

1. (10 points) A country has 15 million homes and totally uses 3 Gigawatts at a given time (One GigaWatt = Million Kilowatts). Write both numbers in scientific notation. Then divide those numbers and find out how many Kilowatts the average home used.

Solution:

15 million equals 1.5×10^7 .

3 GW equals $3.0 \times 10^6 KW$.

Dividing, we get $(3.0/1.5) \times 10^{6-7} = 2 \times 10^{-1} = 0.2 KW = 200 \text{ Watts}$ (because 1 kW = 1000 Watts) as the energy used by the average home.

2. (10 points) True or False ? Explain why.
 1. The only cause of Climate change is driving gas powered cars.
 2. Climate change means winters will get warmer every year.

Solution:

Both statements are false. Climate change is caused by everything that releases carbon dioxide, methane and other greenhouse gases, such as airplanes, factories, agriculture, power plants that burn fossil fuels,...

Climate change means weather will become more unpredictable. They will be warmer on average but some years could be still cold.

3. (10 points) In a lottery 500 tickets are sold for 3 dollars each. There is first prize of 500 dollars, 3 second prizes of 100 dollars, and 5 third prizes of 40 dollars. What is the average winning ? How much profit do the lottery organizers make? What is the probability of not winning anything? Write the probability as a percentage.

Solution: Totally $500 + 300 + 200 = 1000$ dollars are given as prizes. Average winning for a ticket is 2 dollars because you divide total winnings by number of tickets sold. The profit is 500 dollars because they take in $1500 = 500 \times 3$ in revenue for the 500 tickets sold and pay out 1000 dollars in prizes. There are only 9 prizes for 500 tickets, so probability of not winning any money is $491/500$ or 0.982 or 98.2 percent.