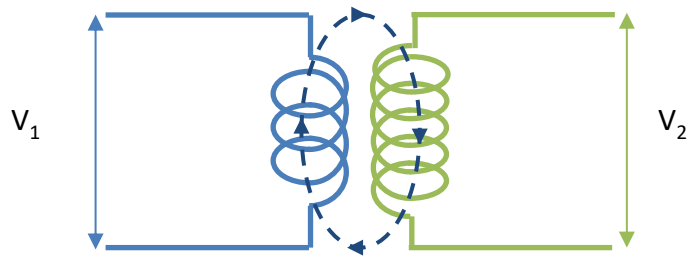
CONCEPT: TRANSFORMERS

- Power in North America is delivered to outlets in homes at 120 V.
  - This is too large to operate many delicate electronics, such as computers.

- Remember! A coil with a changing magnetic field can induce an EMF on a second coil
  - This induced EMF can be as small as needed.

- A TRANSFORMER does exactly this – it uses Faraday's law to convert a large voltage to a small EMF:



- The ratio of the VOLTAGES in a transformer depends upon the ratio of the TURNS:

$$\frac{V_2}{V_1} = \frac{N_2}{N_1}$$

EXAMPLE: You need to build a transformer that drops the 120 V of a regular North American outlet to a much safer 15 V. You already have a solenoid with 50 turns made, but you need to make a second solenoid to complete your transformer. What is the least number of turns the second solenoid could have?

PRACTICE: OPERATING A LAPTOP

An outlet in North America outputs electricity at 120 V, but a typical laptop needs to operate at around 20 V. In order to do so, a transformer is placed in a laptop's power supply. If the coil in the circuit connected to the laptop has 20 turns, how many turns must the coil in the circuit with the outlet have?