Macomb Science Olympiad

2017 Elementary Event Rule Book

Anatomy to Zowie

Rules for all 16 Events in a single super duper compilation!

MacombSO.org/elementary/

Released **October 2016**

Watch for updated info to be added to the individual event pages on our web site:

MacombSO.org/elementary/

Keep an eye on the FAQs for **Rule Clarifications.** At the tournament, these rule clarifications will be applied when scoring the events.

2017 Events

A is for Anatomy
Students will identify anatomical structures of the human muscular and skeletal systems.

Amazing Arthropods
Students will be required to demonstrate an understanding of key concepts in taxonomy (including basic identification and morphology), ecology, life history, and the economic impacts of the major terrestrial arthropod groups.

Bridging the Gap
Students will be given a mystery bag of materials to build a bridge as long as possible and still support the weight of a tennis ball.

Charged Up
Students will be tested on their knowledge of electricity and related concepts. The exam will cover circuits, conductors, diodes, voltage, current, resistance, schematic drawings, meter reading, electrical sources and safety.

Crash Car Eggspert
Each team will build a structure on top of a PineCar Racer. The structure will be designed to hold and protect one or two eggs as the car is rolled down a progressively steeper series of ramps and crashed into an immovable barrier.

Crime Busters
To determine who committed a crime, students will analyze clues that may include testing of unknown powders, paper chromatography to identify ink, matching fingerprints, shoeprints or tire tracks.

Grasp-A-Graph
Students will interpret and organize information using pictographs, pie, bar, double bar, line and double line graphs.

Precision Ping Pong Propulsion
Students will design and construct a device, capable of launching a ping pong ball at a three-dimensional target, which is placed within a given range.

Reflection Relay
A team of three students will work cooperatively to determine the path a light beam follows, as it reflects off a series of plane mirrors.

Rock Hound
Students will prepare charts and use them to identify various rocks and minerals.
Questions about the rocks or minerals, such as their color, specific gravity, relative hardness, reaction to 3 molar hydrochloric acid, shape, and texture will be asked.
This year will focus more on Metamorphic rocks.

2017 Events (continued)

Simple Machines
Participants will identify, use, and answer questions about simple machines and recognize the relationships between work, force and distance as they apply to each simple machine. Knowledge of the following six simple machines will be demonstrated:
lever, inclined plane, pulley, screw, wheel and axle, and wedge.

Starry, Starry Night
This event will test students' knowledge of astronomical facts and concepts relating to the earth, moon, solar system, celestial sphere, stars and constellations, non-planetary members of the solar system.

Water Rockets
Prior to the tournament, contestants will use 2-liter soda/pop bottles to build one or more rockets propelled by pressurized air and water. Rockets will be launched at the tournament and time aloft recorded. The rocket that stays aloft for the longest time will win.

Weather or Not
Students will be tested on their knowledge of weather and meteorology.
Topics may include clouds, simple scientific weather instruments and their functions, weather patterns, severe weather, and weather photographs, drawings, or diagrams. Questions may also include states of water, water cycle, weather terminology, atmosphere, and seasonal changes in weather.

Wildlife Safari
Students will demonstrate their ability to identify birds, their calls, and their habitats through the use of field guides.

Zowie Estimation
Presented with a variety of tasks, students will be asked to estimate mass in grams, volume in cubic centimeters, and number of objects in a container.

A is for ANATOMY

DESCRIPTION: Students will identify anatomical structures of the human muscular and skeletal systems. Only the scientific names of the bones, parts of the bones, and muscles will be utilized and accepted as correct.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME:** 30 minutes

THE COMPETITION: **Twenty two** stations will be set up around the room. Each station will have models or pictures of anatomical structures of the human muscular and skeletal systems. Questions will relate to the identity of those structures.

The teams will move around the room, one team per station, answering the questions at each station as they go. This is a timed exercise. A facilitator will direct the students to move to a new station at one minute intervals. The answers will be recorded on the provided Scantron-type answer sheet with a #2 pencil. Students should bring pencils.

SCORING: There will be **twenty one** stations with four multiple choice questions per station. Each question will be worth one or two points**.** The team with the highest point total will be the winner.

Ties will be broken by the four questions at station **#22.** These questions will be open-ended (not multiple choice) and will be recorded on the Scantron-type answer sheet. Only the correct spelling of scientific names of the structures will be accepted!

MUSCULAR SYSTEM STUDY GUIDE

FACE AND NECK	SHOULDER AND ARM	PELVIS AND LEG
Buccinator	Biceps brachii	Adductor longus
Masseter	Brachialis	Adductor magnus
Platysma	Brachioradialis	Biceps femoris
Sternocleidomastoid	Coracobrachialis	Calcaneal (Achilles) tendon
Temporalis	Deltoid	Extensor digitorum longus
	Infraspinatus	Gastrocnemius
	Pronator teres	Gluteus maximus
ABDOMEN, BACK, AND CHEST	Subscapularis	Gluteus medius
External intercostal	Supraspinatus	Gracilis
External oblique	Teres major	Iliacus
Internal intercostal	Teres minor	Iliopsoas
Internal oblique	Triceps brachii	Psoas major
Latissimus dorsi		Rectus femoris
Pectoralis major		Sartorius
Pectoralis minor		Semimembranosus
Rectus abdominus		Semitendinosus
Rhomboideus major		Soleus
Serratus anterior		Tibialis anterior
Transverse abdominus		Vastus intermedius
Trapezius		Vastus lateralis
		Vastus medialis

SKELETAL SYSTEM STUDY GUIDE

SKULL
Ethmoid bone
- Cribriform plate
- Crista galli
- Perpendicular plate of ethmoid

Foramen magnum
Frontal bone
- Frontal sinus

Lacrimal bone
Mandible
- Mandibular condyle

Maxilla
- Median palantine suture
- Palatine process of maxilla

Nasal bone
Occipital bone
- Occipital condyle

Palatine bone
Parietal bone
Sphenoid bone
- Greater wing of sphenoid
- Hypophyseal fossa
- Orbital surface of sphenoid
- Sphenoid sinus

Sutures
- Coronal suture
- Lamboidal suture
- Sagittal suture
- Squamosal suture

Temporal bone
- External auditory (acoustic) meatus
- Mandibular fossa
- Mastoid process
- Styloid process
- Zygomatic process of temporal bone

Vomer
Zygomatic bone

RIBS AND HYOID
Hyoid
Rib cage
- Costal cartilage
- False ribs (8-12)
  - vertebrochondral ribs (8-10)
  - vertebral (floating) ribs (11-12)
- True or vertebrosternal ribs (1-7)

Sternum
- Body
- Manubrium
- Xiphoid process

VERTEBRAE (general)
Body
Intervertebral foramen
Spinal (vertebral) foramen
Spinous process
Transverse foramen
Transverse process

Cervical vertebrae (7)
- Atlas (c-1)
- Axis (c-2)

Thoracic vertebrae (12)
Lumbar vertebrae (5)
* Be able to tell the difference between the three types of vertebrae.
Sacrum
Coccyx

UPPER EXTREMITY
Carpals
Clavicle
Humerus
- Capitulum
- Coronoid fossa
- Deltoid tuberosity
- Greater tubercle
- Head of the humerus
- Lesser tubercle
- Olecranon fossa
- Trochlea

Metacarpals
Phalanges
Radius
- Head of radius
- Radial tuberosity
- Styloid process (stylus) of the radius

Scapula
- Acromion process
- Coracoid process
- Glenoid cavity
- Spine of scapula

Ulna
- Coronoid process
- Head of ulna
- Olecranon process
- Radial notch
- Styloid process (stylus) of the ulna

LOWER EXTREMITY
Femur
- Greater trochanter
- Head of the femur
- Lesser trochanter

Fibula
- Head of fibula
- Lateral malleolus

Metatarsals
Os coxa (ilium, ischium, pubis)
- Acetabulum
- Obturator foramen
- Ilium
  - Iliac crest
  - Greater sciatic notch
- Ischium
  - Ischial spine
  - Ischial tuberosity
- Pubis
  - Symphysis pubis

Patella
Phalanges
Tarsals
- Calcaneous
- Talus

Tibia
- Medial malleolus
- Tibial tuberosity

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

AMAZING ARTHROPODS

DESCRIPTION: Students will be required to demonstrate an understanding of key concepts in taxonomy (including basic identification and morphology), ecology, life history, and the economic impacts of the major terrestrial arthropod groups. This knowledge will also be applied to recognizing the arthropods in their own neighborhood by assembling a collection of arthropod specimens or specimen photographs and identifying them in advance of the tournament.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME:** 30 minutes

WHAT TO BRING: A pencil and the team's completed arthropod collection. Each team may also bring one, 8 ½" x 11", two-sided sheet of paper of notes.

