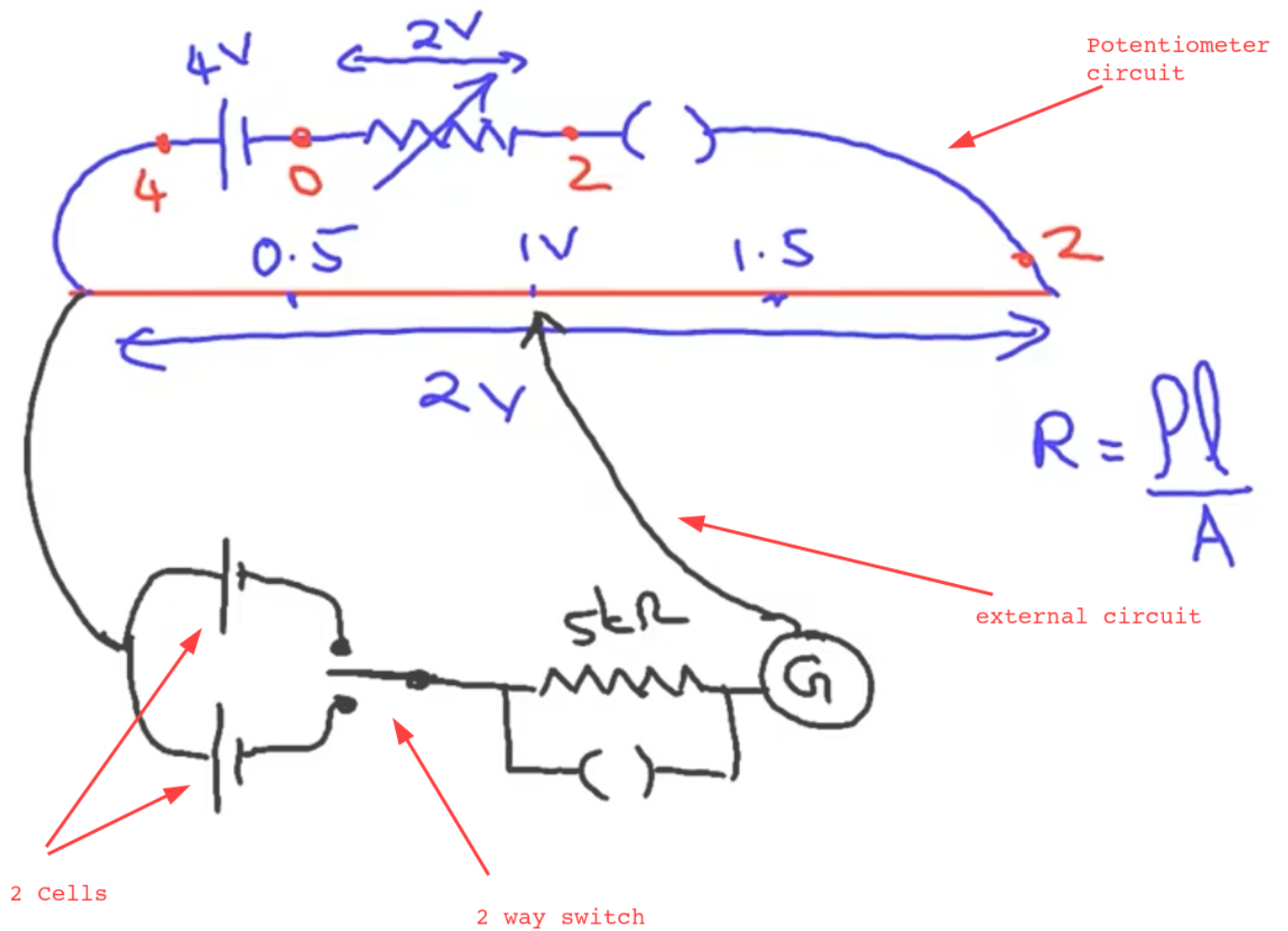
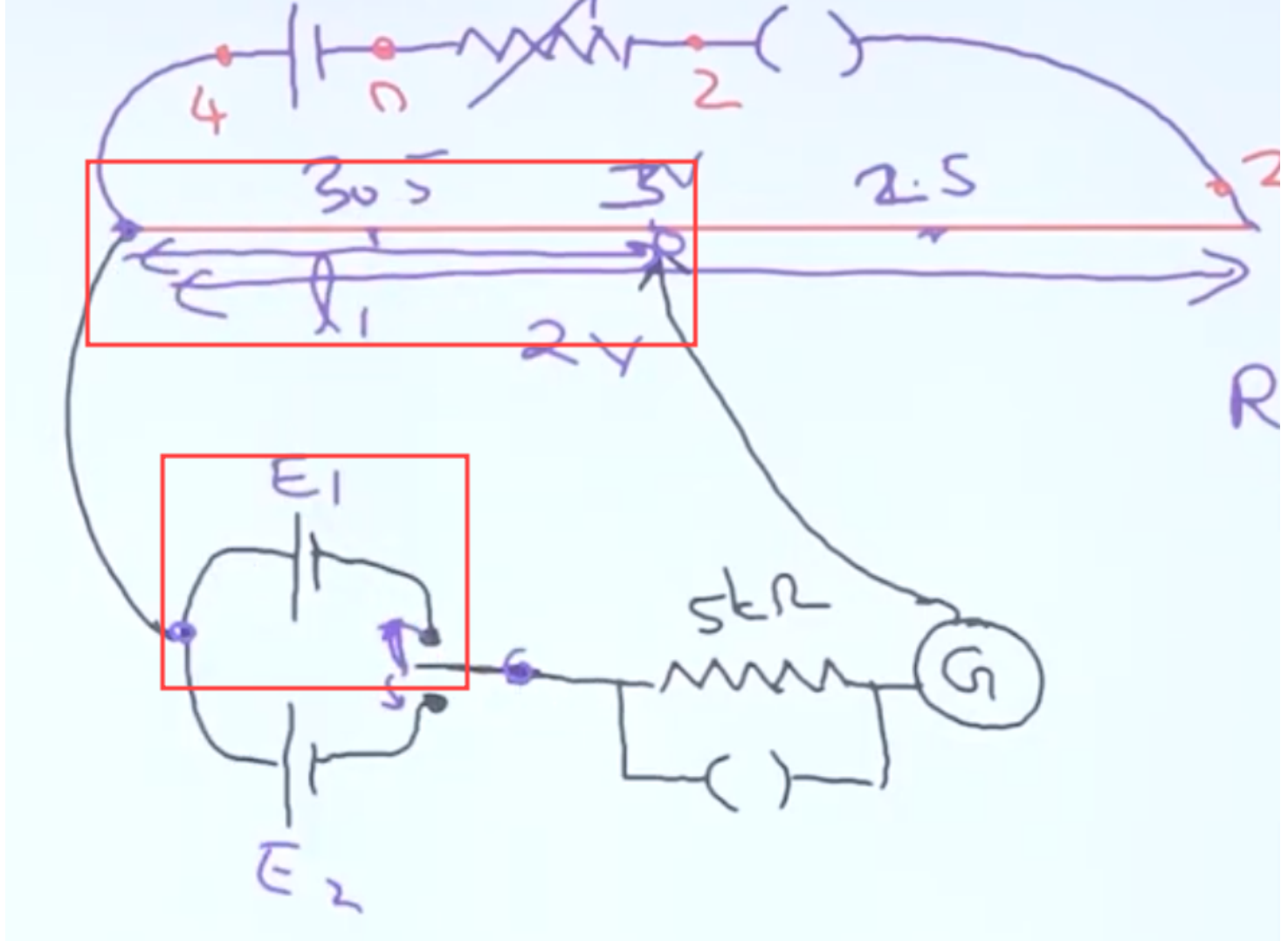


