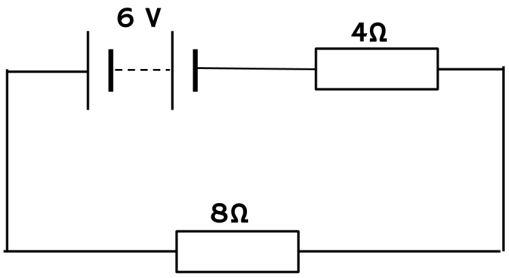
Electricity

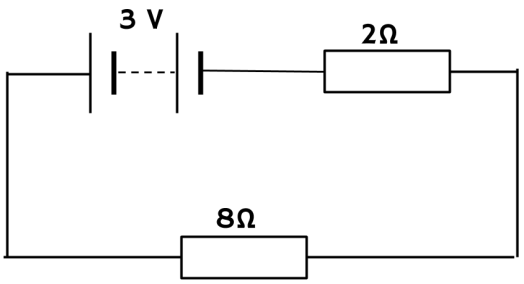
Circuit Theory

1) Find the potential difference across each resistor in the following circuits:

a)

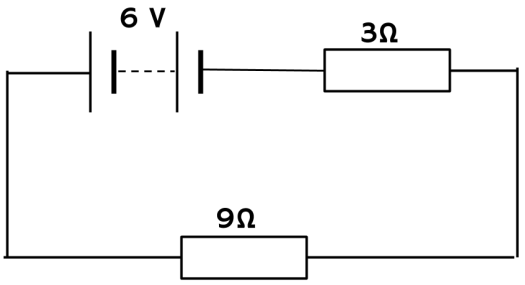


b)

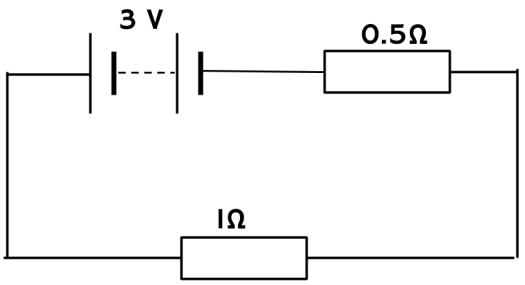


2) Show that the potential differences (pds) across each resistor in the circuits below adds up to the source voltage of the circuit.

a)

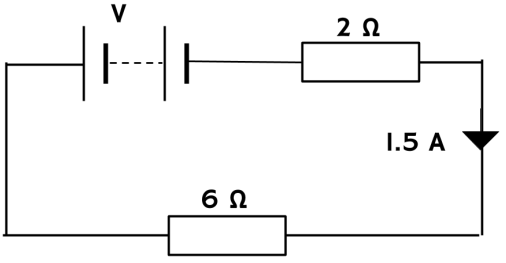


b)

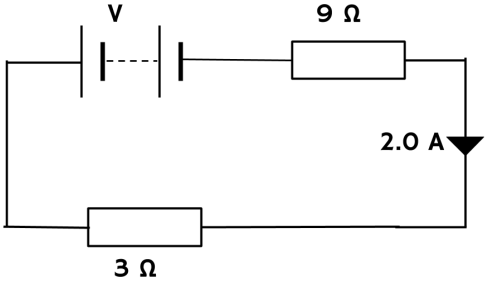


3) In the circuits below find the value, V, of the dc source's voltage.

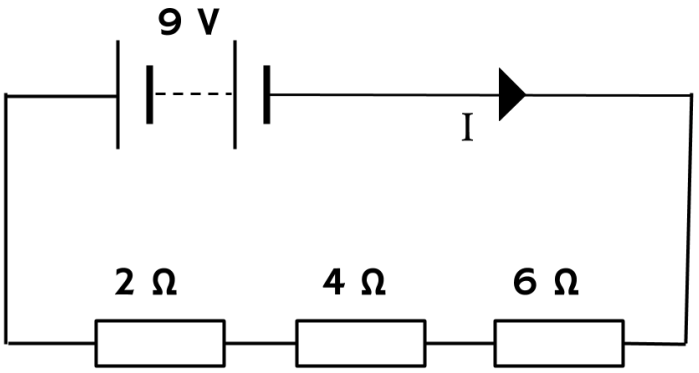
a)



