



Fermi Quiz

Aim: To estimate the values of various quantities.

Materials: None - except an imaginative, innovative mind.

Method: There are 15 questions listed on the attached sheets. For questions #1-9 estimate the closest power of 10 associated with the quantity in question. Circle the most appropriate "multiple-choice" answer - A, B, C, D, or E.

For questions #10-15 select the answer from A, B, or C.

When you have completed the quiz, fill in the back sheet with your answers and hand them to the scorer in room SPL-57.

Conditions: The answers must be determined in the units specified.

Time Limit: Your results **must** be handed in to room SPL57 between **12:00 and 1:00** - before the beginning of time slot #4!

Ranking: The ranking order will be determined from the sum of your marks on all of the questions. The Lowest sum gets the highest ranking, etc.
[The correct answer is given a mark of 1, the answer next closest to the correct one is given a mark of 2, then the next next closest, a mark of 3, etc.]

Fermi Questions

For questions #1-9 estimate the closest power of 10 associated with the quantity in question. . Circle the most appropriate "multiple-choice" answer - A, B, C, D, or E.

Examples: If your estimate is 550 or above but less than 5500, the best answer is "3" .
If your estimate is less than 550 but more than 55, the best answer is "2".

- 1.) How much power, in watts, do you output running up a flight of stairs?
(A) -2 (B) 0 (C) 2 (D) 4 (E) 6

- 2.) How many water molecules does it take to make the ice in a standard NHL-sized ice arena?
(A) 30 (B) 32 (C) 34 (D) 36 (E) 38

- 3.) If you started driving from New York and you could maintain the constant rate of acceleration for an average car, how fast would you be going (in miles/hour) by the time you reached San Francisco?
(A) 0 (B) 2 (C) 4 (D) 6 (E) 8

- 4.) The Sun looks to be about the same size as the full Moon in the sky, and we know the radius of the Moon is about 1/4 that of the Earth. If we also know that the Moon is 1/4 million miles from Earth and the Sun is 150 million km from Earth, of the choices below what is your best estimate of the radius of the Sun in meters?
(A) 3 (B) 5 (C) 7 (D) 9 (E) 11

- 5.) What is your gravitational attraction, in Newtons, on the person next to you?
(A) -15 (B) -13 (C) -11 (D) -9 (E) -7

- 6.) How many wavelengths of visible light fit into the thickness of a piece of paper?
(A) -2 (B) 0 (C) 2 (D) 4 (E) 6
- 7.) How long does it take the light from the light bulb in the ceiling above you to reach your eyes?
(A) -10 (B) -8 (C) -6 (D) -4 (E) -2
- 8.) The sun's total power output is 400 trillion trillion watts. How much mass, in kg, does the sun lose every second?
(A) 1 (B) 3 (C) 5 (D) 7 (E) 9
- 9.) The average car gets 20 miles to the gallon and travels at an average speed of 65 mph. If we were instead forced to travel at an average speed of 55 mph how much gasoline would be saved in the USA per year? Assume that the fuel efficiency of a car improves by 15% when driven at 55 mph.
(A) 2 (B) 4 (C) 6 (D) 8 (E) 109

For questions #10-15 select your answer from a multiple-choice: A, B, or C.

- 10.) If gravity were to suddenly shut off what would be Earth's motion then be?
(A) elliptic as before (B) a straight line (C) it would stop
- 11.) If you were on the moon and you let off a firecracker would you see AND/OR hear the explosion?
(A) see and hear (B) see but not hear (C) hear but not see

12.) The magnetic north pole of a compass points roughly towards Earth's geographic North Pole. What type of magnetic pole must be at the Earth's North End?

- (A) a North pole (B) a South pole (C) There is no pole

13.) You start with 100 pennies. You toss them all and remove the ones that come up heads. You toss the remaining pennies and this time remove those that come up tails. You keep repeating this process alternating between removing those that come up heads and those that come up tails. How many times, on average, do you toss the coins until you only have one penny left?

- (A) 6-7 (B) 9-10 (C) 12-13

14.) Is it easier to set an object in horizontal motion along the surface of a level table on the Moon or on the Earth? (ignore friction and air resistance)

- (A) on the Moon (B) on the Earth (C) same on both places

15.) If you drop a coin in a moving car as you start to slow down will the coin land

- (A) ahead of you (B) beneath you (C) behind you

Fermi Quiz - Circle Correct Answer

Team Name _____

- 1) A B C D E
- 2) A B C D E
- 3) A B C D E
- 4) A B C D E
- 5) A B C D E
- 6) A B C D E
- 7) A B C D E
- 8) A B C D E
- 9) A B C D E
- 10) A B C
- 11) A B C
- 12) A B C
- 13) A B C
- 14) A B C
- 15) A B C