2014

MACOMB COUNTY ELEMENTARY SCIENCE OLYMPIAD TOURNAMENT

EVENT RULES

http://macombso.org/elementary/

INTRODUCTION

These are the official event rules for the 2014 Macomb Elementary Science Olympiad Tournament. Most 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 John Ogden,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 2014Final 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.orgno later than March28, 2014 if your school's volunteers have already committed to a particular job.

*Rule Clarification:*To request arules clarification, please visit:http://macombso.org/index.php/esofaqs.htmlClarifications will be posted on appropriate event web pages.

2014 EVENTS LIST

A is for ANATOMY- (2014)

CHARGED UP (2008)

CRASH CAR EGGSPERT (2013)

DON'T BUG ME(2006)

ECOLOGY RANGERS (2013)

GRASP AGRAPH (2007)

MYSTERY ARCHITECTURE (2014)

REFLECTION RELAY

ROCKHOUND

RUBBER BAND CATAPULT (2000)

SIMPLE MACHINES (2014)

STARRY, STARRY NIGHT

WATER ROCKETS (2008)

WEATHER OR NOT (2005)

WILDLIFE SAFARI (2002)

ZOWIE ESTIMATION(2004)

* Bold indicates new event or significant changes.

MACOMB ELEMENTARY SCIENCE OLYMPIAD
2014 EVENT DESCRIPTIONS

A is for Anatomy
Students will identify anatomical structures of the human nervous, cardiovascular, and respiratory systems. Included on the test are scientific names of the parts of the brain, a spinal cord cross section, a neuron, the simple spinal reflex, special senses (ear and eye) the cardiovascular system and the respiratory system.

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 an egg as the car is rolled down a progressively steeper series of ramps and crashed into an immovable barrier

Don't Bug Me
Using characteristics of the major arthropod classes, students are to distinguish insects from non-insects. They will also identify insect specimens, body parts, characteristics, habitats, ecological significance, and life cycles of specified orders of insects.

Ecology Rangers
Students will be tested on their knowledge of the ecology of Michigan Wetlands. Additionally, they will be expected to understand how human activities have affected this ecology.

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

Mystery Architecture
Students will be given a bag of materials to build a freestanding tower as tall as they can. The tower should be constructed to support a tennis ball at its top.

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

Rock Hound
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.

Rubber Band Catapult
Prior to the tournament, students will design and construct a catapult device. At the tournament, students will demonstrate the accuracy of the catapult by shooting a rubber band at a target that is placed within a given range.

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. Students should know and understand the concept of mechanical advantage and be able to estimate it by comparing the ratio of forces or distances.

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.

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 andtime 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 Michigan mammals 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**nervous,cardiovascular,and respiratory systems**.**Included on the test are scientific names of the parts of the brain, a spinal cord cross section, a neuron, the simple spinal reflex, special senses (ear and eye) the cardiovascular system and the respiratory system.**

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 **nervous, special senses, cardiovascular and respiratory 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 threemultiple choicequestions 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!

NERVOUS SYSTEM STUDY GUIDE

Parts of the brain:	**Spinal cord cross section:**	**Simple spinal reflex (reflex arc):**
- brain stem	- posterior median sulcus	- receptor
- midbrain	- anterior median fissure	- afferent or sensory neuron
- pons	- white matter	- interneuron
- medulla oblongata	- gray matter	- efferent or motor neuron
- cerebellum	- ventral roots	- effector (muscle or gland)
- cerebrum	- dorsal roots	
- frontal lobe	- dorsal root ganglion	
- parietal lobe	- spinal nerve	
- occipital lobe	- pia mater	
- temporal lobe	- arachnoid mater	
- diencephalon	- dura mater	
- thalamus	- vertebrae	
- hypothalamus		
- pineal gland	**Parts of a Neuron:**	
- corpus callosum	- cell body	
- pituitary gland	- nucleus	
- ventricles	- dendrite	
- lateral ventricles	- axon	
- third ventricle	- axon hillock	
- fourth ventricle		
- optic chiasma		
- olfactory bulb		

