is moved to closer than 2 inches from the light bulb, it will be disqualified.

6. Teams will place their device and selected light bulb on one side of a wax photometer and on the other side their selected bulb. The distance between the two light bulbs will be 2 meters. The students may move their device to achieve the best results and lighting on the wax photometer. When the team is certain their device is in the final position, the event supervisor adjust the position of the wax photometer and will examine the illumination on both sides of the wax photometer to ensure it is equivalent and then measure the distance from the light bulb the students selected to the wax photometer.



7. Participants will be asked to collect evidence and complete a journal containing charts. The journal will show the relationship between the effect of the movement of the photometer between the bulbs and the amount of light that shines on both sides. The chart should contain the following information:
    a. The position of the photometer with balanced light between two bulbs of equal wattage.
    b. The position of the photometer with balanced light between two bulbs of different wattage.
    c. An additional self-designed experiment using the photometer and light bulbs.

   The journal should be no longer than 2 pages with data.

Scoring:

The distance is measured from the student selected light bulb in the device to the wax photometer when the illumination is the same on both sides.

1. **High score wins.**
2. Devices will be ranked in the following way:
    a. Tier 1: Teams with a journal.
    b. Tier 2: Teams without a journal
3. Score will be based on formula below.
4. Ties will be broken by quality of the journal entries.

$$\textbf{Energy Points} = \frac{\textbf{(Distance from photometer to student selected light bulb)}}{\textbf{(Printed wattage of bulb selected by students)}}$$

FOOD SCIENCE

Description: This event will include hands-on activities, questions, and calculations as related to food science topics.

Number of Participants: 2

The Competition:

1. The teams will move to various stations and perform activities related to food science topics. Some of the activities may include, but are not limited to the following:
    a. Answer questions about information found on labels of processed foods. Some types of questions that may be asked are:
        - Comparison of protein, fats, complex carbohydrates and simple sugar.
        - Calculate the number of calories contained with the package using serving sizes.
        - Determine the relative amounts of ingredients in a food product.
        - Answer questions about Percent Daily Value.
    b. Determine the types of food and portions needed to maintain a healthy diet using http://www.choosemyplate.gov/ and MyPlate Meal Plans for various age groups and caloric intakes.
    c. Calculate the sugar content of cereals and fast foods (using a graph) or soft drinks (using a prepared graph and a hydrometer).
    d. Find the percentage of water, sugar, or iron in various food products.
    e. Use graphs, tables, and charts to answer questions about food.
2. Teams are allowed to bring a 3-Ring binder, of any size, to the competition. 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 or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically, no materials will fall out.

Scoring:

1. High score wins.
2. Questions will be given preassigned value amounts by the event supervisor and teams will be given on the handouts the point value assigned to each question or activity.
3. Tiebreakers will be a predetermined and announced set of questions as defined by the event supervisor.

MYSTERY PACKAGING

Description: At the beginning of the event, teams will be given a bag of building materials and instructions for designing and building a package that will protect a given material from a drop. This is an **ON SITE BUILD EVENT. Teams will be required to build during the building construction period as shown on the published schedule prior to the start of all events. Teams will test their devices later in the day.**

Number of Participants*:* 2

Event Parameters: Each student on the team may bring 1 scissors, 1 ruler, and 1 pair of pliers. No other materials, tools, notes or resources are permitted.

The Construction:

1. **Teams will construct their device at the morning build time slot. All teams must be present at this time. Teams who are not present will be unable to test or build a device later in the day during the device testing time slot.**
2. Each team will be given a bag containing the same materials. Examples of materials are: paper cups, drinking straws, paper clips, string, tape, paper, thumbtacks, and Popsicle sticks. Materials are not limited to this list. Teams may not use any outside materials, other than what is provided to them by the event supervisor.
3. The team will create a package using the given materials. An unknown material that will be loaded into the device will be announced at the start of construction. This could be either a solid or a liquid and either homogeneous or heterogeneous in composition. After the teams have constructed the package, the material will be loaded into the device. The device must be built to allow for the loading of the material after construction has been completed.
4. Teams will be allowed to examine a separate "inspection" load material of the same size and weight as used for testing but this cannot be loaded into the device during construction. Event Supervisors may use one “official” load for testing all devices.
5. The team of students will have a maximum of 25 min. to construct the specified package.

