

EVENT 1: FERMI QUESTIONS

(rev 9/22)

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

RULES:

1. Each team will be provided with a list of ten Fermi Questions plus 1-2 sheets of blank scratch paper.
2. Teams must bring their own pencils/pens.
3. Each team will have 30 minutes in which to answer the questions.
4. All answers must be recorded in order of magnitude format
(i.e. 10^4 not 3.0×10^4 10^6 not 7.0×10^5)
5. No devices, such as cell phones, calculators, tablets, smart watches, computers, etc., or preprinted references material shall be permitted to be used during the event.
6. Each team will submit their answer sheet and scratch paper at the end of the 30 minutes allotted. Answer sheets will not be accepted late.

SCORING:

7. Each Fermi Question is worth a maximum of 10 points.
8. For each question, one point will be deducted for each order of magnitude difference from the accepted answer.
9. No question will score less than zero points.

Team Final Score = Sum of points earned from all 10 Fermi Questions.

Tiebreaker – To break a 1st place tie: The most number of correct answers wins the tie.

- Winning team gets points added to their score equal to the difference in correct answers. (Ex: Team A had 3 correct answers, Team B had 5 correct answers. Team B gets 2 points added to their score)

Sample Fermi Questions:

⇒ See descriptions and worksheets provided on the NJAAPT.org website (in Event description)

1. How much land area (in square meters) is found on earth? (*Answer: 10^{14}*)
2. How many revolutions will a 14-inch tire make while crossing the continental United States? (*Answer: 10^6*)
3. How many liters of air does an adult inhale in a 24-hour day? (*Answer: 10^4*)
4. How many square meters of turf (real or artificial) are there in a National Football League Stadium? (*Answer: 10^4*)
5. An automobile travels 100,000 km before the tire tread wears out. What thickness of rubber (cm) wears off a tire each revolution of a wheel? (*Answer: 10^{-8}*)

*It is the team's responsibility to periodically check in or inquire about changes and clarifications to the rules.
Go to www.njaapt.org (top menu, "Events" and "Forum")*