

REVISION: PHYSICS

10 SEPTEMBER 2013

Lesson Description

In this lesson we revise

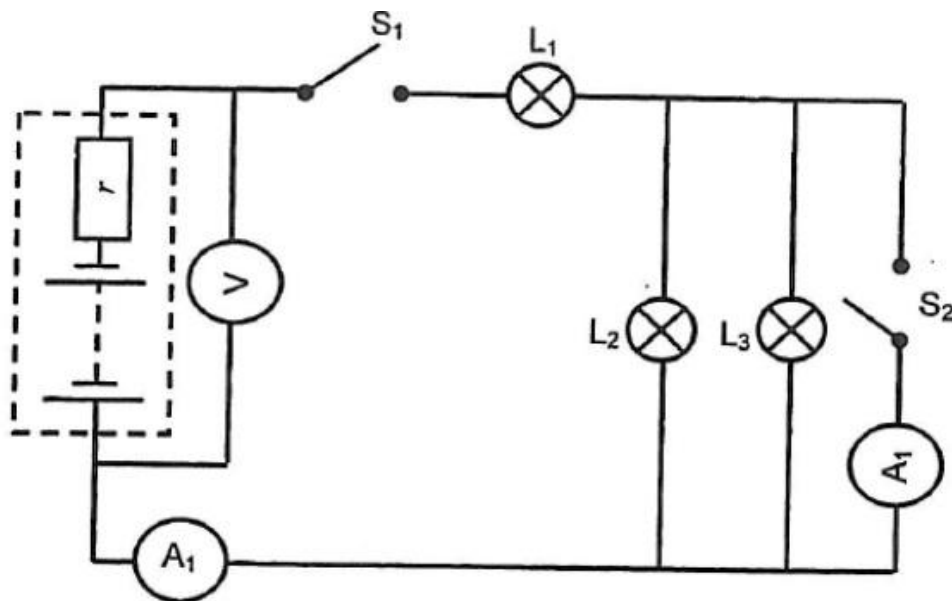
- Electric Circuits
- Diffraction of Light

Questions

Question 1

(Adapted from Sep 2012, KZN, Paper 1, Question 9)

In the circuit diagram below L_1 has a resistance of $3,8\ \Omega$ L_2 has a resistance of $2\ \Omega$ and L_3 has a resistance of $3\ \Omega$. Switches S_1 and S_2 are open. The reading on the voltmeter is 12 V . The connecting wires and ammeter have negligible resistance. The battery has an internal resistance of r .



When only S_1 is closed while switch S_2 remains open, the reading on the voltmeter becomes $9,5\text{ V}$.

- Calculate the total external resistance of the circuit.
- Calculate the internal resistance, r of the battery.

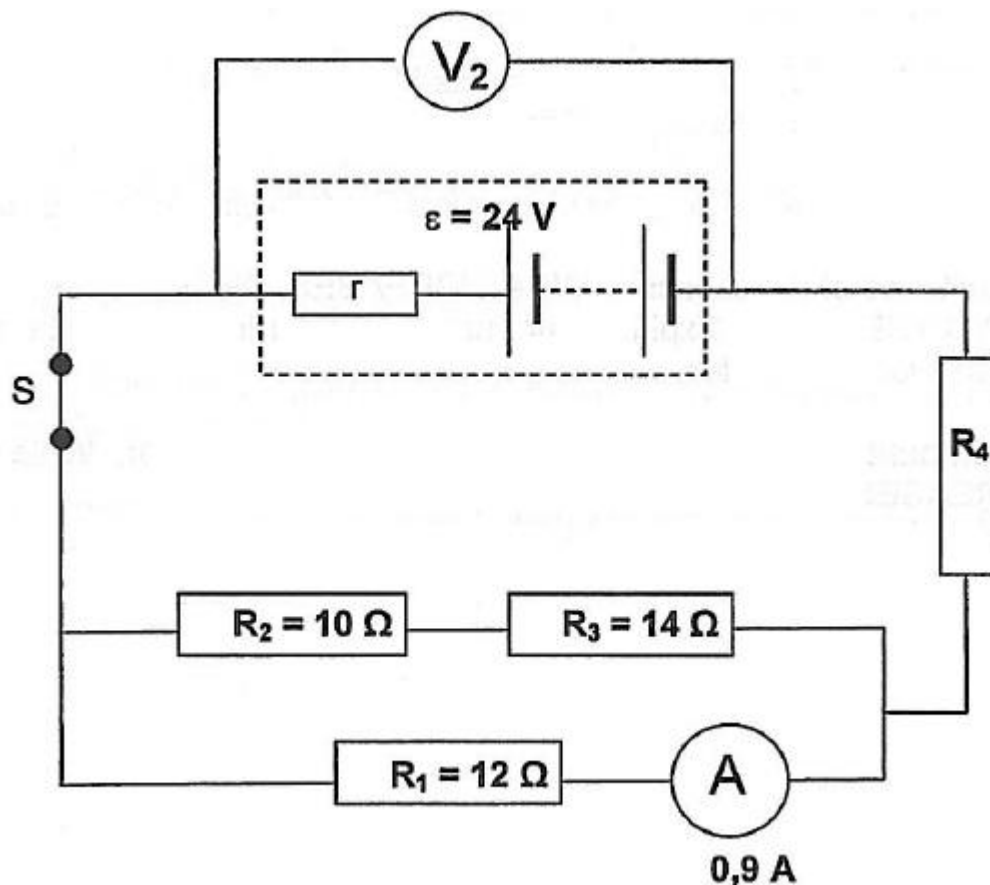
Switch S_2 is now also closed and all the light bulbs continue to burn.

- Will the brightness of L_1 , increase, decrease or remain the same? Use an appropriate equation or relationship to explain your answer.

Question 2

(Adapted from Sep 2012, GDE, Paper 1, Question 8)

The circuit diagram below shows a battery with an emf of 24 V and unknown internal resistance. The ohmic resistors R_1 , R_2 and R_3 have resistances as shown in the diagram. The resistance of resistor R_4 is unknown. When switch S is closed, the reading on voltmeter V_2 is 22 V and the current through resistor R_1 is 0.9 A. The ammeter has negligible resistance.



- a.) Define term ohmic resistor.
- b.) Calculate the following:
 - i.) Equivalent resistance of the parallel combination of resistors
 - ii.) Magnitude of the current in resistor R_2 .
 - iii.) Resistance of resistor R_4 .
- c.) Explain why the reading on the voltmeter V_2 decreases when switch S is closed. Refer to the energy transferred in the battery in your explanation.

Question 3

(Adapted from Sep 2012, E.Cape, Paper 1, Question 7)

The diagrams below show the diffraction patterns for a yellow light (with a wavelength of 582 nm) and a blue light (with a wavelength of 460 nm) that are passed through the same slit in turns. Study the diagrams carefully and answer the questions that follow.



- State Huygen's principle.
- Which diffraction pattern represents the yellow light? A or B. Justify your answer.
- Calculate the position of the first dark band for the blue light if the width of the slit is 5×10^{-6} m.
- If the width of the slit is made smaller than 5×10^{-6} m, how will the diffraction patterns above be affected? Give a reason for your answer.