

**NEW TEXTILES**

# **SENSORS & VOLTAGE DIVIDERS**

electronic sensors detect changes in:

voltage  
current  
resistance

# RESISTIVE SENSORS

sensing change in resistance

# SWITCHES

digital

off/on

$R=\infty/R=0$

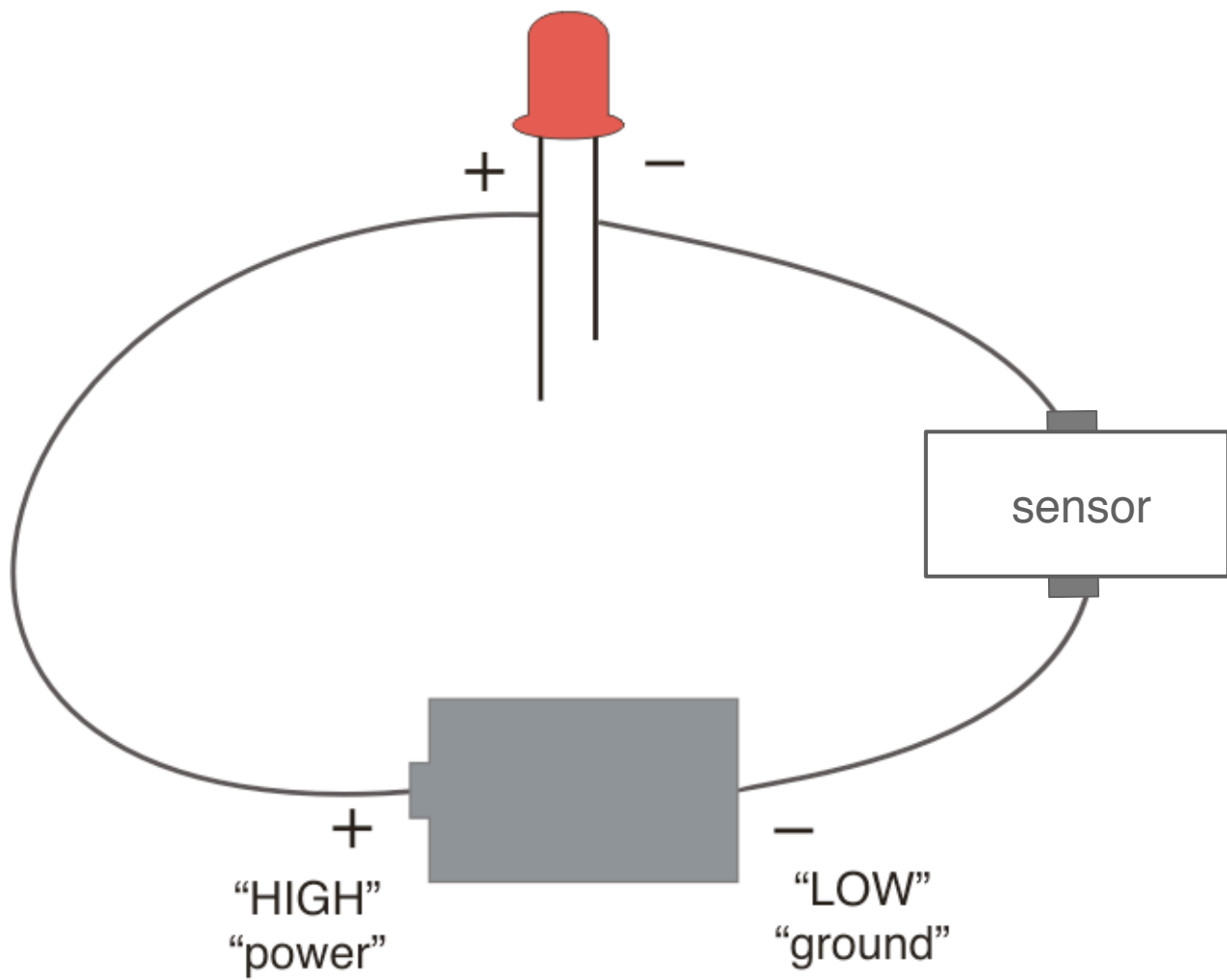
**SENSORS**



analog

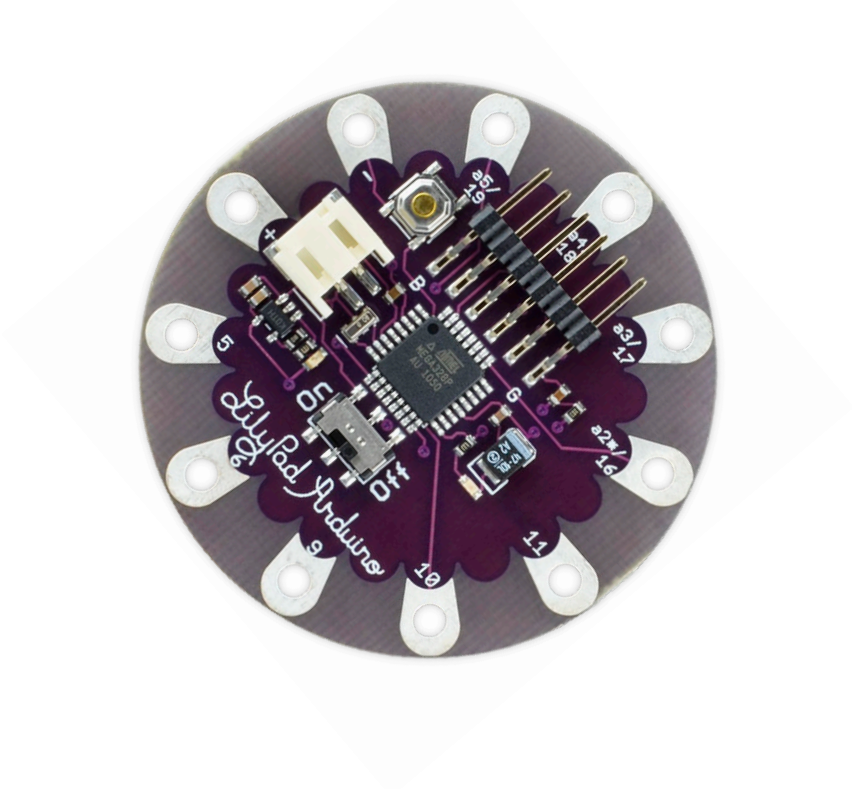
$$R = \infty \rightarrow R = 0$$

# EXAMPLE CIRCUIT



# MICROCONTROLLERS

sensor



**BUT...**

microcontrollers only sense voltages

