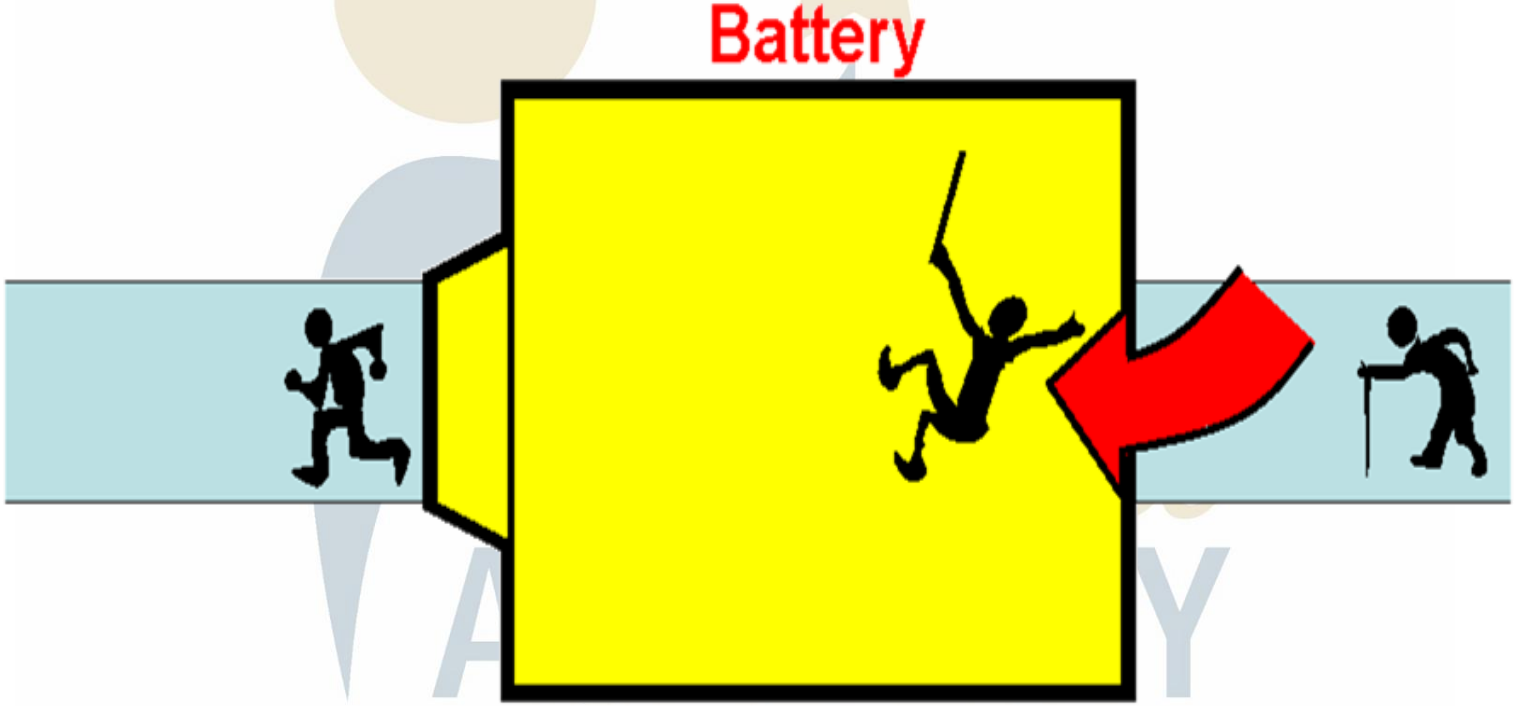