SPECIAL SENSES STUDY GUIDE

Ear:	**Eye:**
Outer Ear - pinna (auricle) - external auditory (acoustic) meatus - auditory canal Middle ear - tympanic membrane - incus (anvil) - malleus (hammer) - stapes (stirrup) - auditory or Eustachian tube Inner ear - semicircular canals - vestibule - cochlea - oval window - round window - vestibular nerve - cochlear nerve	- lacrimal gland - sclera - cornea - pupil - iris - lens - retina - choroid - optic nerve - anterior cavity - posterior cavity - aqueous humor - vitreous humor (body)

CARDIOVASCULAR SYSTEM STUDY GUIDE

Heart:	
- right atrium - right ventricle - left atrium - left ventricle - aorta (ascending, arch, descending) - pulmonary trunk - pulmonary arteries (L&R) - pulmonary veins (L&R) - tricuspid valve - bicuspid or mitral valve	- inferior vena cava - superior vena cava - aortic semilunar valve - pulmonary semilunar valve - chordae tendineae - coronary arteries - cardiac veins Also know the path that blood takes through the heart.

RESPIRATORY SYSTEM STUDY GUIDE

Nares Nasal conchae - Superior - Middle - Inferior Nasal cavity Oral cavity Tongue Hard palate Soft palate Uvula Lingual tonsil Palatine tonsil Pharyngeal tonsil	Nasopharynx Oropharynx Laryngopharynx Hyoid Larynx - epiglottis - thyroid cartilage - arytenoid cartilage - cricoid cartilage Vocal folds Trachea Right Bronchus Left Bronchus Bronchioles Alveoli	Lungs - Right upper lobe - Right middle lobe - Right lower lobe - Left upper lobe - Left lower lobe - Horizontal fissure (right lung) - Oblique fissure (right & left lung) Diaphragm External intercostal muscles Internal intercostal muscles

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

CHARGED UP

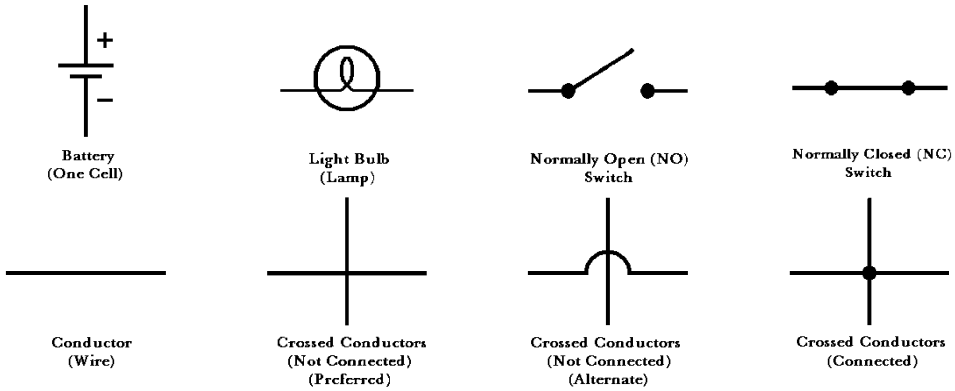
DESCRIPTION:Students will be tested on their knowledge of electricity and related concepts. The exam will cover circuits, conductors, diodes, voltage, current, resistance, schematic drawings, meter reading, electrical sources and safety.

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.

Studentsneed tounderstand 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 drawingswith 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 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

CRASH CAREGGSPERT

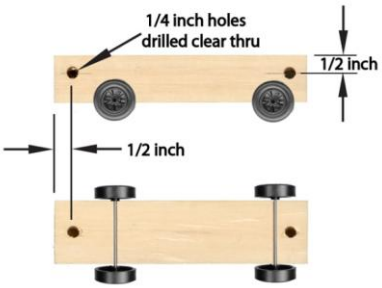
DESCRIPTION:Each team will build a structure on top of a PineCar Racer. The structure will be designed to hold and protect an egg as the car is rolled down a progressively steeper series of ramps and crashed into an immovable barrier.

