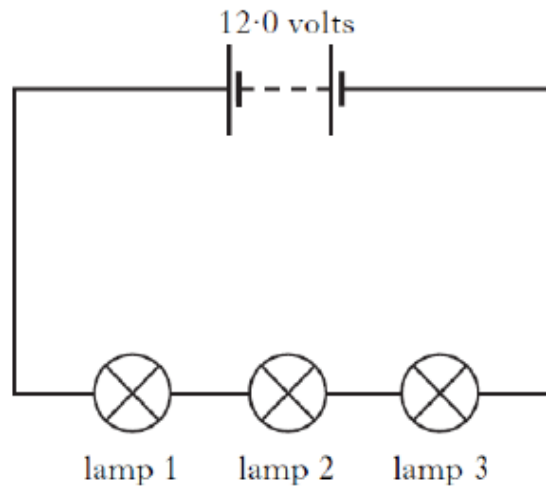# 2.1 Practical Electricity Past Paper Homework Questions

1(a) 3 identical lamps are connected as shown in circuit 1. A 12.0 volt battery supplies a
current of 0.2 amperes.

12·0 volts

lamp 1   lamp 2   lamp 3

Circuit 1

(i)   State the current in lamp 2   (1)
(ii)   Calculate the voltage across lamp 2   (3)

(b)   The lamps are now connected as shown in circuit 2. The 12.0 volt battery supplies a
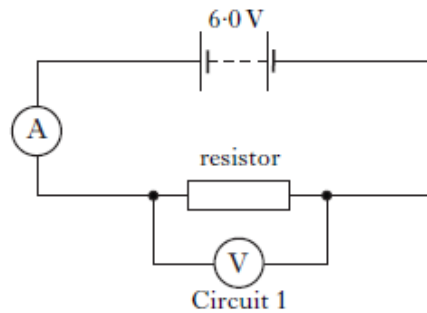current of 0.40 amperes to this circuit.

12·0 volts
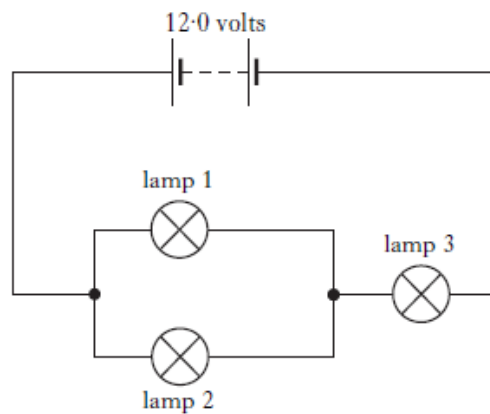
lamp 1

lamp 3

lamp 2

(i)   Complete the table to show the current in each lamp and the voltage across
each lamp.

|	Lamp 1	Lamp 2	Lamp 3
Voltage(volts)			8.0
Current(amperes)			0.4

(4)

2   A student has 4 resistors labelled A, B, C and D. The student sets up Circuit 1 to identify the value of each resistor.

Circuit 1

Each resistor is placed in the circuit in turn and the following results are obtained.

Resistor	Voltage across resistor (v)	Current (A)
A	6.0	0.017
B	6.0	0.027
C	6.0	0.050
D	6.0	0.033

(a)   (i) Show by calculation, which of the resistors has a value of 120Ω.   (3)

(ii) The student the sets up Circuit 2 to measure the resistance of each resistor.

Circuit 2
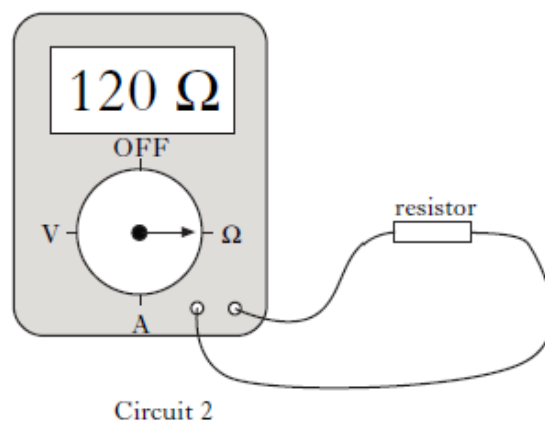
(b)   The resistances of the other three resistors are 180Ω, 220Ω and 360Ω. The student connects all four resistors in series. Calculate the total resistance.   (3)

3 A student sets up an experiment to investigate the current in and voltage across two different resistors.

The student uses a battery, an ammeter, a voltmeter and some wires to obtain measurements for each resistor.