The Testing Time Slot:

1. **Teams will be given the solid or liquid that will be loaded into the device by a team member.**
2. The device's mass and load will be measured prior to drop.
3. Each team will have 1 chance to drop the package, with no trial runs allowed after construction. The package, with the "official" load material added, will be dropped from any height, **chosen by the team**, equal to or greater than 50 centimeters, as defined by the team. The height is measured from the bottom of the package to the floor **and recorded by the event supervisor**.
4. After dropping, the device's mass and load will be measured and recorded to account for any lost load.

Scoring:

Devices will be ranked according to the following rubrics:

1. **High score wins.**
2. The following formula will be used to rank the teams:

$$Points = (Drop\ Height\ - (Initial\ Drop\ Mass - Final\ Drop\ Mass))x100$$

   Drop height will be measured in centimeters
   Mass will be measured in grams
   Negative point values are allowed

3. Devices that cannot support the load will be ranked in Tier 2. These devices will be ranked by the mass of the package, with the lightest package receiving a higher score.

MYSTERY POWDERS

Description: A team of two contestants will be asked to identify a mixture of common white household powders. Safety precautions MUST be used. These include wearing safety goggles, washing hands and not taste-testing.

Number of Participants: 2

The Competition:

1. Three mixtures containing two to three powders will be placed in vials marked A, B, and C. Mixtures will include powders from the following list only: sugar, baking soda, flour, salt, corn starch, and white sand. Mixtures will ONLY contain powders selected from above list.

2. Mixture A will have two mystery powders. Mixture B will have **three mystery powders. Mixture C will contain either three or four powders. Teams will not be told how many powders are contained in Mixture C.**

3. No tasting or touching of powders will be allowed.

4. Teams will be supplied with the following materials to aid in the identification of the powders: vinegar, water, a candle, aluminum foil, a clothespin, iodine solution, magnifying lens, and black paper. A candle test **will be used and** an adult must be present at this station at all times. Students will not be allowed to bring other materials for testing.

5. Participants will be asked to **create a Powder Properties chart** describing the powders' reactions to the above materials BEFORE attending the tournament. This chart should be brought to the tournament with the participants. The chart and answer sheet will be collected at the end of the event.

6. **Teams will be given an Evidence Table on which students state which tests were used to positively identify each powder and each mixture. Teams will fill out this table writing down the evidence used to make their determination.**

7. Safety precautions MUST be used. Students must bring and WEAR their own splash-proof safety goggles. Long hair must also be tied back or secured.

Scoring:

1. **High score wins.**
2. Points will be awarded as assigned on Evidence Table below.
3. **Ties will be broken by examining the quality of the Powders Property Chart. Students who do not provide a Powders Property Chart will be scored in a Tier 2, behind all teams that provide this chart.**

Evidence Table

	Mixture A	Mixture B	Mixture C
	2 powders	**3 powders**	**3-4 powders**
Which powders are in the mixture?	4 points	6 points	6-8 points
Which tools were used to determine powder 1?	2	2	2
Evidence to determine powder 1.	2	2	2
Which tools were used to determine powder 2?	2	2	2
Evidence to determine powder 2.	2	2	2
Which tools were used to determine powder 3?		2	2
Evidence to determine powder 3.		2	2
Which tools were used to determine powder 4?			2
Evidence to determine powder 4.			2

PICTURE THIS – The Weather

Description: The objective is to have a team member draw a representation of a particular weather-related term or concept for team members who must guess the term while watching it being drawn.

Number of Participants: Up to 3

The Competition:

