2016 EVENT SUPERVISOR GUIDE - BIO-PROCESS LAB (B)

EVENT INFORMATION

DESCRIPTION – Bio-Process Lab is a lab-orientated competition involving the fundamental science processes of a middle school life-science program.

RULES – Rules are available from your Tournament Director.

- **2016** should appear at the bottom by the page number.
  - At **www.soinc.org** see the **Event Information** and **Event Supervisor** sections
- BE SURE TO CHECK THE RULES for Event Parameters and suggested topics.
- Rules clarifications are available on the National website at www.soinc.org under event information.

ROTATION – Bio-Process is in for 2 years of a 6 year rotation- other events in 2 yr. rotation are Heredity and Microbe Mission.

FORMAT – Bio-Process Lab is run as timed stations with enough stations to accommodate the number of teams competing per session .

EVENT NEEDS

ROOM TYPE – a lab with electricity, water, and sinks is best or at least a room with tables and electricity for the microscopes.

HELPERS – 2 or 3 helpers are needed to time stations, rotate students, proctor and grade.

EQUIPMENT – microscopes, stereoscopes, triple beam and electronic balances, probes, and other equipment and glassware for the lab practical stations

TIME NEEDED FOR SETUP – Be sure you have at least an hour before your competition with no event in your room so you can set up the stations.

PREPARATION FOR COMPETITION

TIME-LINE FOR PLANNING - You will need to know the number of teams competing. Teams consist of two students so plan accordingly. Be sure you have enough time to prepare the questions, answer keys, answer sheets, and assemble needed equipment

ORGANIZING CONTENT – See page 3 for process skills and page 4 for suggested station topic and types of questions.

WRITING QUESTIONS

- The philosophy of Science Olympiad is that the competition be inquiry- based to emphasize process skills and mental challenges using suggested content.
- Care should be taken to design the each station to require about the same amount of time.
- If there are a large number of teams per session, consider using 2 complete station setups.
- Balance the station content so that it reflects the content described in the rules. Students are expecting to see all of the topics listed in the rules to be reflected in the competition.
- Develop questions which are easy to grade.
- Develop appropriate questions so that **all** ties can be broken.
- Be sure that all teams experience the same testing conditions.

VARING DIFFICULTY FOR SUCCESS OF MANY - To allow most students to be successful, it may be a good idea to vary the difficulty of questions at each station!

ANSWER SHEET ORGANIZATION – Organize the answer sheet so it is easy for students to use and easy for your team to grade. Include team name, team number, student names, as well as a place to record raw score, rank, and points. Be sure you have enough answer sheets for each team. It may be a good idea to put team names and numbers on the answer sheets ahead of time.

ANSWER KEY AND SCORING RUBRICS –

- Questions will be assigned point values.
- Students will be ranked from highest to lowest score.
- Ties will be broken by pre-determined tie-breaker questions.
- Have extra answer keys so your helpers can help you to grade the competition.

- Be sure each section is graded by the same person.

RUNNING THE EVENT

SET UP TIPS

- It may help to have questions laminated or put in sheet protectors. This procedure eliminates damage or tampering during competition.
- Be certain that equipment and questions are placed at the station for easy access of the students.
- Taping questions to the table helps to keep stations organized and undisturbed.
- Using arrow may help students move from station to station.
- Bring extra items needed at stations as rulers. If one is needed, put three there.
- A quick supervisor checklist of useful items to include:
  extra answer keys, extra answer sheets, calculators, extra mm rulers, extra pencils
  an extra set of questions, highlighters, masking tape, red pens, scotch tape
  stapler, stop watches or timers.

CHECK IN TIPS– if possible, allow all teams to compete even if one or both members are late. They may need to miss some stations but they can do part of the competition.

- Check each team member for wrist bands or approved ID before giving teams their answer sheet. Have extra pencils and direct students print their names on sheet.
- Direct student to turn off all non-permitted electronic devices. You may wish to have devices put in a designated spot, given to someone outside the room, or placed in the student back packs and stored at a designated spot in the room.
- Allow each team to have only what is permitted in the Event Parameters.
- Keep students away from the stations until you are ready to begin the competition.
- Give all directions and safety information to all teams before beginning.
- Explain the station setup scheme and rotation pattern to the students.

ROTATION OF STUDENTS FOR STATIONS – Using arrows taped to the table helps students. Helpers can also be stations around the room to help with rotation.

TIMING – Stop watches or timers are best for timing the stations. Have a person responsible for timing the event.

PROCTORING – Use two or three helpers to assist with rotation, checking equipment at stations, and proctoring the competition. You may want proctors to check microscopes, balances, and probes as the students rotate. If you train them during the first session, you can grade papers during successive sessions.