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 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:**
   (1) 6 ½ x 3 ¼ Ziploc brand "snack bag"
   (3) 1 1/8" dia. x 1 ¼" large."Kraft Jet-Puffed" brand marshmallows
   (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 ⅝" long, ¼" diameter flexible drinking straws
   (3) 3"x5" index cards
   (3) ¾ in. x 3 in. Band-Aid brand "Sheer Strip" adhesive bandages
   (1) 4" x 12" sheet of aluminum foil
   The 10 ½ x 5 ¼ x 3 ¼ paper lunch bag holding these materials MAY 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 a '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.**

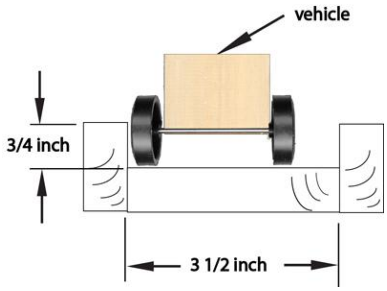
6. No part of the structure may come in contact with the wheels on the PineCar Racer or the ramp. Wheels of the car must be able to rotate freely and no part of the structure shall slow the car's descent by making contact with the ramp.

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 rules**#5 and 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 Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs.html

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.

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 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

ECOLOGY RANGERS

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

TEAM SIZE:1 or 2 students **APPROXIMATETIME**: 30minutes

EVENT PARAMETERS:
The only items each team will be allowed to bring into the competition are pencils, and one5"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. ***Michigan Wetlands***.Wetlands are transitional lands between terrestrial and aquatic systems.The following six types:marsh/coastal wetland, swamp, bog, fen, shrub wetland, and wet meadow/prairie. These types are characterized by a certain mix of vegetation, usually called indicator species.Students will need to demonstrate their understanding of general ecological principles as they relate to thesebiomes:
    a. Food chains, food webs
    b. Predator-prey relationships
    c. Producers; primary, secondary and tertiary consumers; decomposers; scavengers
    d. Invasive species
    e. Adaptations
    f. Succession
    g. Ecosystem services (value of wetlands)

2. ***Human impact on the planet.***
    Topics are species eradication, water quality, bioaccumulation, biomagnification, and pollution. Habitat loss and destruction,as well as mitigation and restorationare included.

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 Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombso.org/index.php/esofaqs.html

GRASP A GRAPH

DESCRIPTION: Students will interpret and organize information using pictographs, pie, bar, double bar, line and double linegraphs. 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 ofpictographs, pie, bar, double bar, line and double line graphs.

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, double bar, line or double 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:

70 % for multiple choice questions
30 % for preparation and interpretation of a graphfrom a given a set of data

Tiebreakers:

1. The score on the graph prepared for **Part 2** of the competition will used.
2. **If ties remain, specific 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.html

MYSTERY ARCHITECTURE

DESCRIPTION:Students will be given a bag of materials to build a freestanding tower as tall as they can. The tower should be constructed to support a tennis ball at its top.

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

COMPETITION:

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

SCORING:

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

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

NOTE:The measurements of an "official" tennis ball are:
DIAMETER: 2 1/2 inches (6.5 centimeters)
WEIGHT: 2 - 2 1/16 ounces (56.7 - 58.5 grams)

REFLECTION RELAY

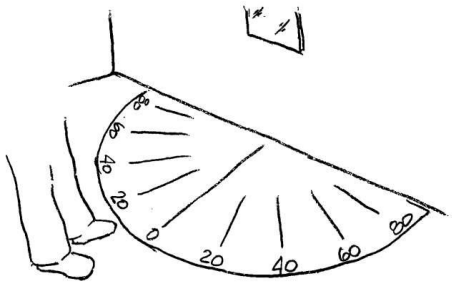
DESCRIPTION:A team of three students will work cooperatively to reflect a beam of light to a target using a series of plane mirrors.

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

THE COMPETITION:

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).

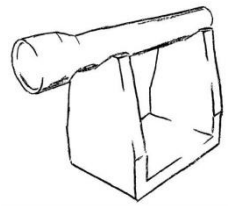


2. Team members must stay at least 80 cm away from the permanently placed mirror. A large protractor (radius of 80 cm) will be placed on the floor in front of the mirror. This will mark the distance the participants must stay away from the mirror and will also provide a measuring device if the participants 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.

