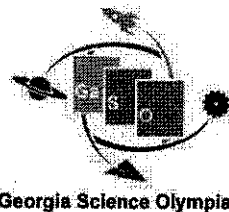


# Backyard Biologist



## Description:

Teams will be assessed on their knowledge of living organisms that they may encounter in their own backyard. In 2018, the focus will be on trees, plants, and birds. Teams will be required to identify organisms from a provided list and know about the habitat and conditions required for growth of the organisms.

## Number of Participants: 2

## Approximate Time: 45 minutes

## Materials:

1. Each team may bring up to 2 commercially produced field guides and/or 2 – 3-ring binders with pages in any form from any source. (This means 2 guides, or 2 binders or a guide and a binder.) No Actual specimens –plant or animal - are allowed in the binders.
2. Teams may also bring up to two hand lenses.

## The Competition:

1. This event will be run as stations that the students rotate through. Stations may include but are not limited to drawings, scenarios, leaves, photographs, specimens and songs.
2. Plants and trees
  - a. Structure and function of roots, stems, leaves and flower parts
  - b. Stages of the life cycle of seed plants.
  - c. Concepts of gravitropism, phototropism, thigmotropism and hydrotropism.
3. Horticulture
  - a. Basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soils and how these determine the ability of soils to support the growth and survival of many plants.
  - b. Identify what is needed to grow a successful garden and harvest food to eat.
4. Birds
  - a. Basic characteristics and description of habitat
  - b. Eating habits and life cycles.
  - c. Importance to the ecosystem and impact on humans or human activities

## Scoring:

The score will be based on the following:

- Points awarded for the accuracy of responses. Students are not required to provide scientific names of specimens. Common names are appropriate. Ties will be broken by responses to pre-selected questions chosen by the event leader.

**Common Birds**

Identify Songs, Calls &amp; Coloring

- American Crow
- American Goldfinch
- American Robin
- Barn Swallow
- Blue Jay
- Brown Thrasher
- Carolina Chickadee
- Carolina Wren
- Chipping Sparrow
- Common Grackle
- Downy Woodpecker
- Eastern Bluebird
- Eastern Phoebe
- Eastern Towhee
- European Starling
- House Finch
- House Sparrow
- House Wren
- Mourning Dove
- Northern Cardinal
- Northern Flicker
- Northern Mockingbird
- Red-bellied Woodpecker
- Ruby-throated Hummingbird
- Song Sparrow
- Tufted Titmouse
- White-breasted Nuthatch
- White-throated Sparrow

**Common Trees**

Identify leaves, bark and seeds

- American Elder
- American Elm
- American Sycamore
- Black Cherry
- Black Willow
- Blackgum
- Eastern Red Cedar
- Flowering Dogwood
- Green Ash
- Loblolly Pine
- Post Oak
- Red Hickory
- Red Maple
- Red Mulberry
- River Birch
- Sweetgum
- Water Oak
- White Basswood
- White Oak
- Yellow-Poplar

**Bushes, Vines & Flowers**

Identify leaves, bark and seeds

- Azalea
- Butterfly Weed
- Trumpet Creeper
- Carolina Lily
- Carolina Rose
- Catawba Rhododendron
- Daisy Fleabane
- Eastern Poison Ivy
- English Ivy
- Kudzu
- Pink Lady's Slipper
- Scuppernong Grape
- Strawberry
- Sunflower
- Venus Fly Trap

# BARGE BUILDING

## Description:

The purpose of this event is to construct a barge using aluminum foil that can support a cargo of the largest number of objects without getting them wet.

Number of Participants: 2

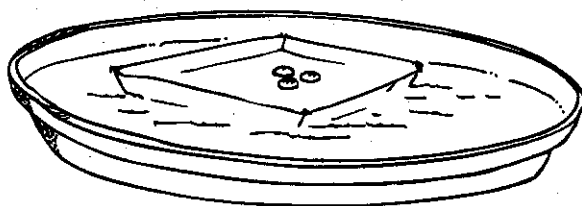
Approximate Time: 20 minutes

## The Competition:

1. Each team of two persons will be given a 15 x 15 cm piece of aluminum foil by the event supervisor. Each team will then be given 10 minutes to construct their barges and turn them into the supervisor. No other materials may be used in building the barge.
2. Each team will then be given 5 minutes to load their barges.
3. The event supervisor will inform each team of the average mass of each cargo piece before they begin their construction. The cargo may be pennies, washers, paper clips, marbles, or other similar objects. The cargo will not be known until the time of competition.
4. The student barge captain and his partner must predict the number of pieces of cargo that the barge will hold. The barge must then be loaded until it sinks. The piece that caused the barge to sink will not count in the total cargo. Sinking occurs when water enters the barge.
5. The event supervisor will provide the barge captain with the cargo to be loaded. Each piece must be loaded one at a time while the barge is floating in a pan of water.