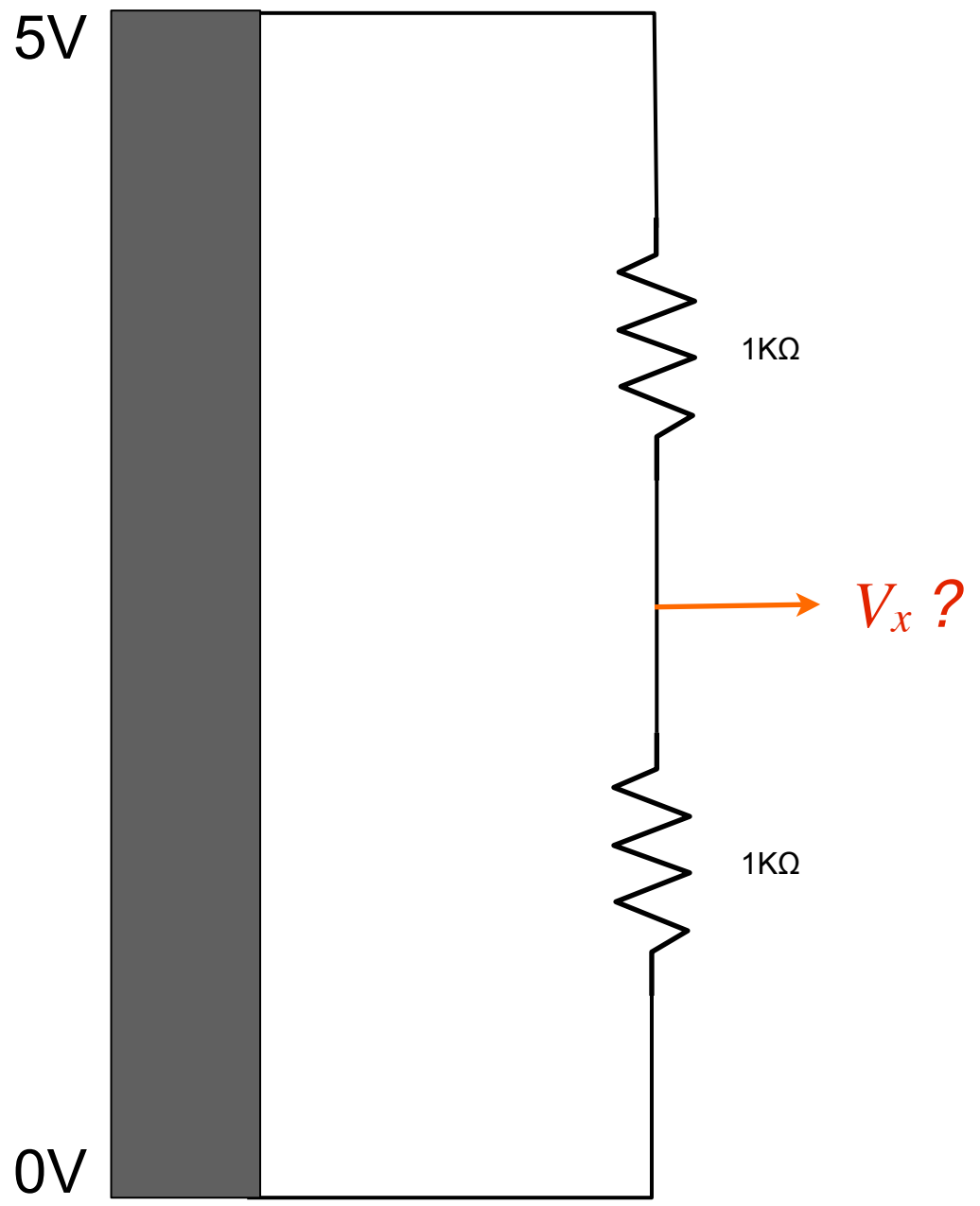
change in resistance

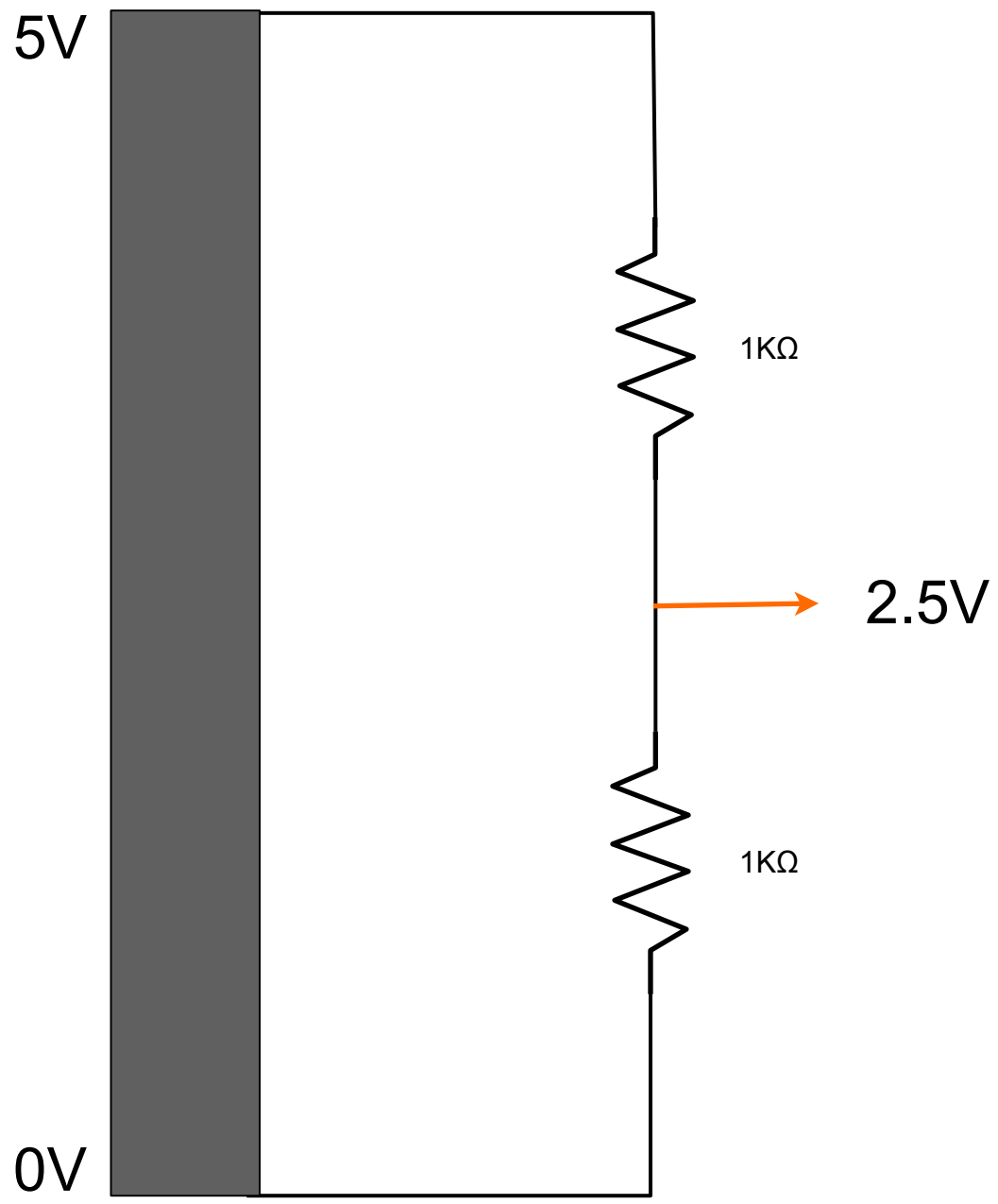


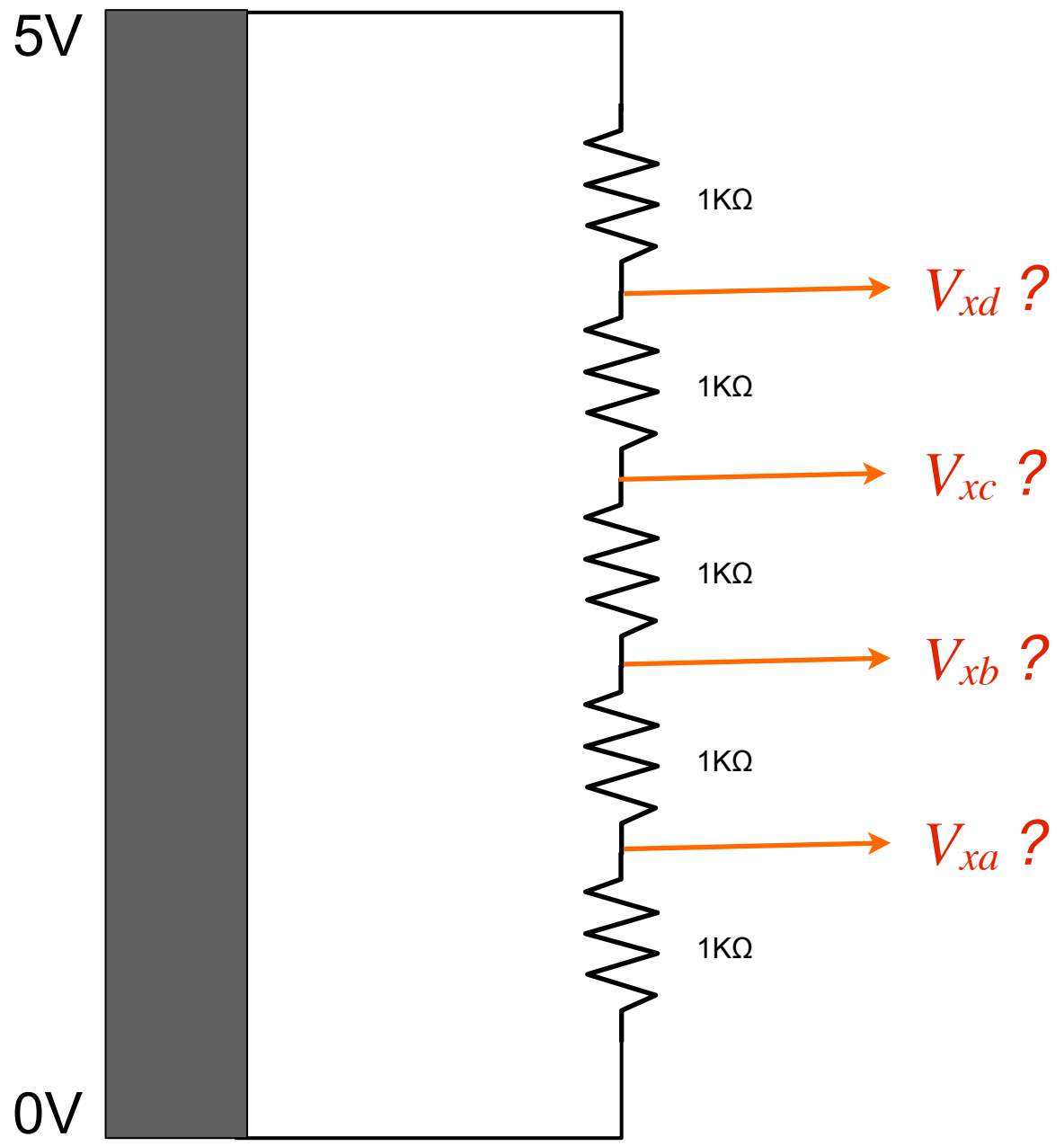
change in voltage

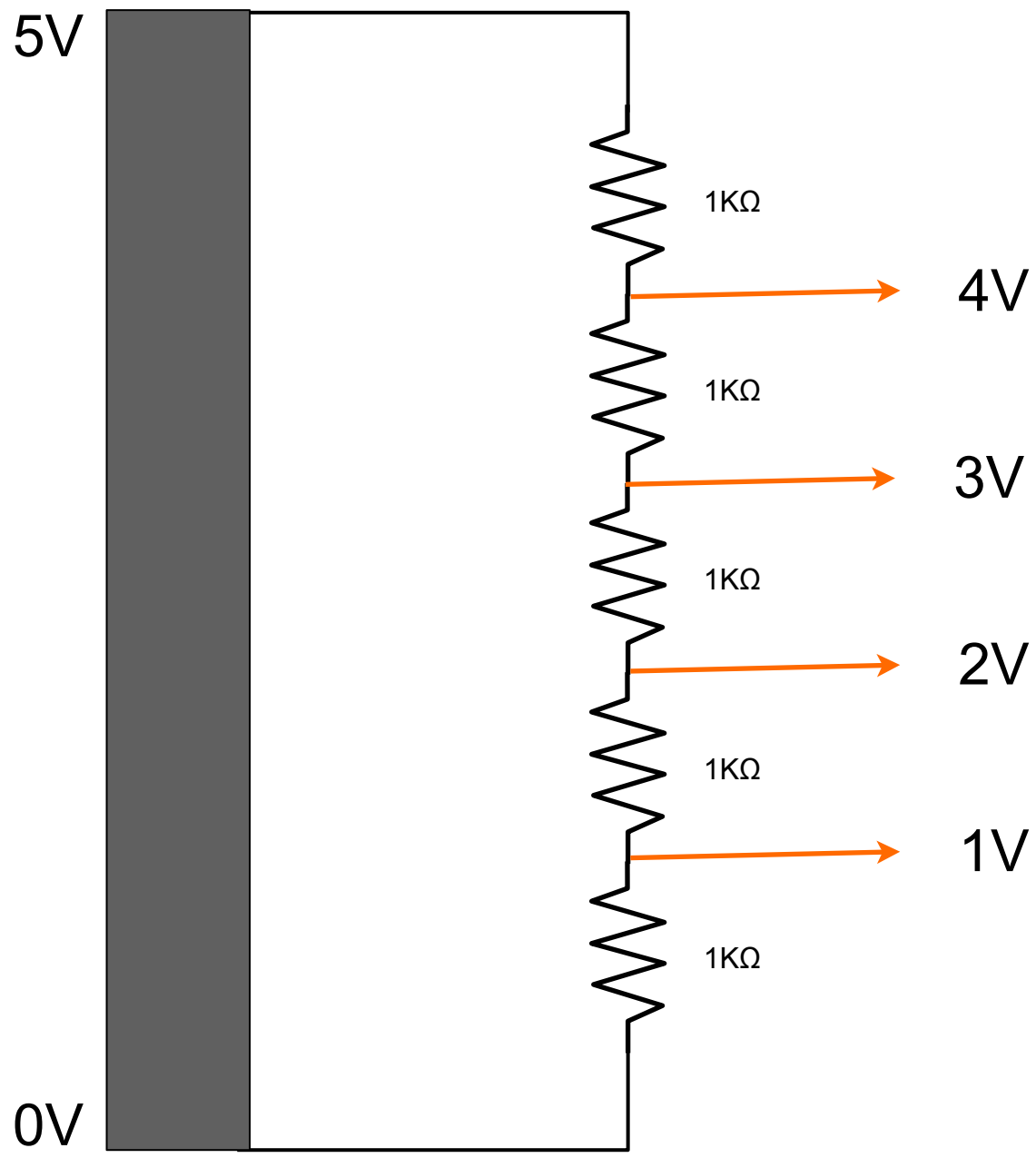


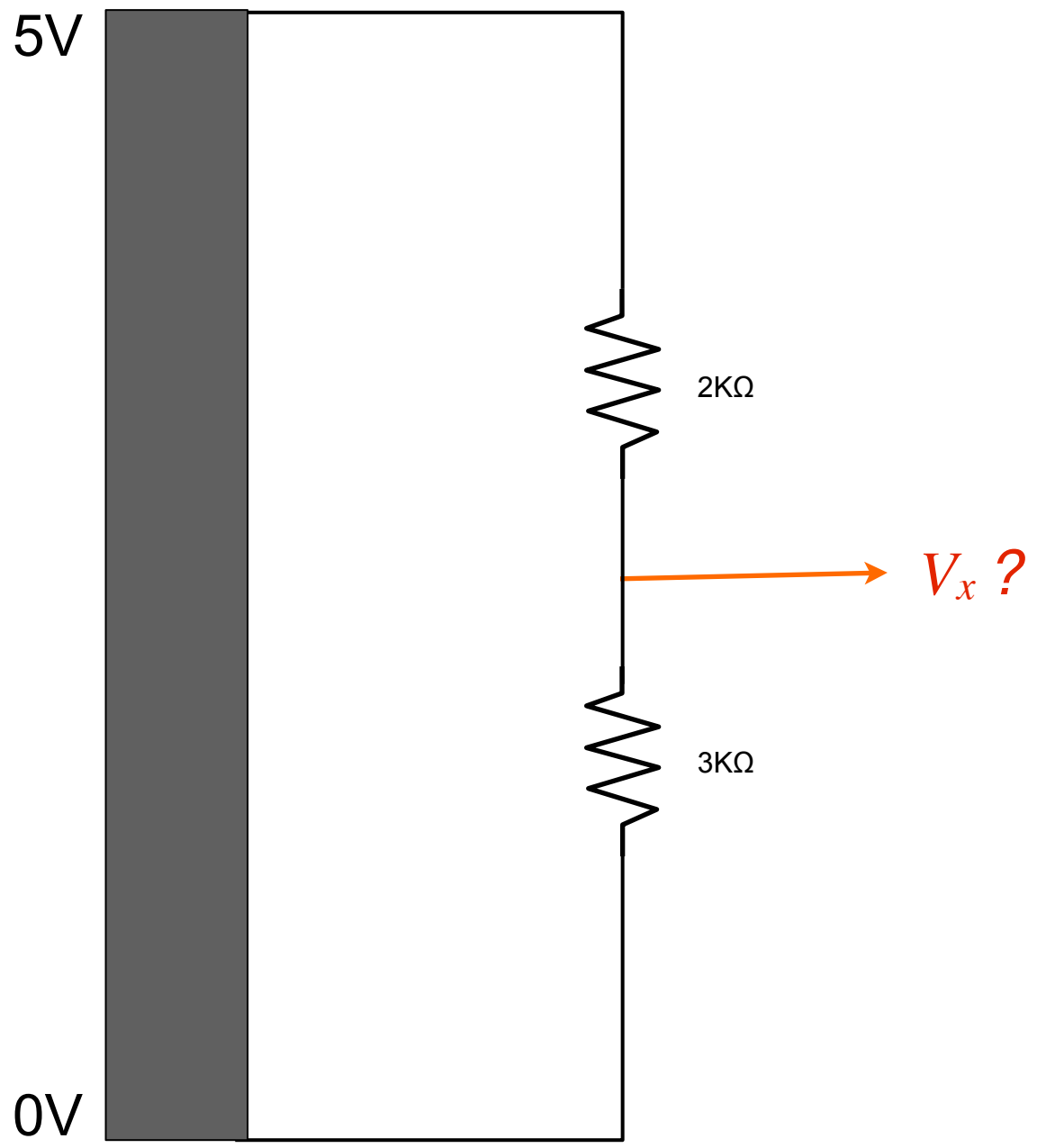
