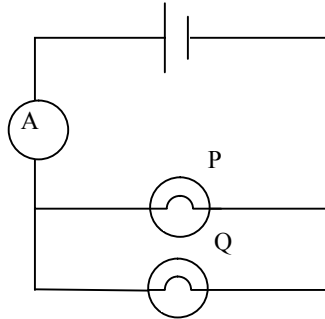


(a) In the circuit below, lamps P and Q are identical. The reading on the ammeter is 3A. The cell shown is of emf. 6V.



Calculate the current that passes through lamp P.

.....
.....
..... [2]

(b) If a voltmeter was connected across lamp P, what would it read ?

..... [1]

(c) Calculate the resistance of lamp P.

.....
.....
..... [3]

(a) Resistors of 5 ohms and 10 ohms are connected in series with a battery supplying 3 volts.
What is the total resistance?

.....
..... [2]

(b) Calculate the current which flows in the circuit.

.....
.....
..... [3]

(a) Resistors of 2 ohms and 4 ohms are connected in parallel across a battery supplying 6 volts. Another resistor of 5 ohms is connected in series with the battery. Draw the circuit.

[3]

(b) Calculate the total resistance in the circuit.

.....
.....
.....
.....
..... [4]

(c) Calculate the current flowing through the 5 ohm resistor.

.....
..... [2]

(a) A lamp is rated at 12 V, 6W.

(i) Explain what this means.

.....
..... [2]

(ii) How many joules of energy are transferred by the lamp in 5 minutes ?

.....
.....
.....
..... [4]

(b)(i) Calculate the current passing through the lamp when it is connected to a 12 V supply.

.....
.....
..... [2]

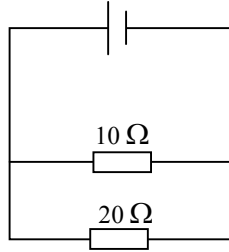
(ii) Calculate the resistance of the lamp in these circumstances.

.....
.....
..... [2]

(c) A 24 V supply is used to connect two such lamps in series.
What difference will there be, if any, in the current and resistance of the lamp ?

.....
..... [2]

In the circuit below, 0.6 A flows through the 10 ohm resistor.



(a) Calculate the current flowing through the 20 ohm resistor.

.....
..... [2]

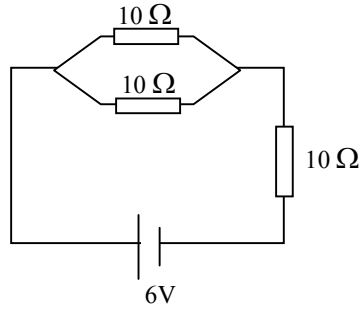
(b) Calculate the current flowing through the battery.

.....
..... [2]

(c) Calculate the voltage supplied by the battery.

.....
.....
..... [3]

Each of the resistors in the circuit below has a resistance of $10\ \Omega$.



(a) Calculate the resistance of the two parallel resistors.

.....
..... [2]

(b) Calculate the total resistance in the circuit.

.....
..... [2]

(c) Calculate the current through each of the resistors.

.....
.....
..... [3]

(a) Calculate the total resistance of resistors of 2 Ω , 5 Ω and 10 Ω when connected:

(i) in series with each other

.....
..... [2]

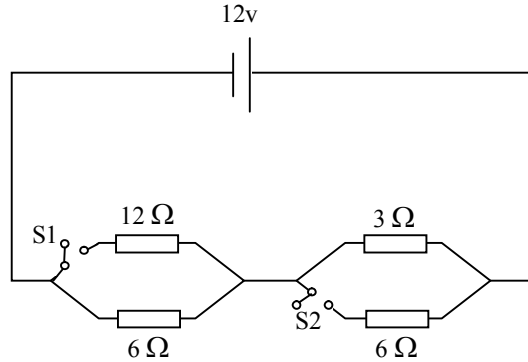
(ii) in parallel with each other.

