show an understanding and use the terms period, frequency, peak value and root-mean-square value as applied to an alternating current or voltage

Alternating Current

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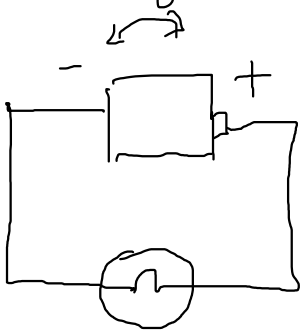
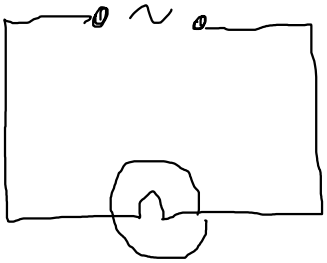
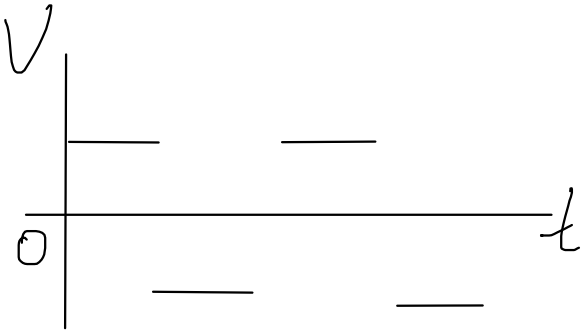
Current that keeps changing direction.

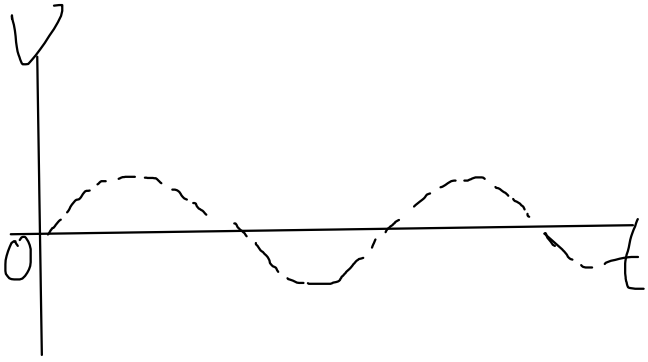
flipping the cell



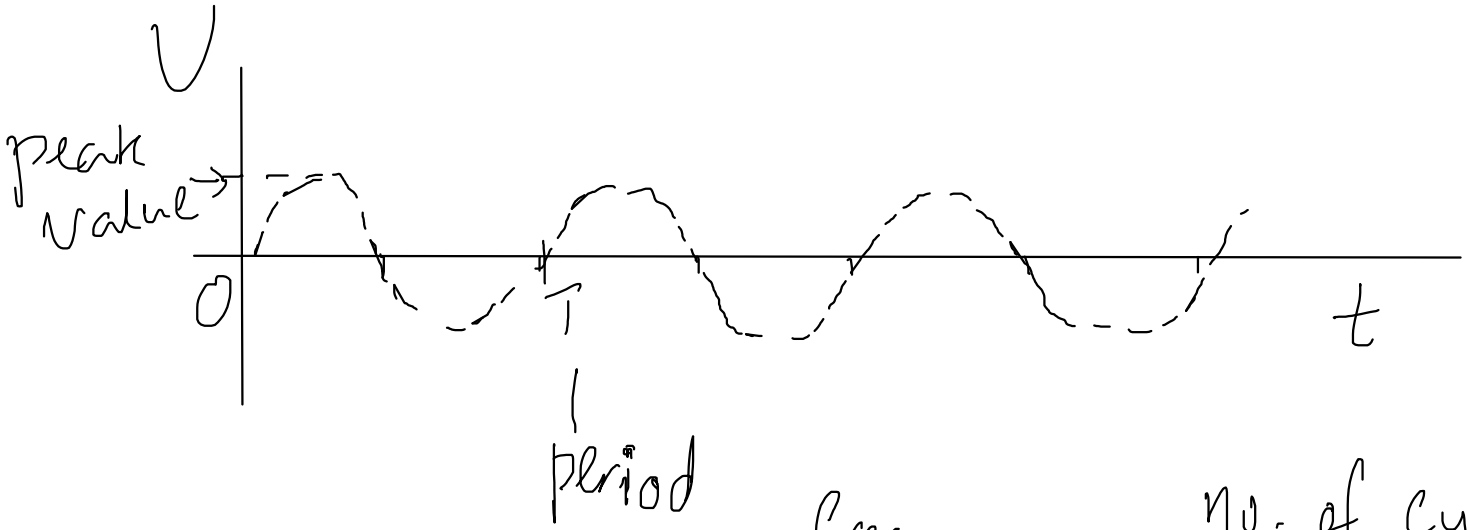
generator







e.g. main electricity



frequency = no. of cycles per unit time

show an understanding and use the terms period, frequency, peak value and root-mean-square value as applied to an alternating current or voltage

