

# **SCIENCE OLYMPIAD ELEMENTARY INVITATIONAL**

## **2011 RULES & SCHEDULE**

*(Revisions highlighted in pink)*

**Saturday, November 19, 2010**

**8:45 AM – 12:15 PM**

**Meet at Foster Hall (FHL)**

Each Team will have a maximum of 15 students. They will be divided as evenly as possible by the Team coach into 5 “Groups.” If you have 15 Team members, then you should have 3 students in each Group. If you have 10 Team members, then you should have 2 students in each Group. If you have 13 Team members, then you should have 3 Groups with 3 students, and 2 Groups with 2 students.

Each Team will be assigned a number. The Groups will have the designations of A, B, C, D, and E, added to the Team number. For example, Team #1 will be composed of Groups 1A, 1B, 1C, 1D, and 1E. Students must remain in the same Group for all five events. Students within the same Group are allowed and encouraged to talk to each other when they are working together in an event. The entire Team of 5 Groups will rotate together from event to event.

Since this tournament is to test students’ knowledge and understanding of scientific concepts, we encourage your Team to prepare and practice beforehand. If you’d like to make this a more spontaneous experience, we know your students will still enjoy themselves, but please do not be disappointed that this is not a “come and learn” activity with full explanations of principles and techniques. Complete tournament information (including registration forms, rules and schedule) may be found on the Southwest Washington Regional Science Olympiad website at <http://www.clark.edu/special/scienceolympiad/> by mid-September.

There will be ribbons for first through fifth place Teams in each event as well as a prize for the one Group that scores best in each event.

TENTATIVE SCHEDULE	
8:00 – 8:30	Coach check-in & begin assembling with team
8:45 – 9:00	Welcome & head off to event rooms
9:00 – 9:30	First event
9:40 – 10:05	Second event
10:15 – 10:35	Third event
10:45 – 11:05	Fourth event
11:15 – 11:35	Fifth event
11:45 – 12:15	Closing

## **BAMBOOZLING BOXES**

**Description:** Students will be asked to make observations and identify the contents of various closed boxes using only their senses of touch and hearing.

**Number of Participants:** Team divided into Groups of no more than 3 each (5 Groups per Team)

**Time:** 20 minutes

### **The Competition:**

1. Various common household and/or classroom items (such as golf balls, macaroni, erasers, pencils, sponges, etc.) will be placed in enclosed boxes.
2. Some boxes may contain up to 10 items, such as four erasers or three plastic forks. All the items in each box will be the same and not a mixture of items.
3. Groups will have approximately 15 minutes to examine five boxes by moving from station to station. This will allow about 3 minutes to examine, evaluate, confer, and record observations for each box.
4. As they examine the boxes, Groups will complete a Score Sheet detailing the evidence they have observed using their senses of touch and hearing. (See attached Score Sheet.) Students may not look into the boxes or go back to a box that the Group has already examined.

### **Scoring:**

1. Points will be awarded as described on the attached Score Sheet.
2. The score for each Group will be the sum of the scores.
3. The Team score will be the total of the 5 Group scores.
4. The highest score is the winner.
5. Team ties will be broken by the best Group score. Group ties will be broken by the Group with the best score for a station selected before the tournament by the event supervisor.





## **BARGE BUILDING**

**Description:** Using only the materials they are given, each group will construct a “barge” that can support a cargo of the largest number of objects without getting them wet.