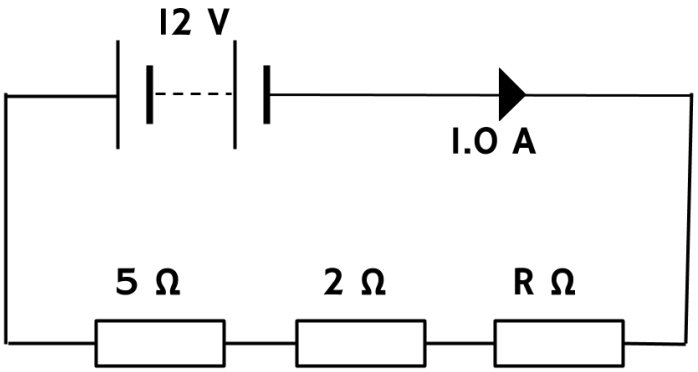
b)



4) Find the potential difference across each resistor in the circuit below.

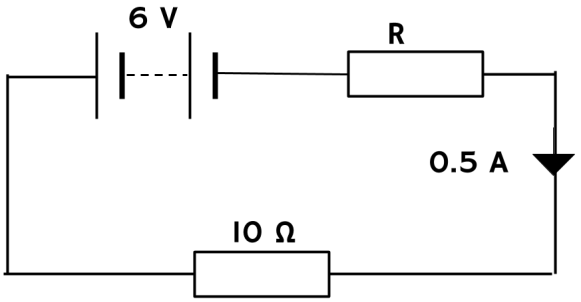


5) Find the value of the resistor R in the circuit below.

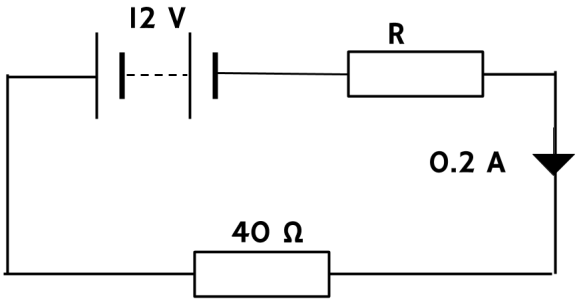


6) Determine the value of the resistor R in each of these circuits.

a)

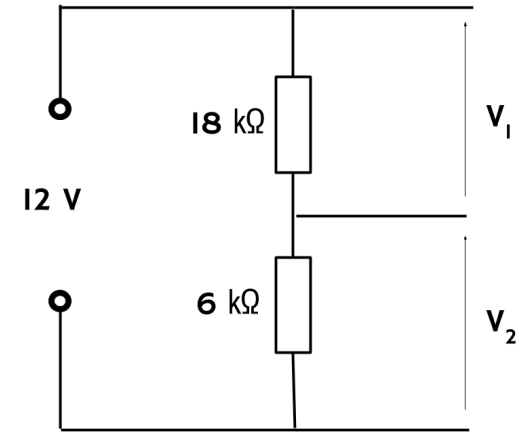


b)

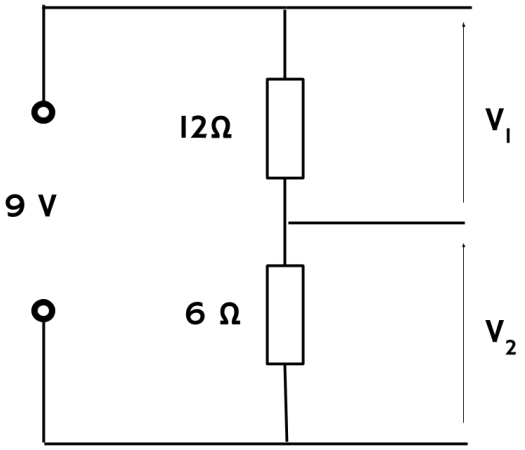


7) Determine the values V_1 and V_2 in the potential divider circuits shown below.

