

2013

**MACOMB COUNTY
ELEMENTARY
SCIENCE OLYMPIAD
TOURNAMENT**

RULEBOOK CLARIFICATIONS



<http://macombso.org/elementary/>

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INTRODUCTION

The modified rules found in this book will be the official event rules for the 2013 Macomb Elementary Science Olympiad Tournament. The 2013 Rulebook Clarifications are modifications of rules found in the *National Science Olympiad Elementary Coaches Manual and Rules* © 2004. We gratefully acknowledge all contributions of the National Organization and thank them for allowing us to modify their rules for our Macomb Elementary Tournament.

CODE OF ETHICS:

Student participants are expected to compete in tournament events with honest effort and to follow the rules and the spirit of the competition. Team members are expected to be the builders of all the devices used in the events. The goal of competition is to give one's best effort while displaying honesty, integrity, and sportsmanship. Students, coaches, parents, and guests are expected to display courtesy and respect toward Science Olympiad officials, other teams, and guests of the Science Olympiad. Spectators at events that are open to public viewing are strictly forbidden from communicating in any way with active competitors. Violations of the spirit of this Code of Ethics may result in the disqualification of the offending competitors or teams.

Team Size: An elementary school may bring in 1 team of 16 students. If your district's elementary schools are K-5, your team may consist of any combination of 3rd thru 5th graders. If your district's elementary schools are K-6, your team may be made up of any combination of 3rd thru 6th graders. As in the past, each school is allowed to bring a maximum of 16 students to the Macomb Science Olympiad Tournament. Alternates are not invited. Further questions should be directed to the Tournament Director, Jody Saccoia, at esodirector@macombso.org

Volunteers: Each team must provide 2 adult volunteers (18 years of age, or a senior in high school) to help the day of the tournament. Each volunteer will be assigned one 2-hour session. Letters for Community Service hours will be available for students. Volunteer assignment cards will be in the team packets that you will receive at the April 2013 Pre-Registration Meeting. Schools may indicate their volunteers' choice of assignment, or whether they want us to assign them. Not all events require volunteers. Please notify the Volunteer Coordinator, Vicki Fraternali, at esovolunteer@macombso.org no later than March 31, 2013 if your school's volunteers have already committed to a particular job.

Rule Clarification: To request an event/rules clarification, please visit: <http://macombso.org/index.php/esofaqs.html> Clarifications will be posted on appropriate event web pages.

2013 EVENTS LIST

A is for ANATOMY- Skeletal and Muscular Systems (2012)

BRIDGING THE GAP (2010)

CHARGED UP (2008)

CRASH CAR EGGSPERT (2013)

DON'T BUG ME (2006)

ECOLOGY RANGERS (2013)

FORCE AND MOTION (2011)

GRASP A GRAPH (2007)

REFLECTION RELAY

ROCK HOUND

RUBBER BAND CATAPULT (2000)

STARRY, STARRY NIGHT

WATER ROCKETS (2008)

WEATHER OR NOT (2005)

WILDLIFE SAFARI (2002)

ZOWIE ESTIMATION (2004)

* Bold indicates new event or significant changes.

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 bones and muscles will be accepted as correct.

TEAM SIZE: 1 or 2 students

APPROXIMATE TIME: 30 minutes

THE COMPETITION: Twenty-six 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 answer sheet with a #2 pencil. Students should bring pencils.

SCORING: There will be twenty-five stations with three multiple choice questions per station. Each question will be worth one point, for a total of 75 possible points. The team with the highest point total will be the winner. Ties will be broken by the three questions at station #26. These questions will be open-ended (not multiple choice) and will be recorded on the back of the Scantron answer sheet. Only the correct spelling of scientific names of the structures will be accepted!

