

Source Code

2019 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

EYE PROTECTION: None

IMPOUND: None

APPROXIMATE TIME: 50 Minutes

2. **EVENT PARAMETERS:**

- A. Each team will be provided one computer. Computers may or may not have internet access.
- B. Teams may not use any other electronic devices besides the provided computer.
- C. Teams will be allowed to bring one 8.5" x 11" sheet of paper (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 for grading.

3. **THE COMPETITION:**

- A. Event supervisors will provide teams with a Python file containing test questions. The test will present a hypothetical real life scenario where programming would greatly improve the efficiency of certain tasks.
- B. Students will code small functions designed to perform the tasks. Each question will follow the theme established in the given real life scenario and may contain multiple objectives. A main function in the file will test students' code by calling each function and outputting the results. Problems should get progressively harder and may require students to call their own previously written functions. The main function should not be modified. Students should know basic syntax of the Python programming language and mathematical concepts described in the categories below (Sections C and D)
- C. Programming Language Basics
 - a. Types and Functions (numbers, strings, type conversion, slicing, built-in functions, etc.)
 - b. Boolean/Arithmetic Operations (and, or, not, equal, addition, multiplication, modulus, etc.)
 - c. Control Flow/Logic (if, elif, else, while, for, switch, etc.)
 - d. Data Structures (lists, dictionaries, sets, tuples)
 - e. Import statements / Libraries (datetime, math) / Files (reading and writing text files)
- D. Mathematical Topics
 - a. Algebra Concepts (order of operations, rounding, powers, factorials, logarithms, prime numbers, fibonacci numbers, time/unit conversions)
 - b. Geometry Concepts (area and volume of shapes, angles)
 - c. Statistical Concepts (average, median, standard deviation, etc.)
- E. In the spirit of the event, all answers should be derived programmatically. While not required, commenting code is a necessity for good organization and is encouraged.

4. **SCORING:**

- A. Highest score wins
- B. Points are earned as follows:
 - a. Correct answers to objectives in each problem will be awarded points as defined in the test.
 - b. Programs that do not run/partially run (ie syntax errors or otherwise) will only be able to receive points until the point of failure. Teams should validate and run their code frequently.
 - c. Use of other electronic devices (besides the provided computer) 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 (and subsequent problems if ties persist). Commented lines will not count.

ADDITIONAL RESOURCES: <https://www.python.org/> | <https://www.codecademy.com/>