THE COMPETITION:

Part 1: A test consisting of multiple choice and true or false questions presented in a station-based format. Teams will rotate among approximately 20 stations and be allowed about 1 minute at each station. Each station may include 4 to 6 questions. Students will record their answers on a Scantron-type form. The scope of subjects listed below will be the basis for questions on the test. The associated Study Guide will aid coaches and students with this material.

Arthropod Classes	Insect Orders	Species	Concepts
Visually recognize, be familiar with the major groups included, their basic biology & anatomy	Visually recognize, use a dichotomous key to identify, be able to recount basic biology, life history and ecology	Visually recognize, recount the taxonomy life history, ecology, economic impact and conservation status	These general topics will help the student be more successful on this event
• Arachnida • Chilopoda • Collembola • Diplopoda • Insecta • Malacostraca	• Blattodea • Coleoptera • Dermaptera • Diptera • Hemiptera • Hymenoptera • Lepidoptera • Mantodea • Neuroptera • Orthoptera • Odonata • Siphonaptera	• American Burying Beetle • Antlion • Black-legged Tick • Bumble Bees • Eastern Carpenter Ant • Eastern Subterranean Termite • German Cockroach • Gypsy Moth • Hine's Emerald Dragonfly • Honey Bee • Human Bed Bug • Japanese Beetle • Karner Blue Butterfly • Leadplant Moth • Multicolored Asian Lady Beetle • Paper Wasps • Pavement Ant • Yellow Jackets	• Linnaean Classification • Basic Arthropod Anatomy • How to use Identification Keys • Various methods and tools of collecting arthropods • Insect Growth & Metamorphosis • Insect Defenses • Insect Respiration • Economic Impacts • Pest Control Tactics

Part 2: An arthropod collection that is brought to the tournament. Specimens may either be pinned or presented as photographs of the actual specimen that the student found. The team number and students' names should be clearly identifiable on the collection. The collection may be required to be impounded before the tournament begins. Check the tournament schedule for details.

The Study Guide contains guidance on creating the bug collection and its presentation, including the allowable size for each format. Students may choose to create a pinned collection or a photograph collection, but not a mix of the two. One type of collection is not preferred over the other, and will not systematically receive more points.

SCORING:

Test: ~ 70% of the total score

- **At the Event Supervisor's discretion, each question may be assigned a value of 2 or 3 points**

Collection: ~ 30% of the total score

- 3 points for each unique Arthropod Class collected and properly identified
- 5 points for each unique Insect Order collected and properly identified (up to 10 orders)
- 1 point per specimen (up to 30 specimens)

The tie-breaker will be based on the overall aesthetic quality and scientific worth of the arthropod collection (nicely mounted specimens, not broken or beaten up specimens, neat and clear labels, proper identifications, and all instructions followed).

***Note*: Points may be deducted at the Supervisor's discretion under these circumstances:**

- ***If it appears that the student misrepresented their arthropod collection (e.g., photos of specimens that the team did not take, pinned specimens that the team didn't preserve, or reused specimens from previous years)***
- ***If it appears that the collection was assembled by an adult***

References: See the supporting Study Guide provided on the Macomb Science Olympiad website.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

BRIDGING THE GAP

DESCRIPTION: This event is designed to test the student's ability to think on their feet. They will be given a bag of appropriate materials which they will use to build a bridge. The bridge should be constructed to span the greatest possible distance while supporting a tennis ball at its midpoint.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME**: 30 minutes

COMPETITION:

1. Each team will be given a bag of building materials. All teams will receive exactly the same materials. Items provided might include: straws, coffee stirrers, wooden skewers, paper clips, tape, string, paper, etc. (This list is only an example, materials actually supplied may be anything that the supervisors feel are appropriate).

2. Each team will have a maximum of 20 minutes construction time. The bridge that they build may only be supported on its 2 ends; no intermediate parts may come in contact with the surface below it. When finished the bridge must support an official tennis ball for at least 5 seconds. The tennis ball must be placed at the center of the bridge. The diameter of an official tennis ball is approximately 6.5 cm and the weight is approximately 58g.

3. Only those materials supplied in the bag, and the bag itself, may be used to construct the bridge. No other materials or adhesives may be part of the finished bridge. Each student may bring scissors, a ruler or tape measure, and a pair of pliers to use as tools while building the bridge. Teams will work on the floor in a space reserved for them, and will be provided with two boxes and a tennis ball for use in preliminary testing,

4. The students are to inform the judges when they finish their bridge. When it is their turn, they will instruct the judges as to approximately how far apart to set the end supports for the bridge testing. Competitors will place their bridge in position, and adjust the supports. The judges will then measure the distance between the supports. When told to do so, the students will place the tennis ball on the center of the bridge. They may touch the bridge when placing the ball. As soon as the tennis ball is released from their hands, timing will start, and they may not touch the bridge or ball again. **Afterwards, students will be instructed to take their bridge to where they will place it on a scale to be weighed.**

5. The bridge may not be attached to the end supports in any way, or extend beyond the end supports. **The platform area on each end of the testing apparatus will be about 12" x 12". These platforms will be a few feet off the ground.**

SCORING:

1. All bridges that successfully support the tennis ball for 5 seconds will be ranked in Tier 1, those which do not in Tier 2. The bridges in each of these groups will be ranked according to the distance spanned, longest distance first, shortest distance last. **Bridges which extend beyond the supports will also be scored as Tier 2.**
2. In the event of a tie, the winner will be the bridge with the lowest weight.

If a question and answer concerning the rules for this event are posted in the elementary FAQ portion of our website http://macombso.org/index.php/esofaqs, the supervisors will score the event accordingly.

CHARGED UP

DESCRIPTION: Students will be tested on their knowledge of electricity and related concepts. The exam will cover circuits, conductors, diodes, voltage, current, resistance, schematic drawings, meter reading, electrical sources and safety.

TEAM SIZE: 1 or 2 Students **APPROXIMATE TIME**: 30 Minutes

THE COMPETITION:
The test will be given in a station format with multiple questions per station. Two or three essay questions or tasks will be included as tiebreakers.

Students need to understand the terms: conductor, insulator, open circuit, short circuit and know the difference between normally open and normally closed switches, series circuits, parallel circuits, and series-parallel circuits. They should be familiar with electrical safety practices, meter reading, voltage, current, resistance, diodes and sources of electricity. They also will be expected to know how to calculate the voltage or resistance of a series circuit. Additionally, students should be able to identify, draw and construct circuits from written instructions or the schematic symbols.