MUSCLE STUDY GUIDE

<p>FACE AND NECK TEMPORALIS MASSETER STERNOCLEIDOMASTOID BUCCINATOR PLATYSMA</p> <p>TRUNK PECTORALIS MAJOR SERRATUS ANTERIOR INTERNAL INTERCOSTAL EXTERNAL INTERCOSTAL TRAPEZIUS LATISSIMUS DORSI RECTUS ABDOMINIS EXTERNAL OBLIQUE INTERNAL OBLIQUE TRANSVERSE ABDOMINIS</p>	<p>SHOULDER & ARM DELTOID INFRASPINATUS SUPRASPINATUS TERES MAJOR TERES MINOR SUBSCAPULARIS</p> <p>TRICEPS BRACHII BICEPS BRACHII BRACHIALIS CORACOBACHIALIS BRACHIORADIALIS PRONATOR TERES</p>	<p>PELVIS AND LEG PSOAS MAJOR ILIACUS ILIOPSOAS GLUTEUS MAXIMUS GLUTEUS MEDIUS</p> <p><i>HAMSTRING GROUP:</i> BICEPS FEMORIS SEMITENDINOSUS SEMIMEMBRANOSUS</p> <p><i>QUADRICEPS GROUP:</i> RECTUS FEMORIS VASTUS LATERALIS VASTUS INTERMEDIUS VASTUS MEDIALIS</p> <p>GRACILIS ADDUCTOR LONGUS ADDUCTOR MAGNUS SARTORIUS GASTROCNEMIUS SOLEUS TIBIALIS ANTERIOR EXTENSOR DIGITORUM LONGUS CALCANEAL (ACHILLES) TENDON</p>
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BONE STUDY GUIDE

<p>FACIAL BONES PALATINE ZYGOMATIC LACRIMAL NASAL VOMER MANDIBLE MANDIBULAR CONDYLE MAXILLA PALATINE PROCESS</p> <p>CRANIAL BONES FRONTAL BONE PARIETAL BONE OCCIPITAL BONE FORAMEN MAGNUM OCCIPITAL CONDYLE TEMPORAL BONE EXTERNAL AUDITORY (ACOUSTIC) MEATUS MANDIBULAR FOSSA MASTOID PROCESS STYLOID PROCESS SPHENOID BONE GREATER WING HYPOPHYSEAL FOSSA ORBITAL SURFACE ETHMOID BONE CRISTA GALLI CRIBRIFORM PLATE PERPENDICULAR PLATE</p> <p>VERTEBRAE (GENERAL) BODY SPINOUS PROCESS TRANSVERSE PROCESS SPINAL (VERTEBRAL) FORAMEN</p> <p>CERVICAL VERTEBRAE (7) TRANSVERSE FORAMEN ATLAS (C-1) AXIS (C-2) ODONTOID PROCESS (DENS) THORACIC VERTEBRAE (12) LUMBAR VERTEBRAE (5)</p> <p>* BE ABLE TO TELL THE DIFFERENCE BETWEEN THE THREE TYPES OF VERTEBRAE.</p> <p>SACRUM COCCYX</p>	<p>RIBS TRUE OR VERTEBROSTERNAL RIBS (1-7) FALSE RIBS (8-12) VERTEBROCHONDRAL RIBS (8-10) VERTEBRAL (FLOATING) RIBS (11-12)</p> <p>STERNUM BODY MANUBRIUM XIPHOID PROCESS</p> <p>HYOID</p> <p>UPPER EXTREMITY CLAVICLE SCAPULA SPINE OF SCAPULA ACROMION PROCESS CORACOID PROCESS GLENOID CAVITY HUMERUS HEAD OF THE HUMERUS GREATER TUBERCLE LESSER TUBERCLE OLECRANON FOSSA CORONOID FOSSA DELTOID TUBEROSITY TROCHLEA CAPITULUM RADIUS STYLOID PROCESS OF THE RADIUS RADIAL TUBEROSITY HEAD OF RADIUS ULNA RADIAL NOTCH OLECRANON PROCESS CORONOID PROCESS STYLOID PROCESS OF THE ULNA CARPALS METACARPALS PHALANGES</p>	<p>LOWER EXTREMITY OS COXA (ILIUM, ISCHIUM, PUBIS) ACETABULUM OBTURATOR FORAMEN ILIUM ILIAC CREST GREATER SCIATIC NOTCH ISCHIUM ISCHIAL SPINE ISCHIAL TUBEROSITY PUBIS SYMPHYSIS PUBIS</p> <p>FEMUR HEAD OF THE FEMUR GREATER TROCHANTER LESSER TROCHANTER TIBIA MEDIAL MALLEOLUS TIBIAL TUBEROSITY FIBULA LATERAL MALLEOLUS PATELLA TARSALS TALUS CALCANEUS METATARSALS PHALANGES</p>
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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.html>, the supervisors will score the event accordingly.