- Setup



The theory is if the galvanometer reading is 0, the voltage drop in the potentiometer circuit is equal to the the potential drop in the external circuit.



Here we have connected the E_1 cell using the 2 way switch and the potential difference of E_1 cell in this case is proportional to the l_1 length. We can do the same for the other cell and compare them. Using that we can build up 2 equations.

$k \rightarrow \text{Potential Gradient}$

$$E_1 \propto l_1$$

$$E_1 = kl_1$$

$$E_2 \propto l_2$$

$$E_2 = kl_2$$

$$\therefore \frac{E_1}{E_2} = \frac{l_1}{l_2}$$

If we want to go for a graph we can do that as follows.

$$\frac{E_1}{E_2} = \frac{l_1}{l_2}$$

$$l_1 = \left(\frac{E_1}{E_2}\right)l_2$$

$$y = mx$$

Here, the way we change the lengths l_1 and l_2 for multiple readings is by changing the potential gradient k . This can be done by changing the resistance in the potentiometer circuit. For that we can use the rheostat

Important Points

- If the balance lengths are too small or big, and needed to make bigger, what is the adjustment we can do?

Change the resistance using the rheostat (in the potentiometer circuit) accordingly

- What the main advantage of using the potentiometer over the voltmeter?

Practically with the voltmeter some current will be drawn while measuring the potential difference and the reading will deviate a little ($V = E - Ir$). But with potentiometer no current will be drawn so the measurement we get will be much more accurate.

- What is the main characteristic of the accumulator? (Cell used in the potentiometer circuit?)