DEALING WITH PROBLEM SITUATIONS – have the cell phone numbers of officials

- DISQUALIFICATIONS OF A TEAM SHOULD BE RESTRICTED TO SAFETY ISSUES, CHEATING, OR ABUSIVE AND UNSPORTSMAN-LIKE BEHAVIOR**.**
- Be sure that tournament officials and coaches are notified of any disciplinary action.

CHECK OUT TIPS

- Be sure to get an answer sheet from each team before you allow them to leave the competition.
- Be sure the team number, team names and member names are present and legible.
- Remind students to take all their backpacks and other possessions as cell phones.

SCORING THE EVENT – DO NOT GIVE OUT RESULTS ANY TEAM OR COACH.

CONSISTANCY IN GRADING – Have the same person grade the same section for all teams.

CHECKING MATH AND RANKING – Be sure to check the math and ranking for all teams so they are accurate. Scoring worksheets or computer programs may be available to help with ranking.

BREAKING TIES – Break all ties and indicate on the student answer sheets and score sheet how the tie was broken. The **DECIMAL METHOD** is a good way to indicate the winner of ties. Example: If two teams have the raw score tie of 83 for, the winner of the tie receives an 83.1 while the other teams has 83.0. If several ties are broken, you have .1 to .9 to use. This also points out scores where ties were broken.

SCORE SHEET – Fill in all information on the score sheet. Indicate how the raw scores are ranked – high score, low score or some other method. Be sure to include raw score, rank and points for each team. Explain how ties are broken.

SCORE COUNSELING

- Have your score sheet completed and signed before going to score counseling
- Arrange student score sheets in rank order for quick checking.
- Turn in answer sheets, a copy of the test and an answer sheet to the Score Counselor

SCIENCE PROCESS SKILLS

Basic Science Process Skills:

1. **Observing** - using your senses to gather information about an object or event. It is description of what was actually perceived. This information is considered qualitative data.
2. **Measuring -** using standard measures or estimations to describe specific dimensions of an object or event. This information is considered quantitative data.
3. **Inferring -** formulating assumptions or possible explanations based upon observations.
4. **Classifying -** grouping or ordering objects or events into categories based upon characteristics or defined criteria.
5. **Predicting -** guessing the most likely outcome of a future event based upon a pattern of evidence.
6. **Communicating -** using words, symbols, or graphics to describe an object, action or event.

Integrated Science Process Skills:

1. **Formulating Hypotheses -** stating the proposed solutions or expected outcomes for experiments. These proposed solutions to a problem must be testable.
2. **Identifying of Variables -** stating the changeable factors that can affect an experiment. It is important to change only the variable being tested and keep the rest constant. The one being manipulated is the independent variable; the one being measured to determine its response is the dependent variable; and all being kept constant are constants or controlled variables.
3. **Defining Variables Operationally** - explaining how to measure a variable in an experiment.
4. **Describing Relationships Between Variables -** explain relationships between variables in an experiment such as between the independent and dependant variables.
5. **Designing Investigations -** designing an experiment by identifying materials and describing appropriate steps in a procedure to test a hypothesis.
6. **Experimenting -** carrying out an experiment by carefully following directions of the procedure so the results can be verified by repeating the procedure several times.
7. **Acquiring Data -** collecting qualitative and quantitative data as observations and measurements.
8. **Organizing Data in Tables and Graphs -** making data tables and graphs for data collected.
9. **Analyzing Investigations and Their Data -** interpreting data, identifying errors, evaluating the hypothesis, formulating conclusions, and recommending further testing where necessary.
10. **Understanding Cause and Effect Relationships** - what caused what to happen and why.
11. **Formulating Models** - recognizing patterns in data and making comparisons to familiar objects or ideas.

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Process Skills and Tasks Which Might Be Tested

Lab Safety

- Distinguishing "safe" behaviors vs. "unsafe" behaviors, identifying safety symbols, evaluating situations -- what to do "if" or what's wrong.
- Identifying the proper techniques to handle lab emergencies.

Observations

- Using senses to notice specific features.
- Identifying similarities and differences in features.
- Identifying qualitative and quantitative changes in conditions.
- Using observable properties to classify objects, organisms or events.

Inferences

- Formulating assumptions based upon observations.
- Distinguishing between observations and inferences.
- Using observations and inferences to identify testable questions or problems.

Problem

- Using observations to propose a topic for experimentation.
- Narrowing the scope of the topic to specific testable aspects.
- Formulate problems within the specific aspects of the topic which are clearly testable.
- Identify which of the problems can be tested with materials available.
- Generalizing variables to be considered in testing the problem such as “The effect of (the independent variable) upon (the dependent variable.)