## Scoring:

The winner will be the team with the highest score. The score will be determined by the following formula: Amount of cargo held x 10 - the difference between predicted amount and actual amount. For example: if the team predicts their barge will hold 70 pieces and it sinks at 57, their score will be  $57 \times 10$  minus the difference between 70 & 57 which is  $(570 - 13 = 557)$  points. Ties will be broken by accuracy of the prediction. If the judges determine that a contestant intentionally sinks his boat at or near the predicted number, that team will be disqualified and receive participation points only.



# BRIDGE BUILDING

## Description:

This event tests a students' ability to build a lengthy, strong, stable, and reproducible suspension bridge from common materials.

Number of Participants: 2

Approximate Time: 45 minutes

## The Competition:

1. Students will be given (at the Science Olympiad site) fifty plastic straws and a length of masking tape. They are to construct a suspension bridge that spans the greatest possible distance and be able to support at least one chalkboard eraser placed (by the judge) in the center of and at a right angle to the bridge.
2. The bridge must support the eraser for 10 seconds.
3. No string or other materials may be used.
4. The bridge will be suspended on two similar supporting structures -- like two chairs or tables.
5. No straws may touch the floor or other supporting structures.
6. Straws may be crimped and slipped together.

## Scoring:

1. The bridge spanning the greatest distance supporting the eraser for 10 seconds will be declared the winner.
2. In the event of a tie, additional chalkboard erasers will be added until the strongest bridge is determined.



# CRIME BUSTERS

## Description:

Participants use tests to identify unknown powders, match fingerprints and use paper chromatography to identify a note found at a crime scene.

Number of Participants: 2

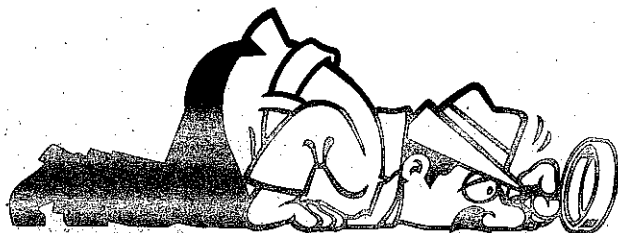
Approximate Time: 60 minutes

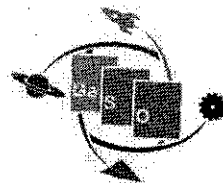
## The Competition:

1. The powders used will come from the following list: salt, granulated sugar, Plaster of Paris, salt, flour, cornstarch, baking soda, limestone and sand.
2. Each team will be given seven vials each containing one substance and two vials containing a mixture of two substances. Teams will be supplied with the following materials to aid in the identification of the powders: water, 1M hydrochloric acid (or vinegar), iodine solution (KI3), a magnifying glass, and several plastic cups. Students will be provided with a list of the possible powders.
3. Touching, tasting or feeling of the substances is not allowed.
4. Students must bring and wear their own chemical splash-proof goggles and a lab apron or coat.
5. Students will be given a set of fingerprints from several suspects. They will be asked to match the fingerprints found at the scene.
6. Students will be asked to make a chromatogram from a pen and use this to help identify the criminals. Chromatograms will be turned in with the test sheet.
7. After all the evidence is collected the students will be asked to identify who committed the crime and why they believe this is the criminal.

## Scoring:

The score will be based on the following formula: Identification of powders - 50%, chromatography - 15%, fingerprints - 10%, and identification of the criminals 25%.





# Data Crunchers

## Description:

Teams will demonstrate their understanding of metric measurement by estimating and measuring length (meter), mass (gram), fluid volume (liter), angles, and temperature (Celsius). Teams should also be able to create and interpret data tables, bar graphs, line graphs, pie charts, and pictographs and make basic calculations that include time, money, fractions and percentage.