**Number of Participants:** Team divided into Groups of no more than 3 each (5 Groups per Team)

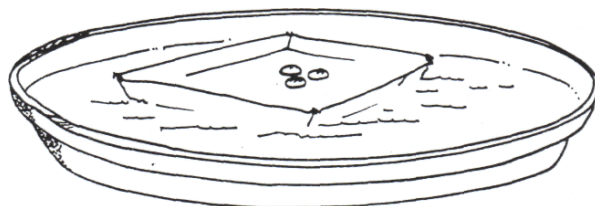
**Time:** 20 minutes

### **The Competition:**

1. Each Group will be given a collection of exactly the same building materials. The floatation will be provided by zip-style plastic bags (sandwich size) which may be inflated by way of drinking straws. Other building materials might include: regular tape, masking tape, paper clips, pipe cleaners, string, drinking straws, and/or popsicle sticks. Actual tournament materials will be determined by the event supervisor. Only materials provided by the event supervisor may be used in building the barge.
2. The event supervisor will inform each Group of the average mass of each cargo piece before they begin their construction. The cargo may be pennies, washers, paper clips, marbles, or other similar objects. The cargo will not be known until the time of competition.
3. Each Group will have 10 minutes to construct their barge.
4. The Group must predict the number of pieces of cargo that the barge will hold. Any cargo that drops in the water without landing on the barge, bounces off the barge as it is being loaded, or causes the barge to sink will not count in the total cargo. Sinking occurs when water enters the barge, cargo falls off the barge into the water, or cargo gets wet.
5. The judges will provide the Group’s “barge captain” with the cargo to be loaded, who will then have 3 minutes to load their barge. Each piece must be loaded one at a time while the barge is floating in a container of water. The barge must then be loaded until it sinks.

### **Scoring:**

1. The score will be determined by the following formula:  
*(Amount of cargo held x 10) – (the difference between predicted amount and actual amount).* For example: if the Group predicts their barge will hold 70 pieces and it sinks at 57, their score will be:  $(57 \times 10 = 570)$  minus *(the difference between 70 and 57 = 13)* or  $570 - 13 = 557$  points.
2. If the judges determine that a student intentionally sinks his barge or stalls the loading so that the 3 minute loading time expires at or near the predicted number, that Group will be disqualified and receive zero points.
3. The Team score will be the total of the 5 Group scores.
4. The highest score is the winner.
5. Team ties will be broken by the best Group score. Group ties will be broken by accuracy of the prediction.



## **METRIC MASTERY**

**Description:** Students will demonstrate proper use of various measuring devices for different objects using metric units. Measurements include length, mass, and volume. Measurement devices include rulers, tape measures, scales (for mass), and graduated cylinders (for volume). Students should be able to estimate a measure between marks on a measuring device. Students may also be asked to estimate a measure given a standard.

**Number of Participants:** Team divided into Groups of no more than 3 each (5 Groups per Team)

**Time:** 20 minutes

### **The Competition:**

1. Approximately ten objects will be designated for students to measure and/or estimate.
2. All measuring devices will be provided for each station. Students may not bring any standardized or marked measuring devices, including pencils, pieces of paper, etc. Students may only bring an unmarked pencil.
3. Students are not to use body parts as measuring devices. Penalties may be imposed.
4. Students will move from station to station as directed by the monitors of the event with about 90 seconds per station. Each Group will be given a score sheet to record their answers. Desired units will be identified on the score sheet (e.g., kilogram, gram or milligram).
5. If a station asks for an estimation, a reference for that measurement may be provided for the students to briefly examine and then set aside. It is suggested that each student in the Group make separate estimations and then discuss amongst themselves what their final answer will be.
6. Students should never make any marks on objects being measured or estimated. If a Group marks an object, they will receive a score of zero for that station.
7. Stations should be left as they were found. For example, all equipment must be returned to its original location. If a spill occurs, please clean up using the provided paper towels. Failure to return a station to its original settings could result in a substantial penalty for that station.
8. Intentionally damaging a station or altering the measured object so that following Group would make inaccurate measurements will lead to disqualification of the Group.

### **Scoring:**

1. Points will be awarded according to the precision of the estimations and the actual measurements determined to be appropriate by the judges. For example, any answer exactly right could earn 5 points; any answer that is within 10% could earn 4 points; any answer that within 25% could earn 2 points; and zero points for outside 25%.
2. The score for each Group will be the sum of the scores for each station.
3. The Team score will be the total of the 5 Group scores.
4. The highest score is the winner.
5. Team ties will be broken by the best Group score. Group ties will be broken by the Group with the most accurate score for a station selected before the tournament by the event supervisor.

## **PAPER ROCKETS**

**Description:** Each Group will build, test and fly a paper rocket using only materials they are given. Scores are based on longest distance and most accurate flight.

