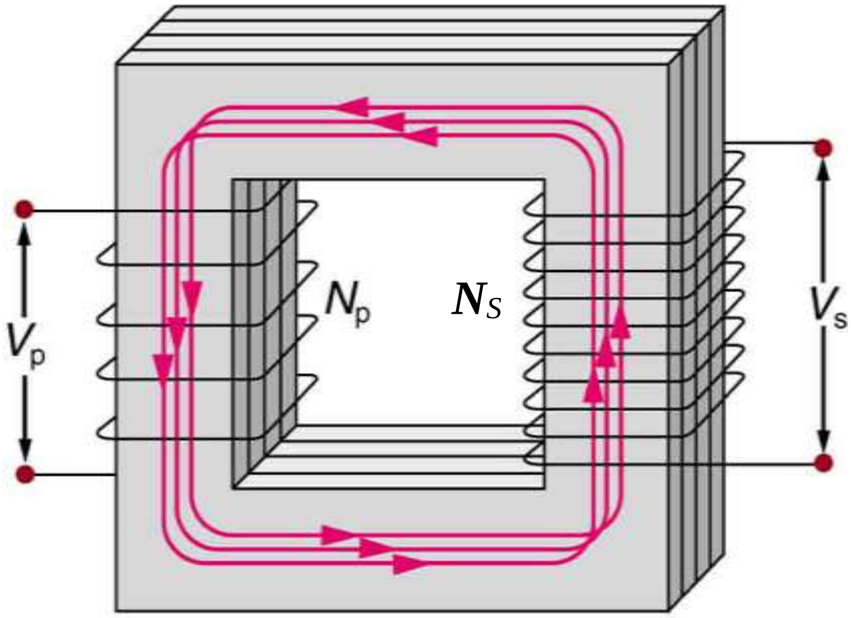
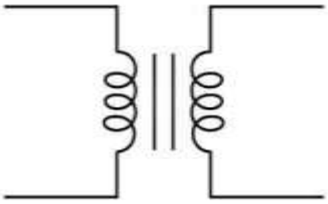
# Section 2 – Transformers

## Transformers




A transformer is a device that consists of an **iron core** and an input and output, or rather a **primary coil** and a **secondary coil**. The actual physics of a transformer is examine in Unit 3 Physics.

The basics of a transformer is that an AC voltage in the primary coil will create a magnetic field within the iron core. In turn, this magnetic field in turn induces an AC voltage in the secondary coil.

The voltage in the secondary coil depends upon whether the number of turns in the secondary coil is less or greater than the number of turns in the primary coil

If $N_S > N_P$ then $V_S > V_P$

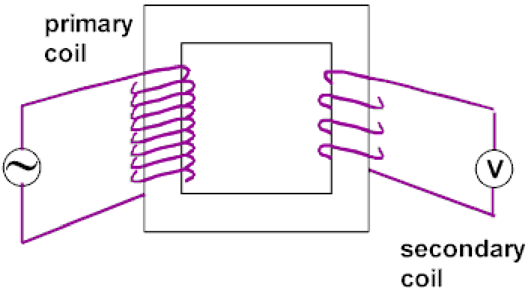
If $N_S < N_P$ then $V_S < V_P$

$$\boxed{\frac{V_S}{V_P} = \frac{N_S}{N_P}}$$

Where $V_S$ = Voltage in the secondary coil
$V_P$ = Voltage in the primary coil
$N_S$ = Number of turns in the secondary coil
$N_P$ = Number of turns in the primary coil

**Example.1**

Calculate the secondary voltage ($V_S$) for the following transformer:




$N_P$ = 40 turns    $N_S$ = 4 turns

$V_P$ = 240 Volts    $V_S$ = ?

$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

$$\therefore V_S = V_P \times \frac{N_S}{N_P}$$

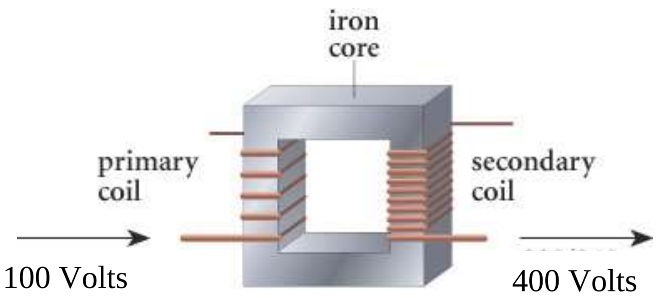
$$V_S = 240 \times \frac{4}{40}$$

$$= \underline{\mathbf{24\ Volts}}$$

**Example.2**

Calculate the value of the following ratio:

$$\frac{\textit{Number of turns in the secondary coil}}{\textit{Number of turns in the primary coil}}$$




$\frac{N_S}{N_P} = ?$

$V_P$ = 100 V

V

$$\frac{N_S}{N_P} = \frac{V_S}{V_P}$$

$$\therefore \frac{N_S}{N_P} = \frac{400}{100} = 4:1$$