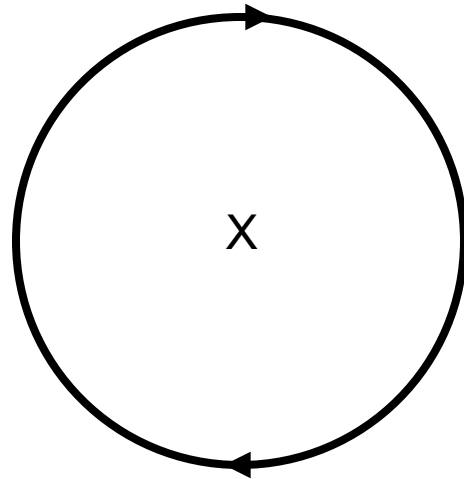# EE251
Lectures

Transformers
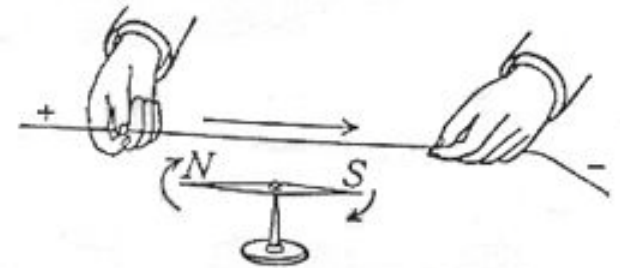
Section 08

Hans Christian Oersted (1777 – 1851)

1822

In 1820 he showed that a current produces a magnetic field.
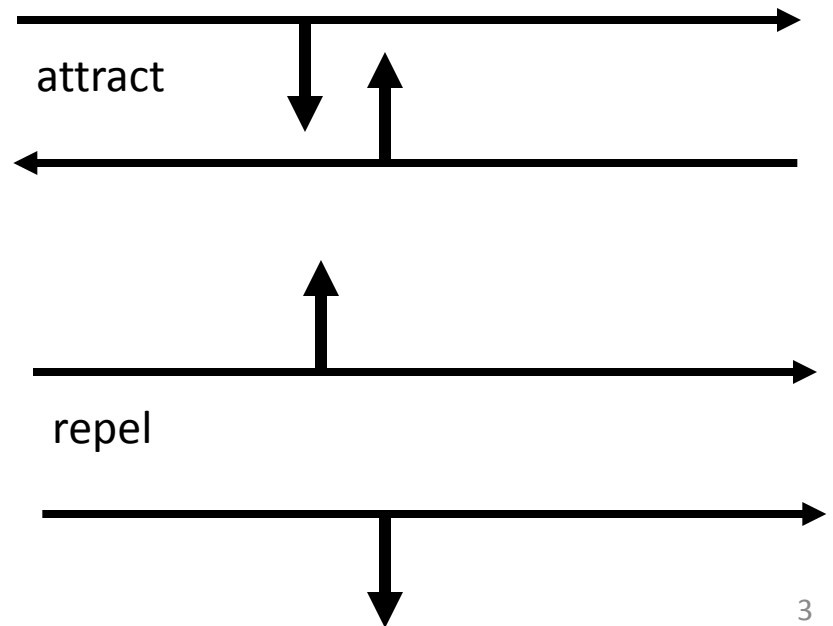
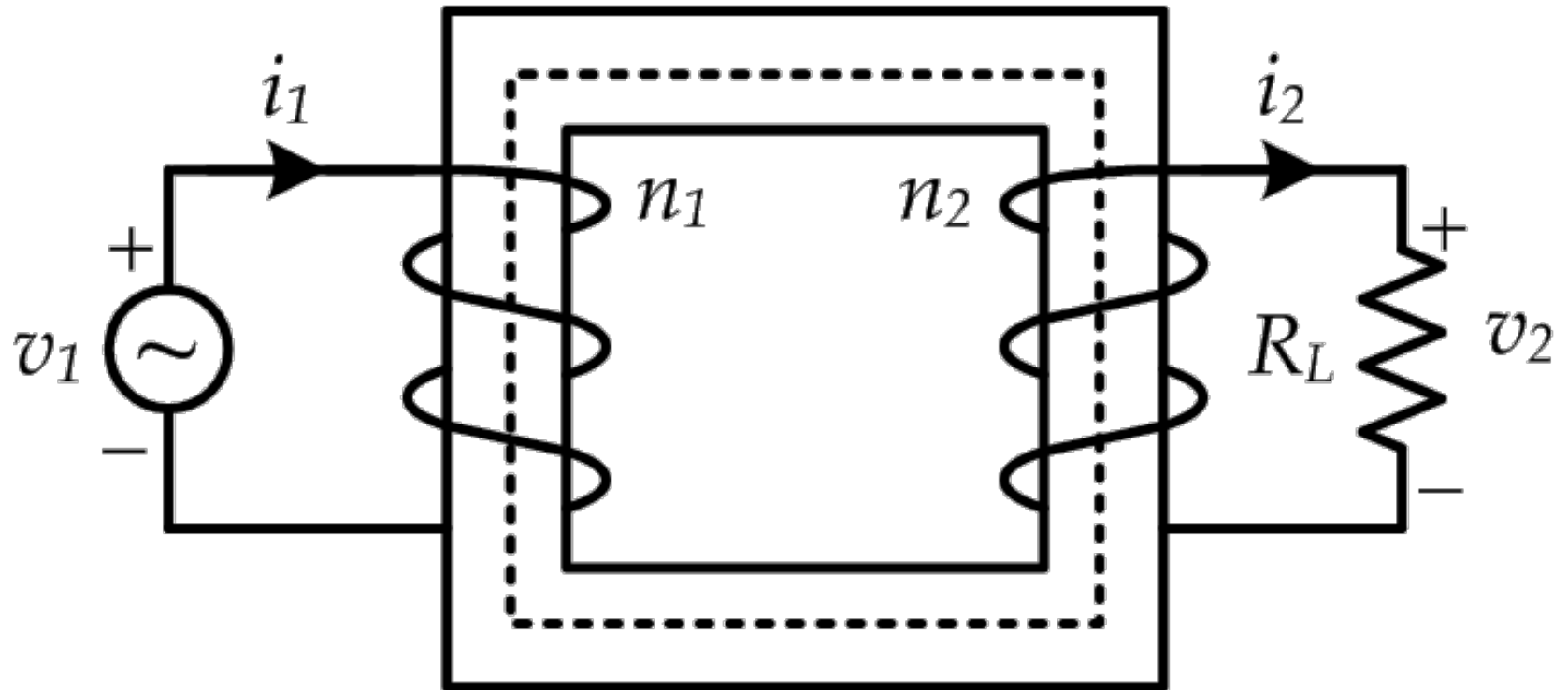Ref: http://chem.ch.huji.ac.il/~eugeniik/history/oersted.htm