.....
.....
..... [3]

(b) In which arrangement will the current in the circuit be larger? Explain your answer.

.....
.....
..... [3]

Resistors of $3\ \Omega$, $6\ \Omega$, $6\ \Omega$ and $12\ \Omega$ are connected up as shown in the diagram.



(a) Calculate the total resistance when both switches are closed.

.....
.....
..... [4]

(b) Calculate the total current supplied when both switches are closed.

.....
.....
..... [2]

(c) Calculate the current in the $3\ \Omega$ resistor when switch S1 is closed and switch S2 is open.

.....
.....
..... [3]

(d) Calculate the current supplied when both switches are open.

.....
..... [2]

(a) Electric current is measured in *amps*.

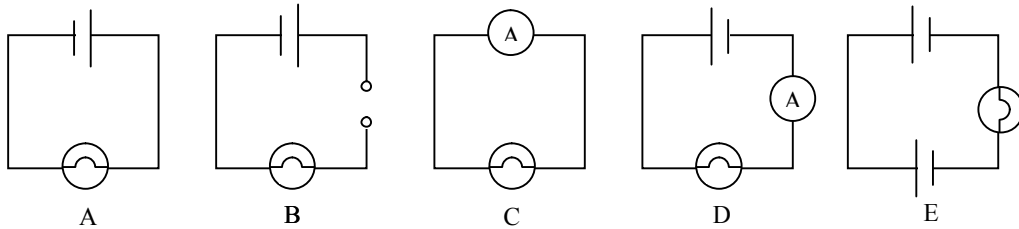
Which of the following quantities is equal to one amp (1A)? Circle the correct answer

- A one ohm per volt
- B one volt per second
- C one coulomb per second
- D one joule per coulomb
- E one coulomb per ohm

(b)(i) What is meant by an electric current ?

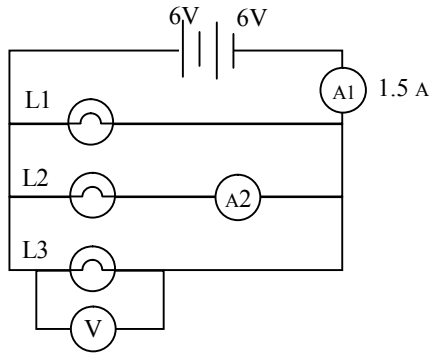
.....
.....
..... [3]

(ii) State in which of the following circuits the lamp would light. There may be more than one correct answer.



..... [1]

The diagram shows a circuit with three identical lamps.
The ammeter, A1, shows a reading of 1.5 A.



(a) Indicate on the diagram where you would insert a switch so that it will switch on or off lamps L2 and L3, but will not affect lamp L1. [1]

(b) What name is given to this arrangement of connecting lamps ?
..... [1]

(c) What will be the reading on ammeter A2 ?
.....
..... [2]

(d) What will be the reading on the voltmeter ?
.....
..... [1]

(a) An ammeter of low resistance is used to measure the current flowing in a circuit.
Explain why it must have a low resistance.

.....
.....
..... [2]

(b)(i) How should a voltmeter be connected in a circuit ?

..... [1]

(ii) Should a voltmeter have a high or low resistance ? Explain your answer.