**Number of Participants:** 2

**Approximate Time:** 45 minutes

**Materials:** None

## The Competition:

1. This event will be run as stations that the students rotate through. Stations may include but are not limited to questions involving the use of rulers, calculators, protractors, meter tapes, meter sticks, balances, beakers, graduated cylinders, thermometers, objects to measure and various types of graphs to be analyzed. Stations may assess any or all of the following topics:
  - a. Estimate or measure the angle degree, mass, volume, length, area, or temperature of various objects in metric units to the precision requested.
  - b. Understand relative scale of metric units and which is appropriate for measurement (mg, g, kg, mm, cm, m, km, mL, L, kL, °C, °K, cm<sup>2</sup>, cm<sup>3</sup>) in different scenarios.
  - c. Collect data (e.g. number of water drops various coins can hold) and represent that data in a correctly labeled graph or data table.
  - d. Plot data points, make and interpret data tables, draw and interpret graphs, including what trends can be predicted from the data shown.
  - e. Make estimates of data between or beyond the data points given.
  - f. Draw and identify lines and angles, and classify shapes by properties of their lines and angles.
  - g. Calculate the amount of time between two events (No time zone calculations).
  - h. Calculate fractions or percentages based on charts, tables or data.
  - i. Solve word problems that involve the use of money.

## Scoring:

The score will be based on the following:

- Points awarded for the accuracy of responses. Ties will be broken by responses to pre-selected questions chosen by the event leader or time.

# DEEP BLUE SEA

## Description:

This event will test students' knowledge about oceanography.

Number of Participants: 2

Approximate Time: 20 minutes

## The Competition:

On Part I the contestants will view pictures and/or slides and answer questions relating to identifying members of the following areas:

- Ocean flora (algae, kelp, etc.)
- Ocean fauna (mammals, mollusks, etc.)
- Ocean vessels and equipment used in exploring (diving bells, submersibles, diving gear, etc.)

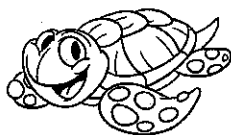
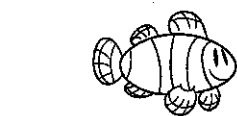
On Part II the contestants will respond to a series of questions relating to the following topics:

- Physical features (trenches, seamounts, etc.)
- Phenomena (tidal waves, currents, etc.)
- Geography (location and identification of oceans, seas, major bays, etc.)
- Vocabulary (relating to any of the above topics)

1. Each team will be given one test packet and one answer sheet. Team members may consult with each other by writing or whispering. Only one answer for each question will be accepted.
2. At the end of the testing period the test packet and answer sheets will be collected from those teams who have not turned in their responses.

## Scoring:

The team earning the highest score will be declared the winner. Two tiebreaker questions will be included.



# DISEASE DETECTIVES

## Description:

Epidemiology uses science to study disease, injury, health, and disability in communities. This study involves: reasoning skills, such as those used by "disease detectives;" comparison of risks (the chances of becoming sick or injured); and surveys to help describe different groups of people (for example, kids in school classes and people in neighborhoods). The goal of the Disease Detectives event is to have students understand connections between things they may encounter in daily life and various health problems that affect communities, risks for disease/injury, and opportunities for prevention. The event will also help students to understand general categories of causes of diseases and injuries.

**Number of Participants:** 1 or 2

**Approximate Time:** 50 minutes

## The Competition:

1. The contestant or team (if 2) will move to different stations. Each station has an object, which may present a risk or prevention opportunity for disease or injury.
2. At each station, participants will perform various activities, such as:
  - a. identifying and writing the disease or injury problem related to the object at the station.
  - b. describing how the object might be used or modified to prevent the disease or injury problem in populations.
  - c. identifying and describing routes of transmission of disease
  - d. using simple calculations (e.g. addition and subtraction) to make comparisons or risk for different groups of people.
  - e. interpreting a table or graph presenting data related to diseases or injuries.

## Sample Problems:

Stations might include examples of an improper cooking techniques as a risk factor for food-borne infectious disease, a bicycle helmet as a preventive measure for injury, fatty foods as a risk for heart disease, a tobacco product as a risk factor for lung cancer, or a bar of hand soap representing effective prevention of person-to-person spread of infectious disease. The last station might include data for students who visit the zoo on a field trip: of 25 students who visited, 12 petted the lizard; of these, 8 became ill. Of the 13 students who did not pet the lizard, only one became ill. How would you present the risk of illness from petting the lizard? Students might compute risks (e.g.  $8/12$  vs.  $1/13$ ) or draw graphs to illustrate the comparison of risk.

## Scoring:

Responses for each station with a commonly found item could include identification of the possible risk of use or exposure to the item and a possible means for prevention. Each identification station is worth 2 points (1 point for identification of the health problem, 1 point for description prevention). The final data station is worth 2 points (1 point for an appropriate risk comparison, 1 point for an appropriate written explanation).





# GRAB A GRAM

## Description:

Teams will cooperate to pick up fifty (50) grams of two different sets of material. There will be two rounds using different substances (preferably different densities) in each round.