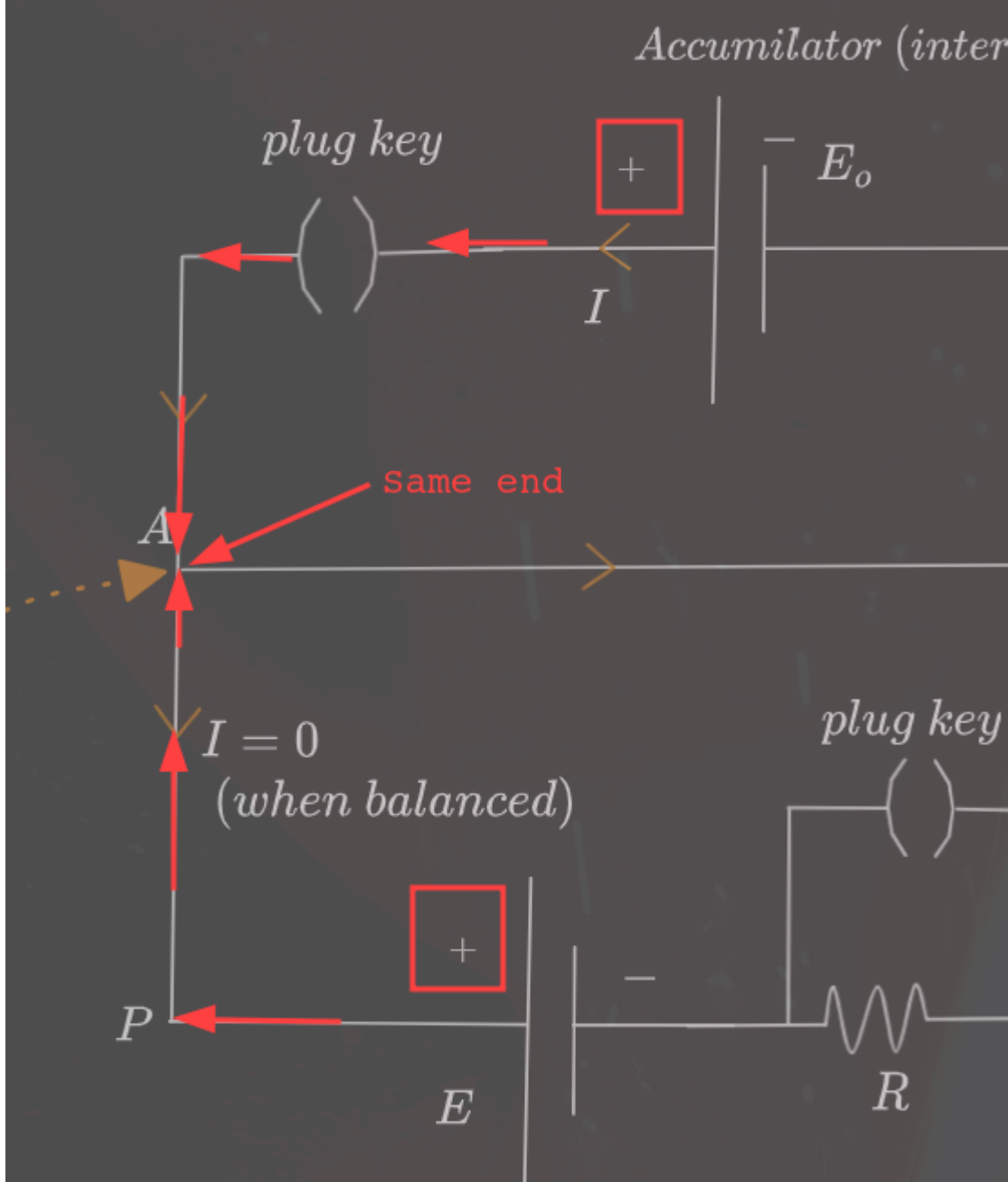
It should be able to provide a constant potential difference for a longer time without running down.

- What is the purpose of the variable resistor in series with the accumulator in the circuit?

To change the potential gradient and take multiple readings for l_1 and l_2

- What would be the reasons if you can't find the balanced length using the external circuit?

1. There maybe a loose connection.
2. Positive terminal of the cells and the accumulator (cell in the potentiometer circuit) may not be connected to the same end of the potentiometer cable.



3. EMF of the external cells maybe greater than the accumulator (potentiometer circuit cell)

- What are the ways we can correct the circuit if the emf of external cells are greater than potentiometer circuits'?

- Applying 2 accumulators for the potentiometer circuit in series.
- Replacing the accumulator with a one having a greater EMF.

- Out of these 2, what is the preferred method and why?

Using an accumulator with a bigger EMF.

Because if we use 2 cells in series not only the voltage but also the internal resistance will increase causing issues with our calculations.