Electricity 001

Name: _____

Class: _____

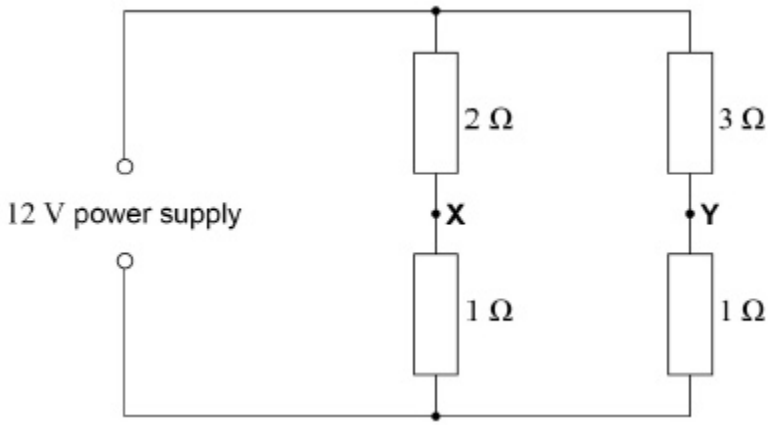
Date: _____

Time: **26 minutes**

Marks: **23 marks**

Comments:

1 In this resistor network, the emf of the supply is 12 V and it has negligible internal resistance.



What is the reading on a voltmeter connected between points **X** and **Y**?

A 0 V ⬭

B 1 V ⬭

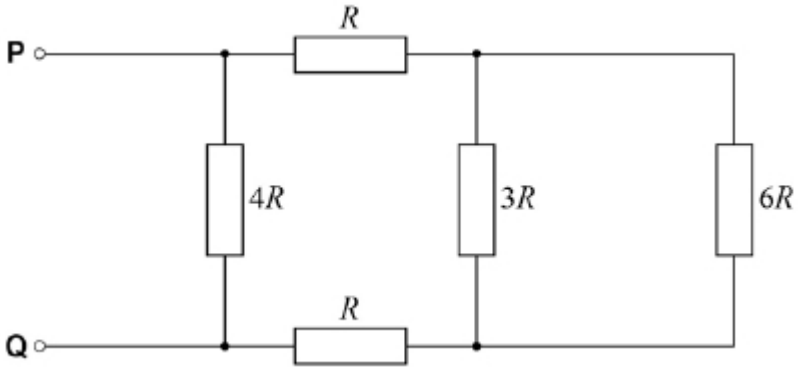
C 3 V ⬭

D 4 V ⬭

(Total 1 mark)

2 The diagram shows a network of resistors connected between the terminals **P** and **Q**.

The resistance of each resistor is shown.



What is the effective resistance between **P** and **Q**?

A R ⬭

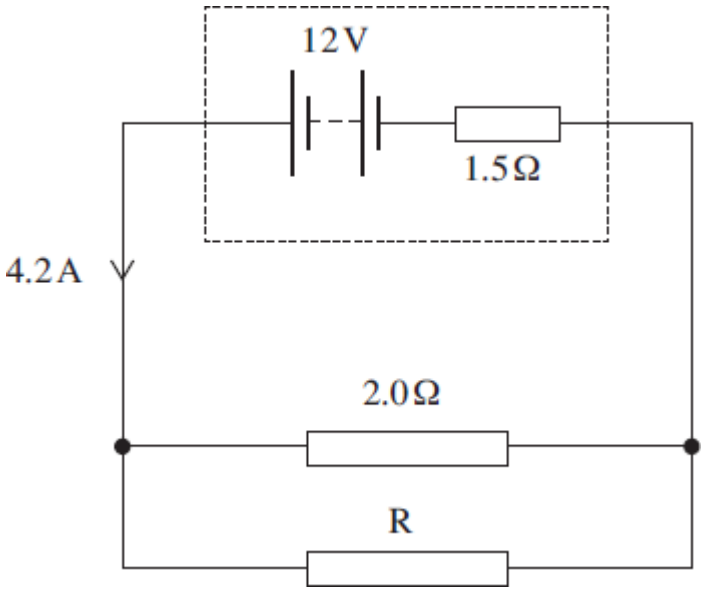
B $2R$ ⬭

C $3R$ ⬭

D $4R$ ⬭

(Total 1 mark)

3 The circuit diagram below shows a battery of electromotive force (emf) 12 V and internal resistance 1.5 Ω connected to a 2.0 Ω resistor in parallel with an unknown resistor, R. The battery supplies a current of 4.2 A.



(a) (i) Show that the potential difference (pd) across the internal resistance is 6.3 V.

(1)

(ii) Calculate the pd across the 2.0 Ω resistor.

pd _____V

(1)

(iii) Calculate the current in the 2.0 Ω resistor.

current _____A

(1)

(iv) Determine the current in R.

current _____ A

(1)

(v) Calculate the resistance of R.

R _____ Ω

(1)

(vi) Calculate the total resistance of the circuit.

circuit resistance _____ Ω

(2)

(b) The battery converts chemical energy into electrical energy that is then dissipated in the internal resistance and the two external resistors.

(i) Using appropriate data values that you have calculated, complete the following table by calculating the rate of energy dissipation in each resistor.

resistor	**rate of energy dissipation / W**
internal resistance	
2.0 Ω	
R	

(3)

(ii) Hence show that energy is conserved in the circuit.

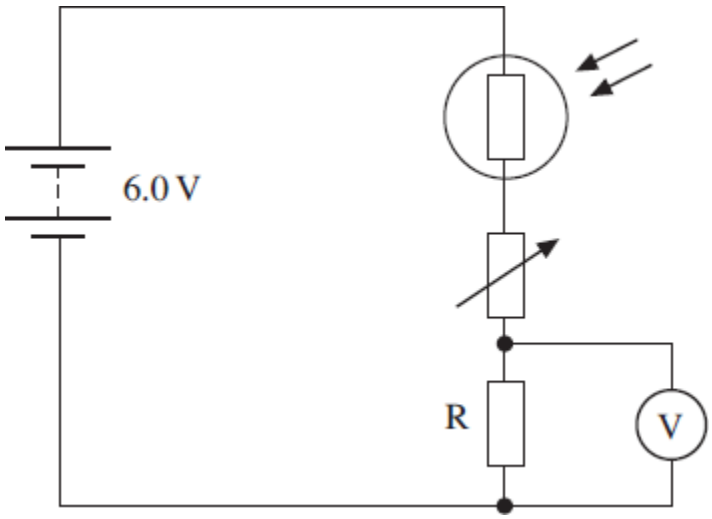
_____

_____

(2)

(Total 12 marks)

4 The circuit diagram below shows a 6.0 V battery of negligible internal resistance connected in series to a light dependent resistor (LDR), a variable resistor and a fixed resistor, R.



(a) For a particular light intensity the resistance of the LDR is 50 kΩ. The resistance of R is 5.0 kΩ and the variable resistor is set to a value of 35 kΩ.

(i) Calculate the current in the circuit.

current_____A

(2)

(ii) Calculate the reading on the voltmeter.

voltmeter reading _____V

(2)

(b) State and explain what happens to the reading on the voltmeter if the intensity of the light incident on the LDR increases.

_____

_____

_____

(2)

(c) For a certain application at a particular light intensity the pd across R needs to be 0.75 V. The resistance of the LDR at this intensity is 5.0 kΩ.

Calculate the required resistance of the variable resistor in this situation.

resistance _____ Ω

(3)

(Total 9 marks)