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

4. Each team will be given two different reflection relay challenges.

5. Materials that will be provided for each team:

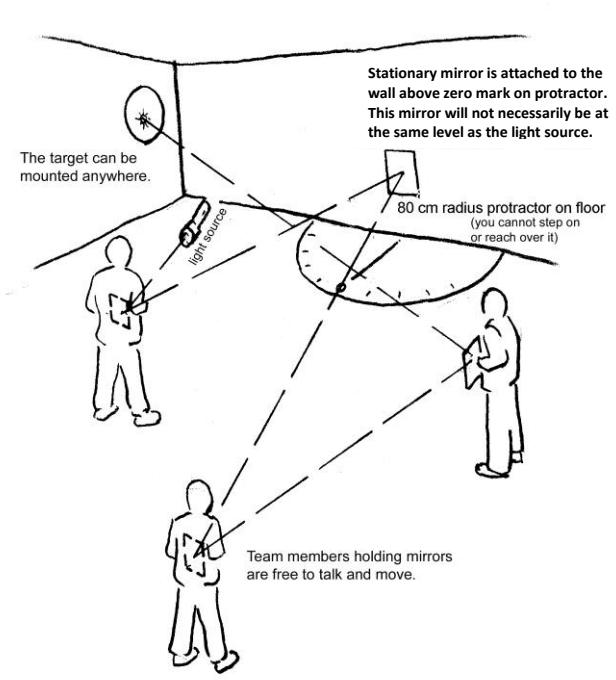


- A light source (a 'Mag-Lite' focusable flashlight on a wooden stand), (The light source will already be in position and focused),
- 3 movable 'handheld' mirrors (3" X 4"),
- 1 non-moveable mirror (3" X 4"), (will already be attached to the wall),
- 1 protractor (80 cm radius, will already be positioned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

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.



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 2SCORING:

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.

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

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.

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, specificgravity, relative hardness, reaction to 3 molarhydrochloric 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 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.html

RUBBER BANDCATAPULT

DESCRIPTION: Prior to the tournament, students will design and construct a catapult device.At the tournament, students will demonstrate the accuracy of the catapult by shooting 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 rubberbands marked with team name and number, must be turned inprior to the start of the tournament.

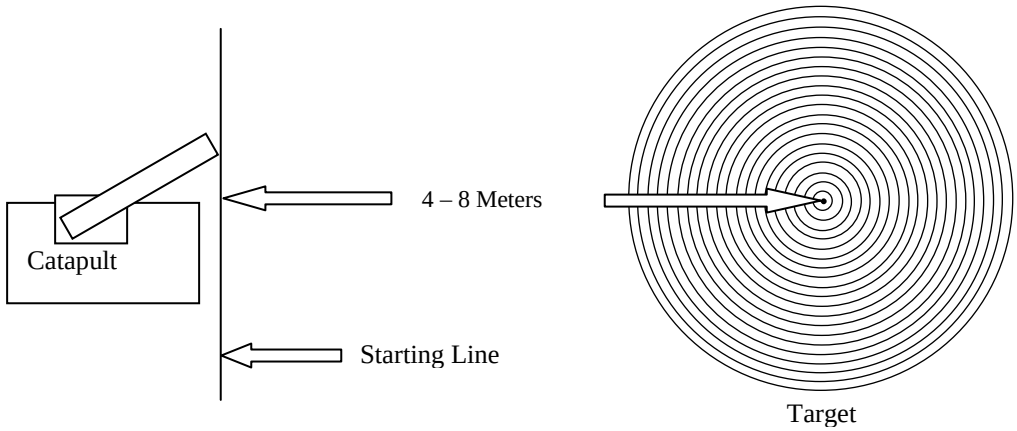
2. **All major components of the catapult must be constructed entirely of paper or cardboard. Metal, plastic or wood hardware are allowed for a pivot, alignment or trigger mechanism. Plastic glue, such as hot glue, is allowed.**

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. **Twostarting lines**will be located at one of the whole or half meter intervals, 4 to8 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 2 different rubber bands at the target from each of the two starting lines.**Practice shots are not allowed. Rubberbands should be packaged and labeled, when turned in, prior to the start of the tournament.