(a)   Copy and complete the diagram below, by inserting a resistor, to show how the measurements can be obtained.
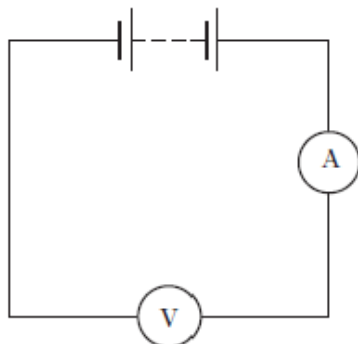
(1)

(b)   The measurements obtained for each resistor are shown in the table.
Use the information in the table to calculate the resistance of resistor X.

Resistor	Current (amperes)	Voltage (volts)
X	0.06	1.5
Y	0.75	1.5

(3)
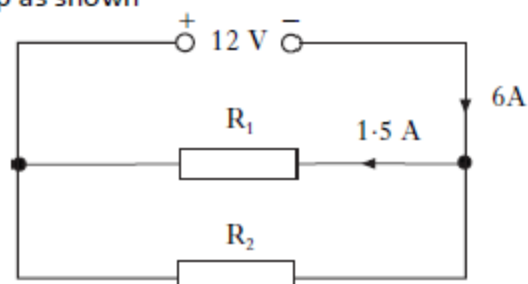
c)   Using one of the phrases below, copy and complete the following sentence.
"An increase in the resistance of a circuit leads to ....
in the current in that circuit."

An increase, no change, a decrease   (1)

4.   A circuit is set up as shown
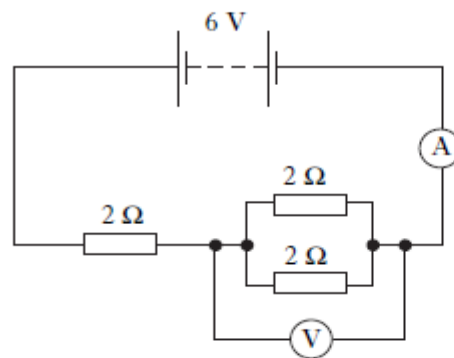

The current from the supply is 6A. The current in the resistor is 1.5 A.

What is the current in, and potential difference across resistor R2 .   (2)
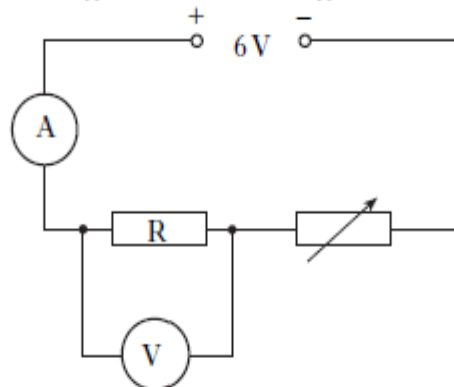
5.

A circuit is set up as shown.

6 V

2 Ω

2 Ω

2 Ω

A

V

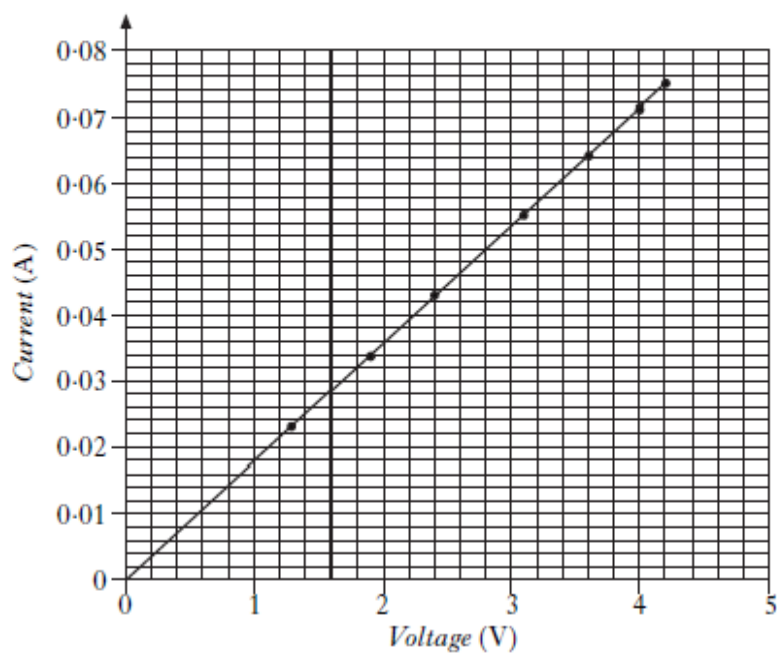Work out the reading on each meter.

(6)

6.