Number of Participants: 2

Approximate Time: 60 minutes

## The Competition:

Each team member must pick up some of the given material and place it in the provided container for delivery to the judges for massing. This must occur during both rounds of the competition. The material could be sand, paper clips, cereal, packing peanuts, beans, rice, etc.

## Scoring:

1. The total mass of the sample (mass of the substance plus the container) from each team becomes its score if the mass is 50 or under. Samples will be massed to the nearest tenth of a gram. Those samples over fifty grams will have that amount over 50 subtracted from 50. The lowest possible score per round is "0", so if a team is more than 50+, they will not have a minus score.
2. The two team scores will be combined to determine a winner. A perfect score at the end of two rounds would be 100.
3. In the unlikely event of a tie, the team with the best single score could be declared winner.

## Sample Scores:

Masses between 1-50 equal that number (e.g., 37 = 37)

Masses over 50 are subtracted from 50, so 62 = 38 (50-12)

Masses over 100 = 0 (as 102 is 52 over 50, which would equal -2, except a negative score is not allowed).



# MYSTERY ARCHITECTURE

## Description:

This event is designed to test the student's ability to think on their feet. They will be given a bag of materials to build a freestanding tower as high as they can. The tower should be constructed to support a tennis ball at its top.

**Number of Participants:** 2

**Approximate Time:** 30 minutes

## The Competition:

1. Each team of two students will be given a bag of building materials. All teams will receive exactly the same materials. The materials might include: straight pins, paper cups, drinking straws, paper clips, tape, string, paper, etc. (This list is only an example; the actual materials may be anything that the supervisors feel are appropriate).
  2. Each team will have a maximum time of 20 minutes to construct a tower to support the tennis ball at its highest point. The top of the tennis ball must be higher than any part of the structure.
  3. Only those materials supplied in the bag, and the bag itself, may be used to construct the tower. No other materials or adhesives may be part of the finished tower. Students may bring scissors, a ruler and a pair of pliers, which they will provide, to use as tools while building the tower. Each team may bring their own tennis ball to use while building their tower, however, all towers will be measured using the same tennis ball (regulation size and weight) provided by the event supervisor.
  4. The students are to inform the judges when they finish their tower. They will place the tennis ball provided by the event supervisor on the top of their tower. The tower must remain standing long enough for the height and base to be measured.
  5. The tower must be completely free standing. It cannot be attached to the tabletop, floor, wall or ceiling.
  6. No coaching of the students will be allowed during the competition.
- Remember, we are assessing the student's ability to think on their feet.

## Scoring:

1. The height of the tower and the width of its base will be measured as precisely as possible by the judges. Since no building materials are to extend above it, the top of the tennis ball will be considered the highest point of the tower. The width of the tower will be measured at its base. The largest diameter of the base will be recorded.
2. All towers that support the tennis ball will be ranked above those that do not. The towers in each of these groups will be ranked according to their height. Tallest tower first, the shortest tower last.
3. In the event of a tie, the winner will be the tower with the smallest base measurement.

Note: supervisors should determine the acceptable measurement with the same equipment that is available to students.



# NO BONES ABOUT IT

## Description:

A team of two (2) students will identify bones and pictures of bones at stations throughout the room. They will also be required to answer questions found on cards at the stations pertaining to bones. Only the SCIENTIFIC NAMES of the bones will be accepted as correct!

Number of Participants: 2

Approximate Time: 30 minutes

## The Competition:

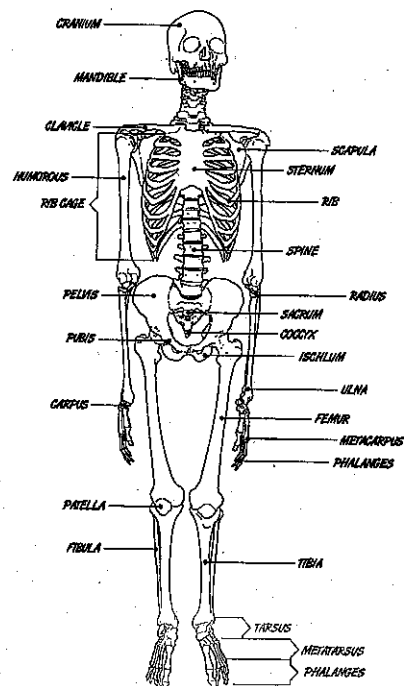
Stations will be set up in the room with provided bones and pictures of bones (HUMAN AND ANIMAL). The two participants will move from station to station with all the other teams only on the direct command of the testing official. (There will be 30 seconds at each station.) The team will be asked to record answers to the questions found at various stations on the provided answer sheet. Questions will relate to the identity of the bones or picture of the bones and also MAY include questions on orientation, articulation, number of this type in the human body, function, type of joint, range of motion, etc.