# VOLTAGE DIVIDERS

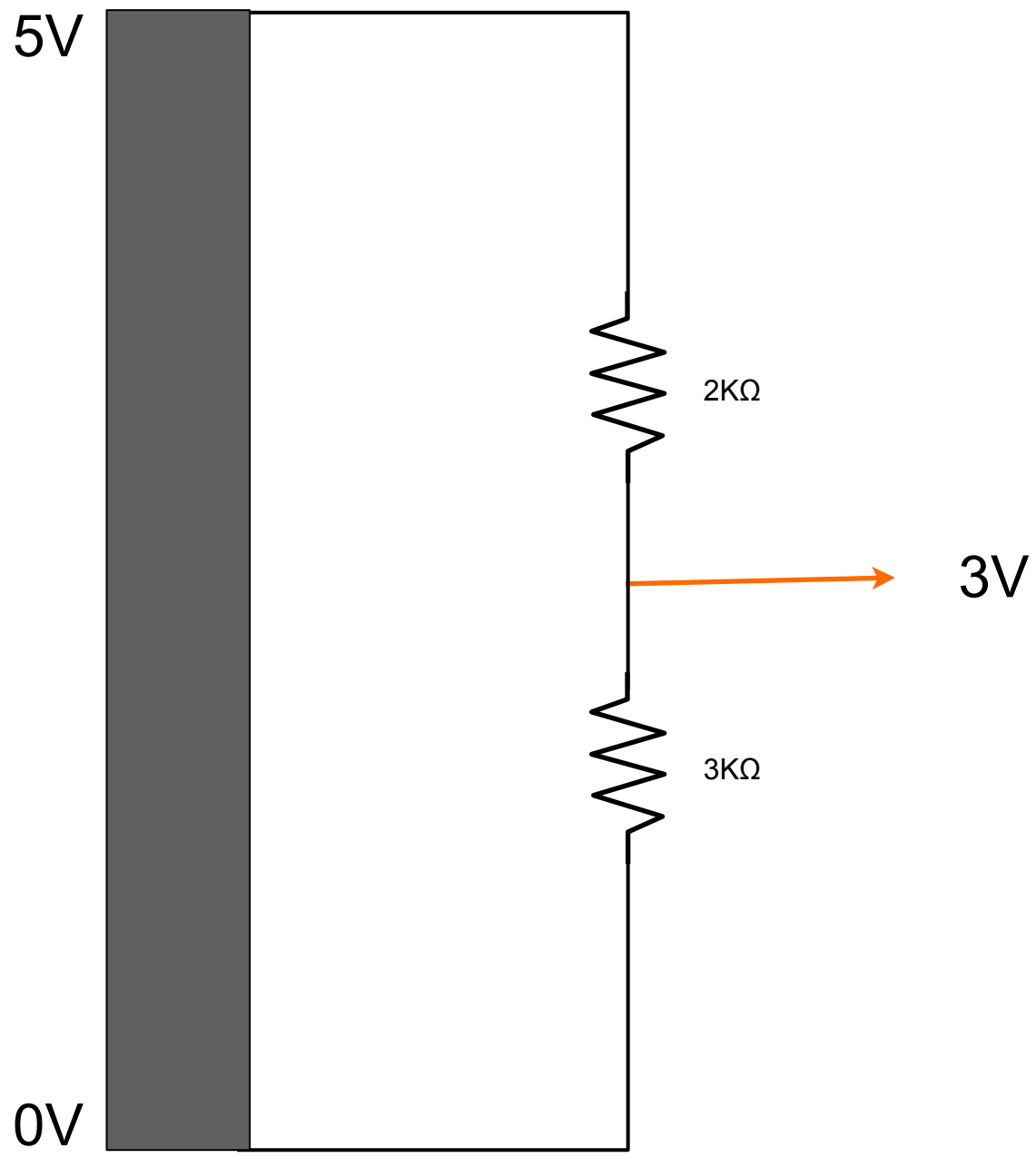


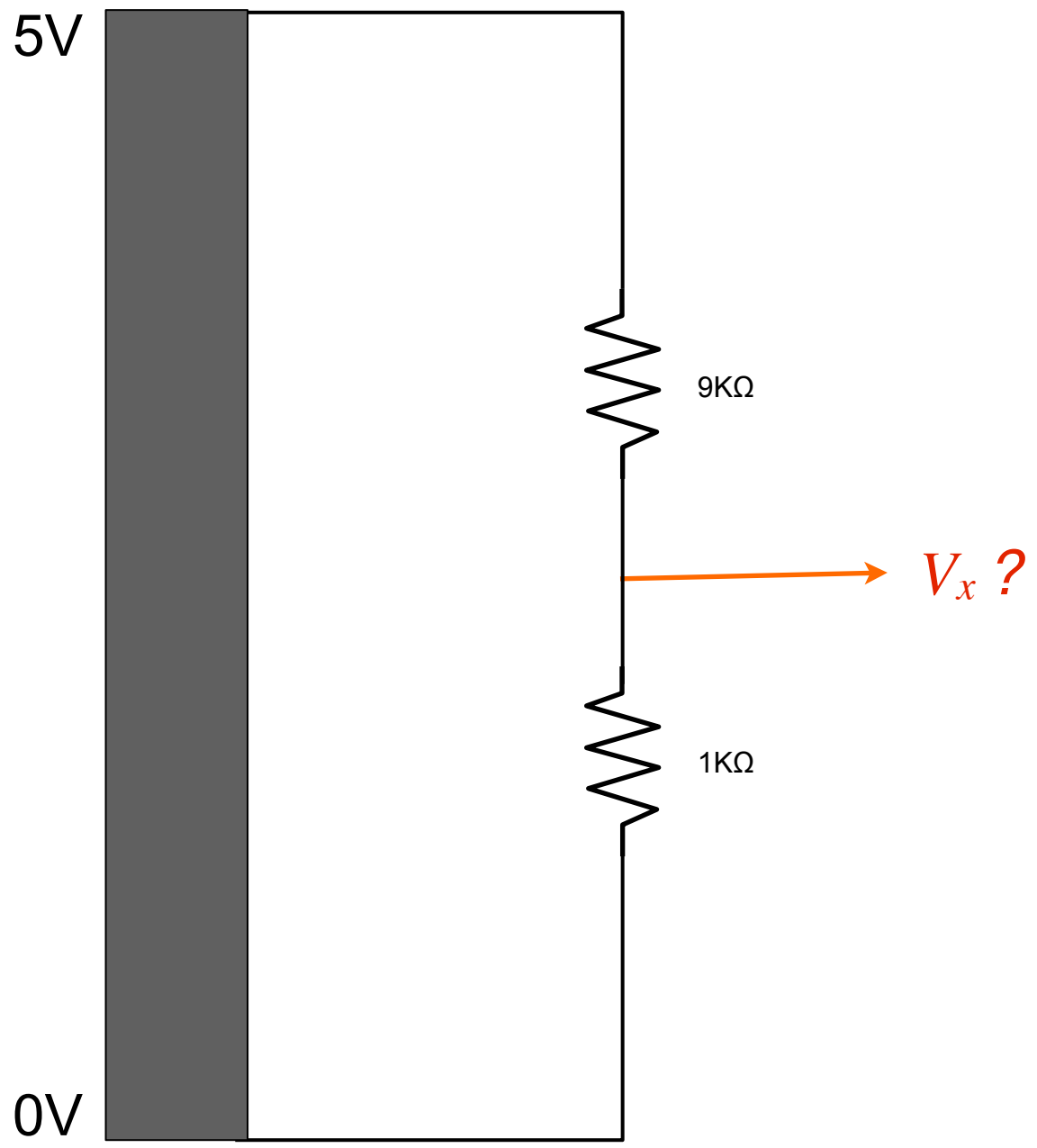




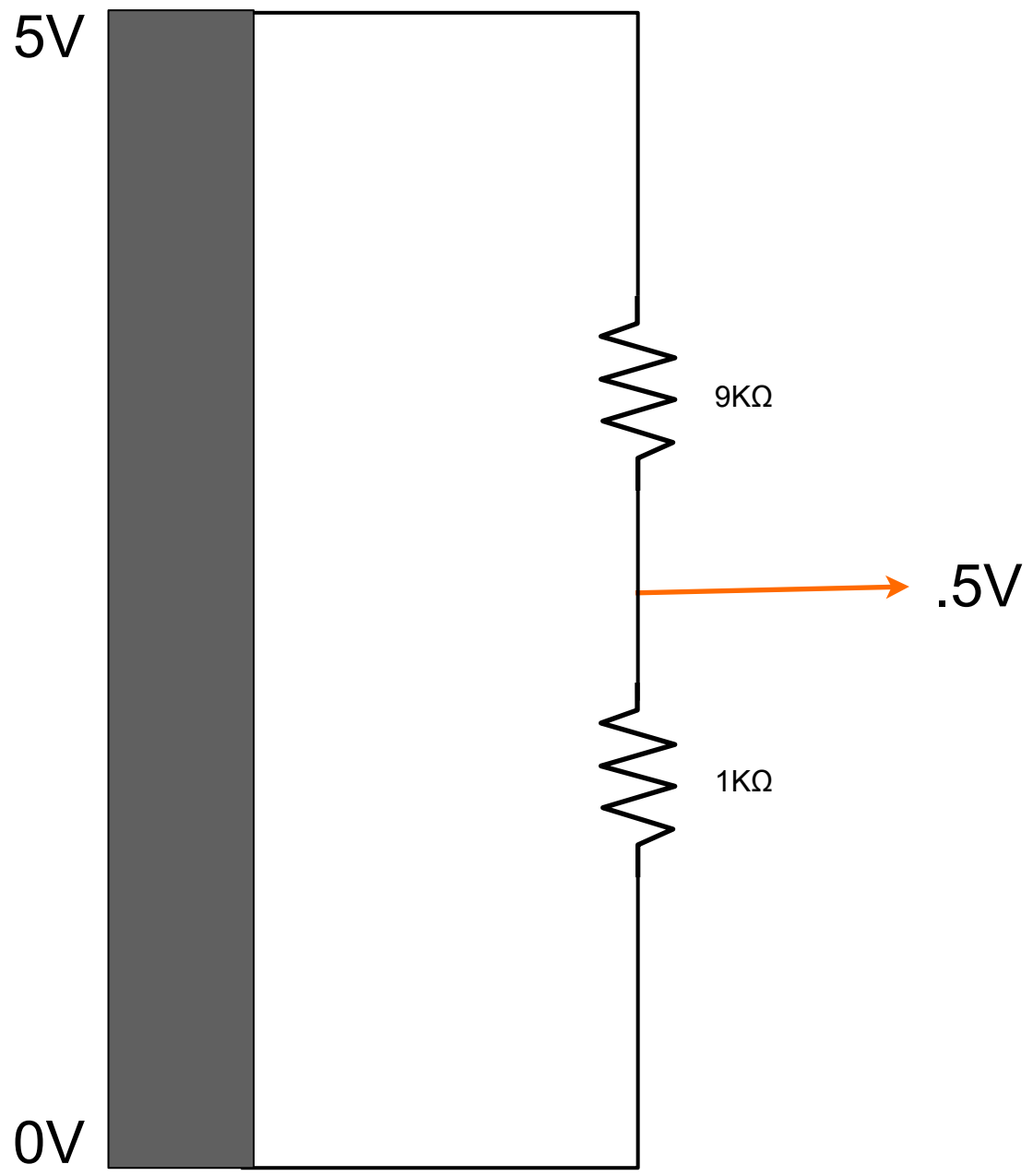












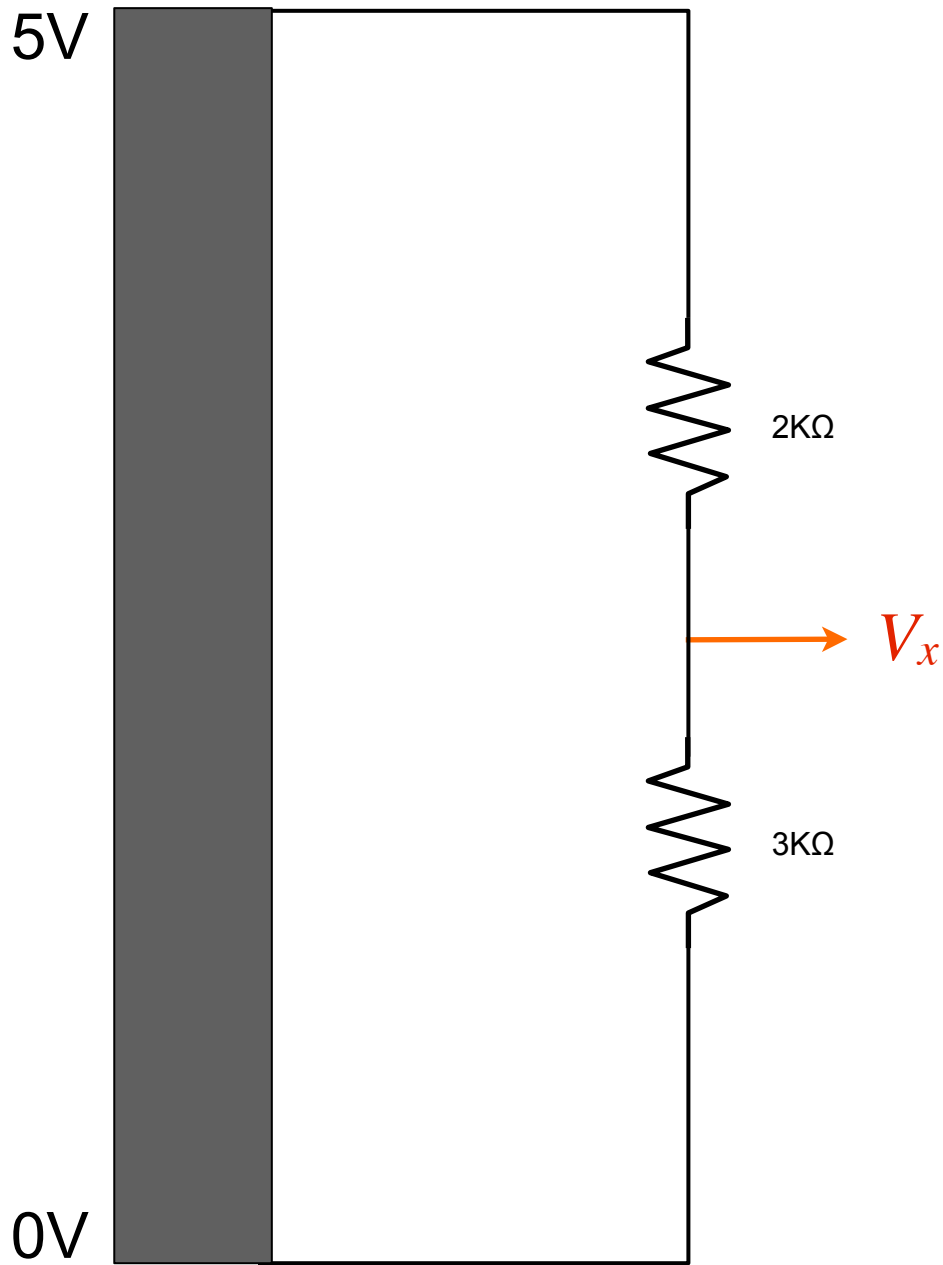
$$V_x = V_t \left( \frac{R_x}{R_t} \right)$$