Hypothesis

- Proposing a hypothesis for a given problem.
- Predicting the effect of the change in the independent variable upon the dependent variable.
- Explaining the relationship or tend that is expected to occur.
- Providing rationale for a hypothesis or prediction.
- Determining the testability of a hypothesis based upon materials provided.
- Evaluating statements presented with a set of data as to their appropriate label.: **1**. logical hypothesis, **2**. illogical hypothesis of contrary to data, **3**. not a hypothesis, but a restatement of data, **4**. reasonable hypothesis, but not based on data

Predictions

- Predicting the results for a proposed lab test or setup.
- Selecting predictions based upon previously observed patterns.
- Providing rationale for predictions.

Lab Equipment

- Identifying pieces of lab equipment and their function.
- Identifying appropriate pieces of equipment to perform a specific task.
- Selecting and using the appropriate piece(s) of lab equipment for a task.

Procedures

- Analyzing procedures for flaws in design.
- Identifying the proper set of equipment for carrying out an experimental procedure.
- Arranging steps of procedures in the appropriate order.
- Determining the repeatability of a procedure.
- Identifying an appropriate procedure to test a problem.

Design Analysis

- Analyzing designs for experiments relative to problem,
- Evaluating the basic assumptions used in the design of the experiment.
- Identifying components as the independent variable, dependent variable, constants (controlled variables), standard of comparison (control), and time period for the test.
- Evaluating the procedure for repeatability.
- Evaluating the materials and appropriateness of the steps in the procedure.
- Identifying appropriate types of qualitative and quantitative data to be collected.

Measurement

- Identifying the capacity, range, and increments of measuring devices as a ruler, graduated protractor, caliper, cylinder, pipet, syringe, or thermometer.
- Identifying length, temperature, volume, and mass to the capacity of the instrument.
- Converting units within the metric system.
- Reading the meniscus when measuring liquids in a cylinder.
- Using technology to obtain real world data.

Balances

- Identifying types of balances as electronic and triple beam.
- Determining the capacity of the balance, its increments, its readability, the types of auxiliary weights, the parts of the balance and their function.
- Determining the mass of an object to the capacity of the instrument.
- Using auxiliary weights to reach the capacity of a triple beam balance.

Microscopy

- Understanding of parts of microscope & their function, magnification, appearance of images, resolution, changes in field with magnification, types of microscopes and their uses.
- Preparing a wet mount.
- Using a light microscope to perform a requested task.
- Using a dissecting microscope to perform a requested task.

Chemical Analysis

- Identifying the appropriate reagents for specific chemical testing.
- Using reagents as pH paper, iodine, glucose test paper, bromthymol blue for chemical analysis.
- Interpreting the results of reagent data.

Dichotomous Key

- Using observations to formulate a dichotomous/taxonomic key.
- Identifying individuals or objects using a dichotomous key.
- Identifying similarities and differences in characteristics from a dichotomous key.

Calculations

- Using measurements to determine area, volume, percentages, probabilities, ratios.
- Determine population density of a sample.
- Performing statistical analysis of raw data as mean, median, mode, and range.

Data Presentation

- Preparing an appropriate date table, chart, diagram, illustration.
- Evaluating the presentation of data**.**

Graphing

- Selecting the appropriate graph for a set of data as line, bar, and pie graphs.
- Identifying the title, source, independent variable & dependent variables, and the legend.
- Scaling each axis for a graph.
- Preparing a line, bar or pie graph to represent a set of data.
- Predicting data points not included in a given graph and/or making a best line fit.
- Interpreting a graph and making predictions or inferences based upon the data on a graph.

Analysis of Data

- Identifying sources of experimental error or human mistakes in the data.
- Determining the validity of results using qualitative and quantitative data.
- Interpreting graphs as well as charts and diagrams as food webs, pedigrees, Punnett squares, food labels, energy and food pyramids, relationships of organisms.
- Identifying data which supports or rejects a hypothesis.
- Identifying discrepancies between stated hypothesis and actual data.
- Understanding cause and effect relationships.

Errors

- Identifying human mistakes or blunders.
- Identifying experimental errors as systematic errors and random errors.
- Making recommendations for eliminating future mistakes or experimental errors.
- Explaining the effects that human mistakes or experimental errors upon results.

Conclusions

- Selecting the most logical conclusion for given experimental data.
- Accepting or rejecting hypotheses based upon data analysis.
- Proposing a new hypothesis for rejected hypotheses.
- Formulating models
- Proposing a future test for inconclusive results.

Some Helpful Hints for Event Supervisors:

The Science Olympiad website www.soinc.org has event information with training materials for students, and internet links which may also assist you in writing questions.

I hope these suggestions are helpful in organizing your tournament. Comments or new ideas are always welcome. Please send them to me at the following address.

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