Root-mean-square

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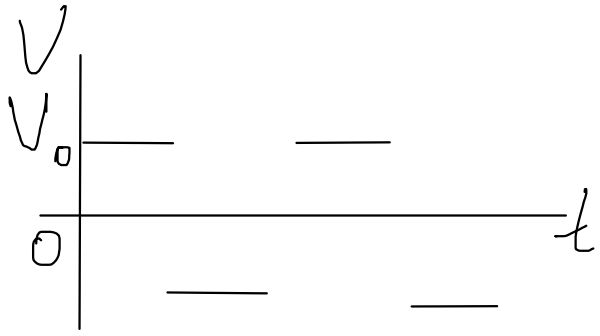
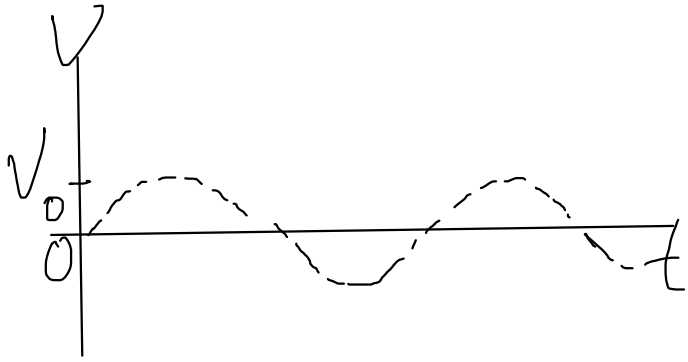
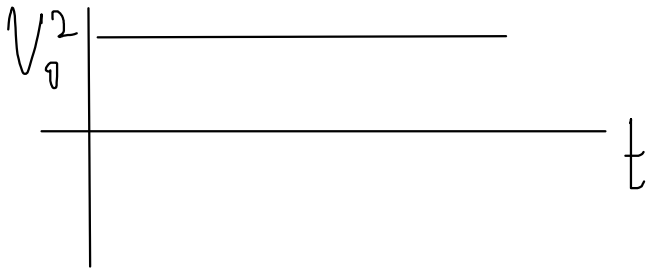
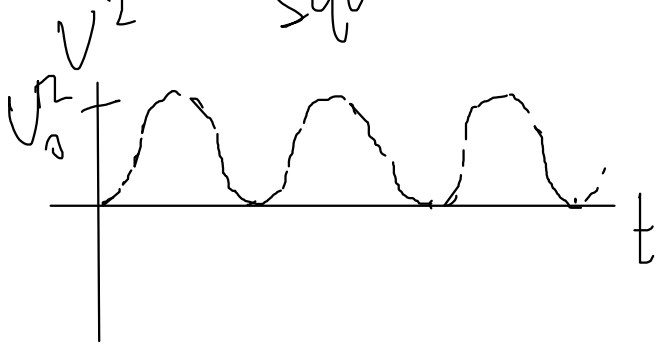




square

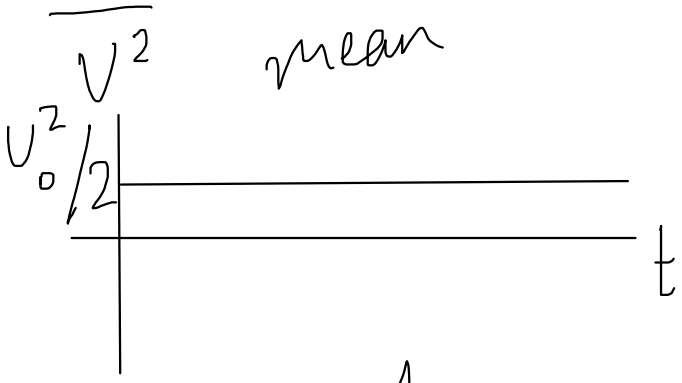


square



mean

mean



root

root

$$\sqrt{\overline{V_0^2}} = V_0$$

$$\sqrt{\frac{\overline{V_0^2}}{2}} = \frac{V_0}{\sqrt{2}}$$

root-mean-square (rms)

deduce that the mean power in a resistive load is half the maximum power for a sinusoidal alternating current