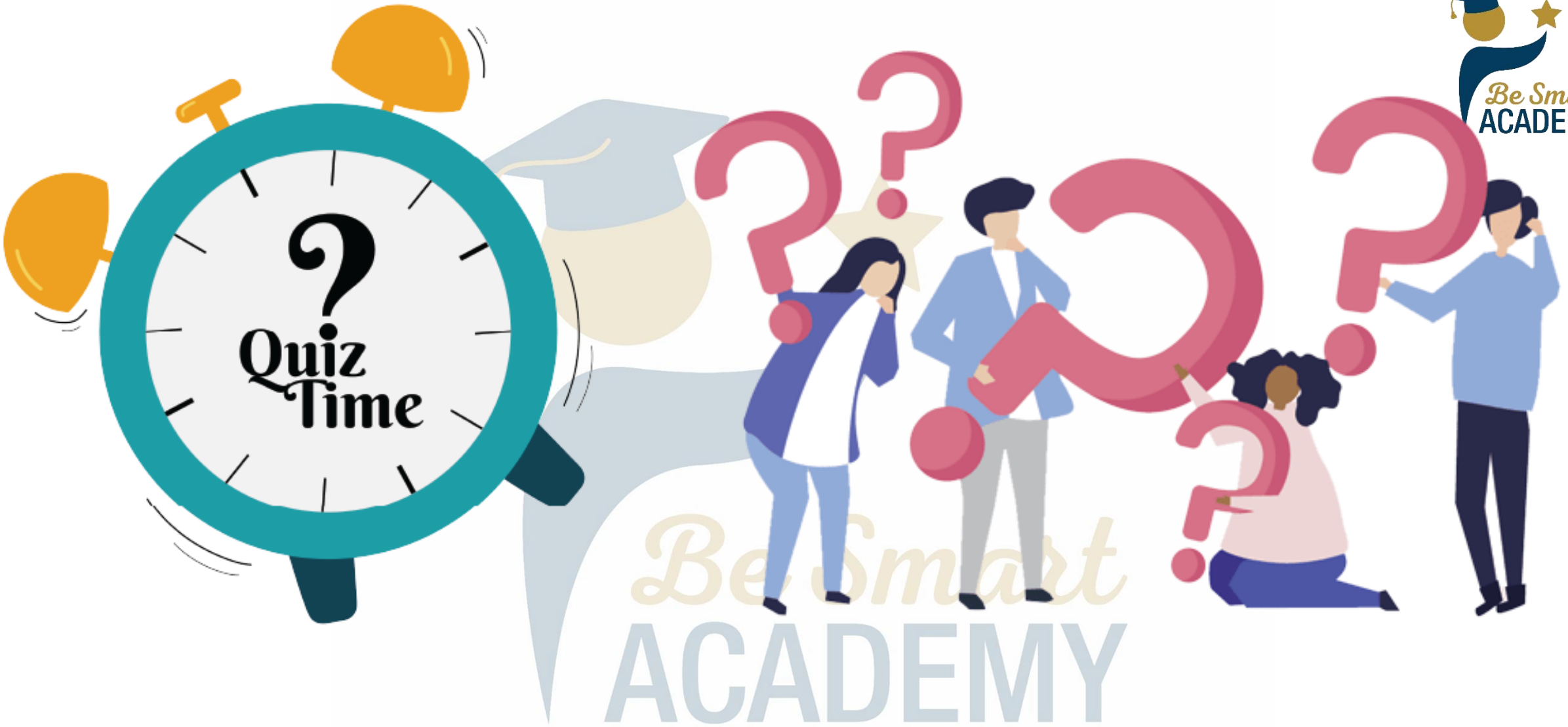
Physics – Grade 10