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. Students may bring scissors, a ruler and a pair of pliers to use as tools while building the bridge. Teams 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. They will then be instructed to take their bridge to the testing area where they will place it on a scale to be weighed. After that, they will instruct the judges as to approximately how far apart the end supports for the bridge should be set. 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. As soon as the tennis ball is released from their hands, timing will start.
5. The bridge may not be attached to the end supports in any way.

SCORING:

1. All bridges that successfully support the tennis ball for 5 seconds will be ranked above those that do not. The bridges in each of these groups will be ranked according to the distance spanned, longest distance first, shortest distance last.
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.html>, 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

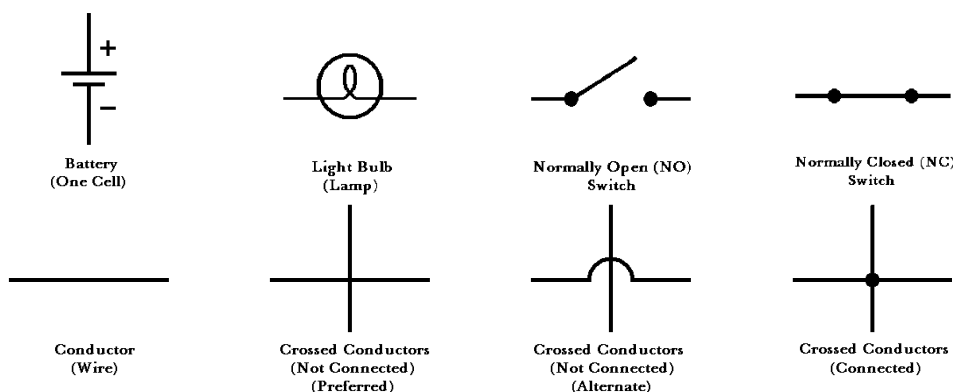
APPROXIMATE TIME: 30 Minutes

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 below.

SCHEMATIC SYMBOLS



Examples of possible items at the stations:

- Schematic drawings with questions regarding the circuits.
- A circuit set up with questions about what happens when a switch is closed/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 schematic drawing, construct an actual circuit.
- Identification of internally connected circuits on mystery cards.

SCORING: Points will be awarded for correct answers. The team with the highest total number of points will be the winner. Correct answers on the 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 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.html>, the supervisors will score the event accordingly

CRASH CAR EGGSPERT

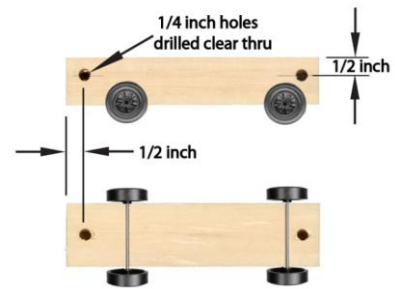
DESCRIPTION: Each team will build a structure on top of a PineCar Racer. The structure will be designed to hold and protect an egg as the car is rolled down a progressively steeper series of ramps and crashed into an immovable barrier.

TEAM SIZE: 1 or 2 students

APPROXIMATE TIME: Building time: 25 minutes
Ramp time: 10 minutes

CONSTRUCTION:

1. Teams will be provided with a basic assembled PineCar Racer that will be modified with four $\frac{1}{4}$ " holes that are drilled all the way through the wood body. Two of the holes will be drilled through the side, both will be $\frac{1}{2}$ " from the top, one $\frac{1}{2}$ " from the front and one $\frac{1}{2}$ " from the back. The other two holes will be drilled through the top, on center, one $\frac{1}{2}$ " from the front and one $\frac{1}{2}$ " from the back.
2. Additionally, teams will be provided with the following materials:
 - (2) 9" diameter foam plates
 - (6) Number #16 rubber bands
 - (6) Number #19 rubber bands
 - (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) $7 \frac{5}{8}$ " long, $\frac{1}{4}$ " diameter flexible drinking straws
 - (3) 3"x5" index cards
 - (6) cotton balls
 - (4) $2 \frac{5}{8}$ " long round wooden toothpicks
 - (1) 4" x 12" sheet of aluminum foil



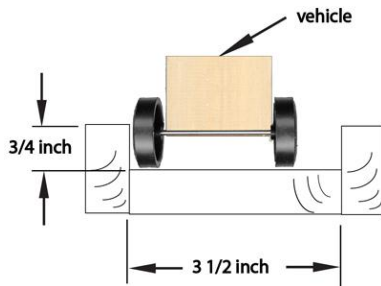
The container holding these materials may not be used in building the structure.