Mean Power

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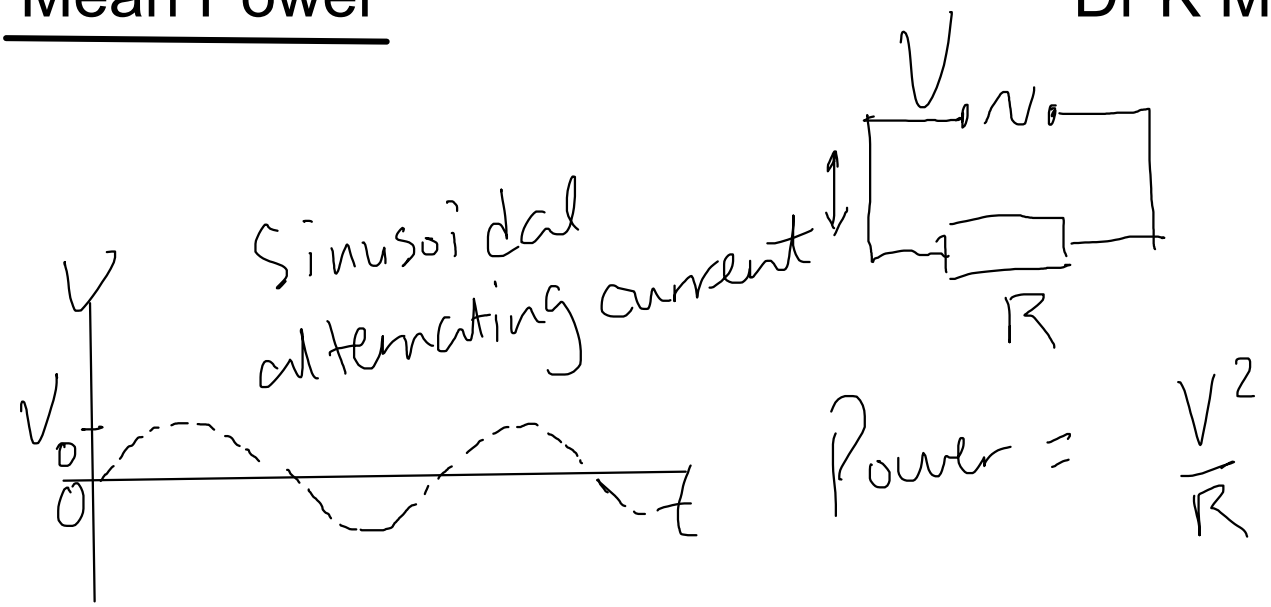
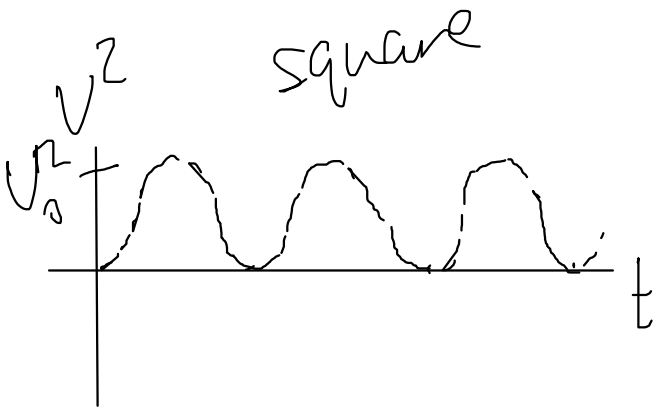
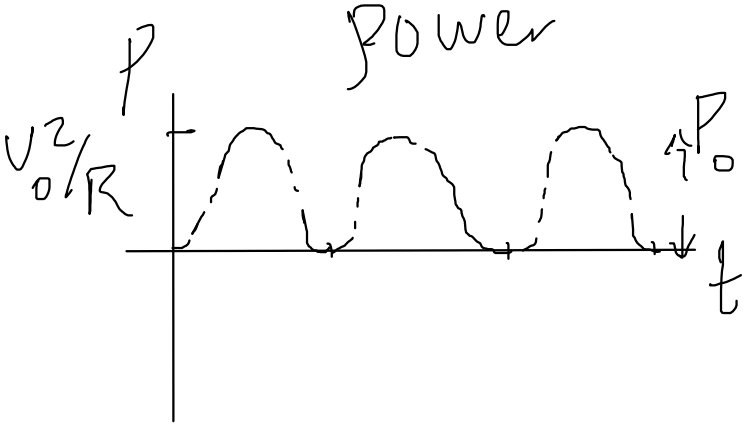
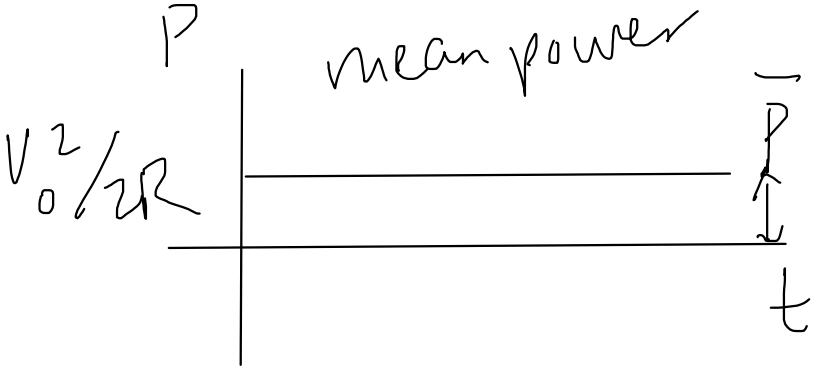