**Number of Participants:** Team divided into Groups of no more than 3 each (5 Groups per Team)

**Time:** 20 minutes

### **The Competition:**

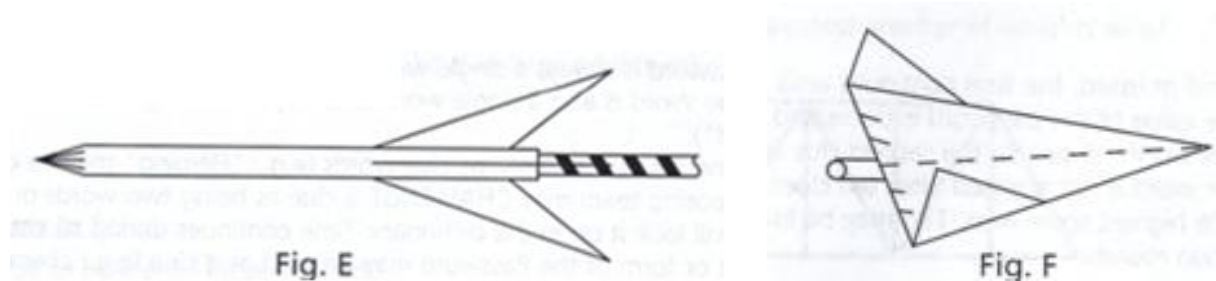
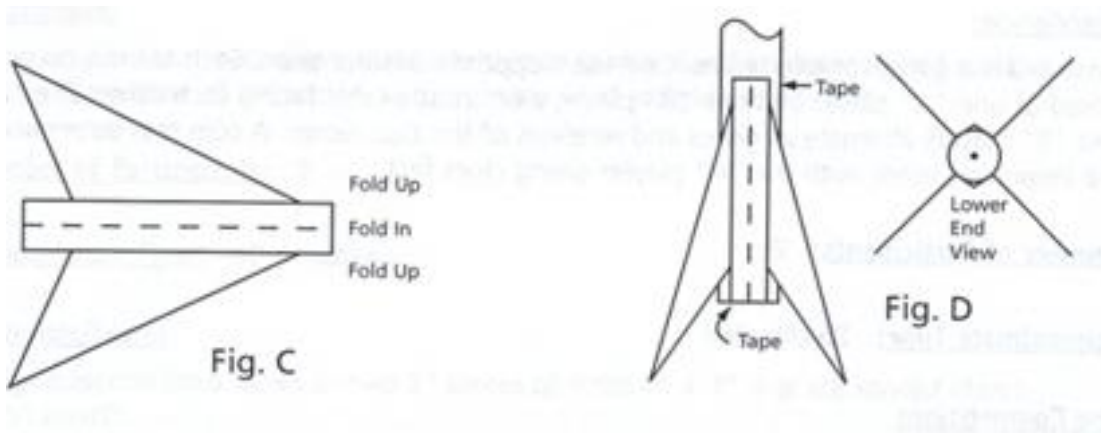
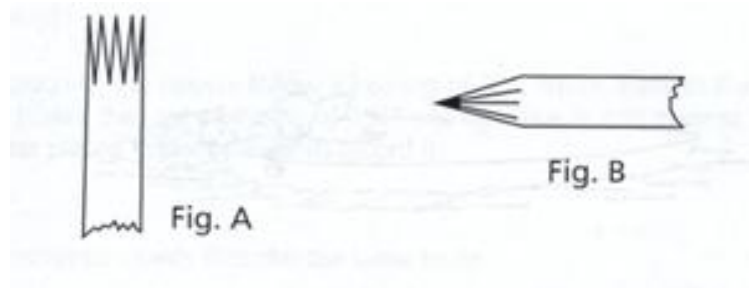
1. Each Group will be given the following materials: three large plastic soda straws, one sharpened pencil (approximately the same size as the straws), two sheets paper (standard weight, 8 ½" by 11"), cellophane or masking tape, scissors, and a ruler.
2. Groups will have up to 10 minutes to build a paper rocket of any design in which it is launched by blowing sharply on a straw. It may be constructed by the procedure described in the Sample Rocket section.
3. Students will be allowed two flights. They may launch one rocket twice or two different rockets one time each.

### **Scoring:**

1. Each Group will launch their rocket(s) from a designated launching spot toward a designated target specified by the judges.
2. After each launch, the judges will measure and record the distance from the launch point to the nose of the rocket where it comes to rest. They will also measure the distance from the rocket's nose to the center line of the launch area.
3. The score for each flight will be determine by the following formula: *(Distance in cm from launch point to rocket nose) - (Distance in cm from center line to rocket nose.)*
4. The Group's score will be the best (highest) of the two recorded scores.
5. The Team score will be the total of the 5 Group scores.
6. The highest score is the winner.
7. Team ties will be broken by the best (highest) Group score. Group ties will be broken by the Group with the best (lowest) accuracy score.