## Scoring:

There will be 25 stations, with 2 questions per station. Each question will be worth 2 points, for a total of 100 points. The team with the highest point total will be the winner. In case of a tie the team with the answers spelled correctly will place ABOVE the team with the incorrect spelling.

SAMPLE QUESTIONS: (Answer in CAPS)

1. A. Identify this bone:  
TIBIA  
B. Location of this bone:  
RIGHT LOWER LEG
2. A. Identify this bone:  
MANDIBLE  
B. Function of this bone:  
ITS MOVEMENT, CHEWS & GRINDS FOOD
3. A. Identify this bone:  
SCAPULA  
B. How many of these bones are in the human body?  
TWO
4. A. Name the bone that is colored in red on this picture  
HUMERUS  
B. How tall would you estimate this animal is?  
20-40 CM
5. A. Is this skull an example of a predator or a prey?  
IF EYES ARE FACING FORWARD=PREDATOR



# PAPER ROCKETS

## Description:

Each team will build and fly a paper rocket using materials, which will be provided.

**Number of Participants:** 2

**Approximate Time:** 45 minutes

## The Competition:

The team will have 20 minutes to build a rocket and practice launching it. This will be followed by the official launching. The winner will be the team closest to the target. The following materials will be provided:

- Large plastic soda straws (the kind used in fast food restaurants). One per student.
- Sharpened pencils (same size as straws). One per student.
- Paper (8.5 x 11). Two sheets per team.
- Cellophane tape. One roll per team.
- Scissors - one per team.
- A ruler - one per team.

1. Cut a strip of paper about 8.5 inches long and 1 to 2 inches wide.
2. Roll the paper strip around the pencil lengthwise to form a tube. Tape the paper so that the tube slides easily off the pencil but is not too loose.
3. Make several pointed cuts at one end of tube. See Figure A.
4. Slide the sharpened end of the pencil toward the pointed cuts. Fold the points around the sharpened end of the pencil and tape to form the nose cone. DO NOT TAPE THE PAPER TO THE PENCIL. See Figure B.

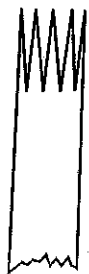


Fig. A

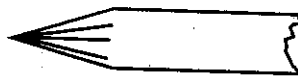
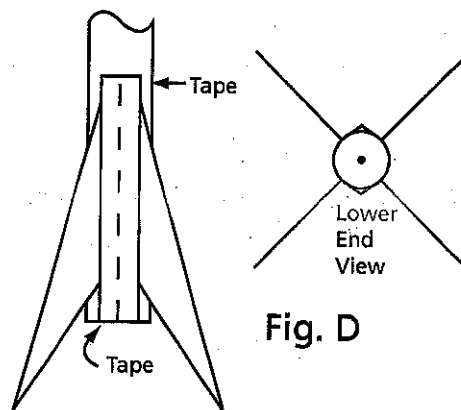
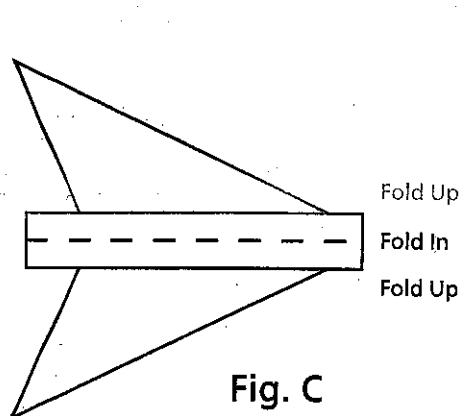
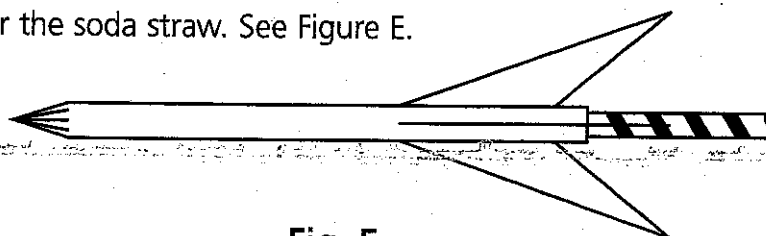


Fig. B

5. Cut out two sets of fins. Use the pattern in Figure C. Fold the fins on the dashed lines in the manner shown in Figure C.
6. Using two pieces of tape, fix the fins to the opposite end of the tube from the nose cone. Insert the pencil for support in taping. See Figure D.