3. Each team will be given one large Grade A raw chicken egg. Team members are responsible for the care and handling of their egg from the time they take possession of it. If they wish, they may exchange the egg that they are given for another, but they must do so immediately after receiving the first egg.
4. Each team may bring 2 pairs of scissors, a ruler, 2 pencils and a pair of pliers. No other tools or materials are allowed.
5. The structure must be built in a way that allows easy insertion and extraction of the egg. Competitors will be required to remove the egg from the structure after each crash and show that it is still intact.
6. 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.
7. Each team will be given 25 minutes to construct their crash structure. 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.

8. 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.

THE COMPETITION:

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 rule #6. 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. Surviving eggs will be placed back in their crash cars and will advance to the intermediate ramp. Eggs that survive this ramp will advance to the steepest ramp.
7. 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.

SCORING:

1. Teams will be ranked in tiers according to how many crashes their egg survived. Those that survived all three crashes will be in Tier 1, two crashes Tier 2, one crash Tier 3 and no crashes Tier 4.
2. Teams with a construction violation that can't be modified within two minutes of discovery will be ranked in Tier 5.
3. Teams whose egg broke prior to the first ramp run will be ranked behind all others.
4. Rank within Tiers will be by construction time, shortest time first, longest time last.
5. The winner will be the team from Tier 1 with the shortest construction time.

If a rule clarification is posted on the web page for this event, supervisors will score the event accordingly. Please visit our website at <http://macombso.org/>

DON'T BUG ME

DESCRIPTION: Using characteristics of the major arthropod classes, the students are to distinguish insects from non-insects. They will also identify insect specimens, body parts, characteristics, habitats, ecological significance, and life cycles of all the major and minor orders of Insecta listed below.

Major Arthropod Classes	Major Orders of Insecta	Minor Orders of Insecta
Arachnida	Orthoptera	Ephemeroptera
Chilopoda	Odonata	Blattodea
Crustacea	Hemiptera	Mantodea
Diplopoda	Coleoptera	Megaloptera
Insecta	Lepidoptera	Phasmida *
	Diptera	
	Hymenoptera	

TEAM SIZE: 1 or 2 students

APPROXIMATE TIME: 30 minutes

THE COMPETITION:

Teams will rotate through 20 different stations that will contain insect specimens, pictures or both. Each station will have between 4 and 8 questions in a true/false, multiple choice or fill in the blank format. The only items students will be allowed to bring into the competition are a 2 sided, 8 ½" x 11" chart and a pencil.

SCORING:

True/false questions will be worth 1 point; multiple choice questions will be worth 2 points; fill in the blank questions will be worth 3 points. The team with the highest score will be the winner. The first tiebreaker will be the number of three point questions answered correctly, and the second tiebreaker will be the number of two point questions answered correctly.

* **Phasmida** was added after the initial rule publication.

Reference Book:

National Wildlife Federation

Field Guide To Insects and Spiders of North America

- **Paperback: 496 pages**
- **Publisher: Sterling (May 31, 2007)**
- **Language: English**

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.html>, the supervisors will score the event accordingly.

ECOLOGY RANGERS

DESCRIPTION: Students will be tested on their knowledge of the ecology of terrestrial biomes. Additionally, they will be expected to understand how human activities have affected this ecology.

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 with notes. Students are permitted to write notes on both sides of the card.

THE COMPETITION:

Teams will rotate between stations answering multiple choice and true/false questions. Answers will be recorded on Scantron answer sheets which will be provided by the supervisor. Questions will vary in degree of difficulty. One station will have a short essay question that will be used only as a tiebreaker.

Students should be prepared to be tested on the following material:

1. *Terrestrial Biomes*

The following six biomes: Tundra, Rain Forest, Desert, Taiga, Temperate Forest, and Temperate Grassland. Students will need to demonstrate their understanding of general ecological principles as they relate to these biomes.

- a. Food chains, food webs
- b. Predator-prey relationships
- c. Adaptations
- d. Succession
- e. Producers; primary, secondary and tertiary consumers; decomposers; scavengers

2. *Human impact on the planet*

Topics to include biotic and abiotic environmental problems such as the greenhouse effect, deforestation, soil erosion and species eradication.

3. *Alternative energy resources*

Topics include the cost, benefits and risks of: renewable and non-renewable sources of energy, recycling, composting and conservation.

