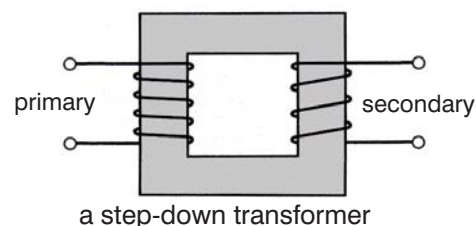


A transformer can be step-up or step-down.
It works on a.c. only.

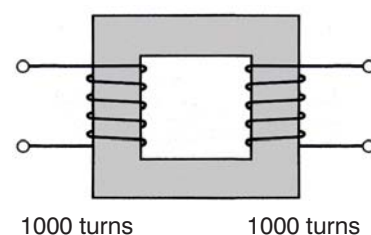
$$\frac{\text{Secondary voltage}}{\text{Primary voltage}} = \frac{\text{Number of turns on secondary coil}}{\text{Number of turns on primary coil}}$$



1. Isolation transformer

This is a transformer used to separate (or 'de-couple') two electrical circuits.

The diagram shows a 1:1 isolation transformer. Because there is the same number of turns on each side, the output voltage is the **same** as the input voltage. But the two circuits are not connected. The left-hand side may be connected to the mains supply, but the right-hand side is not.



Isolation transformers can be used for shaver sockets in bathrooms, for safety.

Touching both output terminals at the same time would be dangerous of course (230V !), but touching one terminal and a water-tap should be safe because of the de-coupling from the mains.

2. Switch-mode transformer

This is the kind of transformer used for mobile phone chargers and power supplies for lap-tops. It works at a very high frequency (over 50 kHz, which is a thousand times the mains frequency).

They are much smaller and lighter than a standard transformer.

Here is a schematic diagram of a switch-mode transformer:

