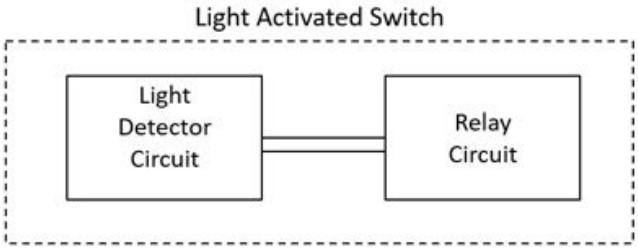
Challenge

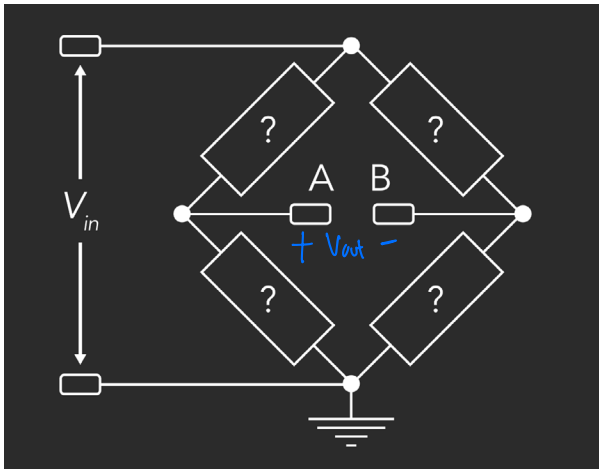
Challenge: Design the light detector circuit for a light-activated switch.

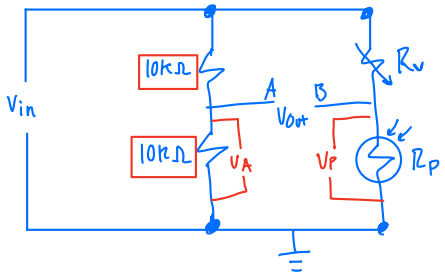


Circuit Description

The light detector circuit is built using a Wheatstone bridge to produce a differential output voltage.

- When the circuit is under light, Voltage A should be greater than Voltage B.
- When the circuit is in the dark, Voltage B should be less than or equal to Voltage A.





$V_A = V_{in} \frac{10k\Omega}{10k\Omega + 10k\Omega}$

$V_{in} = 5V$

$V_A = 2.5V$

Set $R_P = R_V$ so $V_A = V_P$ at the calibration light level

$R_P = R_V = 5k\Omega$ at light level

Goal: Determine the value and location of the following components within the Wheatstone bridge.

- Photoresistor (approximately 1 kΩ in the light/10 kΩ in the dark)
- Variable resistor
- Constant-value resistors