8. Rubber bandsmay 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 **four** 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 4th**, 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 otherthan paperor cardboardfor the major components will be ranked behind all legal devices.**

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

SIMPLE MACHINES

DESCRIPTION:Participants will identify, use, and answer questions about simple machines andrecognize 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).

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

1. identify the simple machines illustrated
2. identify parts of the simple machines (e.g. load, effort, fulcrum)
3. use equipment to measure some variable(s) such as length, force or weight
4. recognize the relationships between work, force and distance as they apply to each simple machine
5. know and understand the concept of mechanical advantage and be able to estimate it by comparing the ratio of forces or distances
6. perform simple calculations

SCORING:
Points will be awarded for correct answers. 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.html

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.
2. Explain the astronomical basis for units of time--day, month, year.
3. Explainthe causes for seasons on the earth.
4. Identifythe 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 planetarymembers of the solar system.
    a. Characteristics of the planets, such as length of day, length of year, number of moons, atmosphere, temperature, relative distance 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: 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
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 galaxies and nebulae, as well as questions about the life cycle of stars.

1. **Demonstrate knowledge of basic information about galaxies. What are they? Recognize shapes - spiral, elliptical and irregular.**
2. **Demonstrate knowledge of information about nebulae. What are they? Understand differences among reflection, emission, and dark nebulae, and be able to visually recognize those types.**
3. **Understand the main stages of stellar evolution – birth, main sequence, red giant, death, remnant.**
4. **Understand the size-dependent differences in star death (planetary nebula, supernova) and remnant type (white dwarf, neutron star, black hole, supernova remnant).**
5. **Know glossary terms specific to galaxies, nebulae and life cycle of stars, posted on www.macombso.org**
6. **Visually identify specific galaxies and nebulae. List is posted onwww.macombso.org**

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 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

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 from previous years may not be used**.

2. 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).

3. 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 less than 28 inches.**

5. **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.**

6. Rocket(s) must fit on the launch pad provided by the event supervisor.

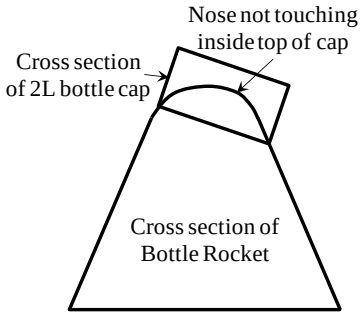


Figure 1

7. 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.

8. Parts of the rocket may separate during flight, but they must remain attached together by a string/lanyard.

9. 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 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

WEATHER OR NOT

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

TEAM SIZE:1 or2 students **APPROXIMATE TIME**:30 minutes

EVENT PARAMETERS:

The only items each team will be allowed to bring into the competition are pencils, and one5"x8" 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, seasonal changes in weatherand **notable scientists in the field of meteorology.**

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. Twoother stations will have 1short essayquestion. The essay questions will be used only as a tie-breaker. Correct spelling will be expected for the essay answers.

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

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. Amphibians/Reptiles
4. Fish

In **2014**, students will demonstrate their ability to identify Michigan **mammals** using the ***Mammalsof Michigan Field Guide (2nd Edition).*** Students will also demonstrate their understanding of basic ecological concepts such as food chains, food webs, and the impact of humans on the ecology of Michigan.

Teams will rotate between **15** and 20 stations where they may viewphotographs of **mammals, furs, tracks, 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 ***Mammals 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 short answers using correct terminology and spelling.

RESOURCES:
Mammals of Michigan Field Guide, 2nd Edition ©2005
By Stan Tekiela
Adventure Publications
820 Cleveland St. S
Cambridge, MN 55008

1-800-678-7006 or 763-689-9800

http://www.adventurepublications.net

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

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 = lxwxh)

SCORING:

The score for each estimation will depend on how close the students' estimate comes to the correct value. The maximum scorefor 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 700points.

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 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