Power is a physical quantity that tells us how rapidly work is being performed, and energy expended to do the work. The common unit of power used by scientists is the watt. In your home there are many electrical items that are measured by the number of watts of electricity they consume in order to operate. The most energy-consuming items involve an electrical motor, which will do work to move air in your air conditioner, or to keep food cold in your refrigerator. When combined together, your home electrical consumption can be thousands of watts per week. The table below shows some typical numbers for the watts involved in operating various kinds of systems you are familiar with.

System	Watts	Energy source
Flash light	5	Battery
Reading lamp	100	Electric Utility Company
Television	90	Electric Utility Company
Computer	200	Electric Utility Company
Refrigerator	500	Electric Utility Company
Small House	1,000	Electric Utility Company
Small town	5 million	Fossil Fuels
Big city	5 billion	Fossil Fuels
United States	420 billion	Fossil Fuels

Scientists can measure the power of an aurora by measuring how much light they produce, and then using these measurements in mathematical formulas to calculate the power needed to produce the light. The table below shows some measurements made during the November 20, 2003 Great Aurora, which you may have been able to see if your nighttime skies were clear! The table gives the time in Column 1 and 2 the estimated power in units of BILLIONS of watts in the North and South Hemispheres

Time	**Power (South)**	**Power (North)**
13:57	403	141
14:47	149	149
15:27	339	305
16:26	432	531
17:07	279	657
17:18	251	446
18:08	500	315
18:46	428	1108
19:18	288	112
19:49	362	383
20:26	132	234
21:32	149	144

Question 1 - When did the peak power occur in the North and South Hemispheres?

Question 2 – What was the average power produced by the aurora during the tabulated time interval in each hemisphere?

Question 3: - What was the total power produced from the aurora in both hemispheres?

Question 4: - For how many years could the United States operate with the total power produced by this aurora?

Answer - Extra Credit Problem

Time	Power (South)	Power (North)
13:57	403	141
14:49	149	149
15:27	339	305
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18:46	428	1108
19:18	288	112
19:49	362	383
20:26	132	234
21:32	149	144

Question 1 - When did the peak power occur in the North and South Hemispheres?
Answer: In the Northern Hemisphere it occurred at 18:46 UT. In the Southern Hemisphere it occurred at 18:08 UT.

Question 2 – What was the average power produced by the aurora during the tabulated time interval in each hemisphere?
Answer: North = 337.1 billion watts. South = 309.3 billion watts.

Question 3: - What was the total power produced from the aurora in both hemispheres?
Answer: South = 3712 billion watts, North = 4525 billion watts . Total = 8237 billion watts.

Question 4: - For how many years could the United States operate with the total power produced by this aurora?
Answer: In one year, the table shows US electricity consumption is about 420 billion watts per year. The total aurora power in both hemispheres for this particular storm was 8237 billion watts, so the US could be supported for 8237/420 = 19.6 years. The reason we don't collect 'aurora power' is that it is spread out over million of square miles and not concentrated as are other forms of usable energy.