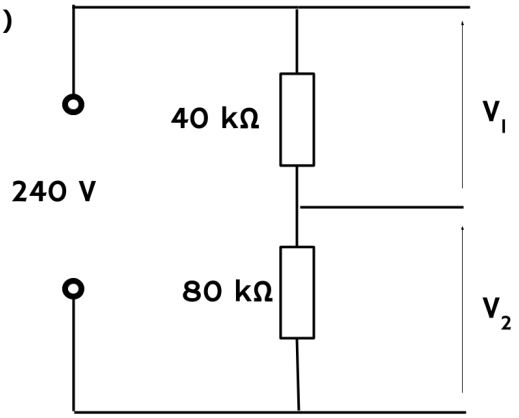
a)



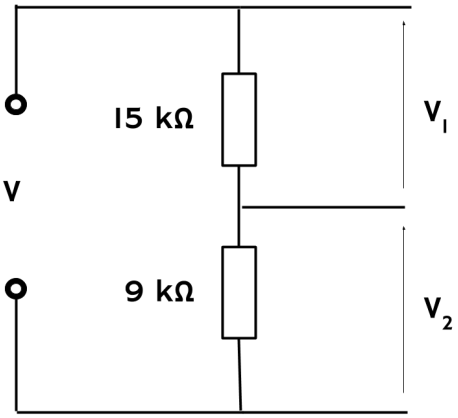
b)



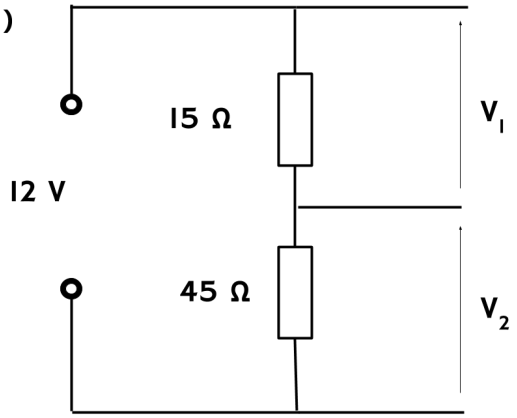
c)



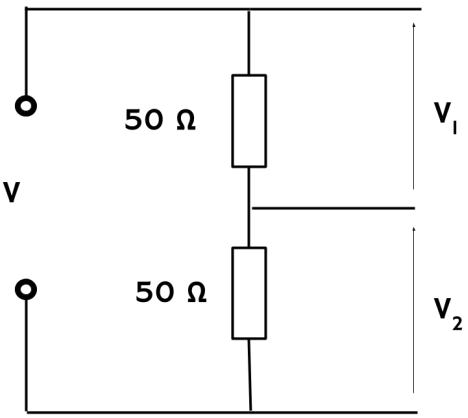
d)



e)

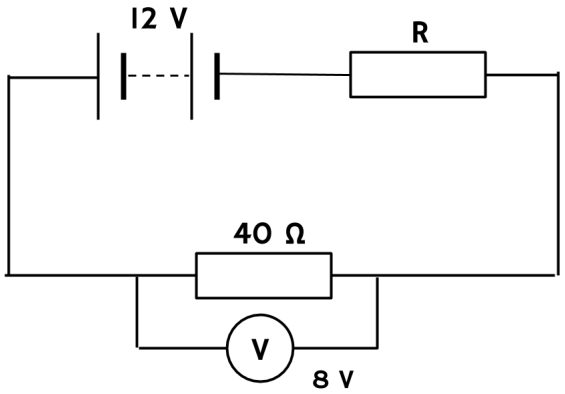


f)

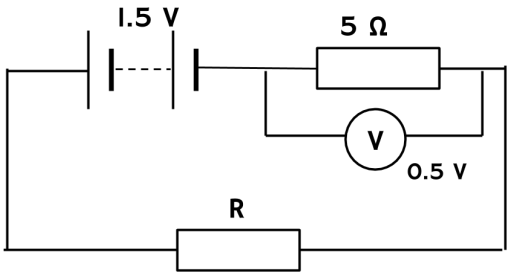


8) Determine the value of the resistor R in the circuit below given the voltage reading on the voltmeter.