Study materials will be posted on the Macomb Science Olympiad web site at
http://macombso.org/index.php/esoevents/chargedup

Examples of possible items at the stations:

- Schematic drawings with questions regarding the circuits.
- Questions about what happens when a switch is closed or opened, or whether a lamp in a given circuit will light or not.
- Identification of series, parallel, and series-parallel circuits.
- A set of materials with questions about conductivity.
- Questions about meter reading, generators or voltage.
- Given a written description or a schematic drawing, construct an actual circuit.
- Identification of internally connected circuits on mystery cards.
- **Construct a circuit tester**
- **Identify the resistance of a given resistor using the 4 band color code**
- **Definitions of electrical terms**
- **Questions on general electrical safety**
- **Using a meter, measure voltage, resistance, and current of components**

SCORING:
Points will be awarded for correct answers. The team with the highest total number of points will be the winner. Predetermined tiebreaker questions or tasks will be used to break ties.

NOTE: Direct current (DC) circuits using low voltage batteries will be used.
WALL SOCKET (AC) CURRENT WILL NOT BE USED!

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit http://macombso.org/index.php/esofaqs

CRASH CAR EGGSPERT

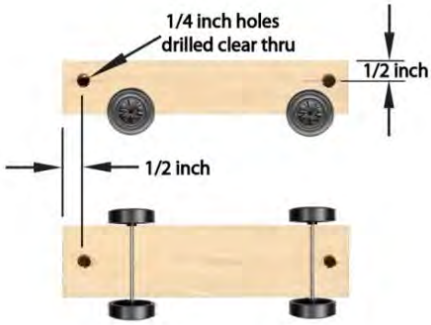
DESCRIPTION: Each team will build a structure on top of a PineCar Racer. The structure will be designed to hold and protect **one or two eggs** as the car is rolled down a progressively steeper series of ramps and crashed into an immovable barrier.

TEAM SIZE:1 or 2 students

APPROXIMATE TIME: Building time: 25 minutes
Ramp time: 15 minutes

CONSTRUCTION:

1. Teams will be provided with a basic assembled PineCar Racer that will be modified with four ¼" holes that are drilled all the way through the wood body. Two of the holes will be drilled through the side, both will be ½" from the top, one ½" from the front and one ½" from the back. The other two holes will be drilled through the top, on center, one ½" from the front and one ½" from the back.



2. Additionally, teams will be provided with the following materials:

   (4) Cotton balls
   (4) 2 5/8" long round wooden toothpicks
   (3) 12" natural rubber latex balloons
   (1) 36" piece of 3 lb. twisted cotton twine
   (4) 12" long "Fuzzy Stick" brand pipe cleaners
   (6) Paper clips size #1 plated steel
   (4) 7 ⅝" long, ¼" diameter flexible drinking straws
   (4) Goody® brand 2 inch long bobbie pins (Stk. no. 03705).
   (4) Bicycle® brand standard playing cards.
   (4) 4 ½ long x 3/8 wide x 1/16 thick wood craft sticks (commonly known as popsicle sticks).
   (14) ¼" dia. self adhesive reinforcement labels (equivalent Avery # 6755)
   (1) 12" x 10 3/4" sheet of aluminum foil (may come folded)
   The 10 ½" x 5 ¼" x 3 ¼" paper lunch bag holding these materials MAY be used in building the structure

3. Up to three of the items listed in rule 2 may be omitted, or have their quantity reduced. The quantity of some items may be increased. The paper lunch bag will not be omitted. Students will not know the exact material list until they begin building. A list of the materials that the bag should contain will be packed inside the bag. If the students believe they are missing any material that is on the list they should immediately alert the Supervisor. DO NOT WAIT until the structure is built.

4. The Supervisor will provide Large Grade A raw chicken eggs. Team members are responsible for the care and handling of their eggs from the time they take possession. If they wish, they may exchange an egg that they are given for another, but they must do so immediately after receiving them.

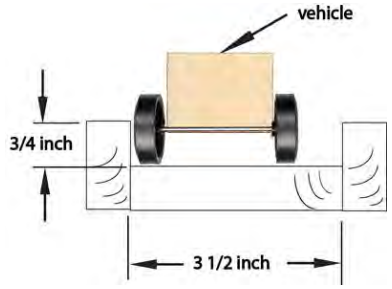
5. **A team may design the structure to carry one egg (the 'driver') or two eggs (the 'driver' and 'passenger'). They must declare that intent when they are given their egg(s). The**

Supervisor will mark the eggs to differentiate between 'driver' and 'passenger'. The decision to carry a passenger egg carries additional responsibility. The cost in points for injuring a passenger is greater than the points awarded for carrying it.

6. Each team may bring 2 pairs of scissors, a ruler, 2 pencils and a pair of pliers. No other tools or materials are allowed.
7. The structure must be built in a way that allows each 'test egg' to fall free when the vehicle is inverted during inspection. Students will remove the egg by inverting their car. They are not allowed to disassemble their device to extract the egg. Pieces of the vehicle that fall away cannot be reattached. There is no vehicle repair allowed between runs.
8. No part of the structure may come in contact with the wheels on the PineCar Racer or the ramp. Wheels of the car must be able to rotate freely and no part of the structure shall slow the car's descent by making contact with the ramp.
9. Each team will be given 25 minutes to construct their crash structure. Times will be recorded to use as a tie breaker.
10. They will return at a later time, on a walk-in (first come, first served) basis, to roll their crash car down the ramps. Cars will be impounded until ramp time.
11. Competitors will be required to transport their completed crash car from the construction zone, to impound, to the competition area. The egg must be in the structure, from the end of construction, until removal after the car's first crash.

<u>THE COMPETITION</u>:

1. The Supervisor will provide three eight foot ramps with a slope somewhere between 20 and 60 degrees. A fixed barrier will be located at the immediate end of each ramp. The ramp slopes will be posted 30 minutes prior to the beginning of the construction time.



The ramps will be made from 8′ lengths of 1"x 4" pine lumber with 1"x 2" side guides.

2. Supervisors will inspect the crash car to make sure there are no violations of construction rules# 7 and 8. If any are found, students will have 2 minutes to correct them.
3. The students who place their car on the ramps must be the students who built the structure.
4. Each team will begin at the ramp with the lowest slope. The car will be rolled down the ramp and will crash into the barrier. Students will be instructed to remove the egg from their structure and show it to the supervisor. The egg is considered to have survived as long as it does not leave a wet spot on a paper towel.
5. If the egg leaves the crash car during the crash, it will be considered to have broken, whether it actually did so or not.
6. **After the ramp 1 crash, then again after the ramp 2 crash, the team will evaluate the condition of their vehicle and decide:**

a. **to continue to the next ramp to earn additional points, or**
b. **to continue to the next ramp without the passenger egg, or**
c. **to stop, and protect the points earned and not risk injuring the driver egg and falling to tier 2.**

The car can continue with an injured or unloaded passenger, but must have an intact driver.

7. **An unbroken passenger egg that a team decided to hold back from a ramp drop can be reintroduced for later drops,**
8. Crash cars and eggs that advance to the next ramp will do so in an as is condition. Structures may not be repaired or refurbished between crashes.
9. **Students determine which end of their car is the front, and where their passenger egg will ride as they prepare to load their car onto the ramp. They can change that orientation between runs, but don't forget rule #8.**

SCORING:

1. **Teams will accumulate points as described in the chart below:**

Points Awarded after each run			
	Driver Egg intact?	*Passenger Egg*	
		Intact?	Bleeding?
Ramp 1	+100	+50	-100
Ramp 2	+150	+75	-100
Ramp 3	+200	+100	-100

2. **If a team's driver egg is intact, they will be ranked in Tier 1 regardless of when they decided to stop.**
3. **A broken driver egg will move a team to Tier 2. A broken passenger egg has a point cost, but does not the affect score tier.**
4. Teams with a construction violation that can't be modified within two minutes of discovery will be ranked in Tier 3.
5. Teams whose egg broke prior to the first ramp run will be ranked behind all others.
6. **Ties will be broken based on construction time, shortest time first, longest time last.**

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs.html

CRIME BUSTERS

DESCRIPTION:
Students will evaluate crime scene evidence to determine who committed a crime. Students will be expected to test unknown powders, use paper chromatography to identify ink, and match fingerprints, footprints, tire prints, and more.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME**: 30 minutes**

EVENT PARAMETERS:

Students must bring:
- **A pencil or pen.**
- Splash Proof OSHA Approved Chemical Safety Goggles. Students will not be allowed into the test room without safety goggles. They must wear safety goggles during the entire event, or the team may be disqualified.