SCORING:

Each correct answer will be worth one or two points. The winner will be the team achieving the highest score. Correct spelling will be expected on the tiebreaker answer.

If a rule clarification is posted on the web page for this event, supervisors will score the event accordingly. Please visit our website at <http://macombso.org/>

FORCE AND MOTION

DESCRIPTION: This event will test students' knowledge of the motion of objects and the forces that affect them. Students need to understand force, motion, speed, gravity and contact and non-contact forces.

TEAM SIZE: 1 or 2 students

APPROXIMATE TIME: 30 minutes

THE COMPETITION:

1. Students will move between stations containing pictures or examples of devices, which will demonstrate aspects of Newton's laws.
2. Students will:
 - a. Demonstrate an understanding of inertia and the effects of balanced and unbalanced forces.
 - b. Be familiar with the formula: $\text{Force} = \text{Mass} \times \text{Acceleration}$ and be able to use it to compare and estimate net forces. Students may be asked to calculate speeds.
 - c. Demonstrate knowledge of how contact forces, such as friction, and non-contact forces such as gravity, affect motion.
 - d. Be able to identify push and pull forces and be able to identify action and reaction force pairs.
 - e. Be asked to interpret graphs, charts, and experimental data to answer questions.
3. Scrap paper will be provided by the Event Supervisor.

SCORING:

Points will be awarded for correct answers. The team with the highest total number of points will be the winner. Ties will be broken by a predetermined set of questions.

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.html>, the supervisors will score the event accordingly.

GRASP A GRAPH

DESCRIPTION: Students will interpret and organize information using pictographs, pie, bar, double bar, line and double line graphs. Students may bring and use any or all of the following: a simple non-programmable calculator, rulers, and colored or regular pencils.

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, double bar, line and double line graphs.

Part 2: Two constructed response questions on graphing.

Part 3: 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, double bar, line or double line graph. Pictographs and pie graphs are not appropriate for Part 3 and should not be used. Scoring will be based on the completeness of the graph, including neatness and labeling.

SCORING:

70 % for multiple choice questions

10 % for two constructed response questions

20 % for preparation of a graph from a given a set of data

Tiebreakers:

1. The score on the graph prepared for Part 3 of the competition will used.
2. If ties remain, the scores on the constructed response questions in Part 2 will be used.

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.html>, the supervisors will score the event accordingly.

REFLECTION RELAY

DESCRIPTION: A team of three students will work cooperatively to determine the path a light beam takes, as it is reflects off of a series of plane mirrors.

TEAM SIZE: 3 students

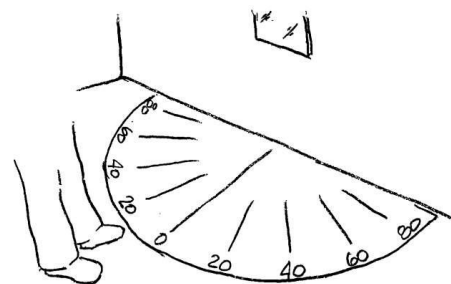
APPROXIMATE TIME: 20 minutes

THE COMPETITION:

Part 1 COMPETITION: 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.

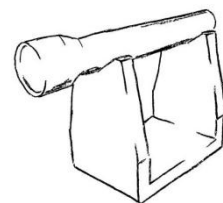
1. The light must reflect off of all four mirrors before hitting the target. There may be obstacles that the beam of light will have to be directed around (see sample diagram).
2. The three-team members must cooperate to direct the beam of light on the target. They must use all four mirrors to change the light's path.

3. Team members must stay at least 80 cm away from the permanently placed mirror. 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.



4. Each team will be given up to one minute of preparation time before the clock is started.
5. Each team will be given two different reflection relay challenges.
6. Materials that will be provided for each team:

- A light source (a 'Mag-Lite' focusable flashlight on a wooden stand), (The light source will already be in position and focused),
- 3 movable 'handheld' mirrors (3" X 4"),
- 1 non-moveable mirror (3" X 4"), (will already be attached to the wall),
- 1 protractor (80 cm radius, will already be positioned on floor),
- Target (Will already be fixed in some location).



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

Part 1 SCORING:

1. Each team will be timed. The objective is to attain the lowest elapsed time in seconds. One point will be added for each second.
2. 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.
3. No team will be allowed to use more than two minutes to accomplish each challenge. Maximum score for each challenge will be 120 points.

