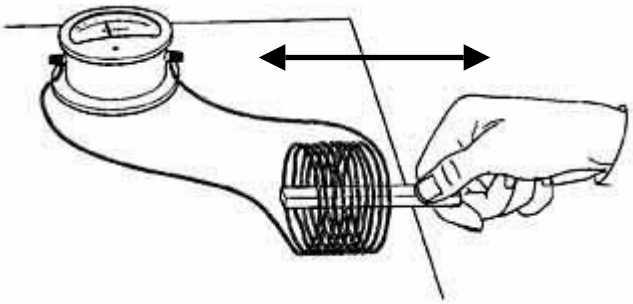
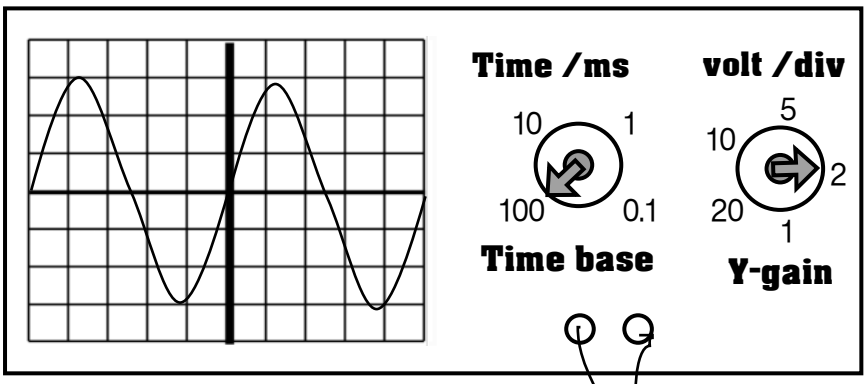
The electric current produced by a cell flows in one direction around a circuit. The chemical reaction in the cell makes an emf which acts in one direction. This kind of electricity is called ***direct current*** electricity or d.c. For short.



Electric current can be produced with a magnet and a coil of wire.

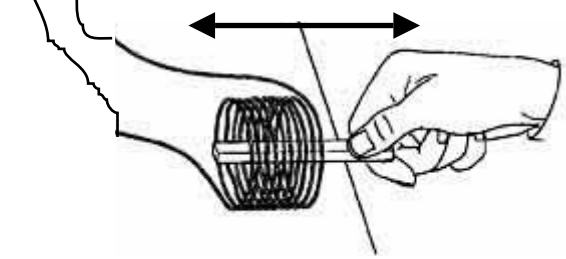
Pushing the magnet into the coil causes the electric current to flow one way.

Removing the coil causes the current to flow the opposite way.

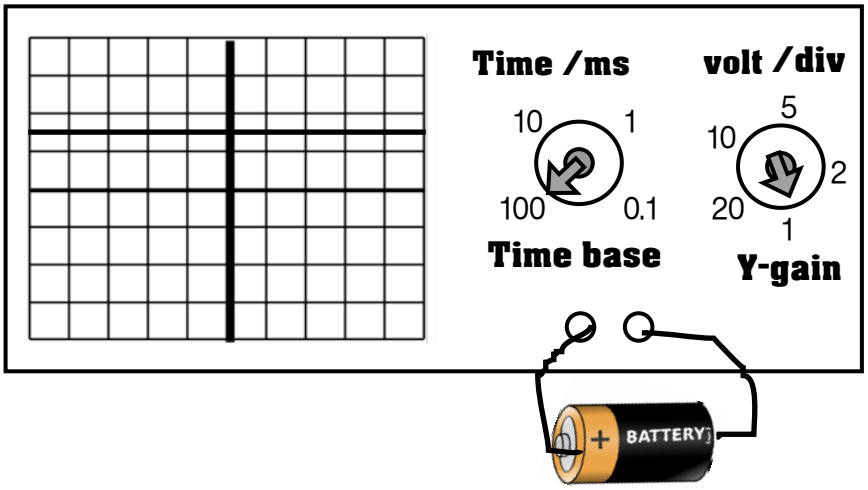


Attaching the coil to an oscilloscope shows the variation in the produced emf and the current.