Students are allowed to bring:
- A 2-sided index card/sheet of paper up to 8.5”×11”, with any notes on it. One sheet per team.
- A magnifying glass.

Students will be provided:
- **A Scantron-type form and answer sheet**
- A list of possible powders.
- Tap water, vinegar (CH_3COOH), and iodine solution (KI_3)* to test powders only.
- Plastic cups, spoons, black paper, and toothpicks.
- Materials to make a chromatogram, including isopropyl rubbing alcohol.

THE COMPETITION:

All parts will be provided at the same time, and they are to be completed in no particular order.

Part 1: Powder identification
- The powders may include: powdered Alka-Seltzer, baking soda, **calcium carbonate powder**, cornstarch, flour, gelatin, salt, white corn meal, white granulated sugar, **yeast**.
- Each team will be given 6 cups containing powders. Each cup will contain 1, 2 or 3 powders. Cup 1 will contain the powders collected at the scene of the crime, while Cups A-E will contain powders collected from each of the suspects.
- Students will be asked to identify all powders in all cups, and they will have to match the powders in Cup 1 to one or two of the other cups.
- Combinations of powders that will NOT occur: flour and cornstarch, baking soda and Alka-Seltzer.
- Touching, tasting, feeling, or sniffing of the powders is not allowed, and may result in disqualification.

Part 2: Chromatography

Students will be asked to make a chromatogram for 6 given ink samples, and use these to help identify the criminal(s). Sample 2 will come from the crime scene, and Samples A-E will come from the suspects. The chromatograms will be turned in with the answer sheet.

Parts 3-5: Prints

Students will be asked to compare (3) fingerprints, (4) footprints or shoeprints, and (5) tire prints from the 5 suspects to those found at the crime scene. Crime scene prints will be labeled by part number (e.g. Fingerprint 3), and suspect prints will be labeled A-E. Partial or obscured prints may be used.

Part 6: Unspecified evidence

Students will be given one piece of "unspecified" evidence recovered from the crime scene that do not fall under any of the previous categories. This evidence will not require any new skills, but will instead focus on students' critical thinking skills. Examples of unspecified evidence include but are not limited to: handwriting samples, hair samples, and liquid samples with varying pH. Ample instructions and assistance will be given.

Part 7: Criminal identification

After all the evidence is collected, the students will identify the suspect(s) who committed the crime. No more than 2 suspects will be implicated.

SCORING:

Students will earn points for:

- Correctly identifying powders in each vial
- Creating a neat, clear chromatogram
- Matching of all evidence to the suspects
- Identifying the criminal(s)

Students may lose points for (including but not limited to):

- Identifying incorrect or extra powders, suspects, or criminals (half off per extra answer)
- **Missing, incomplete, messy, or unsuccessful chromatograms**

Any ties will be broken using one or more tie breaker questions within the scope of the event.

*Note: Povidone Iodine or a colored solution of Tincture of Iodine will work for practice sessions. These can be purchased at many pharmacies. Decolorized Iodine will not work.

** Note: some competition time is allocated to providing instructions, collecting tests and other logistics.

If a question and answer concerning the rules for this event are posted in the elementary FAQ portion of our website http://macombso.org/index.php/esofaqs, the supervisors will score the event accordingly.

GRASP A GRAPH

DESCRIPTION:

Students will interpret and organize information using pictographs, pie, bar, and line graphs and Venn diagrams. Students may bring and use any or all of the following: a simple, non-programmable calculator, rulers, and colored or regular pencils. Students are allowed to whisper to their partner during the test.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME:** 30 minutes

THE COMPETITION:

Part 1: The contestants will answer multiple choice questions based on their interpretation of pictographs, pie, bar, and line graphs, and Venn diagrams.

Part 2: The contestants will be given one set of data and asked to prepare a graph. Graph paper will be provided. As contestants interpret the given data, they will need to decide the best method for displaying that data. For this part of the competition, they will be expected to use a bar or line graph. Pictographs and pie graphs are not appropriate for Part 2 and should not be used. Scoring will be based on the completeness of the graph, including neatness and labeling. Contestants will be asked to interpret their graph through a series of questions.

SCORING:

Part 1: approximately 60%
Part 2: approximately 40%

There is no specific time limit for each section.

Tiebreakers:

1. The score on the graph prepared for Part 2 of the competition will be used.
2. If ties remain, specific predetermined multiple choice questions will be used.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

PRECISION PING PONG PROPULSION

DESCRIPTION: Students will design and construct a launching device, according to the parameters set forth in the rules to propel ping pong balls at a target that is placed within a given range.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME:** 15 minutes

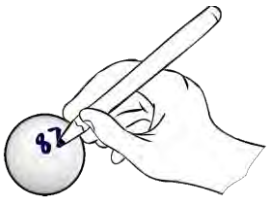
THE COMPETITION:

1. Students are to design, construct and bring to the tournament a launching device. This device should be capable of accurately and consistently shooting a ping pong ball a range of distances. A new launcher must be designed and built by members of this year's Science Olympiad team. Devices from previous years may not be used. Launchers must be marked with team name and number. Balls intended for launch must be marked with the team number. The launcher and marked balls will be impounded prior to the start of the tournament.

2. There are no material restrictions for the launcher. The balls must be launched individually by releasing the stored energy of some elastomeric material (rubber band, inner tube, etc.). Launchers incorporating any electrical components, compressed gas, liquid or metal springs are forbidden.

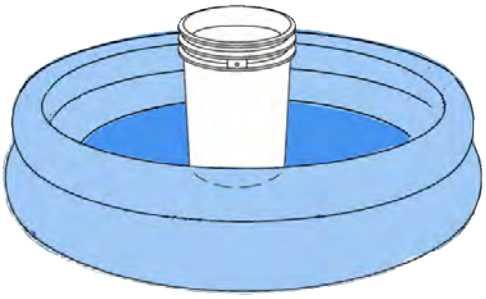
3. Balls must be loaded and launched individually. No auto loading magazine or multi chambered device can be attached to the launcher. Only one ball at a time can be in the launcher.

4. The team will bring **fifteen (15)** regulation 40mm ping pong balls. Each ball will be clearly marked with their team number in two places on opposite sides using a black permanent marker. No other alterations are allowed. (*Team #6 and #9 will under line their number*)
   Ten (10) balls should be white, **five (5)** are orange.
   Mark one (1) of the orange balls with a black band completely around the circumference.



5. All materials that the team will use must be impounded at the beginning of the tournament. This must include the launch device and up to **15** ping pong balls. Data which the team has collected to predict device performance may also be impounded.

6. The target consists of a 5 gal plastic pail with the handle removed (approx 12in. dia. x 14 ½ in. high) placed at the center of an inflatable wading pool (approx 49 in. inside dia. x 58 in. outside dia. x 13 in. tall).



7. Launch lines will be marked on the floor at whole meter intervals, 4 to 8 meters from the center of the target. A starting line will be marked approx 2 meters back from each launch line.