1. Each round shall run 5 minutes. There will be a maximum of **30** words **provided to each team**. All teams will use the same words in the same order.
2. At the start of the competition one team member, hereafter called the sketcher, will be selected to draw the **weather-related** term. No other team member may see the term. The other team members will try to identify the term being drawn.
3. When instructed by the moderator, the sketcher will begin by drawing pictures and visual clues on materials provided by officials. Sketches will be done ON PAPER (not chalkboard) for later documentation, if necessary.
4. The sketcher may not speak except to notify the judge that the team wishes to pass that particular term. When a pass occurs, the judge will give the next sketcher a new term. The team may not go back to any passed terms.
5. Letters of any alphabet or numbers of any kind are not allowed. (It is the intent of this rule to prevent teams from inventing alphabets, codes, etc.) The following are acceptable symbols: to shorten word -; to lengthen word +; (e.g. refract with a + to get "refraction," etc.).
6. Sketchers may not give visual clues except to acknowledge a desired response from team members. If the **weather-related** term consists of two or more words the sketcher may write down any of the word(s) only after the word(s) has been correctly identified by the team members. The number of words may be represented with pluses (+)
7. If a team violates any of the rules regarding the use of alphabets, numbers, verbal communication, etc. the team will be penalized 1 correct term **for each letter or number used**, in addition to the term in play at the time of the violation. (The score will be adjusted by subtracting the l-point penalty from the total score.)
8. The event judge will indicate when a correct response is given. Forms of the word will not be accepted with the exception of plurals and singulars, which will be accepted interchangeably. **After the judge indicates it was a correct response**, the team will be given a new term.
9. **At any time, a team may rotate a sketcher. However, time will not stop when the change is taking place.**
10. Play continues in this manner for five minutes or until the team has gone through their set of terms.
11. **Weather terms used in the event will be obtained from the National Weather Service official glossary found at http://w1.weather.gov/glossary/ . No abbreviations or acronyms will be selected.**

Scoring:

1. **High score wins.**
2. Teams will receive 2 points for each correct term.
3. Teams will be penalized 1 point for each communication violation **as stated in rule 7.**
4. **In the event of a tie, teams with the greatest number of consecutive correct terms (at any point during the round) will receive more favorable rank.**
5. **A second tie breaker will be determined with the least amount of passes, with the team with the fewest passes receiving the more favorable rank.**
6. **Negative scores are permitted.**

ROCK HOUND

Description: Students will prepare charts and drawings to assist in identifying various rocks and minerals and describing their characteristics.

Number of Participants: 2

The Competition:

1. Teams are allowed to bring a 3-ring binder, of any size, to the competition. The binder may contain any item, such as a book, computer generated printout, or student created paperwork. No electronic devices are allowed, such as a computer or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically, no materials will fall out.

2. Teams will identify as many rocks and minerals as possible from a selected group. The list of rocks and minerals will come from the following list:

ROCKS:	basalt	bituminous coal	conglomerate	gneiss
	granite	limestone (fossil)	marble	obsidian
	pumice	quartzite	sandstone	schist (garnet)
	scoria	shale	slate	limestone (chemical)
MINERALS:	calcite	copper	feldspar (pink)	fluorite
	galena	graphite	gypsum-satin-spar	halite
	hematite	mica-biotite	pyrite	kaolinite
	quartz (chert)	quartz (crystal)	talc	

3. Teams will also be asked questions about the rocks or minerals, such as their color, luster, streak, density (relative heaviness per volume), relative hardness (using Moh's scale), reaction to vinegar, shape, texture, cleavage, magnetic properties, commercial uses, ones mined in Florida, etc. Students may be asked to use Moh's scale of hardness to defend which materials in a list would weather faster.

Scoring:

1. **High score wins.**
2. Each rock or mineral identified and each question answered correctly will count one (1) point. The team with the highest total score will be the winner.
3. Ties will be broken with pre-determined tie-breaker questions.

SOLID, LIQUID, OR GAS

Description: Teams will identify various substances as solids, liquids, or gases and then answer questions that relate to molecular motion and the properties of various substances.

Number of Participants: 2

The Competition:

1. Teams are allowed to bring a 3-Ring binder, of any size, to the competition. 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 or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically, no materials will fall out.

2. Each team will move from one station to another. There will be no more than 20 stations.

3. The stations will have pictures, models, or real objects for teams to identify as solid, liquid, or gas.

4. Teams will be asked questions at each station that will include content based on the following:
    a. Comparing the number and motion of molecules
    b. Describe the distance between molecules
    c. Describe differences in volume and shape between solids, liquids, and gases.
    d. Properties of the substance if the object were in a different state than presented.
    e. Common uses of the substance or object.
    f. Sources of the substance or object.

Scoring:

1. **High score wins.**
2. Each question answered correctly will count one (1) point. The team with the highest total score will be the winner.
3. Ties will be broken with pre-determined tie-breaker questions.

