

Yale Physics Olympics

Team Name _____

Fermi Quiz

Aim: To estimate the values of various quantities.

Materials: None - except an imaginative, innovative mind. **Use of electronic devices is seriously frowned upon (FORBIDDEN) for this event.**

Method: Except for question 15, provide only the power of 10 that best answers the question by combining quantities you already know. Question #15 will be a tiebreaker for all events and will not be scored unless there is a tie.

Conditions: The answers must be entered using the units specified. **WRITE CLEARLY!**

Ranking: Each question's score will be the difference between the correct answer and your answer. **A penalty applies for leaving answers blank**, so take your best guess if you can't calculate an answer or don't have time.

- 1) How many trees will be saved if all stores in Manhattan stop printing paper receipts for one year? Answer: 10 trees
- 2) In metric tons, what is the total weight of Acetaminophen tablets taken by people in the US in one day? Answer: 10 tons
- 3) If all the almonds produced in the US in one year were packed into a sphere what would the radius be in kilometers? Answer: 10 km
- 4) In the US, what is the ratio of water used by all fire engines, to water used by all households (exclude industrial uses)? Answer: 10

(TURN OVER)

- 5) How many liters of oxygen are inhaled in one human lifetime? Answer: 10 liters
- 6) How many high school physics teachers are in the state of Texas? Answer: 10 teachers
- 7) How many CO₂ molecules are there in a bubble of soda? Answer: 10 molecules
- 8) In grams, what is the mass of the ink used to print a college textbook? Answer: 10 grams
- 9) If you lined up in one row like on a bookshelf, all the personally owned, printed books currently in existence in the world, how many times around the earth would it go? Answer: 10 times
- 10) How many ordinary helium balloons would you need to lift a US aircraft carrier? Answer: 10 balloons
- 11) In years, assuming realistic driving conditions, how long would it take to drive every paved road in the US? Answer: 10 years
- 12) How many semi trailers do you need to hold all the plastic drinking straws produced in the US in one year? Answer: 10 semis
- 13) In light years, what is the sum total distance traveled by all the NYC subway trains in one year? Answer: 10 ly.
- 14) In mm, by how much is the sea level elevated by all ships currently afloat? Answer: 10 mm

For the following question, enter a number with **at least 2 significant figures** (e.g. 2.2×10^3).

- 15) **TIEBREAKER: How many grains of rice are produced each year, worldwide?**

Answer: grains