

Announcements

- Snapshot 9- Unit Conversions + Order of Magnitude
 - Necessary conversion factors are given

PollEverywhere L9-Q1

You are asked to estimate the total amount of gasoline that will be used by all Americans this year. As an order of magnitude estimate, you determine that the answer should be somewhere around

A. 1 million gallons **B.** 100 million gallons **C.** 100 billion gallons

PollEverywhere L9-Q1 Discussion

What assumptions did you make? What pieces of information did you guess?

Fermi Estimation--Thinking in Orders of Magnitude

[TedEd Video on powers of 10](#)

What is a Fermi Estimate?

A "Fermi question" is a question which seeks a fast, rough estimate of quantity which is either difficult or impossible to measure directly.

For example: The question "How many drops of water are there in Lake Erie?" requires an estimate of the volume of a drop, the volume of Lake Erie from its approximate dimensions and conversion of units to yield an answer. This answer would be an estimate hopefully accurate within an order of magnitude, i.e. a factor of ten.

Have you done this before?

Fermi Estimation Problems

Estimate how many plastic straws used by Americans go to the landfill each day.

Fermi Estimation Problems

Today, a typical congressional representative has more than 700,000 constituents. Is it possible for a representative to campaign by going door to door to meet everyone in his/her district?

Why do we care??

- Job Interviews

- What is Air France's weekly revenue for the Paris-to-New York leg?
- What volume of beer is sold at an average LA Lakers basketball game?
- What is the monthly revenue of your hair salon?
- How many school teachers are there in Chicago?
- What is the monthly profit of your favorite restaurant?
- How many flat screen televisions have been sold in Australia in the past 12 months?
- How many iPhones are currently being used in China?
- Are there more iPhones in operation in the U.S. or in China?
- How many trees are there in New York City?
- How many avocados are used to make guacamole per day in Mexico?
- What is the Revenue for the smartphone market in India?

[Good advice for Job Interviews](#)

Why do we care??

- This could be a job skill needed for:
 - Marketing
 - Business
 - Wedding planning
 - Any job that requires making a budget/proposal
 - Project Management
 - Construction
- Checking plausibility statements from other people/sources

Food Stamp Fraud at All-Time High: Is It Time to End the Program?

In the media...

f share this

✉ email



Dec 27, 2016 // 3:08pm ♥ As seen on Fox & Friends

REACTION: Actress Carrie Fisher Dies at Age 60 After Heart Attack

Should Japanese PM Shinzo Abe Apologize for Pearl Harbor Attack?

Cop Whose House Burned Down Gets Christmas Surprise From Randy Travis

Food stamp fraud is at an all-time high, with cases this year including a state lawmaker and even a millionaire.

According to the USDA, \$70 million of taxpayer money was wasted in 2016 due to food stamp fraud.

In the media...

"Food-stamp fraud is at an all-time high, and some of the worst offenders this year have included a state lawmaker and a millionaire. This year, it is estimated \$70 million of taxpayer money was wasted on food-stamp fraud. So is it time to end the program altogether?"

Should we end the program? \$70 million sounds like a lot, but how much is it in relation to the whole program?

Think about it quickly...

_____ % of Americans receive food stamps

Average food stamp recipient receives _____ annually

There are about _____ Americans

Let's see the expenditures!

% of total expenditures

Think about it...

10% of Americans receive food stamps

Average food stamp recipient receives \$1000 annually

There are about 300 million Americans

Let's see the expenditures!

$0.1 * 300,000,000 * \$1000 = \$30,000,000,000$ (\$30 billion!!!)

% of total expenditures

$70,000,000 / 30,000,000,000 * 100 \sim 0.2\%$!!!!!

Order of magnitude...

We didn't need to know exact values for any of the quantities--just orders of magnitude.

Reasonable Statement?

PollEverywhere L9-Q2

A local food truck sells 2 million dinners every year.

- A. Reasonable
- B. Not Reasonable

Explain your thinking

PollEverywhere L9-Q2

A local food truck sells 2 million dinners every year.

Reasonable Statement?

PollEverywhere L9-Q3

I walked from East Lansing, MI to in Minneapolis, MN in one month.

- A. Reasonable
- B. Not Reasonable

Explain your thinking

PollEverywhere L9-Q3

I walked from East Lansing, MI to in Minneapolis, MN in one month.

Order of Magnitude....PollEverywhere L9-Q4

The thickness of a dollar bill is closest to...

- a. 10^{-4} m
- b. 10^{-2} m
- c. 10^{-1} m
- d. 10^1 m

Estimation

How many dollar bills would you have to stack to reach to moon?

Would this be cheaper or more expensive than building and launching a spacecraft?

More Examples....

How long would it take to count to a million?

More Examples....

How many people in the world are talking on their cell phones in any given minute?

Final Exam Question FS19

Imagine that MSU needs to change all water pipes on campus and all water is shut off for a week. Make an order of magnitude estimate for the number of personal-size (16oz) bottles of water needed to satisfy the drinking needs for all students, faculty and staff on campus.

Do not leave your answer in scientific notation. An answer like “50 billion bottles” with no work or clearly stated assumptions will get no credit.

MTH 101 Gradebook

Using the course gradebook on mth101.com