

POWER

$$Power = \frac{Work}{time}, \quad P = \frac{\Delta W}{\Delta t}$$

- **W** may be mechanical work, or work done by a battery driving an electric current.
- In this definition, **Work** can also be replaced with **Heat**. That will be thermal power rather than mechanical or electric one.
- Units of power are Watts [W]: 1W=1J/s (Joule per second)

POWER IN ELECTRIC CIRCUIT

$$Power = Current \times Voltage, \quad P = I \cdot V$$

Homework

Problem 1 Power outlets in US have (root-mean-square) voltage **110 V**. The maximum current that can safely run through them is **15 Amp**. How fast one can bring **1 liter** of water to boiling (heat it from **20 to 100 degrees C**) by using an electric heating device in US? How this time is different in Europe where the voltage is **220 V** (assume maximum current to be the same)?

Problem 2

An electric motor is used to lift a load of mass **$m=50$ kg** to with speed height **$v=2$ m/s**. Find the power of the motor and current that runs through it, if the voltage on the motor is **110V**.