Unit One – Electricity

Chapter 2 – Potential Difference



Prepared & Presented by: Mr. Mohamad Seif



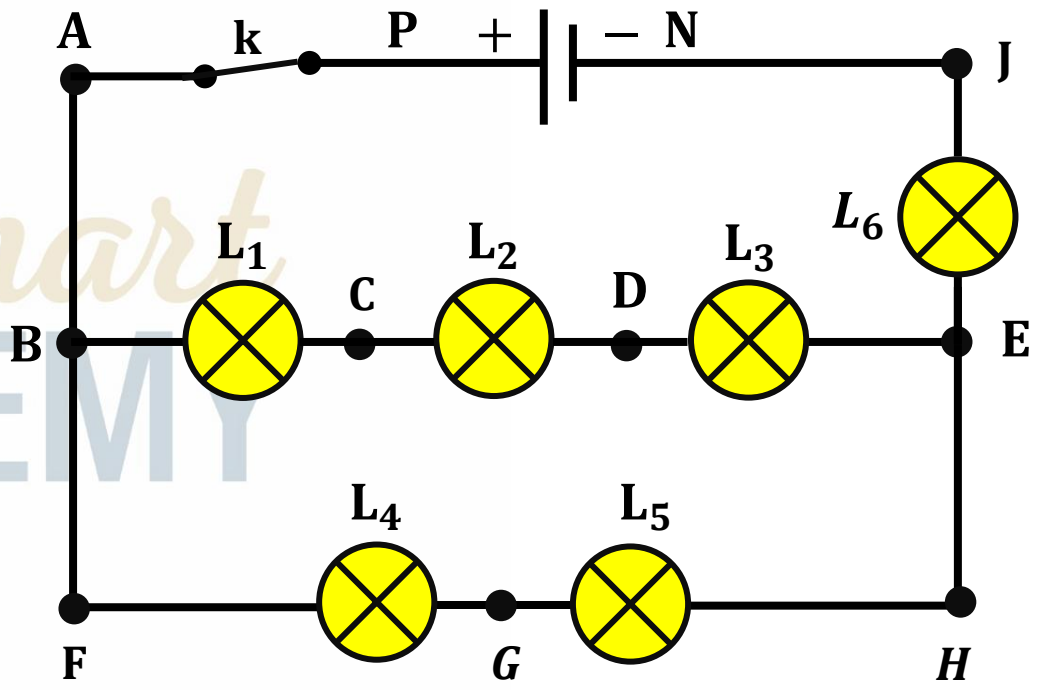
Quiz 1 Physics 15 min

Consider battery delivers a constant voltage $V_{PN} = 12V$ connected to 6 lamps as shown in the adjacent figure.

Given L_1 and L_2 are identical

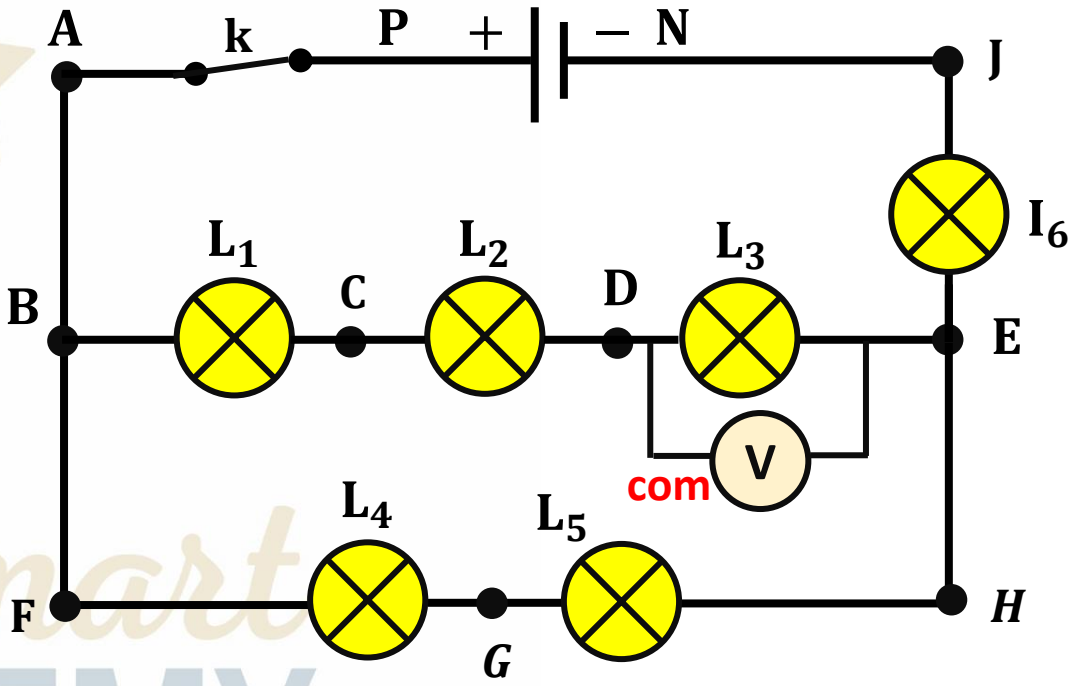
We connect a voltmeter across the terminals of L_3, it reads $-3V$.

1. Show on figure the connections of the voltmeter.
2. What does the voltmeter read V_{DE} or V_{ED}?
3. Calculate V_{BC} and V_{CD}, knowing that $V_{EJ} = 4V$.



