Fermi Questions Key
5 points for correct ans, 3 for off by 1, 1 for off by 2 (must show some work/explanation)

	Answer
1. Distance from Earth to Proxima Centauri, in meters **4 LY = 4*10^16 m**	16
2. Number of atoms in average adult human body **60 kg /(.012 kg/mol C) * 6.02*10^23 atom/mol = 3 * 10^27**	27
3. Number of golf balls that can fit inside the Earth. **Vol golf ball = 40 cm^3; Earth's radius = 6*10^6 m**	25
4. Number of trees on Earth. **Nature's article says so**	9
5. Number of humans that have ever lived **Estimate using birth/death rates, combined with current population**	11
6. Number of seconds your mom has lived **86400 s/day * 365 day * 50 yrs**	9
7. Number of gas molecules you have breathed in your life **86400 s/day * 365 day * 15 yrs * .500 L/breath * 1 breath/3 seconds**	30
8. GDP of entire world in GDP **US is at around 20 trillion and is ¼ of world GDP**	14
9. How many red blood cells are needed to blanket the surface area of a ping pong ball? **Estimate using ping pong ball radius and red blood cell radius**	8
10. How many board game dice would fit in Lake Superior? **Lake superior volume = 2900 mi^3 and dice have around 2 cm height**	18
11. What is the diameter of a 22 caliber bullet divided by the length of an average red ant? **Bullet and ant have approximately equal length**	0
12. What is 4^{35}? **2^10 = 10^3, so 2^70 = 10^21**	21
13. How many more times more expensive is a functional fifteen-year-old car than a toothpick? **Toothpick = $.03, Car = $3,000**	5
14. How many birch pollen grains would weigh as much as a US dollar coin? **Dollar coin = 8 g, Pollen = 8 ng**	9
15. How many red blood cells would fill the Indian Ocean? **Indian Ocean volume = 3 x 10^{20} m^3 and RBC volume = 9 x 10^{-14} m^3**	33
16. How many single Carbon-Carbon bonds would span the entire diameter of Jupiter? **C-C = 154 pm, Jupiter's diameter = 142,984 km**	18
17. What is the volume of the Milky Way, in cubic meters? **6.65 x 10^{60}**	60

18. How many fleas laid head-to-tail would equal the circumference of the Large Hadron Collider? **LHC = 27 km, flea = 1.5 mm**	6
19. How many times longer is the depth of the depth of the Challenger Deep in the Mariana Trench than the height of the Niagara Falls? **Niagara = 52 m, Mariana = 10.9 km**	2
20. How many blue whales lined head-to-tail would equal the diameter of the moon? **Diameter of moon = 3480 km, Blue whale = 30 m**	5