

2005 CLEARVIEW, OH, REGIONAL FERMI QUESTIONS

School _____ Team # _____

Names: _____ & _____

Note: Show only the exponent of your estimated value on the answer sheet. Make certain that the numbers are written legibly. If the supervisor must guess as to whether an answer is correct, it will be counted as being incorrect.

1. How many cases of food-borne botulism occur in the United States annually?
2. What is the lethal dose of botulism toxin, in grams, for a 150 pound human?
3. According to the Census of Marine Life, with a membership of about 1000 scientists in 70 countries, what is the estimated number of life forms in the world's oceans?
4. How many different species of fish did the Census of Marine Life discover in the past year?
5. How many Christmas trees were produced in Ohio last year?
6. If one were to move closer and closer while observing isolated blood cells, at what distance, in meters, would they first come into clear view?
7. If one were to move closer and closer to a carbon atom, at what distance, in meters, would the nucleus appear?
8. At what distance from Earth's surface, in meters, can an astronaut observe the entire hemisphere directly beneath him/her?
9. In 1983, more than 300 years after the first serious measurement attempt the Seventeenth General Congress on Weights and Measure defined the meter as the distance light travels through a vacuum during a time interval of how many seconds?
10. How much voltage can a large electric eel produce?
11. Up to how many MeV may the energy of gamma rays extend during the course of nuclear reactions initiated by low energy particles?
12. What is the distance, in meters, of a satellite in geosynchronous orbit about the Earth?
13. What is the distance from the Sun to Pluto measured in meters?
14. According to the U.S. Bureau of the Census, what was the resident population of the United States on 1/1/2005?

15. What is the average diameter of a human hair in millimeters?
16. How many square kilometers of Lake Erie are solely under the jurisdiction of the USA?
17. A 15.0 cm long cylindrical glass tube, sealed at one end is filled with ethanol ($d = .789 \text{ g/ml}$). The mass of ethanol needed to fill the tube is found to be 9.64g. What is the inner diameter of the tube in centimeters?
18. What is the mass in grams of all the hydrogen atoms in 5.0 molecules of sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$?
19. Municipal Solid Waste Generation has become a big problem. How many pounds of landfill waste would be generated by the population of Cuyahoga county in one year?
20. What was the number of injuries in 2001 from skateboards in the U.S.? [Estimates calculated from a representative sample of hospitals with emergency treatment departments in the United States. Data are estimates of the number of emergency room treated cases nationwide associated with various products. Product involvement does not necessarily mean the product caused the accident.]
21. What is the annual consumption of ice cream, in pounds, for the State of Ohio?
22. What is the ratio of meters of the highest and lowest point in Colorado compared to the highest and lowest point in Minnesota?
23. What is the average rate of continental drift, in meters per day, along the Mid-Atlantic Ridge?
24. Determine the density of oxygen in the air of this room at 25°C and 760 torr in g/L.
25. How many total kg of carbon monoxide were produced in 2001 in the US as Air Pollutant Emissions?
26. What fraction of a cubic meter is a milliliter?
27. What is the length, in meters, of the shortest form of an X-ray wavelength?
28. What is the range, in meters, between the longest and shortest wavelengths of visible light within the electromagnetic spectrum?
29. How many breaths does the average U.S. adult take in a lifetime?
30. How many seconds were cell phones used in 2003 by the U.S. population?

31. How many organic and inorganic substances were registered with the Chemical Abstracts service as of Jan.1, 2005?
32. What is the number of somatic cells in a 49 day old, normally developing fetus?
33. How many genes are currently considered part of the human genome?
34. The diameter of a chromium atom is about 2.4 \AA ($10 \text{ \AA} = 1 \text{ nm}$). How many chromium atoms would have to be lined up to span 1.0 cm ?
35. How many hydrogen atoms are present in 1 mg of aspartame ($\text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$), the artificial sweetener?
36. What is the mass, in grams, of all electrons within a single copper atom?