$V_x$  = unknown voltage

$V_t$  = total voltage

$R_x$  = resistance from 0 to  $V_x$

$R_t$  = total resistance

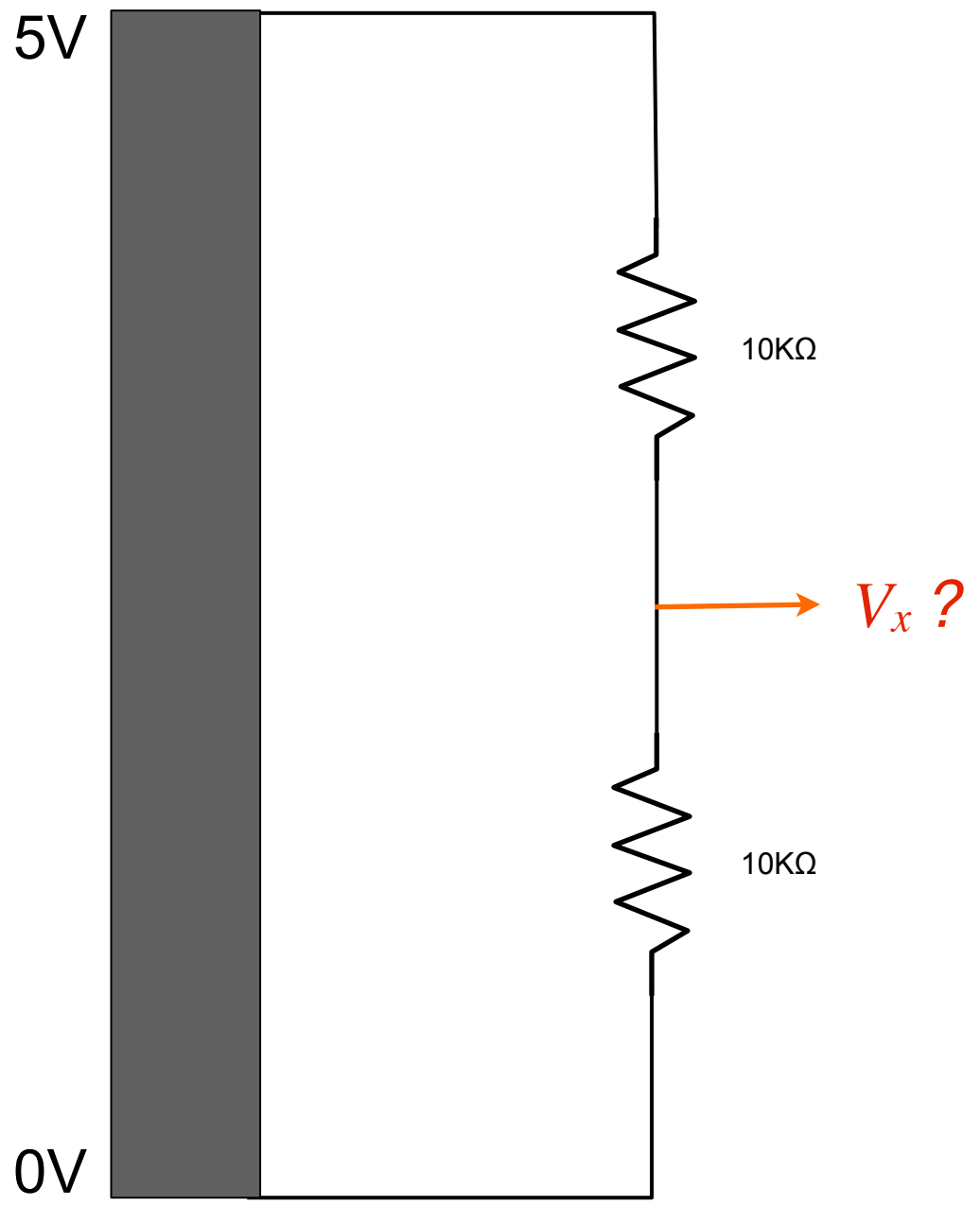


$$V_x = V_t \left( \frac{R_x}{R_t} \right)$$

$$V_x = 5V \left( \frac{3\Omega}{5\Omega} \right)$$

$$V_x = \cancel{5V} \left( \frac{3}{\cancel{5}} \right)$$

$$V_x = 3V$$

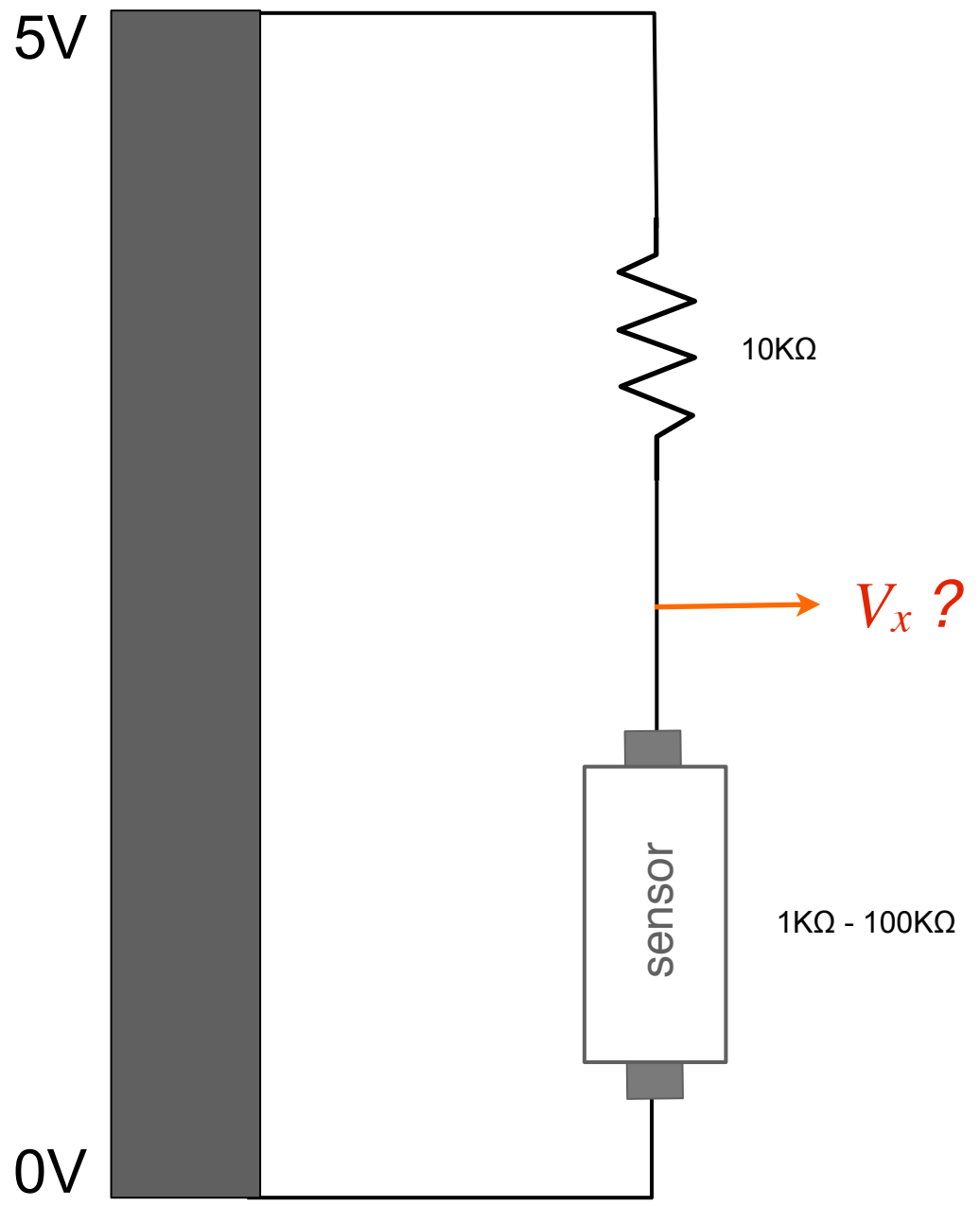