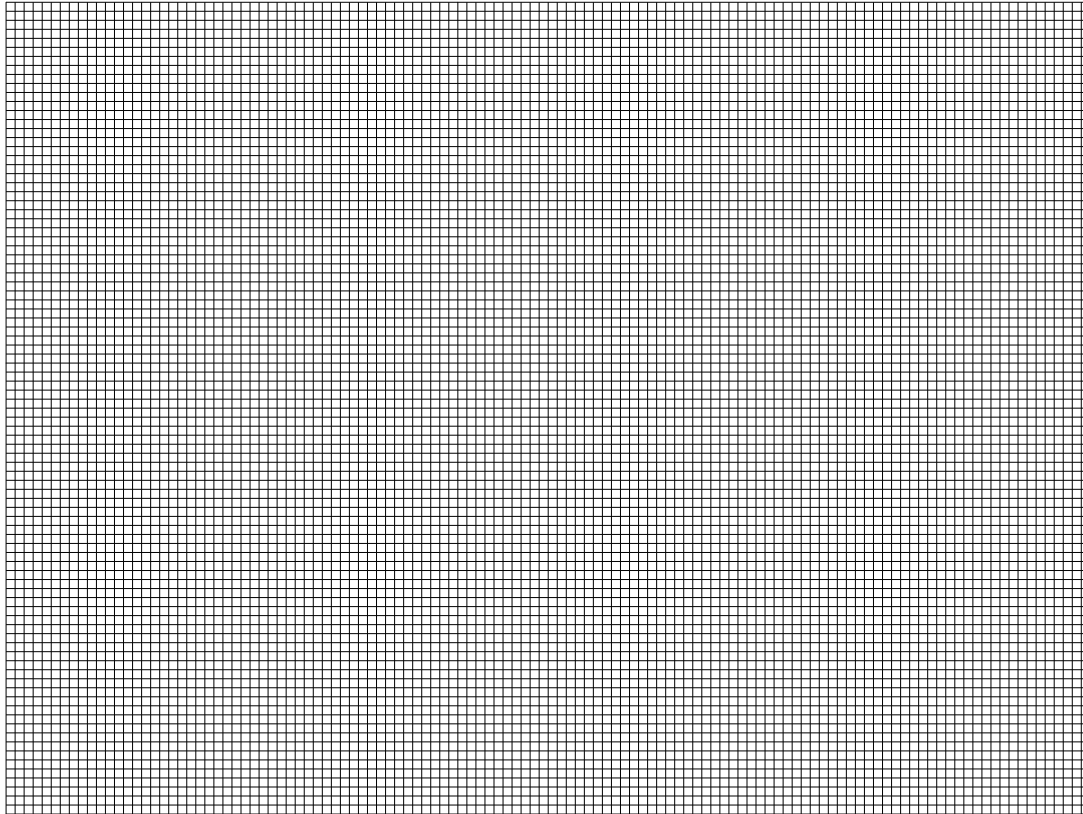
.....
.....
..... [3]

The potential difference and current for an electrical component is measured.
The results are shown in the table below.

Pd / V	0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0
I / A	.020	.040	0.56	0.75	0.88	0.93	1.00	1.08

(a) Plot a graph of pd (y axis) against I (x axis)

[4]



(b)(i) Does the component obey Ohm's law? ?

..... [1]

(ii) Explain your answer.

.....
..... [1]

(iii) Suggest what the component could be.

..... [1]

A student wishes to investigate whether a component obeys Ohm's law.

(a) State Ohm's law.

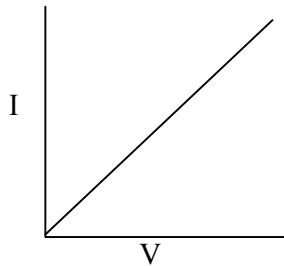
.....
..... [2]

(b) Draw a suitable circuit that could be used for the investigation.

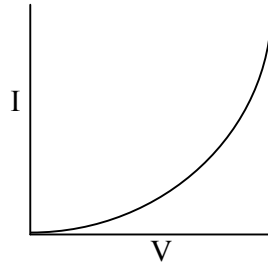
[4]

Below are shown graphs of I against V for three different components; a diode, a lamp filament and a metal wire.

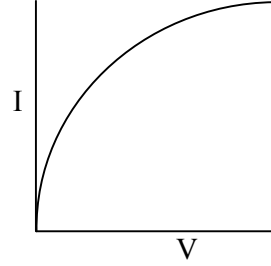
All were at constant temperature.



A



B



C

(a) Identify which graph belongs to which component.

A

B

C [3]

(b)(i) Which graph shows an ohmic conductor ?