Quiz 1 Physics 15 min

$V_{PN} = 12V$; L_1 and L_2 are identical; L_4 and L_5 are identical; $y = -3V$.



1. Show on figure the connections of the voltmeter.

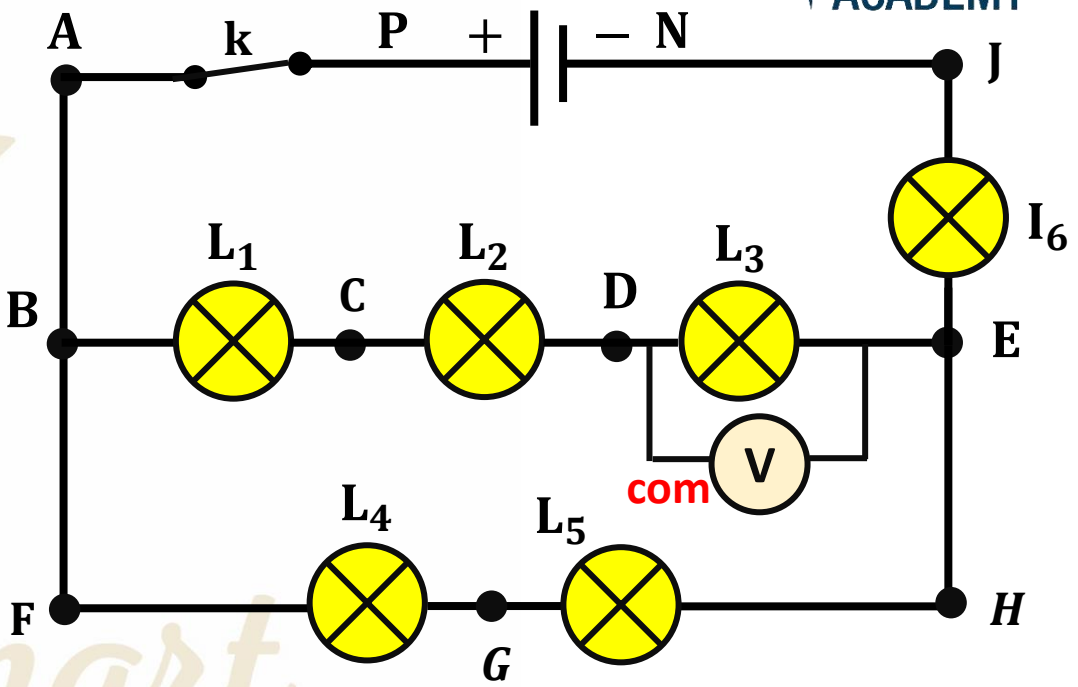
Since the voltmeter reads -3V, then the Com is connected to positive pole

2. What does the voltmeter read V_{DE} or V_{ED}?

The voltmeter reads $V_{ED} = -3V$, because the (com) is connected to D, and the voltmeter reads from V to com.

Quiz 1 Physics 15 min

$V_{PN} = 12V$; L_1 and L_2 are identical; L_4 and L_5 are identical; $y = -3V$.



3. Calculate V_{BC} and V_{CD}, knowing that $V_{EJ} = 4V$.

L_1 and L_2 are identical then:

$$V_{BC} = V_{CD}$$

$$V_{PN} = V_{PA} + V_{AB} + V_{BC} + V_{CD} + V_{DE} + V_{EJ} + V_{JN}$$

$$V_{PN} = V_{PA} + V_{AB} + V_{BC} + V_{BC} + V_{DE} + V_{EJ} + V_{JN}$$

Quiz 1 Physics 15 min

$V_{PN} = 12V$; L_1 and L_2 are identical; L_4 and L_5 are identical; $y = -3V$.