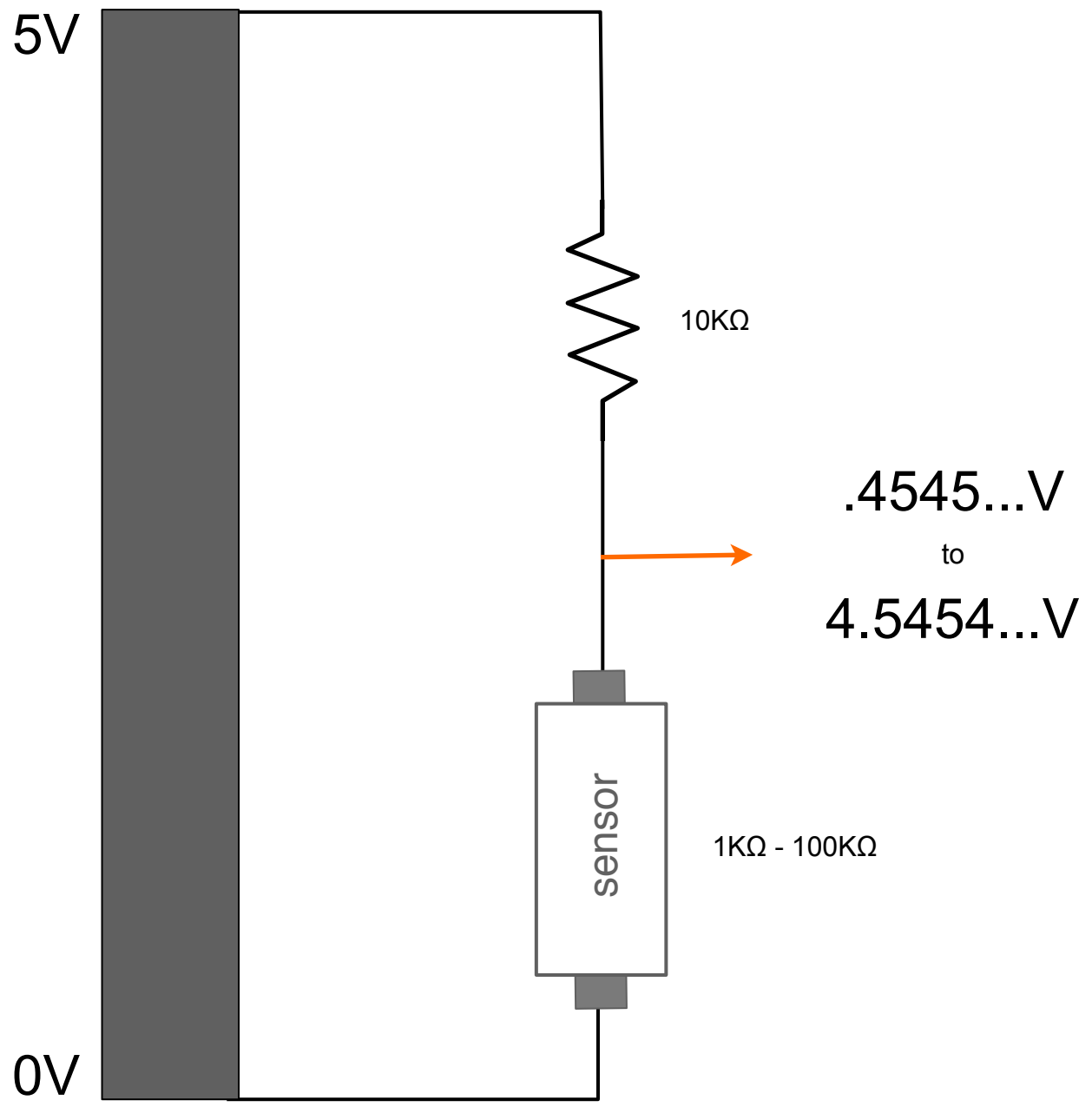
**SENSORS**

change in resistance

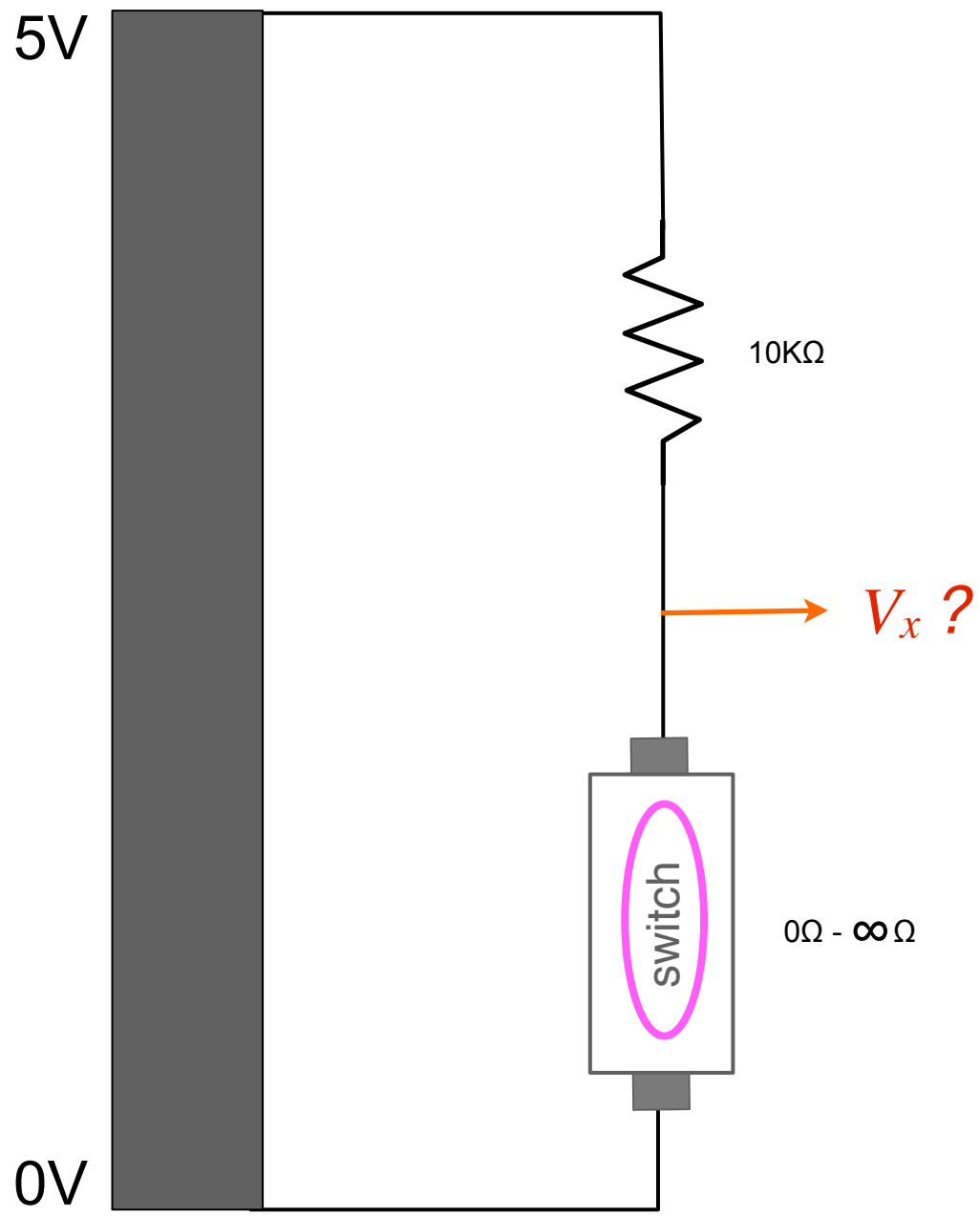


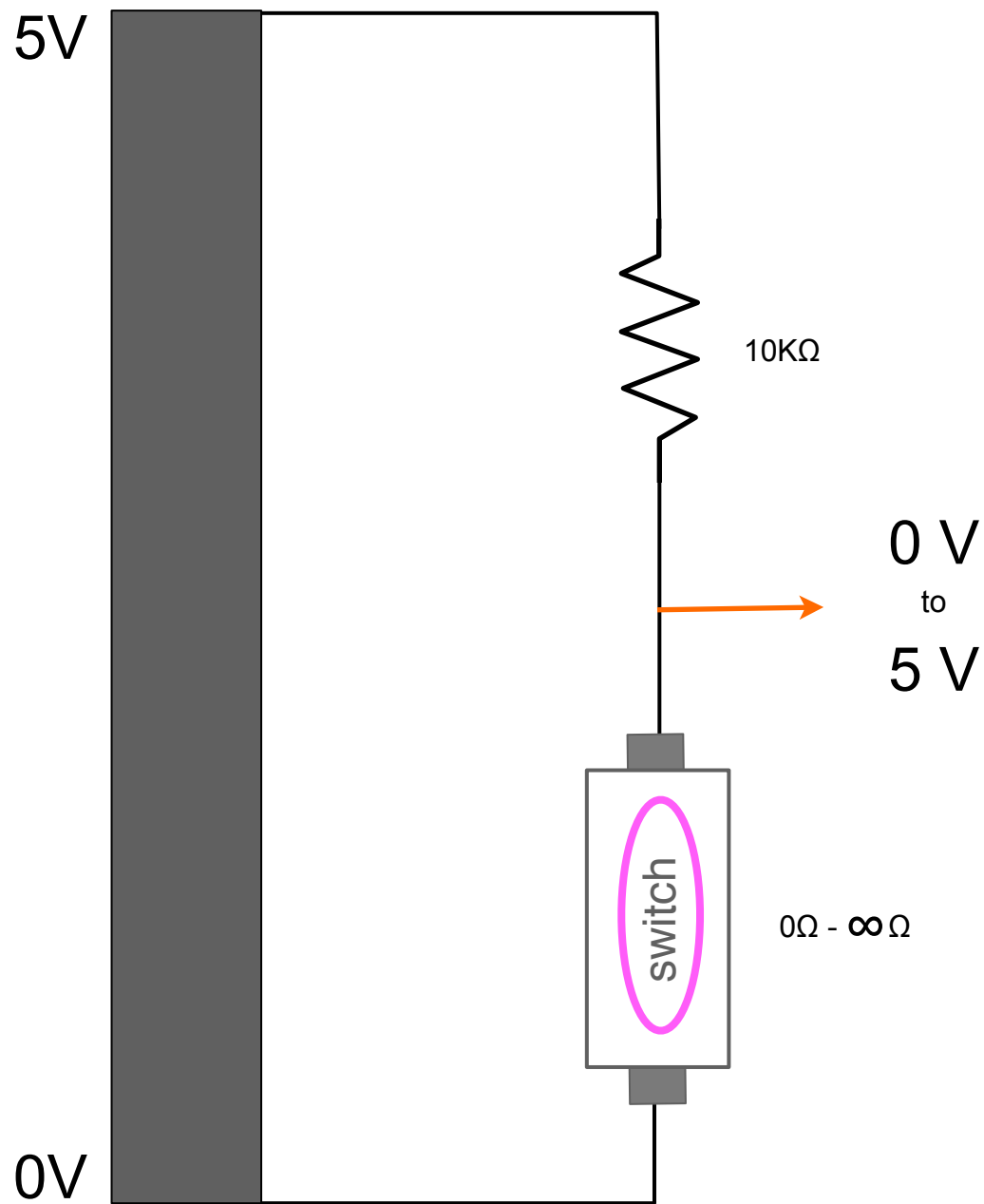
change in voltage

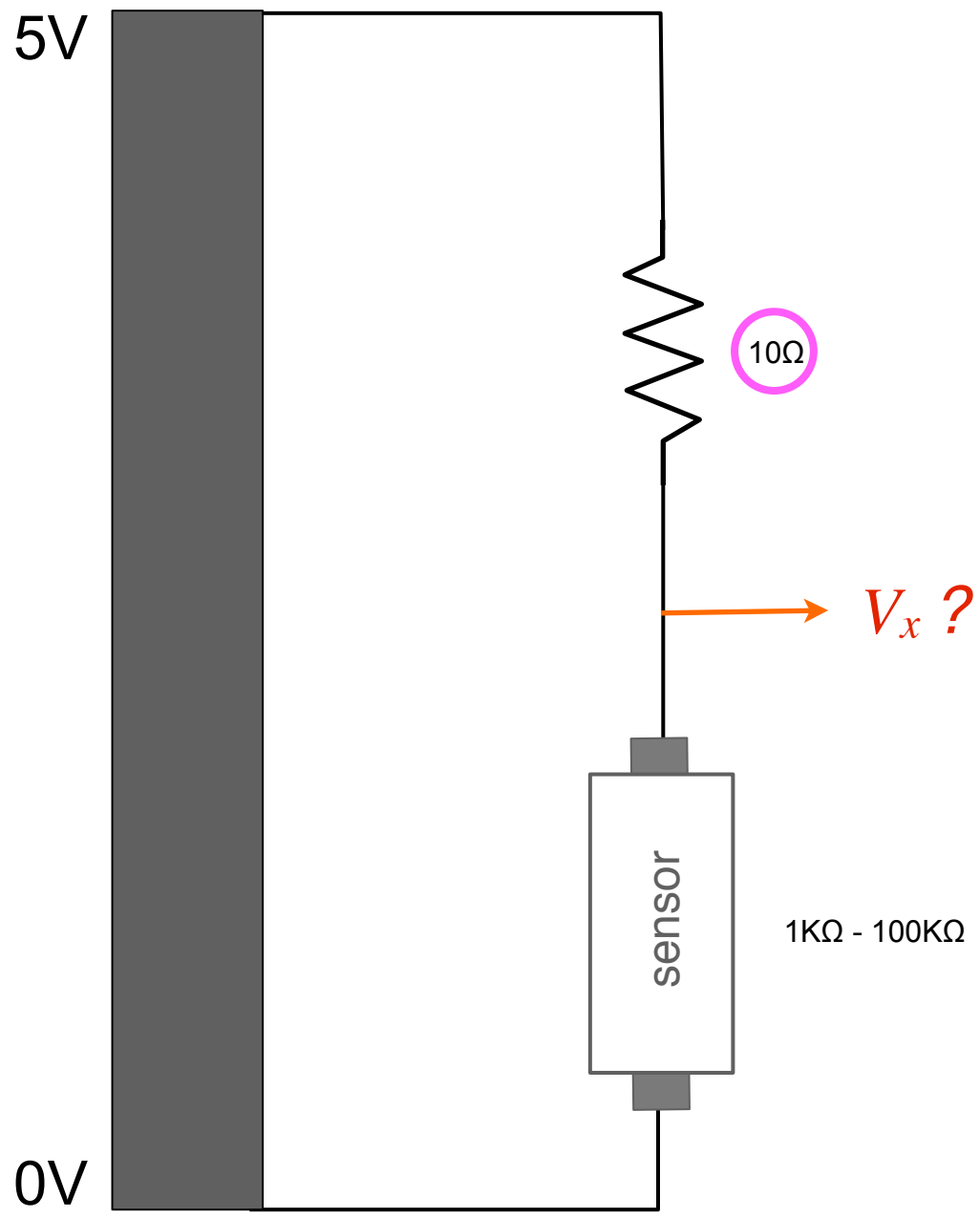


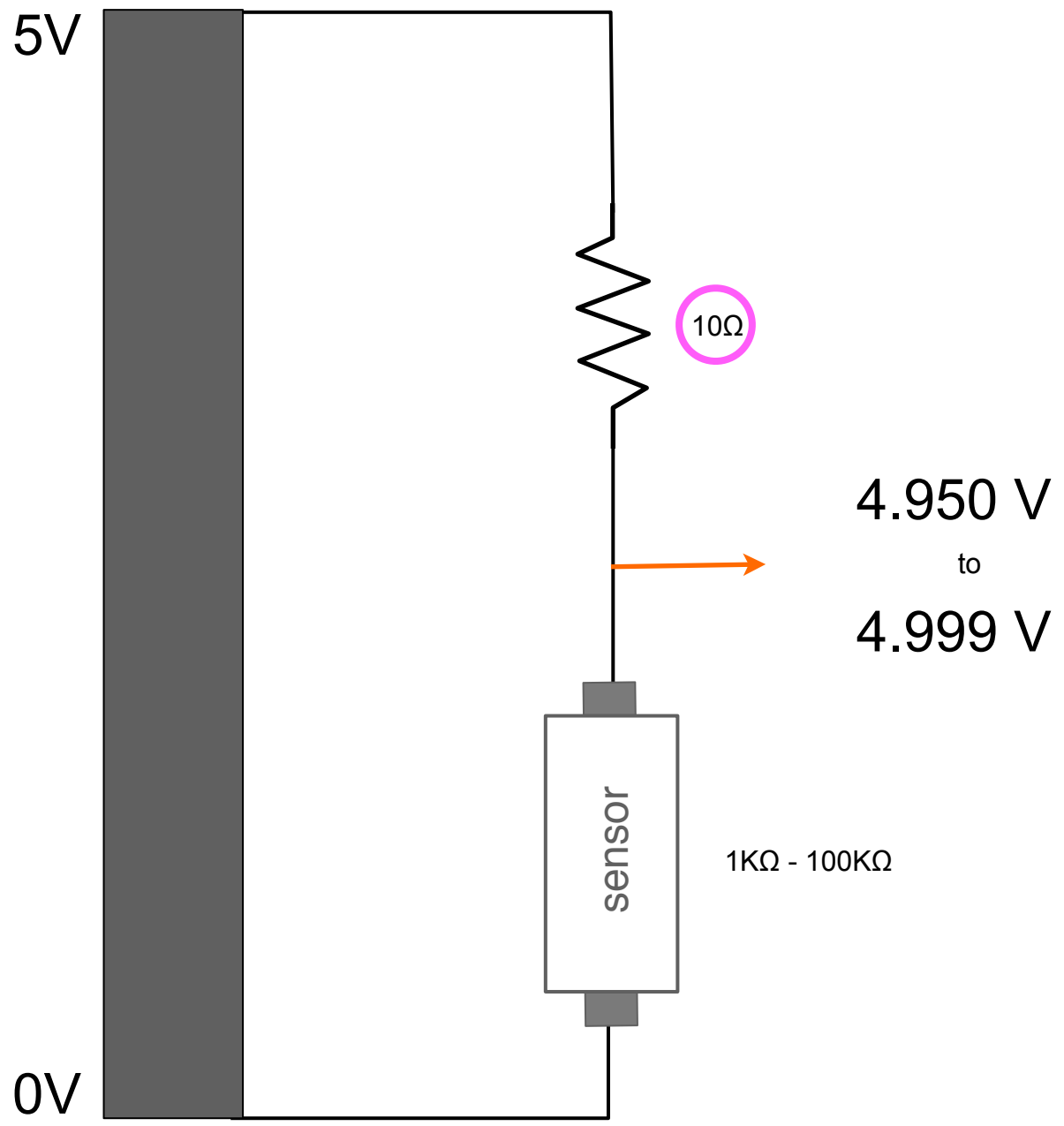






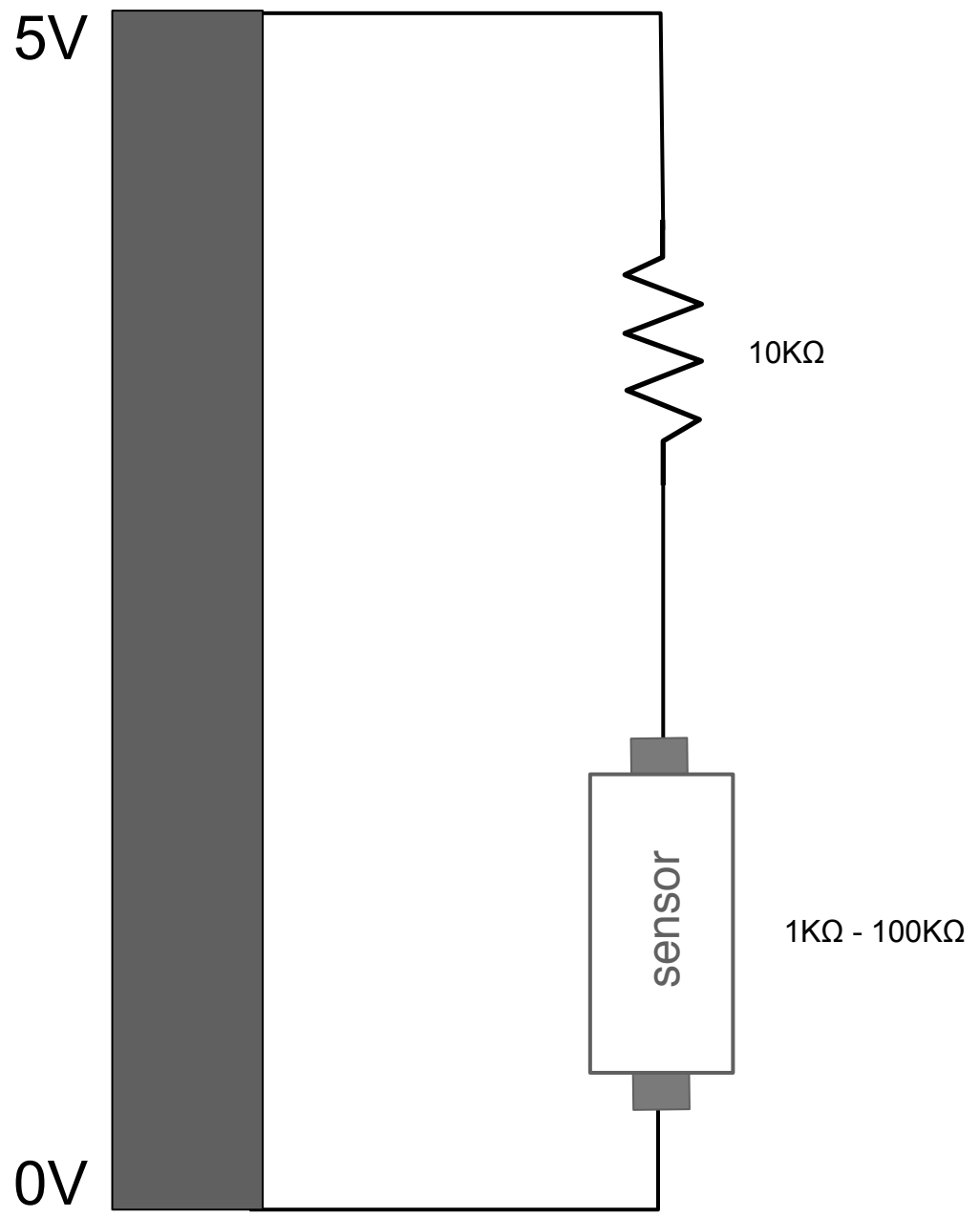


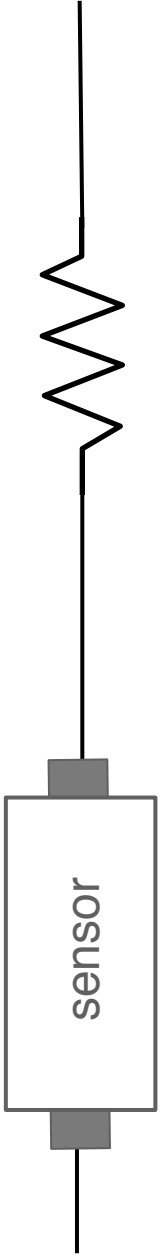