8. The target a launch area will be on a hard surface such as a tiled floor or hardwood gymnasium floor.

9. The distance to the target will be posted at the event after the impound deadline.

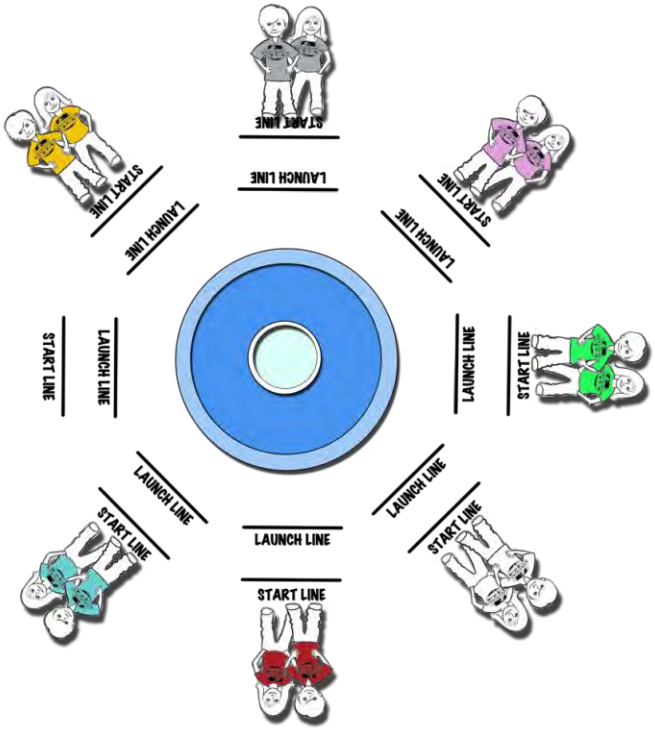
10. The teams will wait with their launcher behind their assigned starting line. When they hear the Event Supervisor's whistle all teams advance to their launch line, set up their launcher and "commence firing at will". No part of the launcher may extend beyond the back edge of the launching line. Back edge is defined as the edge furthest from the target.

11. A total of **4** minutes are allowed to set up and launch all **15** balls. The team decides what order to launch their different color balls. The Supervisor will announce when there is one minute remaining, and sound a whistle to signal the end of **4** minutes when all launches must cease.

12. The target will be surrounded by several launch lines. The chaos of multiple simultaneous launches is part of this event. Expect to see mid-air collisions, unfortunate bounces and unbelievable lucky bounces.

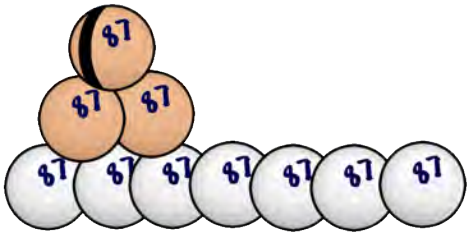
13. Once launched, balls cannot be retrieved and shot a second time. A team begins with **fifteen** balls, and is allowed **fifteen** shots. Misfires which release a ball count as a shot, **unless the ball stays BEHIND the launch line.** Practice shots at the tournament are not allowed.

14. The Event Supervisor will immediately intervene if a team's device or behavior appears unsafe for any reason



15. No one except contestants and judges are allowed in the competition area. Eye protection is required for all contestants for the entire time they are in the competition area.

SCORING:



1. When the final whistle sounds the Event Supervisor will count the balls, by color contained inside the target. Any ball that is outside the target at the final whistle will have no value, even if it was in earlier and was somehow ejected.

2. The pail at the target center is worth 25 points. Inside the pool but outside the pail is worth **nine (9)** points.

3. A point multiplier is applied for colored balls. Orange balls count 3 times and the orange ball with a black band counts 5 times. White balls have no multiplier.

4. The final score will be equal to the sum of the numerical scores for all shots taken within the time limit.

5. The greatest number of points determines the winner.

6. Teams which impound their device after the deadline will be penalized 20 points. Devices which violate construction parameters will be scored in a tier below legal devices.

7. Devices judged to be unsafe by the Event Supervisor will not be allowed to launch.

8. Ties will be broken in favor of the team that scores the most points in these categories:

    a. Points in the bucket

    b. Points scored by colored balls

    c. Total number of balls in the bucket

    d. Total number of balls in the pool

If a question and answer concerning the rules for this event are posted in the elementary FAQ portion of our website http://macombso.org/index.php/esofaqs, the supervisors will score the event accordingly.

REFLECTION RELAY

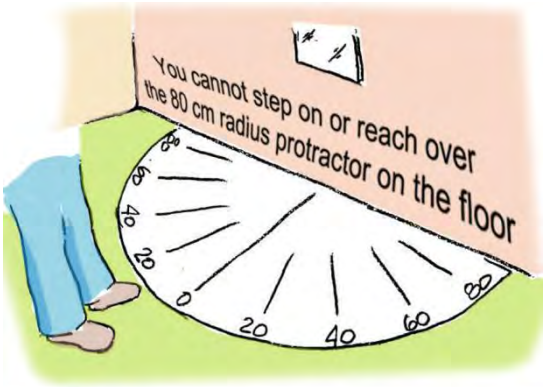
DESCRIPTION: A team of three students will work cooperatively to reflect a beam of light to a target using a series of plane mirrors.

TEAM SIZE: 3 students **APPROXIMATE TIME:** 20 minutes

THE COMPETITION:

3D CHALLENGE (*Formerly Part 1*): Three team members, supplied with four mirrors approximately 3" x 4", cooperate to reflect a light beam onto a predetermined target. One of the mirrors will be mounted on the wall and cannot be moved. Team members must use the mirrors provided by the judge.

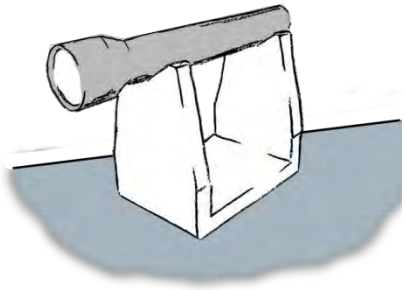
1. The light must reflect off of all four mirrors before hitting the target. There may be obstacles that the beam of light will have to be directed around.



2. A large protractor (radius of 80 cm) will be placed on the floor in front of the mirror. This will mark the distance the participants must stay away from the mirror and will also provide a measuring device if the participants choose to use it. The protractor will have 0 degrees at its center, continuing up to 90 degrees on both the left and right sides.

3. Each team will be given up to one minute of preparation time before the clock is started.

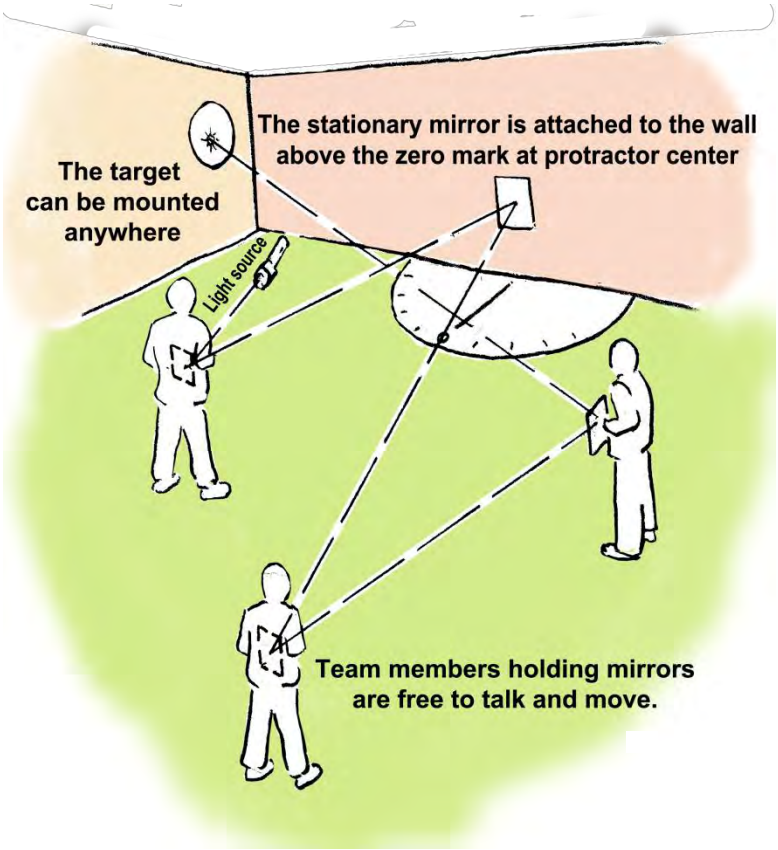
4. Materials that will be provided for each team:



   - A light source ('Mag-Lite' style focusable flashlight on a wooden stand),
     The light source will already be in position and focused,
   - 3 movable 'handheld' mirrors (3" x 4"),
   - 1 protractor (80 cm radius), will already be positioned on floor,
   - 1 non-moveable mirror (3" x 4"), will already be attached to the wall,
     The fixed mirror will be directly over the protractor center "zero degree" line.
     The mirror height can vary between 6 inches higher to 6 inches lower than the light source.
   - Targets, already fixed in some location.
     Targets are flat and circular, between 5 inch and 12 inch diameter.

   Students may bring any other equipment they deem necessary, with the exception of their own light source.

5. Each team will be given two different reflection relay challenges. **The target size for the 1st and 2nd challenge may not be the same.**



3D CHALLENGE SCORING:

1. The team's planning time (1 minute maximum) will be recorded and used as a tie-breaker. One team member will be the spokesperson; responsible for telling the judge the team is ready.

2. Each challenge will be timed. The objective is to attain the lowest elapsed time in seconds. One point will be added for each second.

3. The beam of light must rest on the target for 3 seconds (without wandering off) before the judge stops the timer. The minimum score for each challenge will be 3 points.

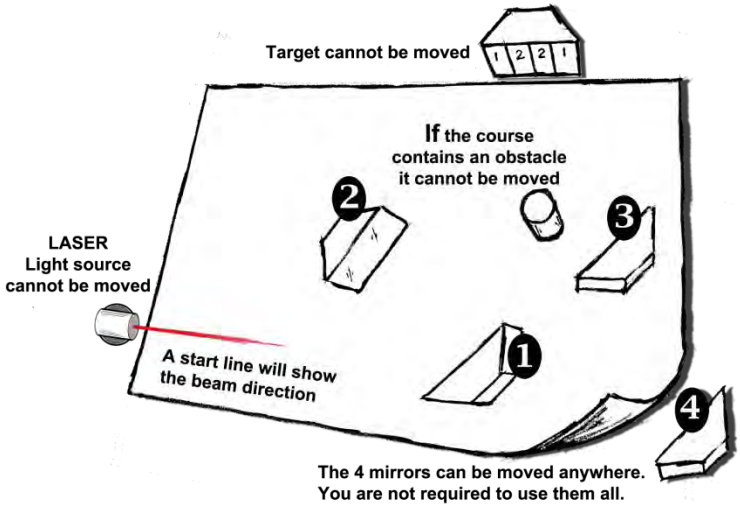
4. No team will be allowed to use more than one minute to accomplish each challenge. Maximum score for each challenge will be 60 points.

5. **The best time of the two 3D challenges will be used to calculate the final score.**

2D CHALLENGE (*Formerly Part 2*):

For the table top Reflection Relay challenge each team will be given a new 1.5 x 3 foot paper area to work on. A laser light source will already be secured to the table top and cannot be moved. A six inch line will be drawn on the paper starting at the laser to show the exact direction of the beam.

A target will also be secured to the table top, and cannot be moved. There may also be obstacles placed on the playing field. The team is not allowed to disturb any obstacles.



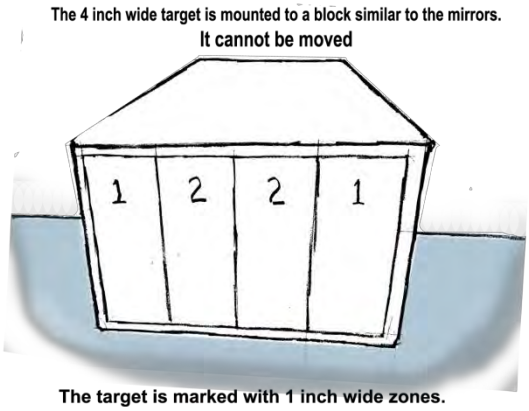
Four movable mirrors (3" x 4") mounted on stands will be provided. The mirrors will be the same height as the laser.

The three team members have 5 minutes to work together, positioning the movable mirrors (while the laser is turned off) to reflect the beam onto the target. When planning their mirror placement, the team has a choice as to how many of the mirrors they want to use. *Using more mirrors increases difficulty, but earns additional points.*

The supervisor will warn the team when there is only 1 minute of prep time remaining. All team members must immediately step back from the playing field when the supervisor signals that time is up. Absolutely no further adjustments are allowed, no matter how subtle.

Participants may bring any other equipment they deem necessary, with the exception of a light source.

2D CHALLENGE SCORING:



At the end of 5 minutes the supervisor switches on the laser to check the beam path.

The team starts with 60 points.
Points are subtracted for mirrors reflecting the laser:

1 mirror	**-1 point**
2 mirrors	**-3 points**
3 mirrors	**-6 points**
4 mirrors	**-10 points**

The beam striking the target will be scored:

Zone 1 - 4X mirror points
Zone 2 - 6X mirror points

FINAL SCORE -

(2D score) + (**Best 3D time**) = Final Score Lowest total score wins.

Example 1:

Team 91 tried to use all 4 mirrors to reach the 2D target, but they only hit 3 mirrors (and missed the target). Their 3D challenge times were 18 seconds and 12 seconds.

60 (starting points)
- 6 (mirror points)
54 points (2D score) *54 (2D score) + 12 (best 3D time) = Total score 66*

Example 2:

For their 2D challenge, Team 89 successfully reflected from 2 mirrors and hit the target in a zone 1. Their 3D challenge times were 21 seconds and 14 seconds

60 (starting points)
- 12 (4X the mirror points)
48 points (2D score) *48 (2D score) + 14 (best 3D time) = Total score 62*

In case of a tie, the team with the shortest combined preparation times for both 3D challenges will be declared the winner.

Scores will range from 3-120.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

ROCK HOUND

DESCRIPTION: Students will identify various rock and mineral specimens and answer questions about the characteristics of these specimens. Prior to the tournament, students may prepare a chart that can be used to help them during the event. One chart is allowed per team, **limited to 8 ½" x 14" in size.** Both sides may be used.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME**: 30 minutes

THE COMPETITION:

1. Teams will rotate through approximately 20 stations where they will identify rock and mineral specimens and answer questions about them. Most specimens will be in covered boxes that will be opened and closed at the supervisor's direction. Students are allowed to touch the specimens unless specifically instructed otherwise. Teams will have about 1 minute per station to answer 4 to 7 multiple choice or true/false questions. The only items they will be allowed to bring into the competition are their rock and mineral chart and pencils.
2. The rocks and minerals that competitors need to be familiar with are listed below. The emphasis this season is on **Metamorphic** rocks and minerals.