$$V_{PN} = V_{PA} + V_{AB} + V_{BC} + V_{BC} + V_{DE} + V_{EJ} + V_{JN}$$

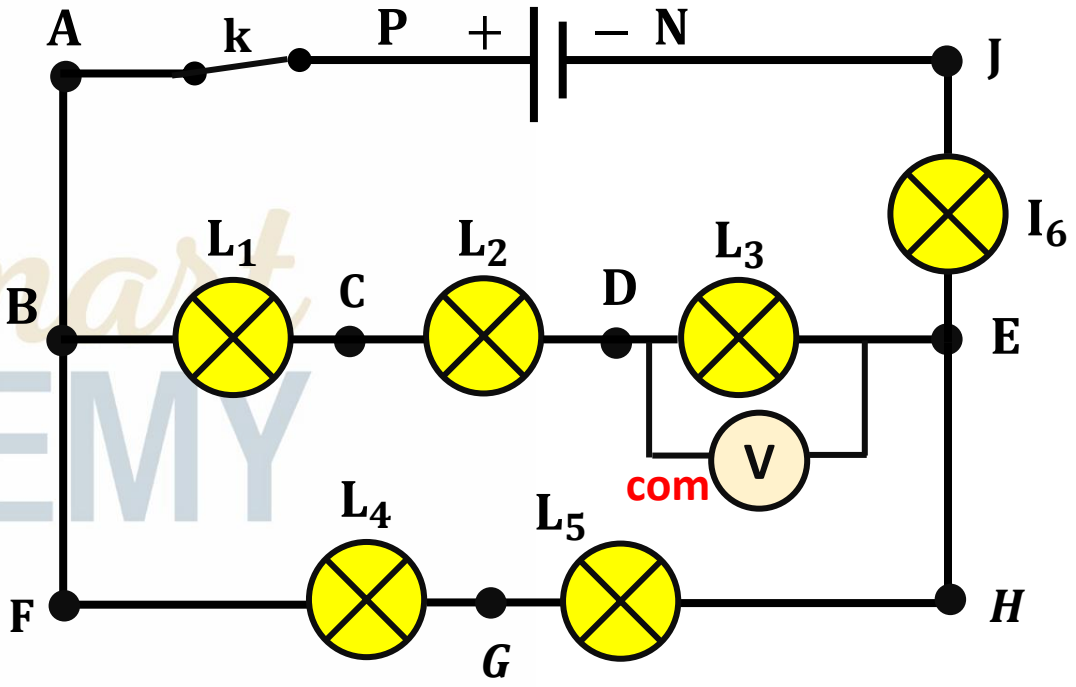
$$12V = 0V + 0V + 2V_{BC} + 3V + 4V + 0V$$

$$12V = 2V_{BC} + 7V$$

$$12V - 7V = 2V_{BC}$$

$$5V = 2V_{BC} \quad V_{BC} = \frac{5V}{2} = 2.5V$$

$$V_{BC} = V_{CD} = 2.5V$$



Quiz 1 Physics 15 min

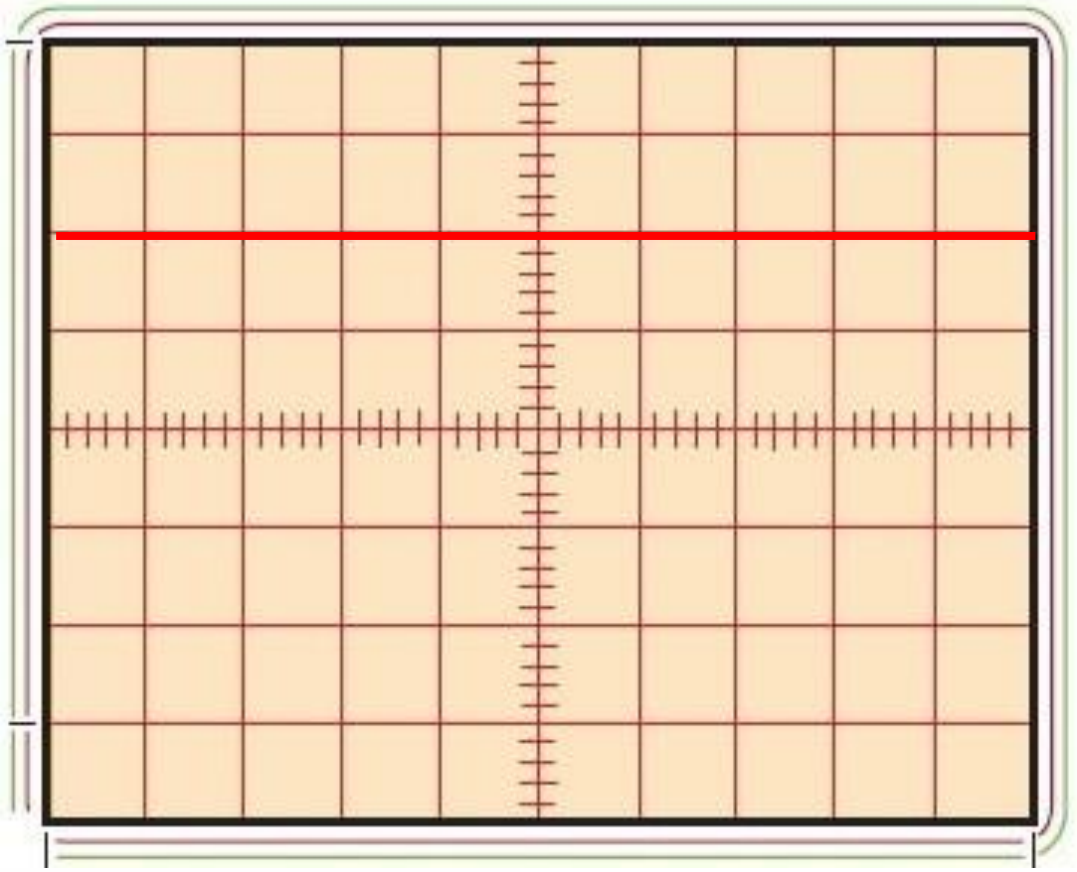
Now an oscilloscope are connected across the terminals of L_4. Doc 2 shows a screen of an oscilloscope ($S_V = 3V/div$).

