Source Code
Trial Event B/C – Michigan Science Olympiad

1. **DESCRIPTION:** This event combines computer science and mathematics to solve problems. The objective is to develop and code an efficient computer program that finds solutions to these problems.

A TEAM OF UP TO: 2   **IMPOUND:** None
EYE PROTECTION: None   **APPROXIMATE TIME:** 50 Minutes

2. **EVENT PARAMETERS:**
   A. Each team will be provided one computer. Computers will have no Internet access. Teams are not restricted from using any applications installed on the computers.
   B. Teams may not use any other electronic devices besides the provided computer. (Cell Phones, Tablets, Calculators, etc).
   C. Teams will be allowed to bring one 3" X 5" index card (both sides) of notes.
   D. The Programming Language used will be Python. (Version 3.4.3 or newer)
   E. A Python IDE or editor will be installed on the computers.
   F. Student's completed Python files will be submitted or collected electronically. Event supervisor will provide details during the event.

3. **THE COMPETITION:**
   A. Students should know basic syntax of the Python programming language and mathematical concepts described in the categories below (Section D and E). Event problems will test these skills.
   B. Event supervisors will provide teams with a python file containing a main function and function definitions for each problem. The main function will call each problem's function and print the returned value. The problems will be described in comments above their corresponding function. Teams will write their code for each problem in the related function using their logic to solve the problem. Functions should be structured such that nothing is output using a print statement or otherwise. The answer to the problem should be returned using a return statement. The main function should not be edited by the teams.
   C. In the spirit of the event, all answers should be derived programmatically (unless the problem is multiple choice). While not required, commenting code is a necessity for good organization.
   D. Python Programming Language Topics
       a. Types and Functions (numbers, strings, type conversion, slicing, len(), etc.)
       b. Arithmetic Operations (and, or, not, equal, addition, subtraction, multiplication, division, modulus)
       c. Control Flow/Logic (if, elif, else, while, for, switch, etc.)
       d. Data Structures (Arrays, Dictionaries)
       e. Import statements / Libraries.
   E. Mathematical Topics
       a. Order of Operations, Powers, Factorials, Averages
       b. Area and Volume of shapes
       c. Prime Numbers
       d. Fibonacci Numbers

4. **SCORING:**
   A. Highest score wins
   B. Points are earned as follows:
       a. Each problem that produces <u>and returns</u> the correct programmatically derived output will receive full points for that problem as designated at the start of the event. Each problem will be worth a minimum of 2 points. Problems requiring more in depth knowledge and understanding of python will be worth more points.

        b.   Additional points may be awarded for each problem if a given bonus objective is met. (ie. Use a 'for' loop in your code. Use a '!=' operator in your code.)

        c.   Each problem with a reasonable attempt to solve the question yet returning an incorrect answer will receive 1 point. Supervisors will determine a reasonable attempt by looking for coding methods and structure that indicates an understanding of the solution. Bonus objective points cannot be earned. Problems with multiple choice answers are not eligible for receiving points for an incorrect answer.

        d.   Programs that do not run (ie syntax errors or otherwise) will only be able to receive a maximum of 1 point per problem as determined by section 4Bc. Teams are encouraged to run their programs often to check for errors.

        e.   Use of other electronic devices (besides the provided computer) or an internet connection will result in disqualification.

  C. Tie Breakers

        a.   First tie breaker will be the team correctly solving a designated tie breaker problem.

        b.   Second tie breaker will be the team with the highest number of correct problems.

        c.   Third tie breaker will be the team with the fewest lines of code in the most difficult problem answered correctly. (Problem with the highest number of points). If Team A answers the problem correctly, but Team B does not, Team A will be awarded the tie breaker. If teams use the same number of lines, the second most difficult problem will be compared and so on. Commented lines of code do not count in this total.

ADDITIONAL RESOURCES AND LINKS
https://www.python.org/
https://www.codecademy.com/