A student sets up the following circuit to investigate the resistance of a resistor.

+   −

6 V

A

R

V

The variable resistor is adjusted and the voltmeter and ammeter readings are noted. The following graph is obtained from the experimental results.

Current (A)

0·08
0·07
0·06
0·05
0·04
0·03
0·02
0·01
0

0   1   2   3   4   5

Voltage (V)

6.   (a) (i)   Calculate the value of the resistor R when the reading on the voltmeter is 4.2V

(3)

    (ii)   Using the information from the graph, state whether the resistance of the
           resistor R1, increases, stays the same or decreases as the voltage increases.
           Justify your answer.   (2)

    (b) The student is given a task to combine two resistors from a pack containing one
         each of 33Ω, 56Ω, 82Ω, 150Ω, 270Ω, 390Ω.
         Show by calculation which two resistors should be used to give:
         (i)   The largest combined resistance   (3)
         (ii)   The smallest combined resistance.   (3)

7.   A student sets up the following circuit using a battery, two lamps, a switch
         and a resistor.
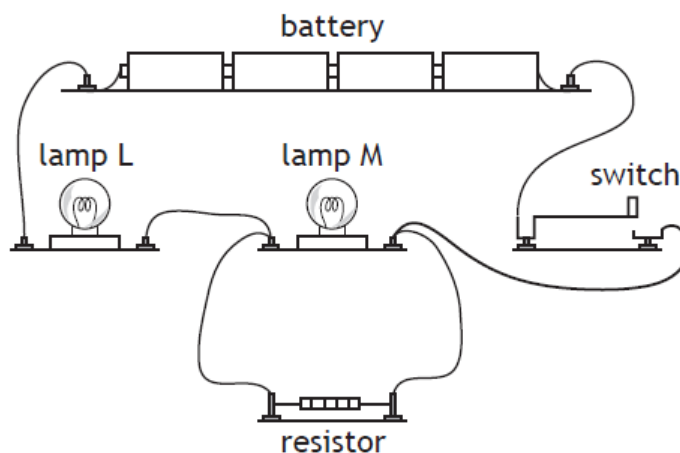
    (a) Draw a circuit diagram for this circuit using the correct symbols for the
         components.   3

    (b) Each lamp is rated 2·5 V, 0·50 A.

         Calculate the resistance of one of the lamps when it is operating at the
         correct voltage.   3

(c) When the switch is closed, will lamp L be brighter, dimmer or the same brightness as lamp M?

You **must** justify your answer.   3

One of the components is operated at 4·0 V with a current of 0·50 A for 60 seconds.

(i) Calculate the energy transferred to the component during this time.   4

(ii) Calculate the charge which passes through this component during this time.   3

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8. Electrical storms occur throughout the world.

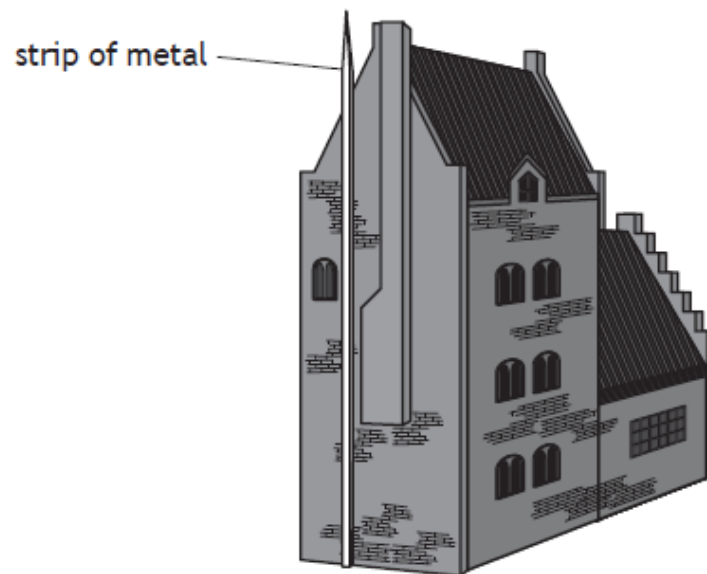During one lightning strike 24 C of charge is transferred to the ground in 0·0012 s.

(a) Calculate the average current during the lightning strike.   3

(b) The charge on an electron is $-1·6 \times 10^{-19}$ C.

Determine the number of electrons transferred during the lightning strike.   1

8. (c) Many tall buildings have a thick strip of metal attached to the side of the building.

strip of metal

This strip is used to protect the building from damage during electrical storms.

Explain how this strip protects the building from damage.   2

Total Marks = 60

9.