STARRY, STARRY NIGHT

Description: Teams will answer general questions about astronomy based on a set of given topics.

Number of Participants: 2

The Competition:

1. Teams are allowed to bring a 3-Ring binder, of any size, to the competition. 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 or smartphone. All materials must be securely bound inside the binder, so that when it is opened vertically, no materials will fall out.
2. This event will test the teams' knowledge of astronomy in two parts.

Part I. The teams will view slides and/or photographs and identify the following celestial objects:

1. Constellations (see list of constellations- at least 5 will be on the test)
2. The Sun and Stars (see list of stars- at least 5 will be on the test)
3. Planets (at least 3 will be on the test)
4. Moon and/or any of its phases
5. Total and partial eclipses of the Sun and Moon
6. Spiral galaxy, a nebula, a star cluster, and a comet

CONSTELLATIONS AND *THEIR STARS OR STAR CLUSTERS*

Aquila	*Altair*	**Cygnus**	*Deneb*	**Pegasus**	
Bootes	*Arcturus*	**Draco**		**Scorpio**	*Antares*
Canis Major	*Sirius*	**Gemini**	*Castor, Pollux*	**Taurus**	*Aldebaran, Pleiades*
Canis Minor	*Procyon*	**Leo**	*Regulus*	**Ursa Major**	*Merak, Dubbe*
Cassiopeia		**Lyra**	*Vega*	**Ursa Minor**	*Polaris*
Cepheus		**Orion**	*Betelgeuse, Rigel*	**Virgo**	*Spica*

Part II. This section will consist of a series of written questions about any of the following astronomical facts and concepts. **Sample activities may include:**

1. Distinguish between the motions of rotation and revolution.
2. State the effects produced by rotation and revolution of the earth.
3. Demonstrate knowledge about units of time (day, month, year) and their astronomical basis.
4. Arrange a group of bodies according to their relative sizes from largest to smallest.
5. Arrange a group of objects according to their distance from either the sun or the earth.
6. Demonstrate knowledge about the seasons on the earth and their causes.
7. Be able to name and identify the phases of the moon and state the factors that produce them.
8. Demonstrate knowledge about the members of the solar system.
9. Demonstrate knowledge about solar and lunar eclipses and the conditions that produce them.

Scoring:

1. **High score wins.**
2. Each question answered correctly will count one (1) point. The team with the highest total score will be the winner.
3. Ties will be broken with pre-determined tie-breaker questions.

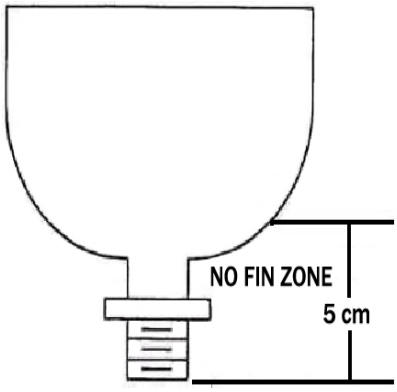
WATER ROCKETS

Description: Prior to the competition, teams will build a rocket propelled by air pressure and water out of a 2-liter plastic soda bottle. Alterations should be made to the rocket to help it stay aloft. The rocket that stays in the air for the longest time will win. **This is a PRE-BUILT EVENT.**

Number of Participants: 2 **Impound:** YES

Construction:

1. Water rockets will be impounded at the competition location during the impound window. Teams will have rockets in a box labeled with team names and team number. Repair kits are not impounded. The rocket must also have the team number printed on it using permanent marker.
2. The rocket fuselage/body must be made from a single **clear, traditional** plastic 2-liter soda bottle used to hold water and air pressure that propels the rocket when released.
3. **The 2 liter bottle must have a neck/nozzle opening internal diameter of approximately 2.2 cm. Some water bottles have different diameters and heights and they cannot be accommodated on the launcher. Some also have extended necks, making it impossible to attach to the launcher.**
4. The bottle itself must not be altered in any way (e.g. holes, scratches, increasing the volume, restricting the bottle's opening). A safety check will be done to make sure that the bottle has not had any structural alterations due to physical, thermal, or chemical changes.
5. The rocket must not contain or be subject to any of the following: metal, commercial model rocket parts including the parachute, explosives, gases (except air), electronic devices, elastic, throwing, remote control, chemical or pyrotechnics, super glue (cynacrylate), or high temperature hot glue.
6. Fins, parachutes, and other items may be added to the outside of the bottle to increase the time aloft. Adhesives that may be used to attach components to the bottle are limited to tape and glue (only silicone, polyurethane-based, or others that do not damage the structural integrity of the bottle).
7. All parts and any changes must be 5 cm above the level of the bottle's opening.
8. Nose of the rocket must be rounded or blunt (min. 2.5 centimeters) at the tip.
9. The fully assembled rocket must not exceed 22" tall and 11" wide, not including the parachute.
10. Energy to propel the rocket must come only from the water and air pressure in the bottle. Other sources of potential or kinetic energy are not allowed.
11. Only plain tap water may be used in the rocket. No other material of any type may be put in the bottle or added to the water. A water level line may be marked on the bottle to aid in adding water.
12. Parts of the rocket may deploy during flight, but they must remain attached together by a string/lanyard.



The Competition:

1. Teams may bring repair kits containing tools, spare parts, and extra parachutes. Any parts found to be dangerous (ex. glass or metal), illegal (ex. commercially made rocket parts), or that prevent a rocket from fitting on the launch pad must be removed before the rocket can be launched. Rockets that are changed to meet the construction requirements will not be penalized as long as this occurs before the close of the impound window. Rockets deemed unsafe according to the event supervisor's judgment will not be launched.
2. Two launches will be allowed. Different rockets may be used for each launch. Teams must use the water, launch pad, and source of pressure provided by the event supervisors. The team will add the desired amount

of water to the rocket before each flight and may make alterations or repairs to rockets between launches. Outside assistance/coaching from the sidelines is not permitted.

3. The event supervisors will supervise the pressurization of the rocket to 60 psi and the launching of it. Students must not begin any action without explicit direction of the event supervisor. Anyone within 10 meters of a pressurized rocket must wear eye protection. Contestants may not hold their rocket during pressurization. Only the coaches should pressurize the rocket during practices.
4. Once a rocket has been pressurized it must be launched, In case of high winds, the supervisors will launch the rocket as quickly as possible. It will be the supervisors' decision whether the flight should be considered as unofficial due to the weather conditions.
5. Timing begins when the rocket separates from the launcher.
6. Timing ends when any part of the rocket touches the ground, rests on an obstruction, or goes out of sight.

Scoring:

1. **High score wins based on longest time aloft.**
2. Scores will be determined for the rocket by taking the average of the two event supervisors' times for the duration of the rocket's flight.
3. The watches will be started simultaneously to the launch and stopped when the rocket touches the ground or any object in contact with the ground, trees, etc.
4. Flights of rockets whose parts do not remain attached together during the entire flight, or that cannot be changed to meet the construction requirements, will be ranked **in Tier 2 and then** by their time aloft, behind all flights of rockets without construction violations and whose parts remain attached.
5. Teams whose rockets cannot be launched for any reason will receive participation points only.
6. Ties will be broken using the team's lesser flight times. Teams with two flights will win ties over teams with only one flight.

WHO WANTS TO BE A BIOLOGIST?

Description: Teams will compete in three game show style events that will focus on various aspects of biology and life science.

Number of Participants: 2

The Competition:

1. A Game Show format is used with concepts from Biology. Teams will participate in a series of mini-game show competitions that will include the following:
    a. Concentration – find the matching cards. The cards will contain organisms that are to be matched to the environment in which they live. For example, a matching card set might be a cheetah and a picture of a Savannah. The cards will contain both the name and the picture of the organism and the environment. There will be a minimum of 12 sets of organisms-environments cards.
    b. Card Sort – given a set of cards, teams will create a food web. The cards will contain both the name and the picture of the organisms and will contain a set of cards with arrows. There will be a minimum of three food webs to solve.
    c. Crossword Puzzle – teams will fill out a crossword puzzle using content from evolution and adaptation standards. There will be a minimum of 20 clues to solve.
2. Content on the game show events will focus on these Next Generation Science Standards:
    a. LS2.A: The food of almost any animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants, while decomposers restore some materials back to the soil.
    b. LS2.C: When the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.
    c. LS3.A, LS3.B: Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.
    d. LS4.C: Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.
3. Teams are allowed to bring a 3-Ring binder, of any size, to the competition. 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 or smartphone that can connect to the internet. All materials must be securely bound inside the binder, so that when it is opened vertically, no materials will fall out.
4. Teams are allowed to have calculators.