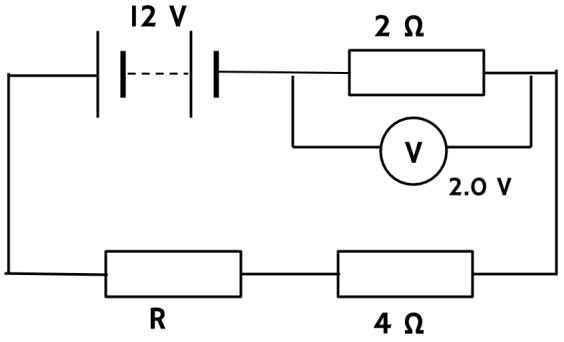
a)



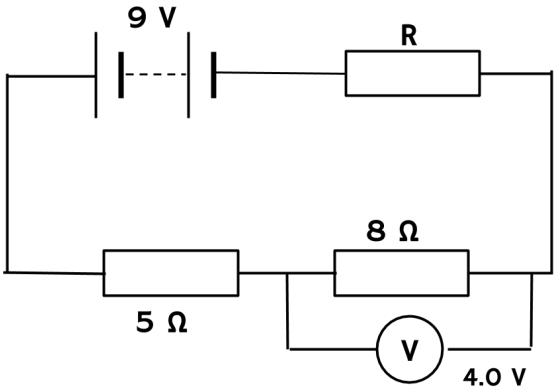
b)



c)



d)



Answers:

1) a) 2 V across the 4Ω and 4 V across the 8Ω
   b) 0.6 V across 2Ω and 2.4 V across 8Ω
2)
3) a) 12 V b) 24 V
4) From left to right: 1.5 V, 3 V and 4.5 V
5) 5Ω
6) a) 2Ω b) 20Ω
7) a) V1 = 9 V, V2 = 3 V b) 6V, 3V c) 80V, 160V d) 30V, 18V e) 3V, 9V f) 6V,6V
8) a) 20 Ω, b) 10 Ω, c) 6 Ω, d) 5 Ω

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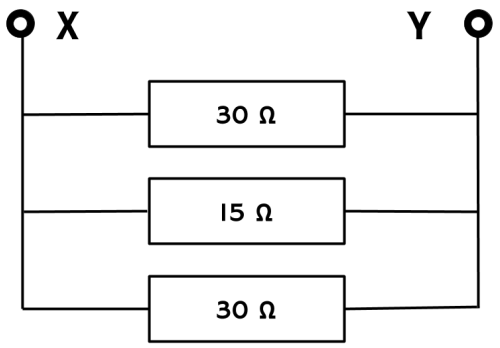
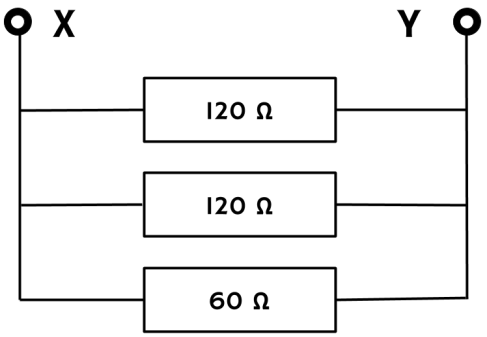
9) Calculate the combined resistance of these resistors between X and Y.

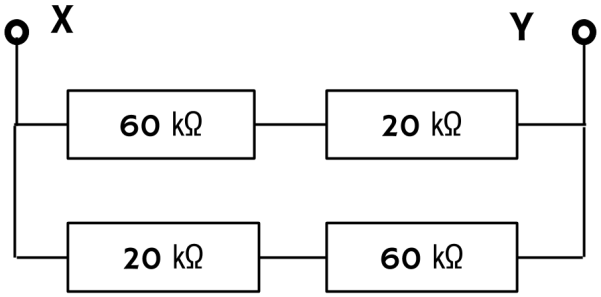
a)