Part 2 COMPETITION:

Three team members will have 10 minutes to work together on a 5 page test that will be provided by the supervisor. Each page of this test will require competitors to predict the outcome of scenarios that use a light source, mirror(s) and target(s).

Participants may bring rulers, protractors, and any type of writing utensil.

Part 2 SCORING:

For each page of the written test answered correctly, one (1) point will be deducted from the team's score from Part 1. Partial credit will not be given for any page that is partially correct.

FINAL SCORE -

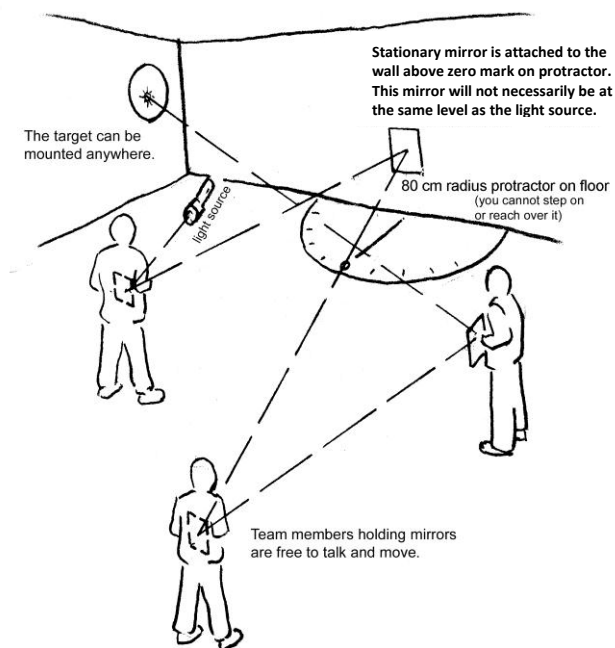
Scores from the two Reflection Relay challenges in Part 1 will be combined, and then the score from Part 2 will be subtracted from the Part 1 score. Lowest total score wins.

In case of a tie, the team with the shortest preparation time for both challenges combined in Part 1 will be declared the winner.

Scores may range from 1-240.

This diagram of Part 1 represents one possible set up of the equipment and is not necessarily the set up that will be used at the tournament.

NOTE: The angles of reflection and incidence shown in this illustration have not been measured, and are not necessarily accurate.



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ROCK HOUND

DESCRIPTION: Students will prepare a chart that they will use to help them identify various rock and mineral specimens. They will then answer questions about the characteristics of these specimens.

TEAM SIZE: 1 or 2 students

APPROXIMATE TIME: 30 minutes

THE COMPETITION:

1. Teams will rotate thru 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. Teams will have 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. The rocks and minerals that competitors need to be familiar with are listed below:

ROCKS

anthracite coal	basalt	conglomerate
bituminous coal	gneiss	granite
limestone (fossil)	marble	obsidian
pumice	metaquartzite	sandstone
schist (garnet)	scoria	shale
slate		

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

2. Rock and mineral characteristic questions may be about their color, specific gravity, relative hardness, reaction to 3 molar hydrochloric acid, shape, texture, etc.
3. Students should bring their completed charts with them to the tournament. The charts may be used to help identify specimens and answer characteristic questions. Charts will not be turned in.

SCORING:

Each question answered correctly will be worth 1 point. The contestant with the highest total score will be the winner. Ties will be broken using predetermined tiebreaker questions.

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.html>, the supervisors will score the event accordingly.

RUBBER BAND CATAPULT

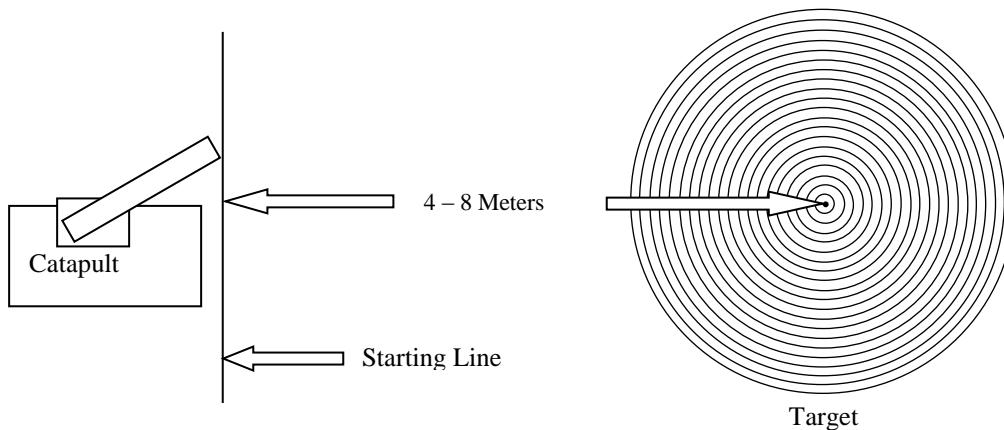
DESCRIPTION: Students will design and construct a catapult device, according to the parameters set forth in the rules, to shoot a rubber band at a target that is placed within a given range.