André-Marie Ampère (1775 − 1836)

French mathematics professor who only a week after learning of Oersted's discoveries in Sept. 1820 demonstrated that parallel wires carrying currents attract and repel each other.

A moving charge of 1 *coulomb* per second is a current of 1 *ampere* (amp).
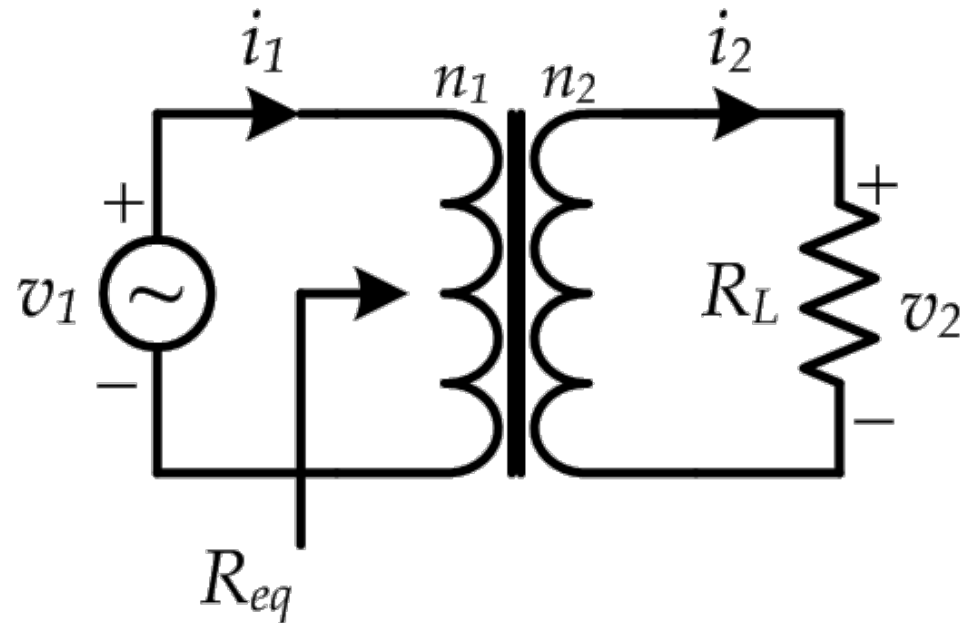
attract