$$\text{Power} = \frac{V^2}{R}$$







Mean power

$$\bar{P} = \frac{1}{2} P_0$$

represent an alternating current or an alternating voltage by an equation of the form $x = x_0 \sin \omega t$

a. c. equation

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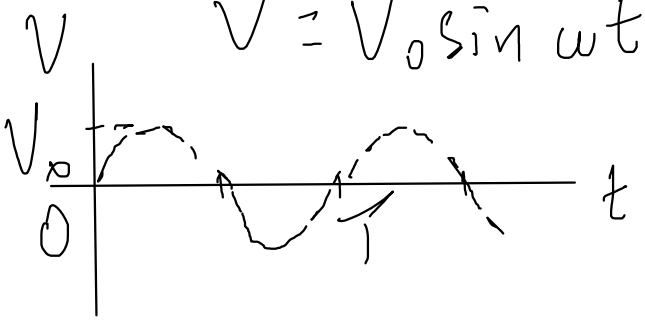
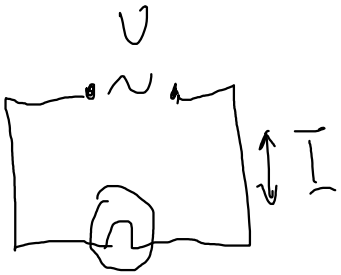
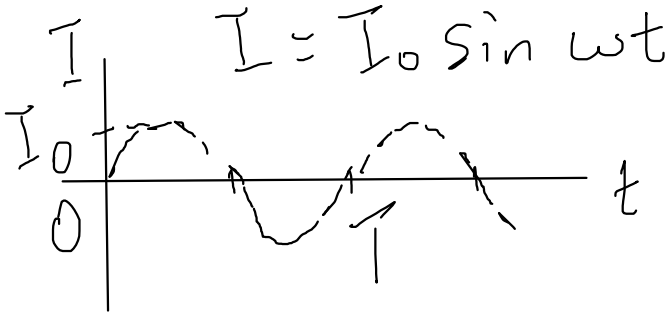
Examples:





$$\omega = \frac{2\pi}{T}$$

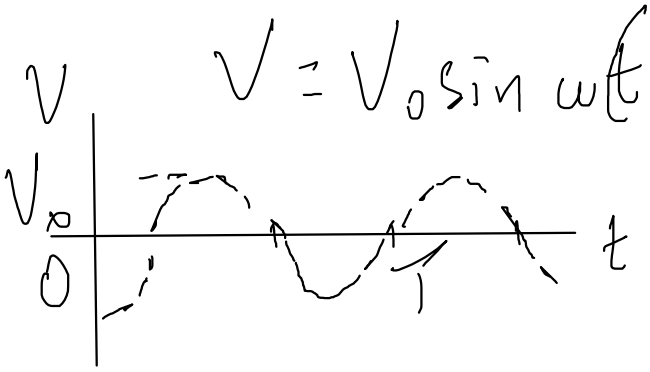


frequency f:

$$f = \frac{1}{T}$$

$$\omega = 2\pi f$$

Can also start at other time of the cycle, e.g.