Scoring:

1. **High score wins.**
2. Teams will be awarded points based game show event.
3. Ties will be broken with predetermined tie-breaker questions.

SUPPLY LIST

This supply list is provided for planning purposes. When this list conflicts with the official rules, the rules always take precedence. Teams must provide safety equipment (goggles, aprons) for those events in which it is required. A team will not be allowed to participate if the team does not have the proper safety equipment.

Event	Team List	Event Supervisor List
A is for Anatomy	• 3 Ring Binder, any size with reference materials • Pen or pencil	• Test • Answer Sheet • Models or Pictures
Bridge Building	• Scissors, up to 2 • Optional 200 g and 500 g mass • Impact goggles	• 50 plastic straws • 50 cm masking tape • 1 Gallon sized Ziploc bag • 200 gram mass with hook • 500 gram mass with hook • 2 support structures (i.e. tables) • Scale or balance to measure 500g+/-.1 gram • Tape measure, cm • Calculator • Stopwatch
Egg Drop	• Egg Drop Package • Plumb line	• 1 Large Grade A Egg • Stopwatch • Scale or balance to measure 500g+/-.1 gram • 2 Tape measures, cm • Calculator • Paper Towels • Tarp • Tarp or plastic drop cloth
Energy Lab	• Light Capture Device • Journal with 3 graphs or sets of data, no longer than 2 pages.	• Wax photometer • 2 light sockets • At least 3 different light output CFL light bulbs that are spherical and frosted (not flood or flat tops). Two of the light bulbs must be identical. • Power strip • Extension Cord • Ruler • Tape Measure, cm
Food Science	• 3 Ring Binder • Pen or pencil	• Test • Answer sheet • Models, pictures, or other materials as determined by the event supervisor.

Event	Team List	Event Supervisor List
Mystery Package	• 1 Pair of Scissors • 1 Ruler • 1 Pair of Pliers	• Ziplock back with a set of supplies – could be straws, paper, tape, cardboard, foam, etc. • Mystery material for dropping. • Separate duplicate mystery material, 1 for each team. • Tape measure • Stopwatch • Scale or balance, at least 500 g +/-0.1g

Mystery Powders	• Goggles
	• Aprons
	• Power Properties Chart
	• Pen or pencil
		• Small containers for the powders that contain:
		Three of these:
		  • Sugar
		  • Baking Soda
		  • Salt
		  • Corn starch
		  • White Sand
		  • Mixture A contains 2 powders
		  • Mixture B contains 3 powders
		  • Mixture C contains 3-4 powders
		• Evidence Table Handout
		• Test Sheet
		• Answer Sheet
		• Magnifying Glass
		• Vinegar
		• Water
		• Droppers
		• Candle
		• Matches
		• Aluminum foil
		• Clothes pin
		• Iodine solution, diluted
		• Black paper

Picture This	• None needed	• 30 terms on index cards • Markers or crayons • Paper, 8.5"x11" minimum • Stopwatches
Rock Hound	• 3 Ring Binder • Pen or pencil	• Rocks (as defined in the rules) • Test • Answer Sheet • Calculator
Solid, Liquid, or Gas	• 3 Ring Binder • Pen or pencil	• Test • Answer sheet • Calculator • Models or pictures of SLG
Starry Starry Night	• 3 Ring Binder • Pen or Pencil	• Test • Answer sheet • Calculator

Event	Team List	Event Supervisor List
Water Rockets	• Up to 2 prebuilt 2-L Bottle Water Rocket • Box • Repair Kits • Graduated Cylinder • Goggles	• Launcher • Air pump with pressure gauge • Extension Cord • Bucket • Water • Funnel • Stopwatches
Who Wants To Be A Biologist	• 3 Ring Binder • Pen or Pencil • Calculators	• Concentration cards with at least 12 matching sets • Card sort of a food web with at least 3 food webs to solve. Includes name and picture of organism and a set of arrows. • Crossword Puzzle with 20 clues • Calculator • Answer Sheet