repel

Ideal Transformer

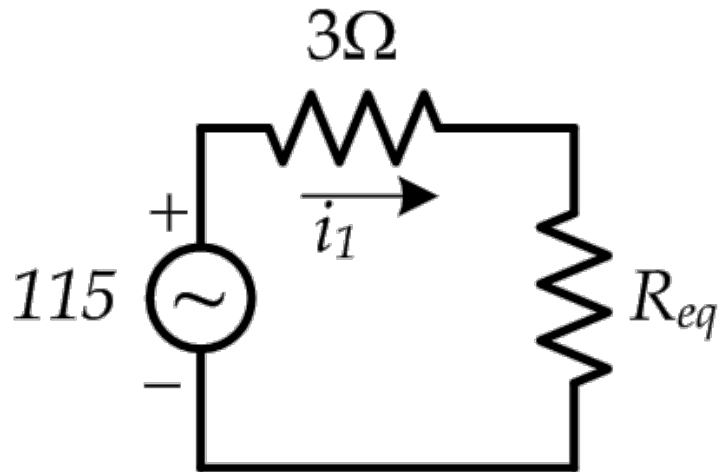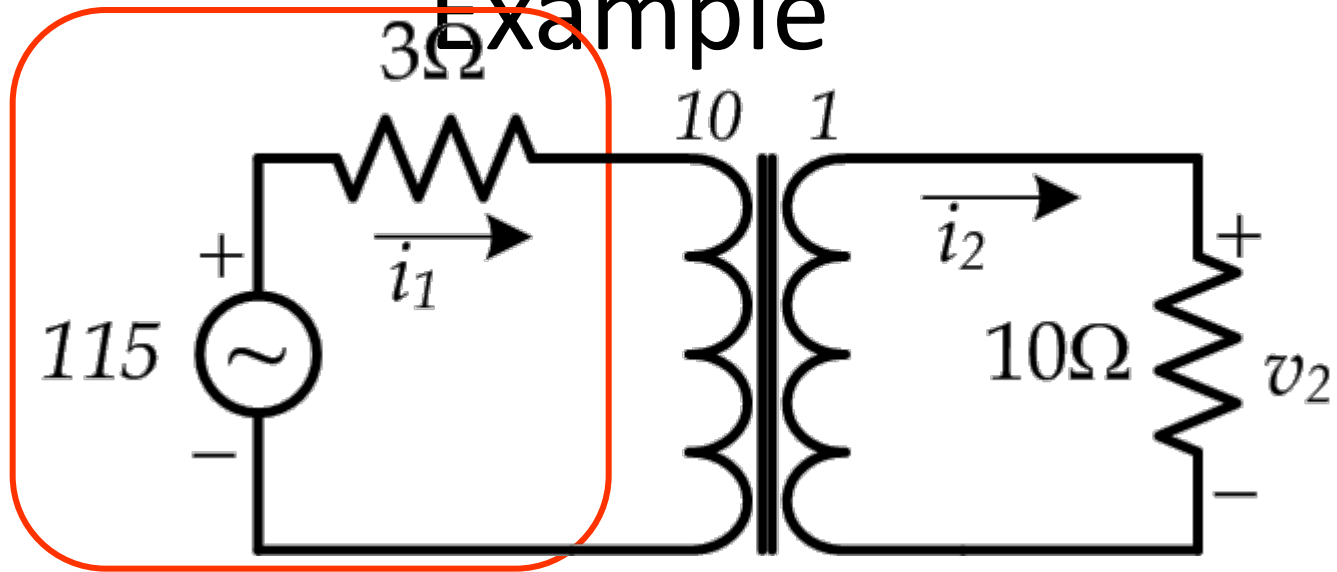# Ideal Transformer Equations