	Igneous	Sedimentary	Metamorphic
ROCKS:	basalt	conglomerate	anthracite coal
	granite	bituminous coal	gneiss
	obsidian	limestone (fossil)	marble
	pumice	sandstone	metaquartzite
	scoria	shale	schist (garnet)
			slate
			migmatite
			hyllite
			schist (mica)
MINERALS:	bornite (peacock copper)	calcite	Copper
	feldspar (pink)	quartz (amethyst)	halite
	hematite	quartz (crystal)	graphite
	gypsum (satin-spar)	quartz (rose)	kaolinite
	gypsum (selenite)	quartz (citrine)	pyrite
	mica-biotite	quartz (chert)	fluorite
	mica-muscovite	quartz (milky)	talc
	lepidolite	quartz (smoky)	galena
	garnet	**kyanite**	**staurolite**

3. Rock and mineral characteristic questions may be about their color, specific gravity, relative hardness, reaction to 3 molar hydrochloric acid, shape, texture, etc.

4. Students should bring their completed chart with them to the tournament. The chart may be used to help identify specimens and answer characteristic questions. The chart will not be turned in.

SCORING:
Each question answered correctly will be worth 1 or 2 points. The contestant with the highest total score will be the winner. Ties will be broken using predetermined tiebreaker questions.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

SIMPLE MACHINES

DESCRIPTION:
Participants will identify, use, and answer questions about simple machines and recognize the relationships between work, force and distance as they apply to each simple machine. Knowledge of the following six simple machines will be demonstrated: lever, inclined plane, pulley, screw, wheel and axle, and wedge. Students should know and understand the concept of mechanical advantage and be able to estimate it by comparing the ratio of forces or distances.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME**: 30 minutes

THE COMPETITION:
Participant(s) will move between stations containing pictures or examples of devices made up of one or more simple machines. Teams must move at the time indicated by the event supervisor to ensure that all teams have equal opportunity to use the equipment at each station (e.g. 2 minutes per station). Students may carefully handle and manipulate objects found at each station.

At each station students will answer questions designed to test their ability to:

- Identify the simple machines illustrated
- Identify parts of the simple machines (e.g. load, effort, fulcrum)
- Use equipment to measure some variable(s) such as length, force or weight
- Recognize the relationships between work, force and distance as they apply to each simple machine
- Know and understand the concept of mechanical advantage and be able to estimate it by comparing the ratio of forces or distances
- Perform simple calculations

Possible question formats could include:

- Identifying simple machines as parts of an object (yes or no for each type)
- Matching
- Multiple choice
- True/false

SCORING:
Points will be awarded for correct answers. Questions will be worth either 1 or 2 points. The team with the highest total points for all stations will win. Ties will be broken by a predetermined set of questions.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs.

STARRY, STARRY NIGHT

DESCRIPTION: This event will test students' knowledge of astronomical facts and concepts relating to the earth, moon, solar system, celestial sphere, stars and constellations.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME**: 30 minutes

THE COMPETITION:

The students will take a written test, consisting of a variety of question formats, including: true/false, multiple choice, matching, fill in the blank, and sketch a diagram.

Part I: A series of written questions about our solar system:

1. Distinguish between the motions of rotation and revolution.
2. Explain the astronomical basis for units of time--day, month, year.
3. Explain the causes for seasons on the earth.
4. Identify the phases of the moon and understand why they occur.
5. Compare solar and lunar eclipses and the conditions that produce them.
6. Demonstrate knowledge about the planetary members of the solar system.
    a. Characteristics of the planets, such as which has the longest day or year, the most number of moons, the widest temperature variance, order from the sun, and relative size.
    b. Visual identification of planets and planetary features.
    c. Glossary of terms listed on www.macombso.org.

Part II: Demonstrate knowledge about the celestial sphere and the following concepts: zenith, horizon, celestial meridian, celestial poles, celestial equator and ecliptic.

Be able to identify these constellations and specific stars or star cluster, on a star chart of any month with no constellation lines visible.

Constellation	Star or Star Cluster
Bootes	Arcturus
Canis Major	Sirius
Cassiopeia	
Cepheus	
Cygnus	
Draco	
Gemini	Castor, Pollux

Constellation	Star or Star Cluster
Leo	
Orion	Betelgeuse, Rigel
Scorpius	
Taurus	Aldebaran, Pleiades
Ursa Major	
Ursa Minor	Polaris
Virgo	Spica

Part III: A series of written questions and visual identification of the non-planetary members of the solar system:

1. **Meteoroids, meteors, meteorites, comets, asteroids – location, origin, composition.**
2. **Dwarf planets (aka Plutoids or Trans-Neptunians) – definition, names, locations.**
3. **Moons – In addition to Luna, be familiar with the characteristics of, and be able to visually identify the following moons:**
    a. **Phobos, Deimos (Mars)**
    b. **Io, Europa, Ganymede, Callisto (Jupiter)**
    c. **Mimas, Enceladus, Hyperion, Iapetus (Saturn)**
4. **Structure of the outer solar system – Kuiper Belt, Oort Cloud, Interplanetary Medium.**
5. **Know glossary terms specific to non-planetary members of the solar system, posted on www.macombso.org.**

Part IV: A series of written questions on various space missions, posted on www.macombso.org.

1. **Be able to recognize a basic description of each mission.**
2. **Know the important findings from each mission.**

SCORING: One (1), two (2) or three (3) points will be awarded for each correct answer, depending on the level of difficulty. There will be about **65** questions that add up to about **130** points**.** Tie-breaker questions will be included on the test.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

WATER ROCKETS

DESCRIPTION:
Prior to the tournament, contestants use 2-liter soda/pop bottles to build one or more rockets propelled by pressurized air and water. Rockets will be launched at the Tournament and time aloft recorded. The rocket that stays aloft for the longest time will win.

TEAM SIZE: 1-3 students **APPROXIMATE TIME**: 25 Minutes

CONSTRUCTION:

1. New rockets must be designed and built by members of this year's Science Olympiad team. Rockets or rocket components from previous years may not be used.
2. The school name, team number, and the **year** must be clearly marked on all rockets **with permanent marker.**
3. Each rocket must be made from a **GREEN** 2-liter soda/pop bottle, that is used to hold water and pressurized air, which 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 opening).
4. Fins, parachutes and other items may be added to the outside of the bottle to increase the time aloft. Elastic devices may be used to aid in nosecone and parachute deployment.
5. Items not allowed are: a) commercially made rocket components, b) sharp/pointed objects, c) parts made from glass and metal (except for small snap swivels for attaching parachutes). **There are no specific prohibitions on the use of glues. The Event Supervisor may publish separately information about glues that have been tested in some fashion, but will not endorse any specific glue. Teams should take care to not damage the pressure vessel.**
6. Minimum nose tip radius: The nose of the rocket must be rounded or blunt at the tip and designed such that when a standard 2 liter bottle cap (~3.1 cm diameter x 1.25 cm tall) is placed on top of the nose, no portion of the nose touches the inside top of the bottle cap (see Figure 1). Teams must not use a nose that is sharp, pointed, or consisting of a rigid spike regardless of the material used.
7. Fins and other parts added to the bottle must be 5 cm (2 inches) or higher above the level of the bottle's opening, to ensure that the rockets will fit on the launcher (see Figure 2).
8. Energy to propel the rocket must come exclusively from the water and pressurized air 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.
9. Parts of the rocket may separate during flight, but they must remain attached together by a string/lanyard.