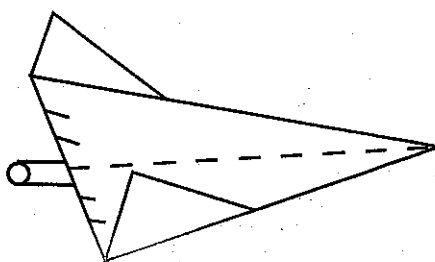
7. Place the rocket over the soda straw. See Figure E.



8. During competition students will launch the rocket from one end of the classroom toward a designated target. Each team member will launch the team's rocket one time.
9. Launch the rocket by blowing sharply on the straw. Be sure to aim rockets in the desired direction.

### Scoring:

1. After each launch the distance will be measured from the center of the target to the nose of the rocket where it comes to rest. The distance from the target will become the participant's score. The target will be placed 3 to 8 meters from the launching site.
2. Each teammate will fly the rocket once. The score will be determined by measuring the distance in centimeters the rocket is from the target for each launch and adding the two scores.
3. The lowest score will be the winner.



# ROCK HOUND

## Description:

Students will prepare charts, identify various rocks and minerals and describe their characteristics.

**Number of Participants:** 2

**Approximate Time:** 20 minutes

## **The Competition:**

1. Contestants will be allowed 20 minutes to identify as many rocks and minerals as possible from a selected group to include such rocks as but not necessarily limited to:

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

2. Contestants will also be asked questions about the rocks or minerals, such as their color, density (relative heaviness per volume), relative hardness, reaction to vinegar, shape, texture, etc.
3. Contestants should bring their completed charts with them to the tournament. The charts may be used in the identification process and to aid in answering any questions. Copies of these charts should be submitted with the answer sheets at the end of the twenty-minute period.

## **Scoring:**

Each rock or mineral identified and each question answered correctly will count one (1) point. The contestant with the highest total score will be the winner. In case of ties, contestants with the most complete and accurate charts will be the winners.

# STARRY, STARRY NIGHT

## Description:

This event will test student's knowledge of astronomy in two parts.

Number of Participants: 2

Approximate Time: 30 minutes

## The Competition:

1. Each team will be given one test booklet and one answer sheet. Team members may consult with each other by writing (no talking). Only one answer for each question will be accepted.
2. At the end of the testing period the test booklet and answer sheets will be collected from those teams who have not turned in their responses.
3. The contestants will be shown star charts, slides, overheads or photographs of star fields and be asked to identify indicated stars and constellations.
4. Contestants should prepare for the test by looking through astronomy periodicals or textbooks for pictures of the moon, planets, star clusters, nebula, or galaxies.

**Part I:** The contestants will identify the following celestial objects:

1. At least 5 constellations (See attached list of stars and constellations.)
2. At least 5 stars. (See list.)
3. At least 3 planets.
4. The moon and/or any of its phases.
5. The sun.
6. The totally eclipsed sun.
7. A spiral galaxy, a nebula, a star cluster and a comet.

**Part II:** The contestants will answer a series of written questions about important astronomical facts and concepts:

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 and 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 celestial sphere and the following points: zenith, horizon, four directions, celestial meridian, north celestial pole, and ecliptic.
9. Demonstrate knowledge about the members of the solar system.
10. Demonstrate knowledge about solar and lunar eclipses and the conditions that produce them.

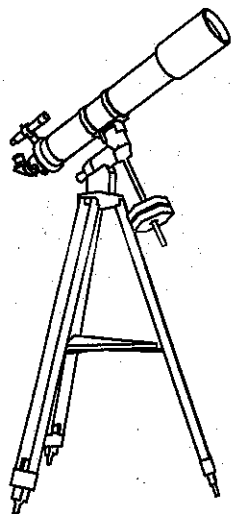


CONSTELLATION	STARS or CLUSTERS*
Aquila	Altair
Bootes	Arcturus
Canis Major	Sirius
Canis Minor	Procyon
Cassiopeia	
Cepheus	
Cygnus	Deneb
Draco	
Gemini	Castor
	Pollux
Leo	Regulus
Lyra	Vega
Orion	Betelgeuse
	Rigel
Pegasus	
Scorpio	Antares
Taurus	Aldebaran
	Pleiades (7 sisters)*
	Hyades*
Ursa Major	Merak
	Dubhe
Ursa Minor	Polaris
Virgo	Spica

**Scoring:**

All questions will be evaluated with equal weight. The contestant attaining the highest score will be declared the winner.

