

# Workbook



## Table of Contents

DC Circuits .....	2
DC Circuits.....	2

# DC Circuits

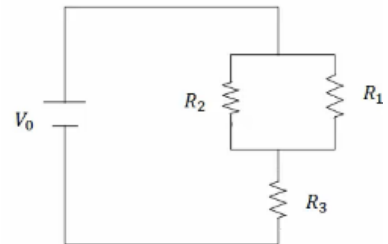
## DC Circuits

### Questions

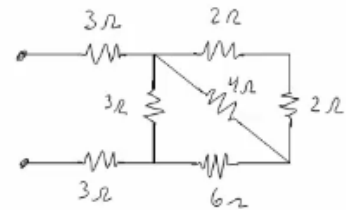
1) We are given the following resistances and voltage:

$$R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 5\Omega, V_0 = 31V.$$

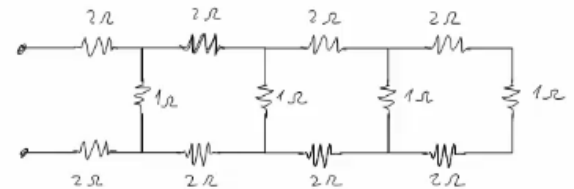
- Calculate the total resistance of the circuit.
- Calculate the current passing through the battery.  
Calculate the current and voltage on each resistor.



2) Calculate the total resistance of the following circuit.



3) Calculate the total resistance of the following circuit.



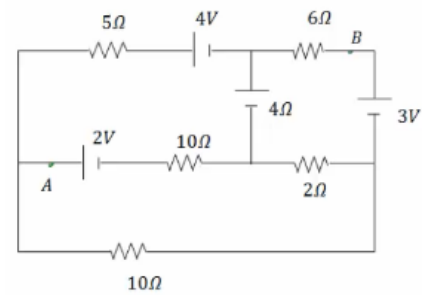
4) Find as many ways to connect three identical resistors of resistance  $R$ .

Calculate the total resistance of these circuits.

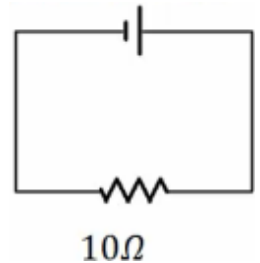
5) Calculate the current and voltage on each resistor.



- 6) a. Calculate the current through each resistor.  
 b. Calculate the voltage  $V_{AB}$ .



- 7) The following circuit is comprised of a non ideal battery and a  $10\Omega$  resistor.  
 The internal resistance of the battery is  $1\Omega$ .  
 A current of  $2A$  flows through the circuit.



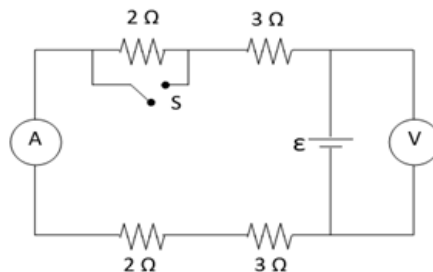
- a. What is the battery's EMF?  
 b. What is the terminal voltage?

- 8) A non ideal battery is attached to a  $10\Omega$  resistor. The current in the circuit is measured as being  $2A$ . The battery is then disconnected from the  $10\Omega$  resistor and is instead connected to a  $6\Omega$  resistor. Now a current of  $3A$  is measured.

- a. What is the EMF and internal resistance of the battery?  
 b. Calculate the terminal voltage in each case.

- 9) The following circuit is made up of four resistors, an ideal voltmeter and ammeter, a non ideal battery and a switch. The value of the ammeter is recorded twice- once when the switch is closed, and again when it is open. The two readings were  $1.5A$  and  $1.8A$ .

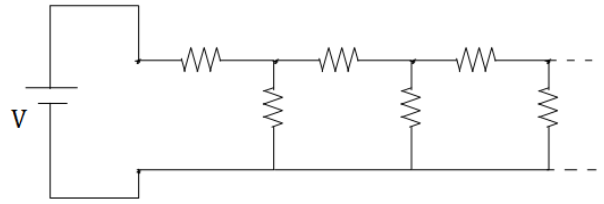
- a. At what position was the switch when the greater value for current was recorded? Explain your answer.  
 b. What will be the value on the voltmeter when the switch is open and when it is closed?  
 c. Calculate the EMF and internal resistance of the battery.  
 d. What values would the ammeter and voltmeter show if they traded positions?



10) In the diagram there is an infinite ladder circuit containing resistors.

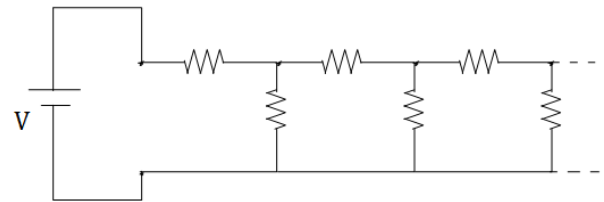
Each resistor has resistance  $R$ .

- Calculate the total resistance of the circuit.
- Calculate the current in the battery.



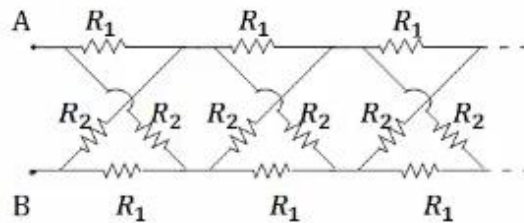
11) In the diagram there is an infinite ladder circuit containing resistors.

Each resistor has resistance  $R$ . Find an equation for the voltage on each resistor and calculate the current on the  $23^{rd}$  perpendicular resistor.



12) a. Calculate the total resistance in the following circuit (the resistance between A and B).

b. We are told that  $R_1 = R_2$ . Calculate the current in each resistor.



\*For the solutions go see the videos