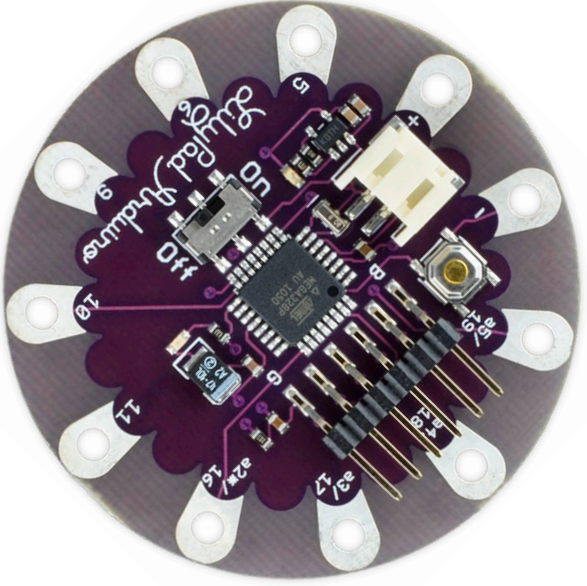




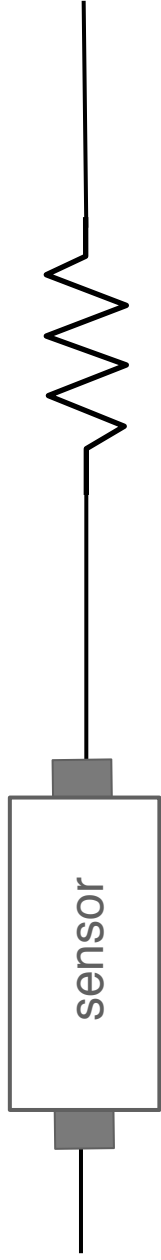
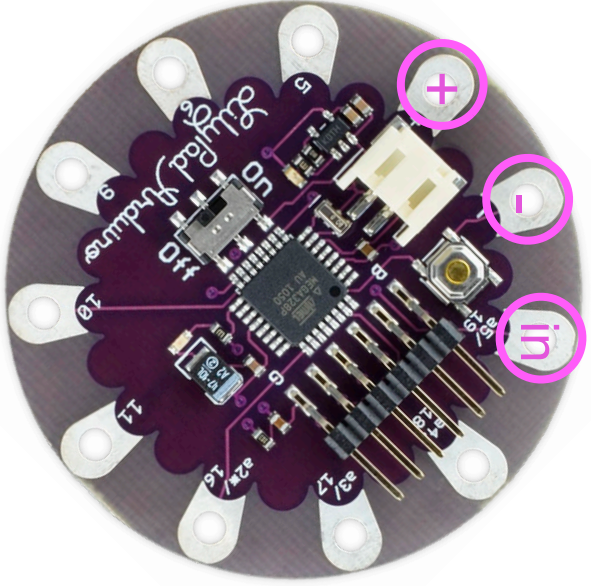
**create a voltage divider/sensor**  
**calculate and measure resistance & voltage**

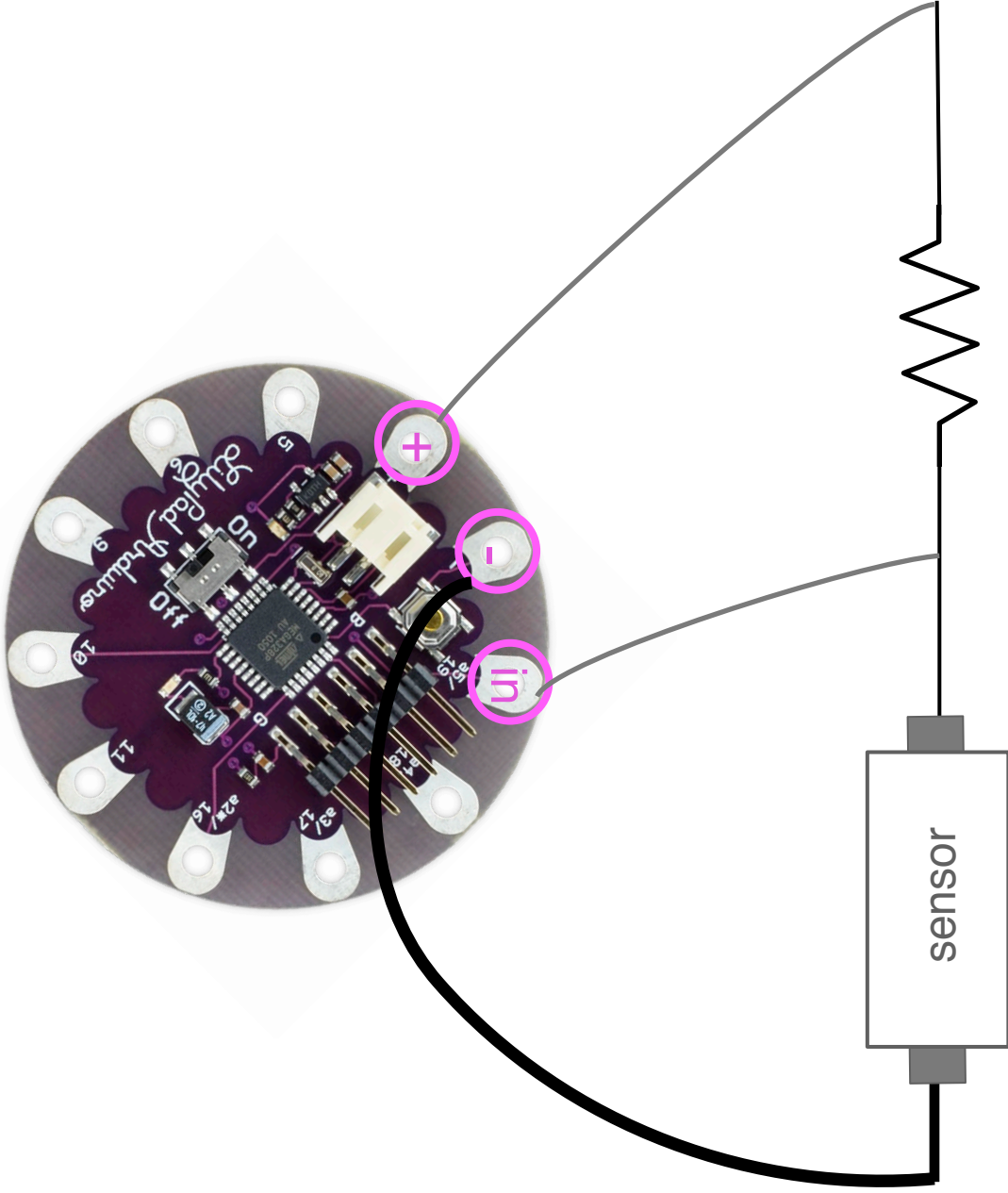
# MICROCONTROLLERS

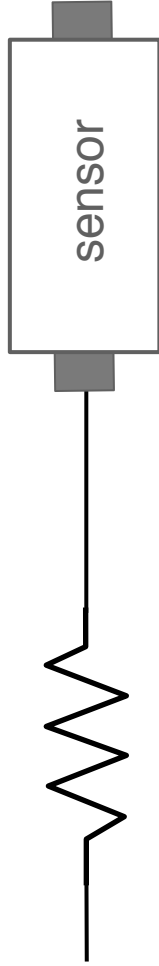
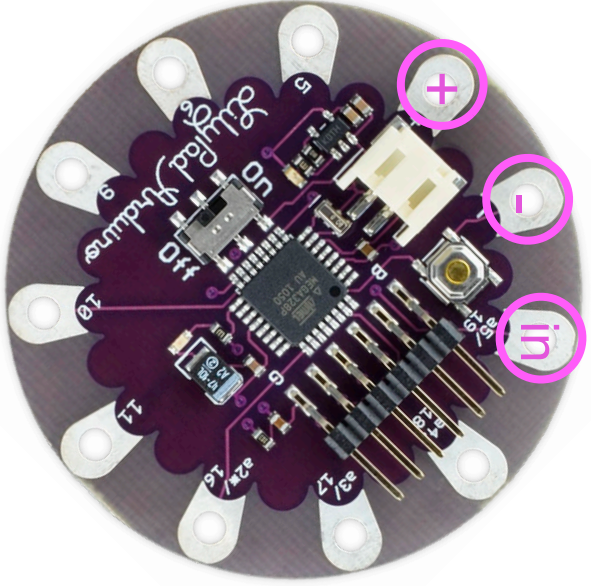