**Sample Rocket for Paper Rockets:**

1. Cut a strip of paper about 8.5" long by 1"-2" wide.
2. Roll the paper strip around the pencil lengthwise to form a tube. Tape the paper so that the tube slides easily off the pencil but is not too loose.
3. Make several pointed cuts at one end of tube. See Figure A.
4. Slide the sharpened end of the pencil toward the pointed cuts. Fold the points around the sharpened end of the pencil and tape to form the nose cone. Do not tape the paper to the pencil. See Figure B.
5. Cut out two sets of fins. The pattern and folding instructions (dashed lines) in Figure C may be used.
6. Using two pieces of tape, fix the fins to the opposite end of the tube from the nose cone. Insert the pencil for support in taping. See Figure D.
7. Place the rocket over the straw. See Figure E.
8. The rocket is launched by aiming the rocket in the desired direction and blowing sharply on the straw.



## PONDERING POWDERS

**Description:** Participants will be asked to make observations and identify common white household powders.

**Number of Participants:** Team divided into Groups of no more than 3 each (5 Groups per Team)

**Time:** 20 minutes

### The Competition:

1. Students will be asked to identify the following powders: **ascorbic acid** (powdered, not tablet, form of vitamin C), baking soda, cornstarch, flour, gelatin (such as Knox, not Jello), non-iodized salt, granulated sugar (not powdered), and plain white sand. (The sand should not react in any way with any test done for this event.)
2. Each Group of students will be given four vials marked A, B, C, and D. Each vial will contain one or two powders selected from the powders listed above. The contents of the vials will be different from each other.
3. Each Group of students will be given about 15 minutes to fill out a check-off sheet with a list of possible observations and correctly identify the powders in the four samples.
4. Groups will be supplied with the following materials to aid in the identification of the powders: white vinegar, distilled water, tincture of iodine, test tubes/small cups, spatulas/stir sticks, and black paper.
5. Each Group needs to bring one magnifying glass (or jeweler's lope) and one **conductivity tester/probe\***. Students will not be allowed to bring other materials for testing.
6. Each Group of three students may also bring one chart describing the powders' reactions to the above materials. The chart can be no larger than one side of an 8.5" by 11" piece of paper and must be completed before attending the tournament.
7. Safety precautions **MUST** be used. **Clark College policy requires students to wear long pants and closed toed shoes.** The event supervisor will supply splash-proof safety goggles (or Teams can bring their own).
8. No tasting, touching, or smelling of powders will be allowed!
9. Students will be expected to use proper laboratory techniques\*\* so as not to contaminate samples provided for testing. Penalties may be imposed for this violation.
10. Paper towels will be supplied for clean up. Any Group failing to clean up their area before leaving will be penalized up to 10 points. Students will receive instructions on where to put various waste materials.

### Scoring:

1. The score for each Group will be number of correct observations and powders identified.
2. The Team score will be the total of the 5 Group scores.
3. The highest score will be the winner.
4. Team ties will be broken by the best Group score. Group ties will be broken by the Group with the most correctly identified powders. The second tie breaker is any Group failing to adequately clean up their area or not using proper laboratory techniques.

\*A simple **conductivity tester/probe** to test for the presence of ion in solutions can be made from simple cheap parts (a 9 volt battery, a battery clip, a resistor, an LED, some wire, a popsicle stick and some electrical tape.). Instructions for building a simple device may be found at <http://www.clark.edu/special/scienceolympiad>.

**\*\*Proper Laboratory Techniques:**

- Never put leftover sample back into the original sample container.
- When taking a sample of powder/liquid, use either a clean spatula/dropper or use the same spatula/dropper each time with the same powder/liquid.
- Label spatulas/droppers for each powder/liquid. Different color tape works well for this.
- Never use the same spatula/dropper to sample different powders/liquids.
- Spatulas/droppers used to transfer materials should either be placed back in the container they came from or on a clean paper towel.
- Never lay a spatula or dropper on a table (where it can pick up contaminants) and then reuse it.
- Use a separate spatula for stirring. Do not use the same spatulas/droppers for transferring materials as those used for stirring.
- Never mix chemicals that you are not instructed to mix.
- Use small amounts of sample or reagents (vinegar and iodine) as instructed.
- Dispose of all powders and solutions as instructed.