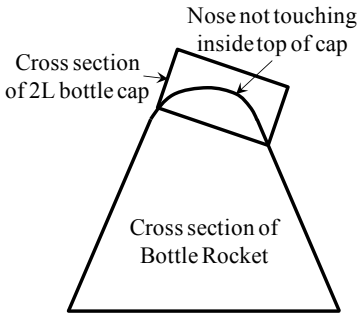


Figure 1

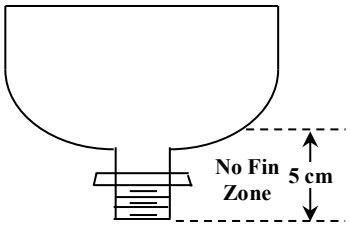


Figure 2

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 from fitting on the launch pad, must be removed before the rocket can be launched. Any on site repairs or modifications must be made by the competing students. Adult coaching help is not permitted. Rockets that are changed to meet the construction requirements will not be penalized. Rockets 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. If the rocket(s) contain parachute(s), competitors may be required to fully open and repack them for the event supervisor during inspection, before the water is added to the rocket.
3. 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.
4. The judges will pressurize the rocket to 75 psi. Anyone within 30 feet of a pressurized rocket must wear safety goggles. Contestants may not touch their rocket during or after pressurization. When practicing, only the coaches should pressurize the rocket and they should never exceed 75 psi.
5. 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.

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, any object in contact with the ground (e.g. tree, building) or disappears from sight. 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 behind all flights of rockets that remain intact and have no construction violations. **A rocket which bursts on the launch pad will be scored as an official launch with a construction violation.**
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 time. Teams with two flights will win ties over teams with only one flight.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

WEATHER OR NOT

DESCRIPTION: Students will be tested on their knowledge of meteorology (weather and climate).

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME**: 30 minutes

EVENT PARAMETERS:

The only items each team will be allowed to bring into the competition are pencils, and one 5”x 8” index card (per team) with notes on weather concepts. Both sides of the card may be used.

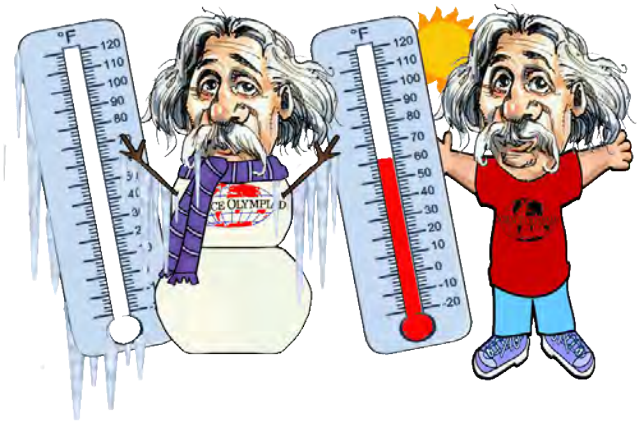
THE COMPETITION:

Student teams will answer questions regarding weather concepts. **For some questions, all students will collectively be presented information (e.g., a projected image on the wall).** During most of the session, teams will rotate from station to station, where they will have close to but likely less than a minute at each station.

Topics may include, but are not limited to, clouds and cloud formation, weather instruments, fronts, the atmosphere, the water cycle, severe weather, wind, seasons, weather terms and historical figures in the field of meteorology.

SCORING:

The team with the highest score will win. A majority of the questions will be multiple choice format. Each question will be worth **1, 2, or 3 points** based on the difficulty of the question (determined prior to the competition by the Event Supervisor). Two stations will have tie-breaker questions. **The first tie breaker will consist of a lengthy list of matching terms.** The second tie breaker station will ask a **short answer question**. Correct spelling and **legibility is recommended** to help prevent errors in scoring.



If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs

WILDLIFE SAFARI

DESCRIPTION: In this event, students will demonstrate their ability to identify wildlife and their habitats, **to identify their call and/or song**, as well as answer general information about the animals through the use of field guides.

TEAM SIZE: 1 or 2 Students **APPROXIMATE TIME:** 30 Minutes

THE COMPETITION:

Students will demonstrate their ability to identify **birds** of Michigan and answer questions from the ***Birds of Michigan Field Guide and Audio CD.*** Students should be familiar with the entire book, because questions may be selected from any part of it. **Not all of the bird calls or songs from the CD are in scope. The list is provided below.**

Each team will be issued their own copy of the test. Questions will vary in degree of difficulty and will be graded accordingly. Question format will be multiple choice and true/false. **The test will begin with a series of bird calls which will be played aloud for all teams.** A Scantron-type forms answer sheet will be provided.

Students will be responsible for bringing pencils, and up to one field guide per student. A field guide may be either the ***Birds of Michigan*** publication, or a student-created field guide. A student-created field guide must be contained in a binder or notebook with no loose pages. Students may **write or** highlight in the ***Birds of Michigan*** field guide **prior to the tournament**. Students may also place tabs in the book. **Anything loose or removed from a field guide during the test is not allowed.** No other materials will be allowed in the competition.

SCORING:

Answers may be worth between 1 and **4** points. **Bird calls will comprise 10%-20% of the total.** Ties will be broken based on the number of difficult questions answered correctly.

RESOURCES:

Birds of Michigan: Field Guide and Audio CD Set
By Stan Tekiela
ISBN-10: 1591930448
ISBN-13: 9781591930440
Publisher: Adventure Publications
Publication date: 2004
Pages: 296

BIRD CALLS OR SONGS

American Crow	Common Tern	House Sparrow	Rose-breasted Grosebeak
American Goldfinch	Cooper's Hawk	House Wren	Ruby-crowned Kinglet
Bald Eagle	Dark-eyed Junco	Indigo Bunting	Sandhill Crane
Baltimore Oriole	Eastern Kingbird	Northern Cardinal	Scarlet Tanger
Barred Owl	European Starling	Northern Flicker	Tree Swallow
Cedar Waxwing	Gray Catbird	Pied-bill Grebe	Tufted Titmouse
Chestnut-sided Warbler	Great Blue Heron	Pileated Woodpecker	Tundra Swan
Common Goldeneye	Great Horned Owl	Red-headed Woodpecker	White-breasted Nuthatch
Common Loon	Hooded Merganser	Red-tailed Hawk	White-throated Sparrow
Common Nighthawk	House Finch	Red-winged Blackbird	Wood Duck

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ZOWIE ESTIMATION

DESCRIPTION:

Presented with a variety of tasks, students will be asked to estimate mass in grams, volume in cubic centimeters, and number of objects in a container.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME**: 30 minutes

THE COMPETITION:

The competition will consist of three stations.

Station 1 Students will place an estimated 100 grams of a substance such as sand, cereal, corn meal or paper clips in a given container.

Station 2 Students will estimate the number of objects in three different containers holding from 100 to 10,000 pennies, beans, golf balls, etc.

Station 3 Students will estimate the volume of three different boxes between 100 and 2000 cubic centimeters. (Volume = length × width × height)

SCORING:

The score for each estimation will depend on how close the students' estimate comes to the correct value. The maximum score for each estimation is 100 and the minimum score is zero. Any estimate double the actual number, or larger, will result in a score of zero.

Example:

Estimate lower than actual: The students' estimate 3500 and the actual number is 4000. Their score will be: 3500/4000 = 0.875 x 100 = 87.5 points.

Estimate higher than actual: The students' estimate 5000 and the actual number is 4000. Their score will 5000/4000 = 1.25 – 2 = - 0.75 x 100 = 75 points. Notice that the negative sign is dropped to get the score

The overall score for the event will be the sum of the scores for Stations 1, 2 and 3. A perfect score for all three stations will total 700 points.

NOTE: Students will be provided with pencils and calculators (TI-108). The pencils and calculators may not be used as measuring devices. Fingers with pre-marked lines on them are not allowed. No other objects or measuring devices will be allowed. Students are allowed to handle and pick up the material at Station #1, and the boxes at Station #3. The containers at Station #2 may be touched but not picked up.

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