a) Show on figure the connections of the oscilloscope across L_4.

b) Calculate the voltage across L_4.

c) Calculate the potential difference across L_5.

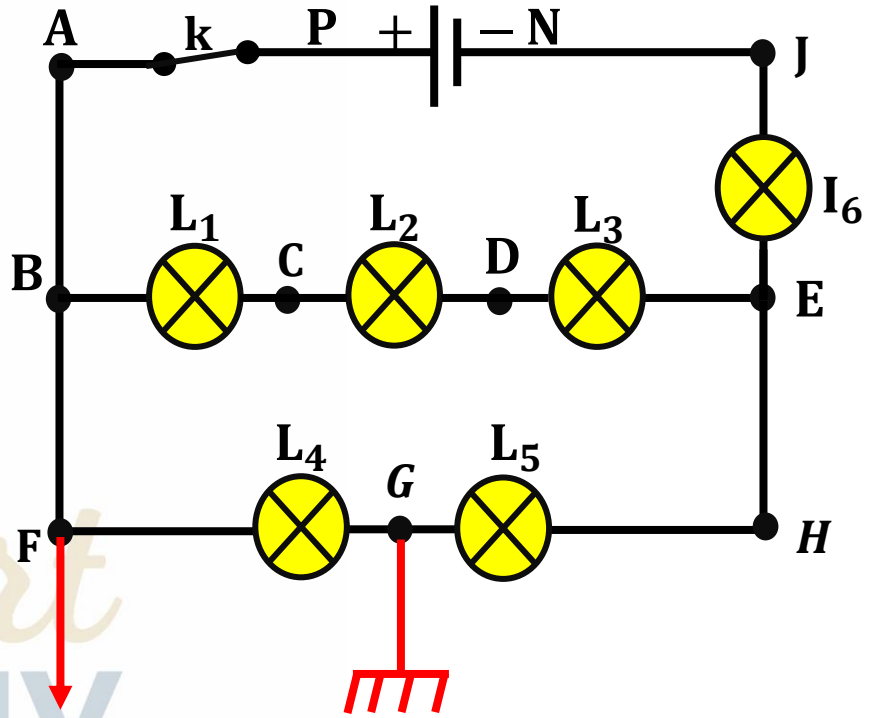
d) B is a reference potential. Determine the electric potentials V_C and V_E.



Quiz 1 Physics 15 min

a) Show on figure the connections of the oscilloscope across L_4.

Since the luminous line moves up, then phase connected to F and ground connected to G.



b)Calculate the voltage across L_4.

$$V_{FG} = S_V \times y$$

$$V_{FG} = 3V/div \times 2div$$

$$V_{FG} = 6V$$

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c) Calculate the potential difference across L_5.