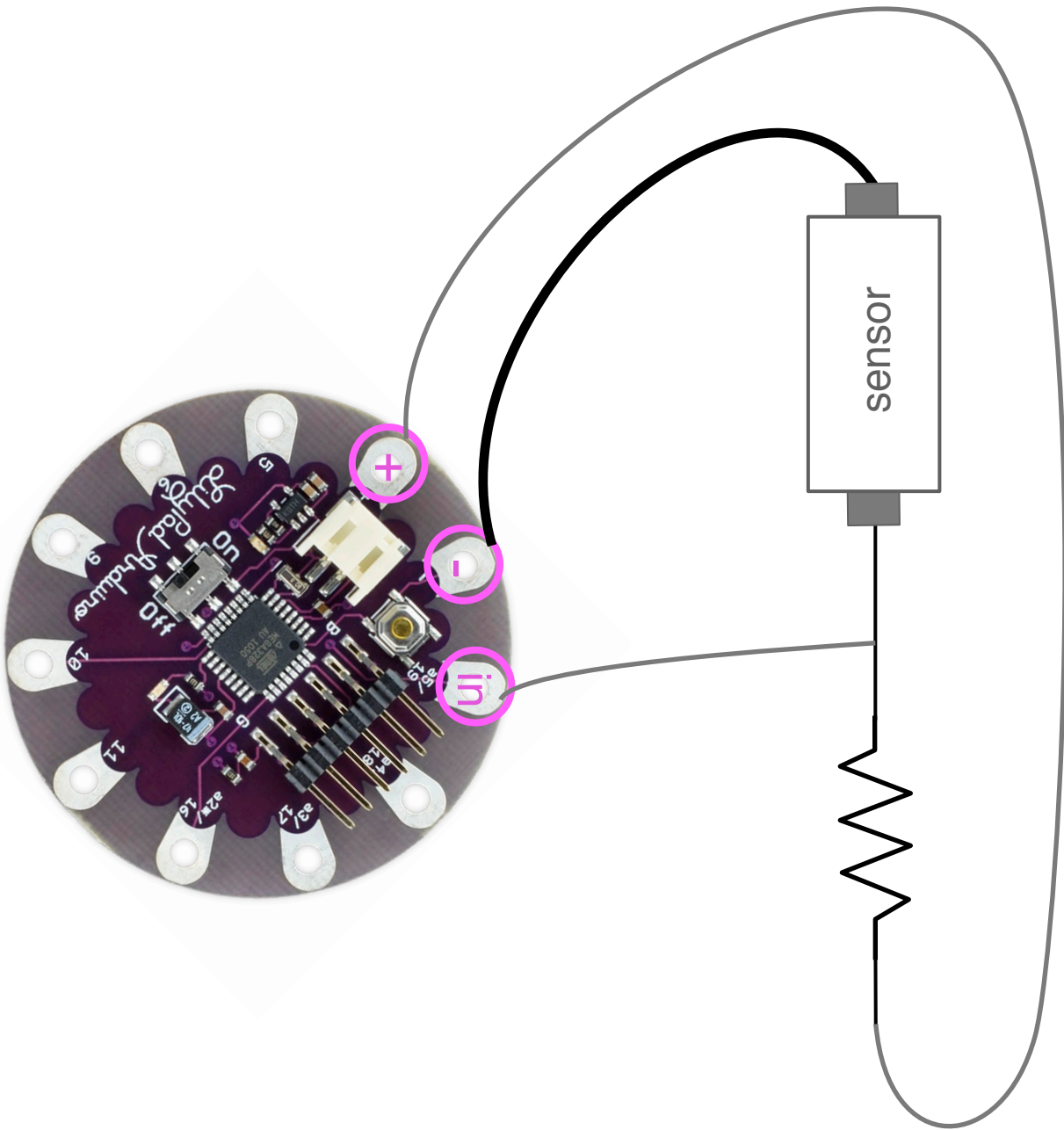


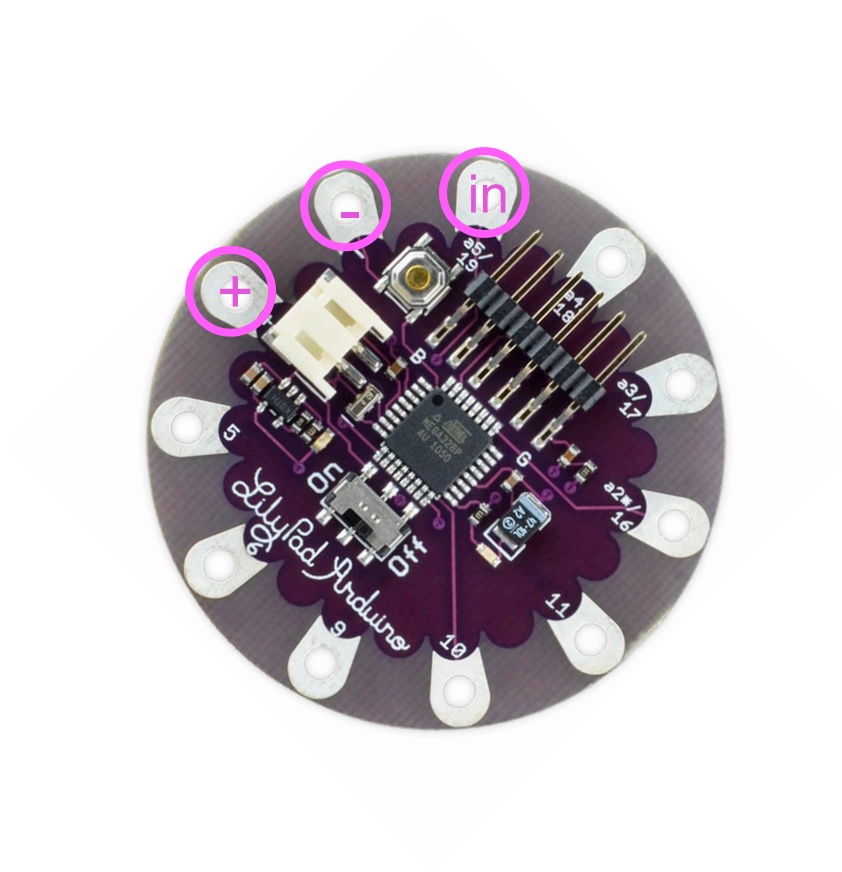
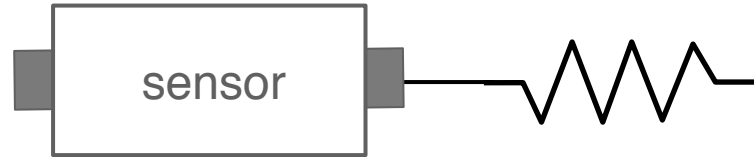


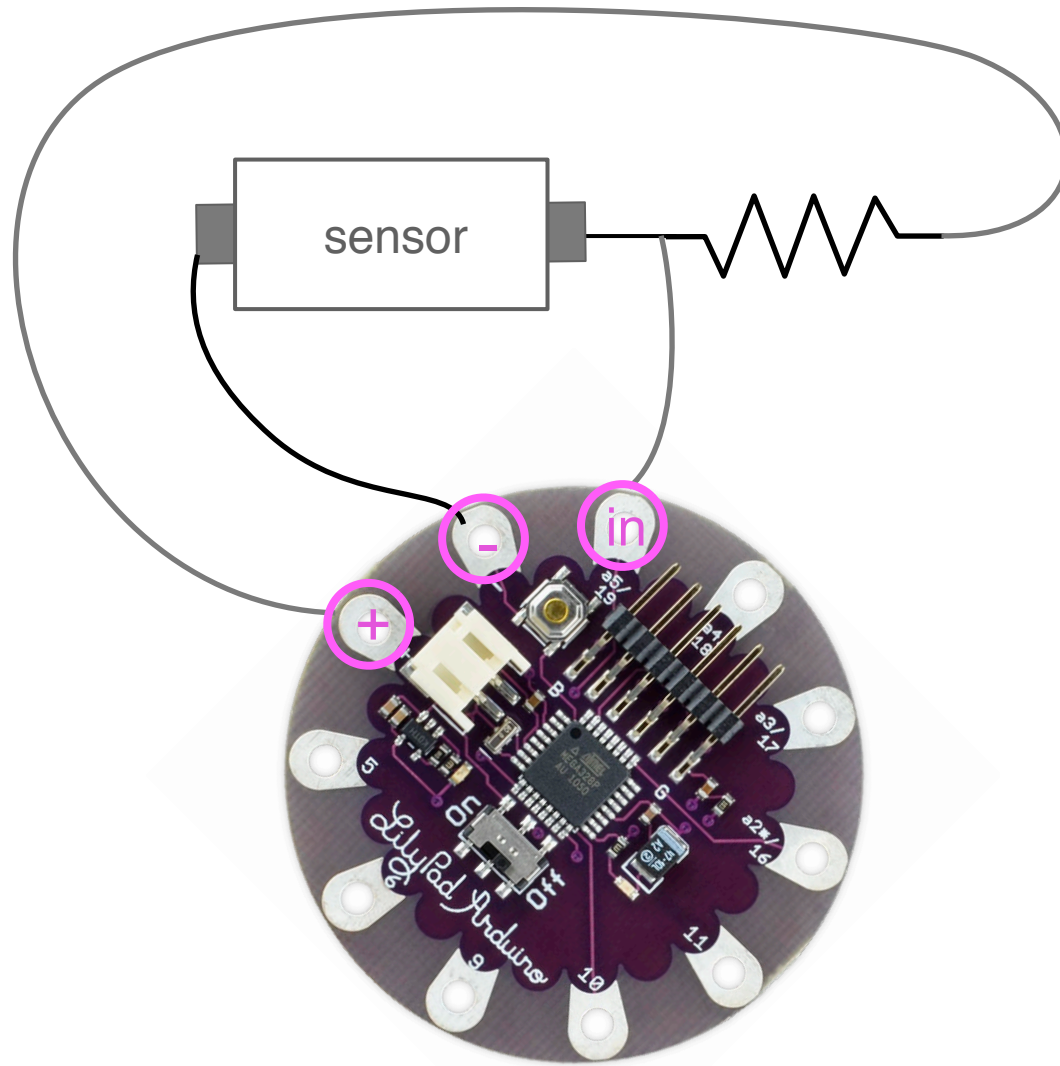












# INTERNAL PULL-UP RESISTORS