This type of current is called ***alternating current. a.c.***

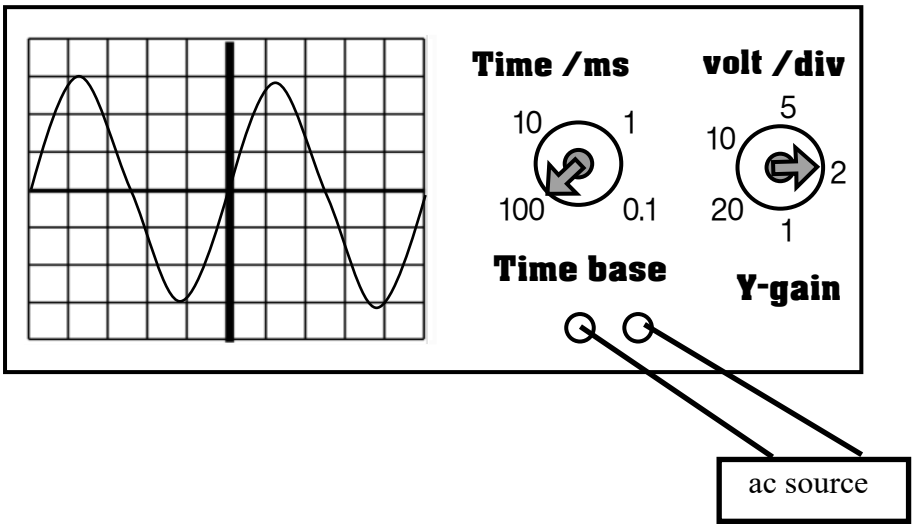


Y-gain



Time base

Measuring Alternating Current



The oscilloscope screen is really a graph.

The horizontal squares represent time called the time base and the vertical squares represent voltage.

In the oscilloscope shown the time base is set at one square = 100 milliseconds

The vertical scale usually called the y gain is set to 2 volts per square.

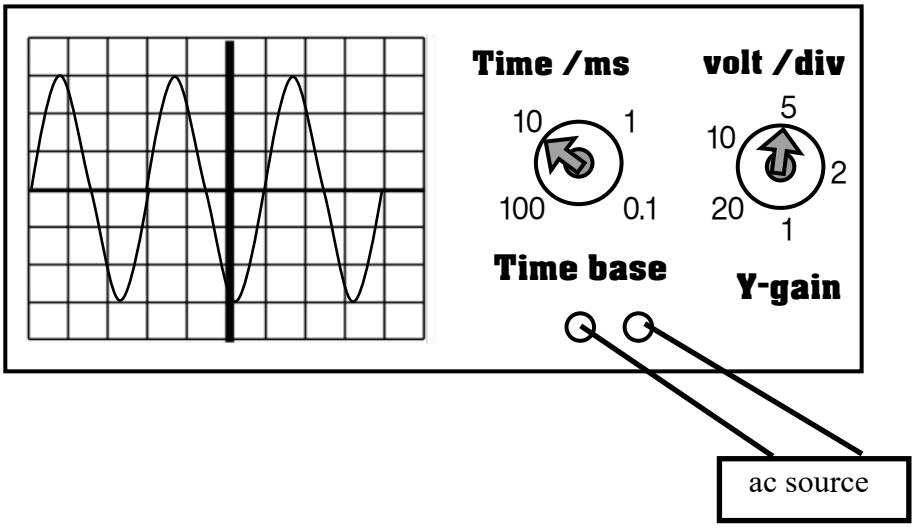
Measuring the peak voltage

Y-gain X number of squares

Measuring the frequency

Find the period of the wave **Time base X number of squares**

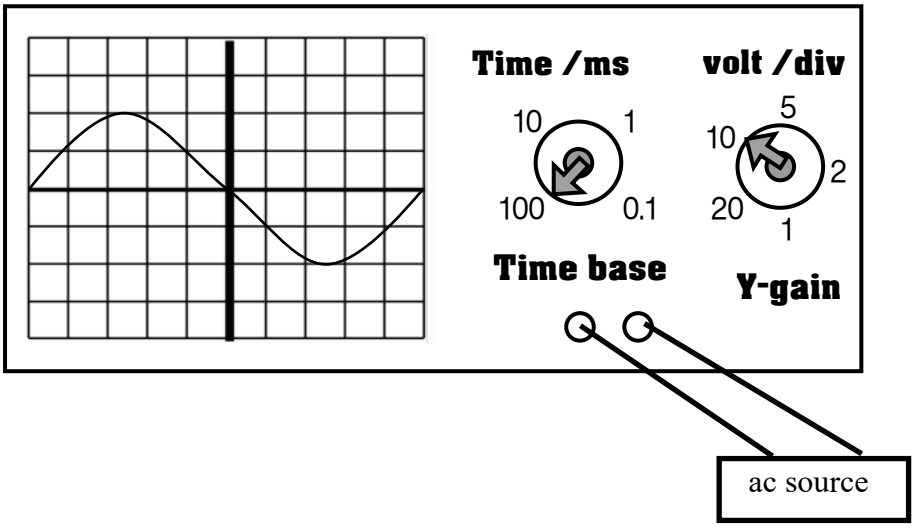
Frequency = 1/period



Find the peak voltage and frequency of this ac source of electricity.

Y-gain = ...

Time base = ...



Find the peak voltage and frequency of this ac source of electricity.

Y-gain = ...

