Power

- Power is an amount of work done in unit time:

$$P = \frac{\Delta W}{\Delta t}$$

Remember that *Work= Force *Displacement*
Unit of power is called Watt, 1W=1J/s

- You can also use Power to characterize the rate with which heat is produced:

$$P = \frac{\Delta Q}{\Delta t}$$

Homework

Problem 1

What should be a power of an electric heater that can bring 10 liter (10 kg) of water to the boiling, starting at 20°C, in 3 minutes. Specific heat of water is $4200\,\dfrac{J}{kg\cdot^{o}C}$

Problem 2

In the table, enter different forms of energy that your family uses **per day**. Please ask your parents to help with gathering the data. You will need to analyze electricity & heating bill, check with your parents how much gas they normally use for transportation. For food, assume 2000 Cal diet for each family member. All numbers may be approximate. The Energy must be in Mega-Joules (MJ). I list all necessary conversion factors below.

	food	car	electricity	heating
Usage per day, various units	Cal	Gallons of gas	kWh	therms
Usage per day, MJ				

1Cal=1000cal=4184 J

1 kWh (kilowatt*hour)=(1000W) * (3600s)=3.6MJ

1 gallon of gasoline when burned gives 132MJ

1 therm= 105 MJ.

Therms are normally shown in the bill if you use natural gas for heating. If you use heating oil, convert gallons to MJ (in the same way as for car).