**NOTE:** Students should bring a red penlight.





# STRAW EGG DROP

## Description:

Each pair of students will make a device of straws and masking tape, supplied on-site by the event supervisor, to hold a large, raw egg. The device containing the egg will be dropped from a fixed height to a target.

Number of Participants: 2

Approximate Time: 45 minutes

## The Competition:

1. Each pair of students will be provided with:
  - a. 20 plastic non-flexible straws
  - b. one meter of one inch masking tape
  - c. scissors
  - d. one raw egg
2. Students will have 20 minutes to construct a device to cushion the egg and prevent it from cracking or breaking. They will have 10 minutes to drop the device from a height of 2 - 3 meters onto a target. No tape may be attached to the egg.
3. There will be ONE drop per team from the prescribed height.
4. Plumb lines will NOT be allowed during the competition.

## Scoring:

1. Teams whose egg is unbroken after the drop will be ranked ahead of all teams whose egg is broken.
2. Teams whose egg is broken during the drop will be ranked after all teams whose egg is unbroken.
3. Teams whose egg is broken before the official drop will drop the empty container and be ranked after all teams whose egg is broken during the drop.
4. Teams in each of the three groups above will be ranked by the distance measured from the center of the bulls-eye to the farthest edge of the container or the farthest edge of any parts thrown from the container (not the egg).
5. The winning team will be the team whose egg does not crack or break AND is the closest to the target. In the event of a tie, construction time for building the containers will be the deciding factor.



# WATER ROCKETS

## Description:

Prior to the tournament, contestants use 2-liter plastic soda/pop bottles to build one or more rockets propelled by air pressure and water. The rocket that stays aloft for the longest time will win.

**Number of Participants:** 1-3

**Approximate Time:** 10 minutes

## Construction:

1. Rockets must be made from a 2-liter soda/pop bottle used to hold water and air pressure that propels the rocket when released. The bottle itself must not be altered in any way. (e.g., holes, scratches, increasing the volume, restricting the bottle's opening).
2. Fins, parachutes and other items may be added to the outside of the bottle to increase the time aloft. Commercially made rocket components, sharp/pointed objects, parts made from glass and metal (except for a small snap swivel for attaching parachutes) and adhesives, such as super glue (cyanoacrylate) and high temperature hot glue that weakens the bottle is not allowed.
3. Rocket(s) must fit on the launch pad provided by the event supervisor and have a straw attached vertically to one side of the bottle to keep the rocket vertical during launch.
4. 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. 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.
5. Parts of the rocket may separate during flight, but they must remain attached together by a string/lanyard.
6. The school name and team number must be clearly marked on all rockets and parachutes.

## The Competition:

1. Contestants may bring repair kits containing tools, spare parts and extra parachutes. The rocket(s) and repair kits must be brought for inspection 15 minutes prior to your scheduled launch. Any parts found to be dangerous (e.g. glass or metal), illegal (e.g. commercially made rocket parts), or that prevent a rocket 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. Rockets without the straw, those that cannot be made to fit on the launcher, or those that, in the event supervisor's judgment, are unsafe will not be launched.
2. Two launches will be allowed. Different rockets may be used for each launch. Contestants must use the water, launch pad, and source of pressure provided by the event supervisor. The contestants will add the desired amount of water to the rocket

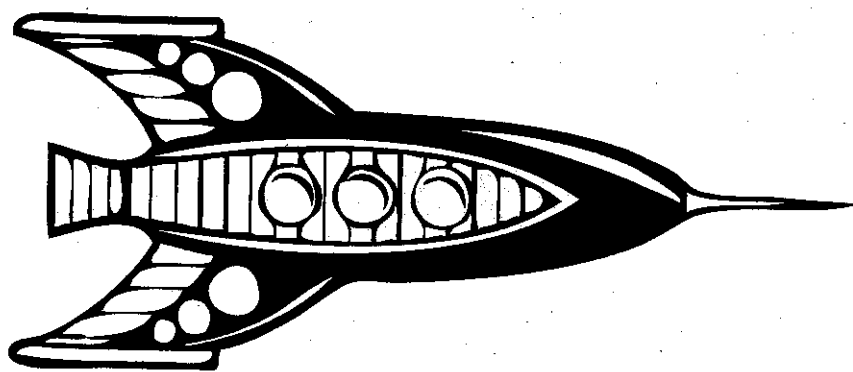


before each flight and may make alterations or repairs to rockets between launches. Outside assistance/coaching from the sidelines is not permitted.