$$v_2 = \frac{n_2}{n_1} \times v_1$$

$$i_2 = \frac{n_1}{n_2} \times i_1$$

$$R_{eq} = \left(\frac{n_1}{n_2}\right)^2 \times R_L$$
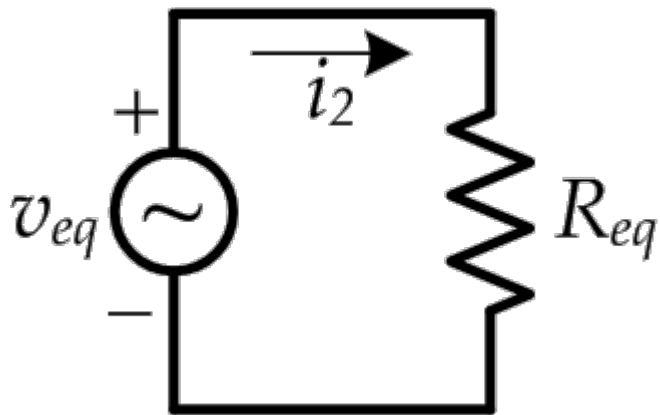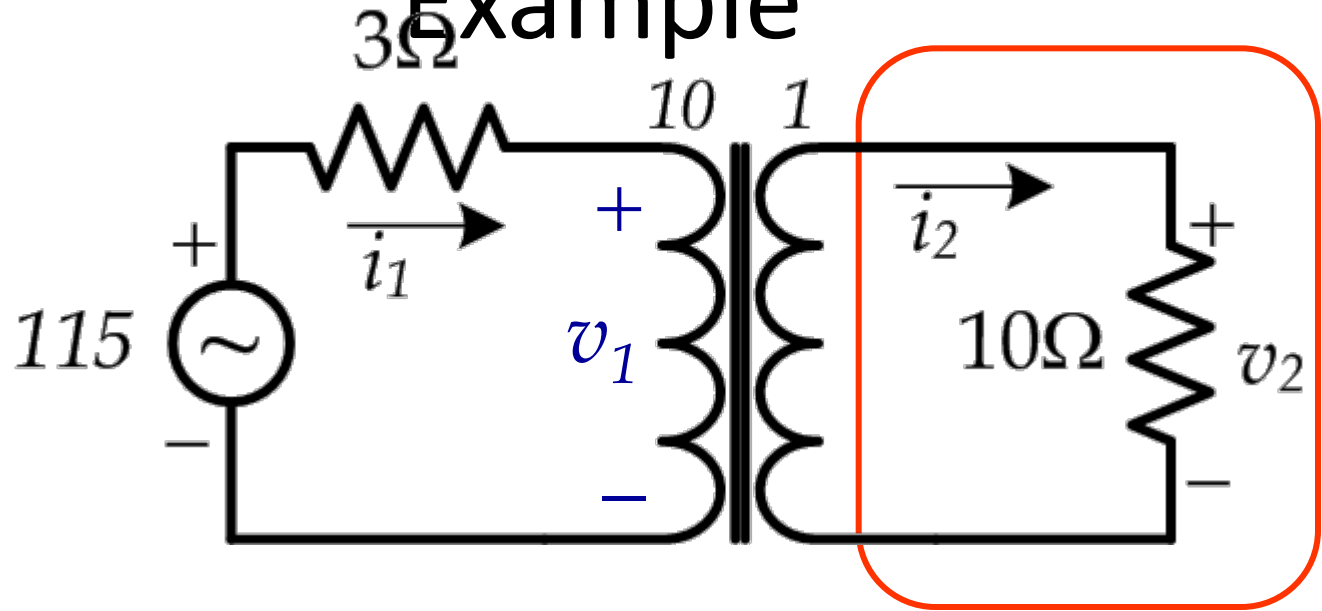
$$P_1 = P_2$$

Example

$$R_{eq} = \left(\frac{10}{1}\right)^2 \times 10 = 1000\Omega$$

$$i_1 = \frac{115}{3+1000} = 0.1147\,A$$

Example

$$v_1 = 115 - i_1 \times 3 = 114.7V$$

$$v_2 = \frac{1}{10} \times v_1 = 11.47$$

$$i_2 = \frac{11.47}{10} = 1.147A$$