

## **EVENT 1: FERMI QUESTIONS**

**OBJECTIVE:** To estimate the order of magnitude of a quantity that is difficult or impossible to measure.

### **RULES:**

- Each team will be provided with a list of ten Fermi Questions.
- Each team will have 30 minutes in which to answer these questions.
- Each team will submit a single set of answers.
- All answers must be recorded in order of magnitude format (i.e.,  $10^4$  not  $3 \times 10^4$ ,  $10^6$  not  $7 \times 10^5$ ).
- No calculators or reference materials may be used.

### **COMPETITION AND SCORING:**

Ten points will be awarded for each correct answer (correct order of magnitude). There will be 1 point off for each order of magnitude difference from the accepted order of magnitude. No answer will score less than zero.

### **Sample Fermi Questions:**

**How much land area (in square meters) is found on earth?**

**(Answers  $10^{14}$ )**

**How many revolutions will a 14-inch tire have to make during a crossing of the continental United State?**

**(Answer is  $10^6$ )**

**How many liters of air does an adult inhale in a 24-hour day?**

**(Answer is  $10^4$ )**

**How many square meters of turf (real or artificial) are there in a National Football League Stadium**

**(Answer is  $10^4$ )**

**An automobile travels 100,000 km before the tire tread wears out. What thickness of rubber wears off the tire each revolution of the wheel? Please express your answer in centimeters.**

**(Answer is  $10^{-8}$ )**

- Updates to the rules will be posted on the NJAAPT web site at [www.njaapt.org](http://www.njaapt.org).
- Frequently asked questions with answer will be available by e-mailing [John\\_Valente@mast.mcvsd.org](mailto:John_Valente@mast.mcvsd.org).
- It is your team's responsibility to remain updated about changes and clarifications to the rules.