

## Some Fermi Questions

[Some of the following questions are taken from or adapted from the following web sites:

<http://www.ralenz.com/old/misc/fermis.html>

<http://forum.swarthmore.edu/workshops/sum96/interdisc/fermicollect.html>

Some of the questions at the latter site were actually posed by students.]

In a Fermi question, the goal is to get the answer to an order of magnitude (power of ten) through reasonable assumptions about the situation, not necessarily relying upon absolute knowledge for an "exact" answer.

1. Can you live to be a million seconds old? A million hours old? A million days old?
2. Could you put \$1,000,000 worth of \$1 coins in a pile under your desk? What about a billion dollars' worth of \$2 coins?
3. How many people could you cram into the classroom? How many balloons? How many ping-pong balls?
4. How many maths lessons are taking place in Australia today?
5. How much money is spent in the school canteen each day?
6. If all the people in the world joined hands and stretched themselves out in a straight line, how long would it reach? Could you go around the world?
7. How many hairs are there on your arm?
8. Ignoring oceans and such, how long would it take to walk entirely around the world?
9. How much water per year flows in the Yarra under the Princes Bridge?
10. How many semi-trailer loads would it take to move Mt. Kosciusko? How long would it take?
11. In the song "In the year 2525" by Zager & Evans, it is sung that "man cried a billion tears." How much water is that? Would it cover the entirety of, say, the MCG? How deeply?
12. How fast is the earth travelling as it orbits the sun?
13. How big is a 1:1,000,000 scale map of Australia?
14. If all the people in the world moved to Tasmania, how crowded would it be?
15. How many atoms are in a cell?
16. How many servings of rice are in a 10kg bag?
17. How many people do you know? How many people do they know?
18. How many lightbulbs burn out in one minute?
19. How many hours do you have to work to pay for a car?
20. How long does it take to paint a house? How much paint would you use? How long would it take to dry?
21. How long would it take to make dinner for twelve people? Where would you put it while you were waiting to serve it?
22. Note the scale of a millimeter vs. a meter, now imagine something 1/1000 mm, now imagine something 1000 m, imagine them both at the same time; you are now contemplating one billion.
23. How high are a million kids standing on each other's shoulders?
24. How large a bowl would you need to hold a million goldfish?
25. How many pages would be needed to show a million stars?
26. How long would it take to count to a million?

27. Imagine you had a rope stretched tight round the earth and you spliced one metre more rope into it. Could you now get a coin under it? How much rope would you have to add before you could walk under it?
28. How many piano tuners are there in Australia?
29. How many cells are in the human body?
30. How many grains of sand are there on St Kilda beach?
31. How many Ford Falcons are equal in mass to the mass of the water in an Olympic-sized swimming pool?
32. How many jelly beans fill a one-litre jar?
33. What is the mass in kilograms of the student population of the University of Melbourne (or your school)?
34. How many litres of petrol are used by cars each year in Australia?
35. How high would the stack reach if you piled one trillion ten dollar notes in a single stack? (A trillion is now a million million. The word "billion" was previously used to mean this, but we've now adopted the US usage of "billion" which means "thousand million".)
36. Approximately what fraction of the area of the Australia is covered by cars? By houses?
37. How many hairs are on your head?
38. What is the weight of solid garbage thrown away by Australian families every year?
39. If your life earnings were doled out to you at a certain rate per hour for every hour of your life, how much is your time worth?
40. How many individual frames of film are needed for a feature-length film?
41. How many water balloons will it take to fill the school gymnasium?
42. How many flat toothpicks would fit on the surface of a sheet of poster board?
43. How many hot dogs/meat pies will be eaten at AFL games during a one year season?
44. How many revolutions will a wheel on the bus make during a trip from Sydney to Melbourne?
45. How many minutes a year will be spent on the phone by high school students in the United States?
46. How many pizzas will be ordered in Victoria this year?
47. If you had a stack of \$2 coins as tall as Mt Kosciusko, what would it be worth? Could you fit it in your bedroom?
48. How far do you walk in an average week?
49. How much water does your household use each week?
50. How many maths lessons will you have in a lifetime?
51. How many blades of grass are there on South Lawn?

**Some useful information:**

Radius of the earth: about 6,400 km  
 Distance of the earth from the sun: about 150 million km  
 Distance of the moon from the earth: about 380,000 km  
 Population of the world: about 6 billion  
 Population of Australia: about 18 million  
 Population of Melbourne: about 3 million  
 Student population of the University of Melbourne: about 30,000  
 Area of Tasmania: about 68000 square km  
 Area of Victoria: about 228000 square km  
 Area of Australia: about 7,700,000 sq. km  
 Height of Mt Kosciusko: 2230m

Pose your own question ...