

# FERMI QUESTIONS \*NC Div C 2021

1. **DESCRIPTION:** Teams provide answers to a series of “Fermi Questions”; science related questions that seek fast, rough estimates of a quantity, which is either difficult or impossible to measure directly.

2. **A TEAM OF UP TO:** 2

3. **APPROXIMATE TIME:** 50 minutes

4. **EVENT PARAMETERS:**

- a. The participants may use whatever material or resource available to them either on the internet or on paper. Physical and internet calculators are allowed. Internet searches are allowed.
- b. The event supervisor will provide the questions and answer sheets with identifying units.

5. **THE COMPETITION:**

- a. Each team will have the same amount of time to answer as many questions as possible.
- b. All answers are to be written to the correct power of ten (exponent) as follows:
  - i. For a number in the form  $C \times 10^E$ , the guide for rounding of the coefficient (C) is: if C is 5 or greater (to 9.99...), round C up to 10. For example, if the number is  $5.001 \times 10^3$ , the correct power of ten is 4. Responses recorded as  $5.001 \times 10^3$  on the answer sheet will be marked as incorrect.
  - ii. If C is below 5 (and greater than 1), round C down to 1. For example, if the number is  $4.99 \times 10^6$ , you record 6 as your answer.
- c. Positive exponents are the default. For negative exponents, the minus (-) sign must be included in the answer. If the number is  $1.5 \times 10^{-3}$ , the correct power of ten is -3.

6. **SAMPLE QUESTIONS/TASKS:**

- a. “How many drops of water are there in Lake Erie?” requires an estimate of the volume of a drop, the volume of Lake Erie from its approximate dimensions and conversion of units to yield an answer.
- b. “What is the mass of helium gas, in grams, required to fill the Goodyear Blimp?” requires an estimate of the volume of the Goodyear Blimp, the number of helium molecules, and the mass of those molecules to yield an answer.
- c. “How many birds are in the Amazon Rain Forest?” requires an estimate of the number of birds on the planet and the surface of the planet covered by the Amazon Rain Forest to yield an answer.

5. **SCORING:**

- a. High score wins.
- b. Ties are broken by counting the highest number of answers that receive seven (7) points. If the number of 7-point answers is the same, the number of 5-point answers will be used, then 3-point answers, then 1-point answers. The last tie breaker will be the team who received points on the first question that the other team missed.

**If the response is:**

Equal to the accepted value  
 $\pm 1$  of the accepted value  
 $\pm 2$  of the accepted value  
 $\pm 3$  of the accepted value

**It earns:**

7 points  
5 points  
3 points  
1 point

- c. Scoring Example: If the accepted value is 10 and the response given is 10; then seven (7) points are awarded. A response of 11 or 9 receives five (5) points, a response of 12 or 8 receives three (3) points, a response of 13 or 7 receives one (1) point.