Using law of addition of voltage:

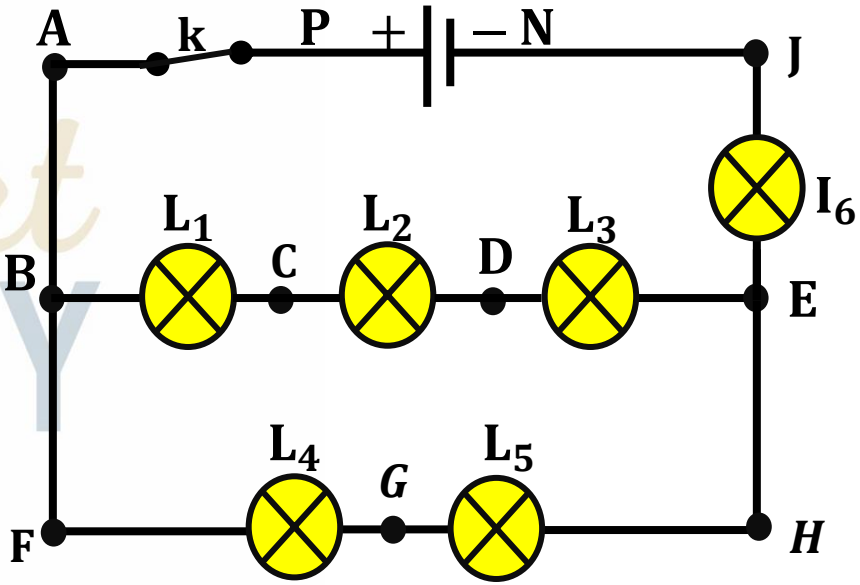
$$V_{PN} = V_{PA} + V_{AB} + V_{BF} + V_{FG} + V_{GH} + V_{HE} + V_{EJ} + V_{JN}$$

$$12V = 0V + 0V + 0V + 6V + V_{GH} + 0V + 4V + 0V$$

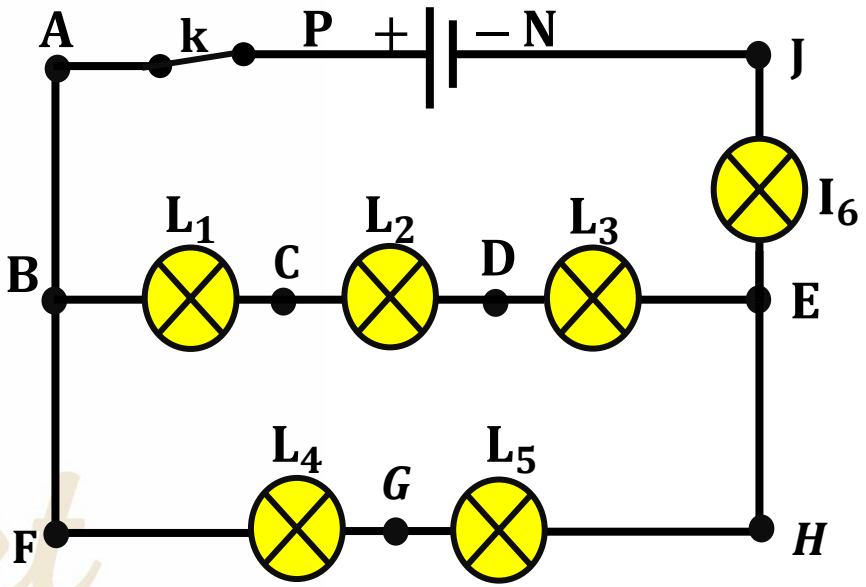
$$12V = 10V + V_{GH}$$

$$12V - 10V = V_{GH}$$

$$V_{GH} = 2V$$



d)B is a reference potential. Determine the electric potentials V_C and V_E.



$$V_{BC} = V_B - V_C$$

$$2.5V = 0V - V_C \qquad V_C = -2.5V$$

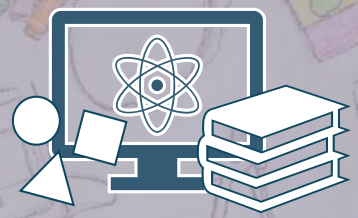
$$V_{CD} = V_C - V_D \qquad 2.5V = -2.5V - V_D$$

$$V_D = -5V$$

$$V_{DE} = V_D - V_E \qquad 3V = -5 - V_E$$

$$V_D = 8V$$

The End



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