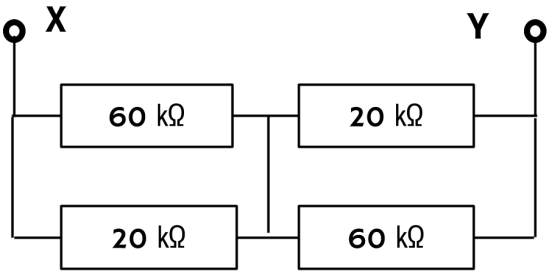
b)



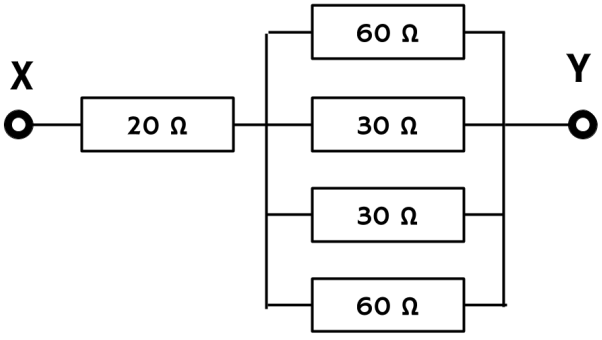
c)



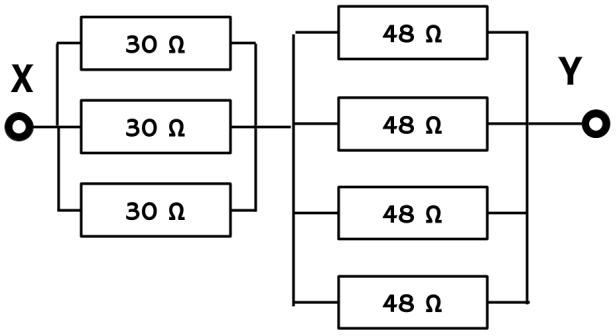
d)



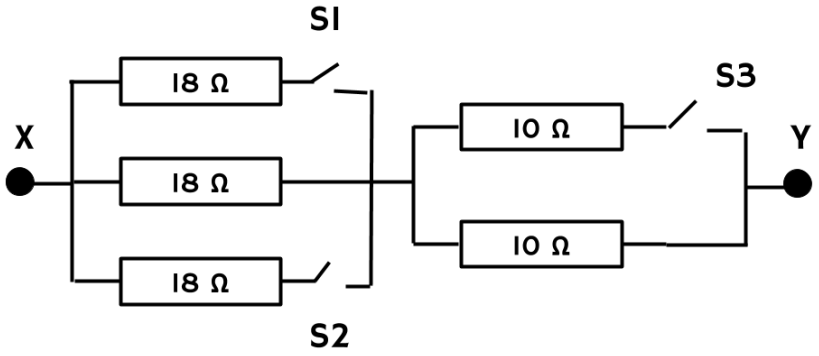
e)



f)



10) A student built a resistor network as part of an electronics project. It consists of 5 resistors: Three 18 ohm and two ten ohm resistors plus three switches S1,S2 and S3

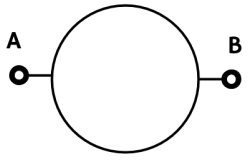


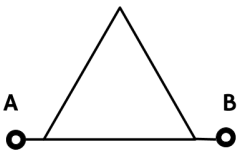
a) Determine the value of the resistance between X and Y which gives a total resistance of 11 Ω.

b) Which switches should be on for a total resistance of 16 Ω

c) Determine the two possible combinations of switches that would give a total resistance between X and Y of 14 Ω

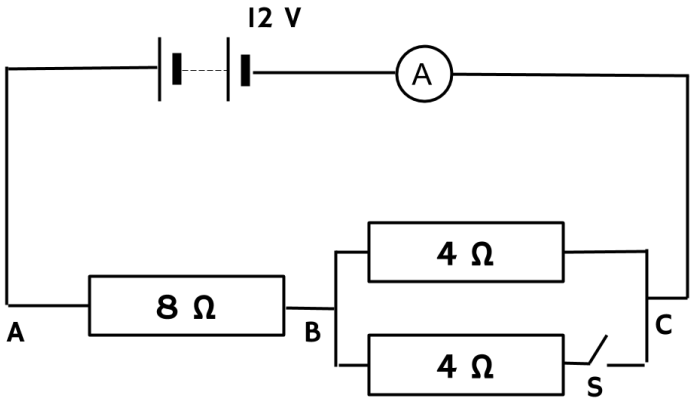
11) A wire of length 30 cm, which has a resistance of 4 Ω per cm, is made into a circle and an equilateral triangle. The shapes are connected to connecting terminals as shown.