distinguish between r.m.s. and peak values and recall and solve problems using the relationship I_rms = I_0 / sqrt(2) for the sinusoidal case

r.m.s. and peak values

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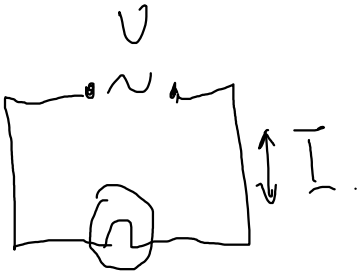

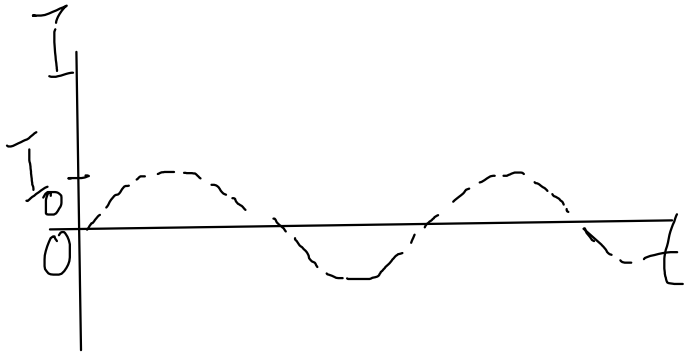

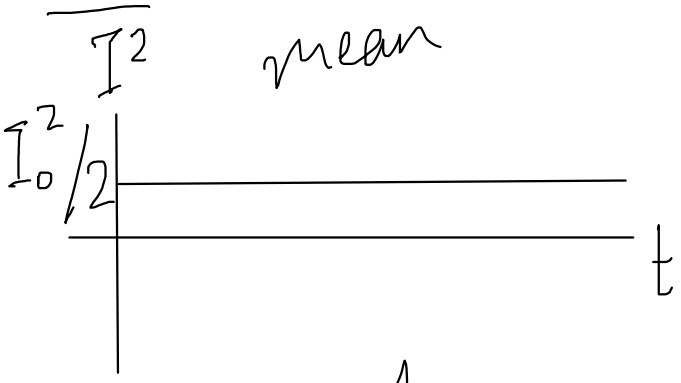

a kind of average

root

peak value

$$\text{rms value} = \sqrt{\frac{I_0^2}{2}} = \frac{I_0}{\sqrt{2}}$$

show an understanding of the principle of operation of a simple iron-cored transformer and recall and solve problems using Ns /Np = Vs /Vp = I p / I s for an ideal transformer

Transformer

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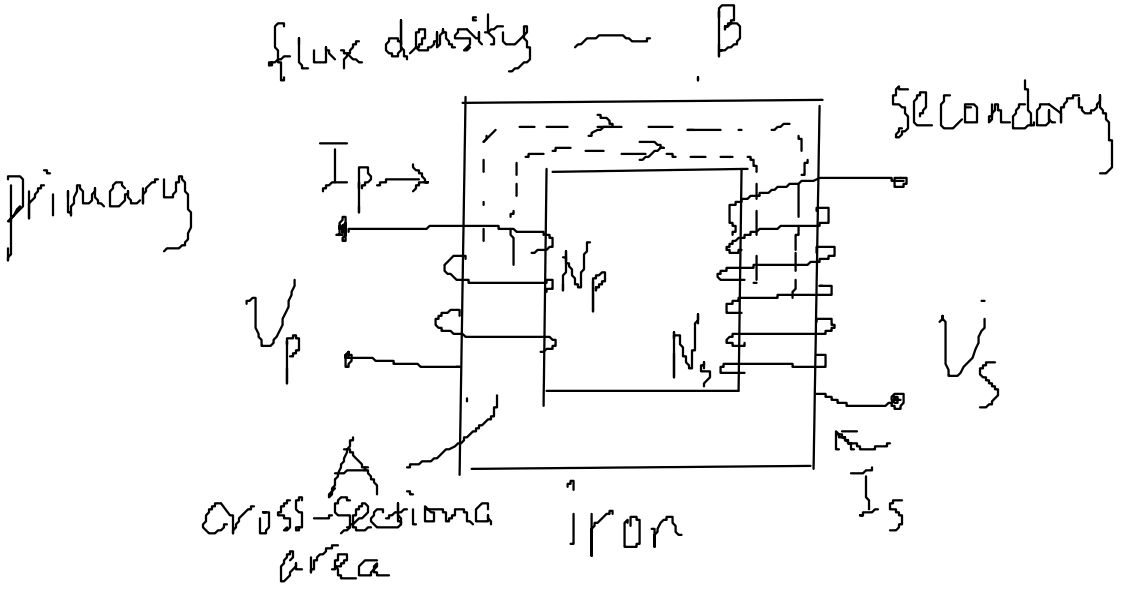

Flux thru' both primary and secondary coil are equal : $\Phi = BA$.