TEAM SIZE: 1 or 2 students

APPROXIMATE TIME: 20 minutes

THE COMPETITION:

1. Students are to design, construct and bring to the tournament a catapult device. This device should be capable of accurately and consistently shooting a rubber band a range of distances. **New catapults must be designed and built by members of this year's Science Olympiad team. Devices from previous years may not be used.** Catapults, data tables and rubber bands marked with team name and number, must be turned in prior to the start of the tournament.
2. **All major components of the catapults must be constructed entirely of wood or wood composite products. Other materials may be used to assemble the parts of the catapult or to construct a trigger mechanism.**
3. Evidence should be collected and presented on a data table which shows combinations of settings and distances rubber bands will travel.
4. The target consists of 20 concentric rings with a dot at their center. The smallest ring is approximately 8cm in diameter with approximately 5cm between rings. The center dot is approximately 2cm in diameter. The starting line will be located at one of the whole or half meter intervals, 4 to 8 meters from the center of the target.
5. Contestants will not be told the distance to the target until they enter the competition area.
6. No part of the catapult may extend beyond the back edge of the starting line. Back edge is defined as the edge furthest from the target.



7. Contestants may bring as many rubber bands as they wish. They will shoot 3 different rubber bands at the target. Practice shots are not allowed. Rubber bands should be packaged and labeled, when turned in, prior to the start of the tournament.
8. Rubber bands may not be more than 22 cm long (length, not circumference - measured with the rubber band suspended freely, under only its own weight, from a nail or similar object) and 1.0 cm wide. Rubber bands may not be knotted, linked together, or attached to any other material.
9. No one except contestants and judges are allowed in the competition area.

SCORING:

1. The score for each shot will be determined by the smallest ring (highest number) any part of a rubber band is touching or inside of when it comes to rest. The smallest ring is worth 20 points, with each successively larger ring worth 1 less point.
2. In addition to the 20 points for the smallest ring, an "X" will be awarded for all shots where any part of the rubber band is touching or within the center dot.
3. The final score will be equal to the sum of the numerical scores for all three shots.
4. The greatest number of points determines the winner.
5. Ties will be broken in favor of the team with: first, the most Xs; second, the most 20s, continuing with 19s through 1s. Any remaining ties will be broken in the same manner comparing each shot, 1st thru 3rd, in order.
6. If ties still exist, the team with the best-prepared data table will win.
7. **Catapults that are constructed using any material other than wood or wood composite products will be ranked behind all legal devices.**

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.html>, the supervisors will score the event accordingly.

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:

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

1. Distinguish between the motions of rotation and revolution and the effects produced by them.
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 the factors that produce them.
5. Compare solar and lunar eclipses and the conditions that produce them.
6. Demonstrate knowledge about the planetary members of the solar system.
 - a. Classification of planets based on various schemes—relative distance from the sun, relative sizes, temperature, composition, density.
 - b. Characteristics of the planets—length of day, length of year, number of moons, and atmosphere.
 - c. Visual identification of planets and planetary features.
 - d. Glossary of terms specific to planetary mechanics and planetary features.

Part II: Given a select list of constellations, know location, season visible, the alpha and beta stars. Demonstrate knowledge about the celestial sphere and the following points: zenith, horizon, celestial meridian, celestial poles, celestial equator and ecliptic.