Determine the total resistance between connectors A and B for the circle and triangle.

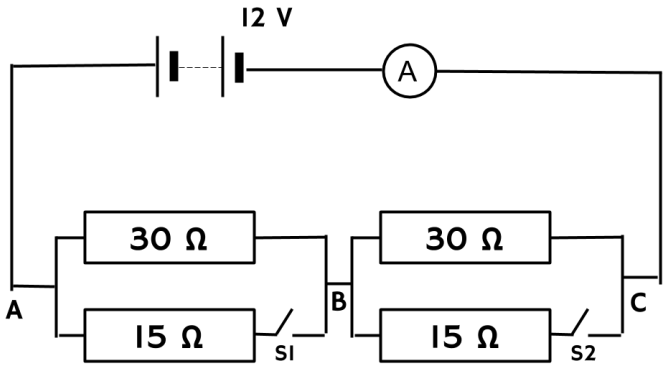
12) An electrical circuit is built as shown below.



Determine

a) The reading on the ammeter when the switch is
   i) Open
   ii) Closed
b) The pd across the points A and B when the switch is
   i) Open
   ii) Closed

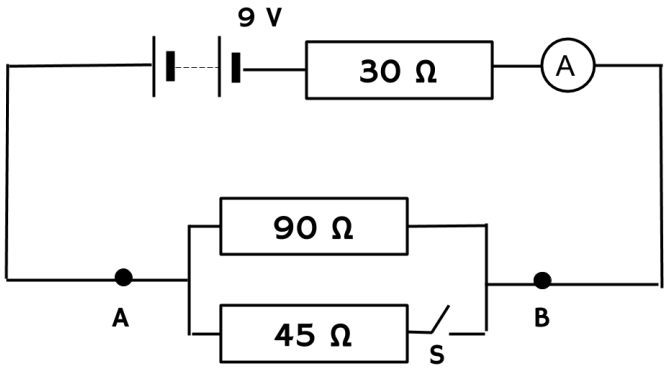
13) A student built this electric circuit for an electronics project.



a) With both switches open (off) determine:
   i) The ammeter reading.
   ii) The pd across A and B
   iii) The pd across B and C

b) With switch S1 open and switch S2 closed (on) determine:
   i) The ammeter reading
   ii) The pd across A and B
   iii) The pd across B and C

14) An electric circuit is built by a technician.

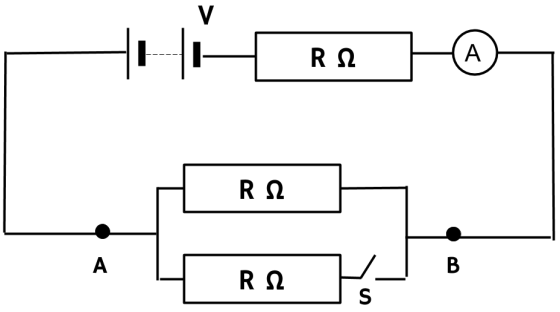


a) Determine the ammeter reading when
   i) The switch is open
   ii) The switch is closed.

b) Determine the pd across points A and B when
   i) The switch is open
   ii) The switch is closed.

c) Calculate the power dissipated across the points A and B when
   i) The switch is open
   ii) The switch is closed.

15) With reference to this circuit shown, state whether the statements are true or false.



a) The ammeter reading is the greatest When the switch is open.

b) When switch S is open the pd across Points A and B is half the battery voltage.

c) Closing switch S results in a fall in the pd across the points A and B.

d) The total resistance between points A and B when the switch is closed is 2R

e) When switch S is closed, the total resistance of the circuit is 3R/2

Answers