Faraday's law :

primary coil $V_p = -N_p \frac{d\Phi}{dt}$

Secondary " $V_s = -N_s \frac{d\Phi}{dt}$

Dividing : $\boxed{\frac{V_p}{V_s} = \frac{N_p}{N_s}}$

Assume no heat loss in iron core :

power in = power out

$\boxed{V_p I_p = V_s I_s}$ → good for long distance transmission

explain the use of a single diode for the half-wave rectification of an alternating current.

Convert a.c. to d.c.

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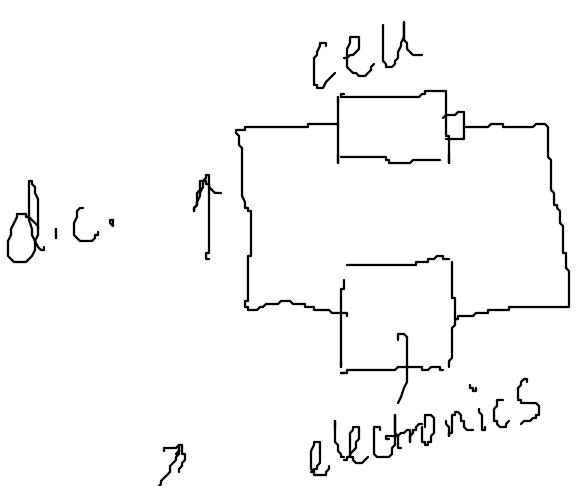
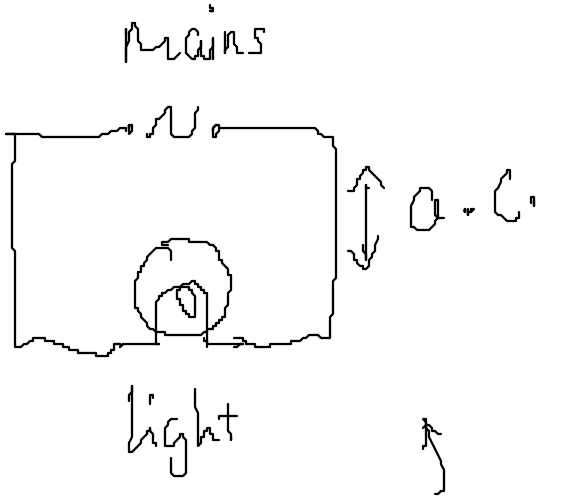


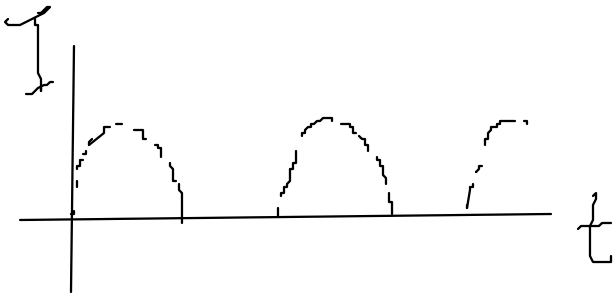
low power



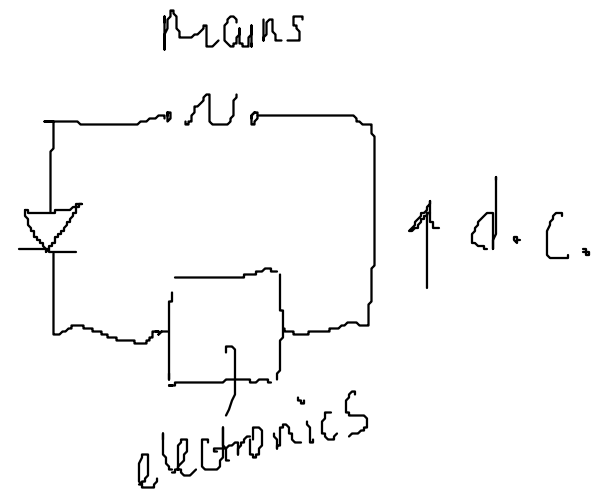
not good for electronics

How to convert a.c. to d.c. ?

e.g. just add a diode.



only one direction allowed by diode →



half wave rectification