Star Charts with these constellations and specific stars are to be identified:

CONSTELLATION	STAR OR STAR CLUSTER
Aquila	Altair
Bootes	Arcturus
Canis Major	Sirius
Canis Minor	Procyon
Cassiopeia	
Cepheus	
Cygnus	Deneb
Draco	
Gemini	Castor, Pollux

CONSTELLATION	STAR OR STAR CLUSTER
Leo	Regulus
Lyra	Vega
Orion	Betelgeuse, Rigel
Pegasus	
Scorpius	Antares
Taurus	Aldebaran, Pleiades
Ursa Major	Merak, Dubhe
Ursa Minor	Polaris
Virgo	Spica

Part III: A series of written questions about the non-planetary members of the solar system:

1. Meteoroids, 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, Titan (Saturn)
 - d. Triton (Neptune)
4. Structure of the outer solar system – Kuiper Belt, Oort Cloud, Interplanetary Medium.

SCORING: One (1), two (2) or three (3) points will be awarded for each correct answer, depending on the level of difficulty. Tie-breaker questions will be included on the test.

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.html>, the supervisors will score the event accordingly.

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: 10 Minutes

CONSTRUCTION:

- 1. New rockets must be designed and built by members of this year's Science Olympiad team. Rockets from previous years may not be used.**
- Each rocket must be made from a 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's opening).
- 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. 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) and d) adhesives, such as super glue (cyanoacrylate) and high temperature hot glue, that weaken the bottle.
- 4. The height of the rocket, in its pre-launch state, cannot be more than 24 inches.**
- Rocket(s) must fit on the launch pad provided by the event supervisor.
- 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.
- Parts of the rocket may separate during flight, but they must remain attached together by a string/lanyard.
- The school name and team number must be clearly marked on all rockets.

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 must fully open and repack them for the judges, prior to launch.
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 and launch it. Anyone within 30 feet of a pressurized rocket must wear eye protection. Contestants may not hold their rocket during 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.
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 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.html>, the supervisors will score the event accordingly.

WEATHER OR NOT

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

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 with notes about weather. One index card per team will be allowed. Notes are permitted on both sides of the card.

THE COMPETITION:

Student teams will rotate between 20 stations and be given a test on weather terms and concepts. Topics may include clouds, simple scientific weather instruments and their functions (such as thermometers, barometers, etc.), 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.

SCORING:

The winner will be the team achieving the highest score. Eighteen stations will have 2 multiple choice questions worth two points each, and 2 true/false questions worth 1 point each. Two other stations will have 1 short essay question. The essay questions will be used only as a tie-breaker. Correct spelling will be expected for the essay answers.



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WILDLIFE SAFARI

DESCRIPTION: In this event, students will demonstrate their ability to identify Michigan wildlife and their habitats through the use of field guides.

TEAM SIZE: 1 or 2 Students

APPROXIMATE TIME: 30 Minutes

THE COMPETITION:

Each year a separate animal group will be studied rotating between the following:

1. Birds
2. Mammals
3. Reptiles/Amphibians
4. Fish

In **2013**, students will demonstrate their ability to identify Michigan **birds** using the ***Birds of Michigan Field Guide (2nd Edition)***.

Teams will rotate between 10 and 20 stations where they may view photographs of **birds, bird skins, mounted birds, feathers, nests, skulls and/or photographs of habitats**. Each station will consist of 1 to 6 questions and each team will have between 1 and 3 minutes to answer all questions at a station. Questions will vary in degree of difficulty. Questions will be multiple choice, true and false, and short answer. Answer sheets will be provided.

Students will be responsible for bringing the ***Birds of Michigan Field Guide (2nd Edition)*** and pencils. Students may write, highlight and/or place tabs in the book to assist them in using it. No other materials will be allowed in the competition.

SCORING:

Each correct answer will be worth between 1 and 10 points. Tie-breakers will be based on the number of difficult questions answered correctly, and the use of correct terminology and spelling on short answer questions.

RESOURCE:

Birds of Michigan Field Guide, 2nd Edition* (\$12.95)

By Stan Tekiela

Adventure Publications

820 Cleveland St. S

Cambridge, MN 55008

1-800-678-7006

<http://www.adventurepublications.net>

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.html>, the supervisors will score the event accordingly.

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 5000 pennies, beans, golf balls, etc.

Station 3 Students will estimate the volume of **three** different boxes between 100 and 1000 cubic centimeters. (Volume = l x w x h)

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: $3500/4000 = 0.875 \times 100 = 87.5$ points.

Estimate higher than actual: The students' estimate 5000 and the actual number is 4000. Their score will $5000/4000 = 1.25 - 2 = -0.75 \times 100 = 75$ 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.

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.html>, the supervisors will score the event accordingly.