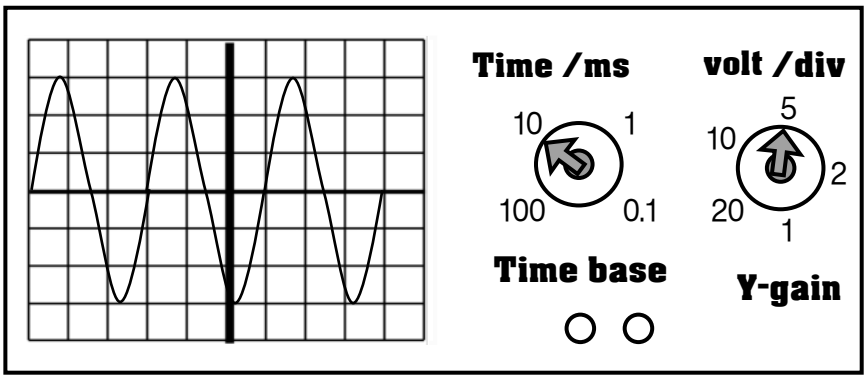
Time base = ...

The root mean squared voltage

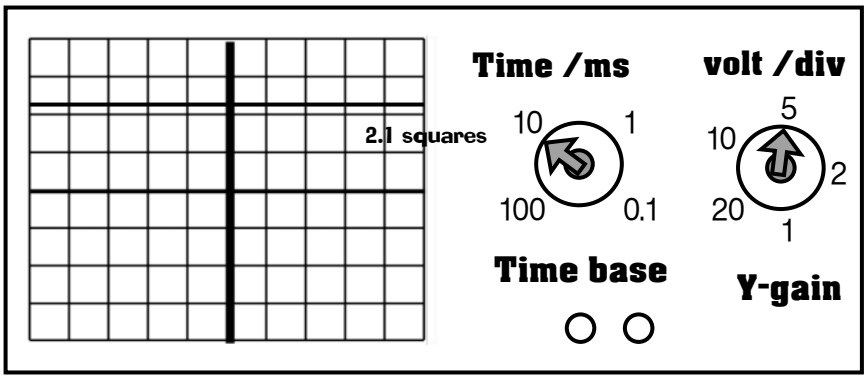
The oscilloscope shows that the voltage (and current) from an ac source is continually changing. The peak voltage is really only present for a fraction of a second.

It is better that we have a measurement of an ac electrical source that **gives the SAME heating or lighting effect as an equivalent dc source of electricity.**

To do this we connect a lamp to an ac and dc source and adjust the irradiance of the lamp until it gives the same value for the ac and dc source



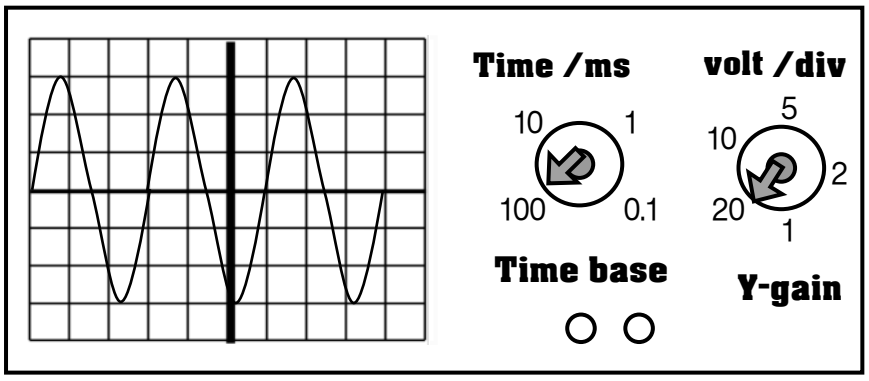
Alternating voltage from the ac source connected to the lamp.



Direct current voltage from the dc source connected to the lamp giving the exactly **same brightness.**

Peak voltage ac	Equivalent dc voltage	

The root mean squared voltage examples



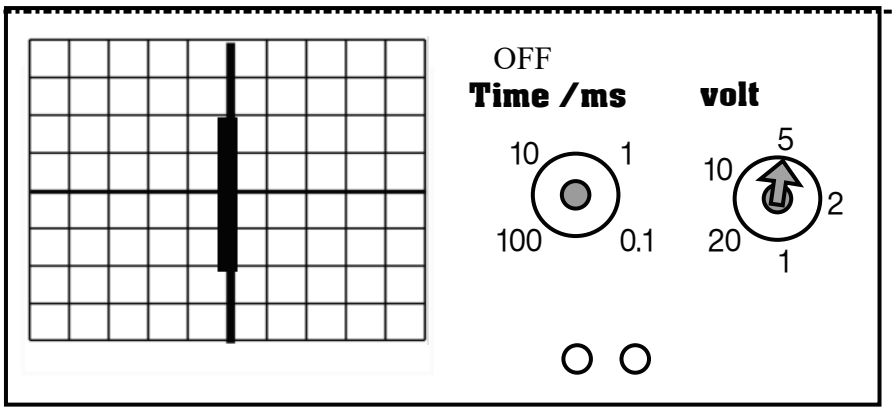
Find the peak voltage and the root mean squared voltage from the a.c. signal.

The peak ac current passing through a resistor is measured to be 5.0 A.

Determine the root mean squared current .

The root mean squared potential difference across a resistor of value 100 Ω is 3.5 V.

Determine the peak voltage across the resistor and the peak current passing through it.



Find the peak voltage of this ac source.

Determine the root mean squared voltage.