3. The judges will pressurize the rocket to 75 psi and launch it. Anyone within 10 meters of a pressurized rocket must wear eye protection. Contestants may not hold their rocket during pressurization. Please do not exceed this pressure when practicing. Only the coaches should pressurize the rocket.
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.

### **Scoring:**

1. Judges will measure and record the time aloft for each flight. Time starts when the rocket is launched and stops when any part of the rocket touches the ground, or any object in contact with the ground. (e.g. tree, building). Teams will be scored using only the flight that will produce the better score/rank.
2. 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, by their time aloft, behind all flights of rocket's without construction violations and whose parts remain attached.
3. Teams whose rockets cannot be launched for any reason will receive participation points only.
4. The longest time aloft wins. Ties will be broken using the team's lesser flight times. Teams with two flights will win ties over teams with only one flight.



# WEATHER OR NOT

## Description:

This competition will test the students' knowledge of meteorological terms, techniques, and events.

**Number of Participants:** 2

**Approximate Time:** 45 minutes

## **The Competition:**

1. Student teams will be given a test on basic weather terms and techniques. Material may include cloud charts, simple scientific weather instruments (such as thermometers, barometers, etc.), weather patterns, severe weather photos, major weather events/disasters of the past years and other weather charts, graphs, tables, photographs, drawings, or diagrams.
2. Questions may also include states of water, water cycle, weather terminology, atmosphere, weather instruments and their function, seasonal changes in weather, weather safety and types of severe weather and watches/warnings.
3. Students may be asked to make readings on a variety of simple scientific weather instruments such as thermometers, barometers, and anemometers.

## **Scoring:**

The winner will be the team achieving the highest score. Ties will be broken by a pre-selected set of questions.



# WHICH WAY'S NORTH?

## Description:

Teams of up to two students will attempt to navigate themselves around a state road map.

**Number of Participants:** 2

**Approximate Time:** 50 minutes

## The Competition:

1. Teams will be given a standard state road map and a set of directions to guide them across the state to a pre-determined destination. All teams will receive the same map and directions.
2. Rulers will be provided. Calculators may be used but will not be provided. Students may make notes. Notes must be confined to one side of an 8.5-11" sheet of paper. Notes will be collected when students turn in their answer sheets. Students are not to mark on the maps.
3. All participants will begin at the same time and have a maximum of 45 minutes to answer the questions and turn in their notes and answer sheets.
4. Question areas include locating and interpreting symbols, locating and interpreting features, determining the distance between features, and using the map index, scale and key, inset maps, and data tables.
5. Questions may follow along a storyline journey, be in form of a simple test, or a combination of both.

## Scoring:

The number of correct answers recorded will determine places in this competition. In case of a tie, the team using the least amount of time will be awarded the higher place.

## Notes:

A combination of a storyline journey, fill in the blanks section and a brief map quiz section has proven successful. The storyline journey can include names of towns passed through, highways intersecting, points of interest passed by, etc., as the students follow a given set of directions. In the map quiz, students can be quizzed on all elements of the map from the key and legend to other informational elements (state info, rest area locations, state police posts) printed on the map.



# The 24 Game

## Description:

Participants use problem solving skills combined with their knowledge of mathematics (addition, subtraction, multiplication and division) to make the number 24 using the 4 numbers provided on the game cards.

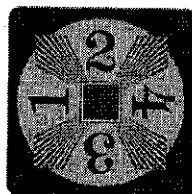
**Number of Participants:** 2

**Approximate Time:** 45 minutes

## The Competition:

1. Each team will be provided a set of 30 game cards.
2. Each team will be provided with the exact same set of cards. They may solve them in any order they choose.
3. Participants will write out the complete solution (all three steps) to arrive at 24 on paper provided for each card.
4. The game cards will be varying degrees of difficulty (1 dot, 2 dot and 3 dot cards). Single digit and double digit game cards requiring addition, subtraction, multiplication and division will be used.

**Example  
card and  
solution**



$$4 \times 3 = 12$$

$$12 \times 2 = 24$$

$$24 \div 1 = 24$$

## Scoring:

The score will be based on the following:

- Each correctly solved card will be worth 2 points. Partial credit will NOT be provided.
- Correct responses will be multiplied by the Dot value of the cards, 1 dot, 2 dots, or 3 dots.
  - **Example:** Participants correctly solve the 1 dot card above. The score for that card would be  $2 \times 1 = 2$ . If the card above was a 3 dot card, the score would be  $2 \times 3 = 6$ .
- Total points scored will be added together for a final score.
- Time will be used as a tie breaker.