..... [1]

(ii) Which graph shows a component in which resistance increases ?

..... [1]

A machine in a workshop will only operate when the safety guard is in place. There is a large switch on the machine and a switch where it is plugged into the mains.

(a) (i) Draw a circuit diagram showing the switches for the machine.

(ii) Explain why the switches are placed in the circuit in the way in which you have drawn them. [3]

.....
..... [2]

(b) Two switches are used when you want to be able to operate something from two different places. (eg a light at each end of a corridor). Explain how the arrangement of the switches will differ from that in the machine.

.....
.....
.....
..... [3]

A student is asked to investigate how the resistance of a wire varies with its length.

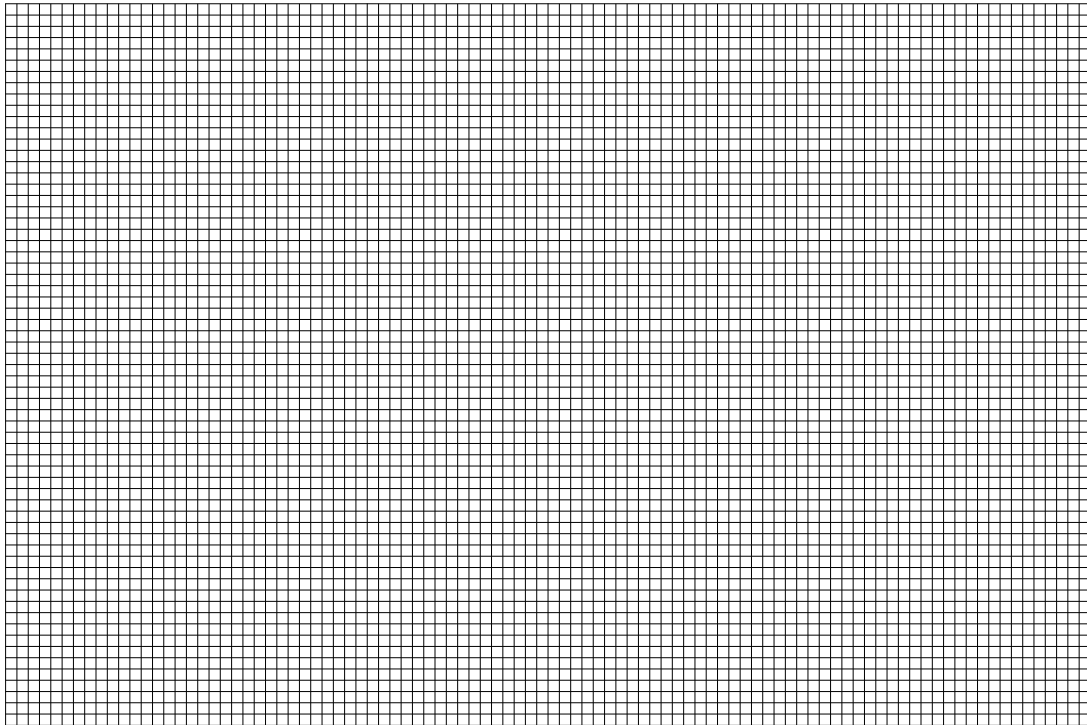
(a) Briefly describe how this could be done.

.....
.....
.....
.....
.....
.....
..... [4]

(b) Here are the results of the experiment.

Length of wire/cm	0.0	10	20	30	40	50
Resistance/ohms	0.0	4.5	9.1	13.6	18.1	22.3

(i) Plot a graph of length of wire against resistance. [3]



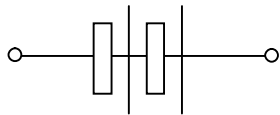
(ii) What can you conclude about how resistance of the wire varies with length?

.....
..... [2]

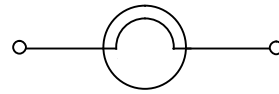
(iii) How is this made use of in a dimmer switch ?

.....
.....
.....
.....
..... [3]

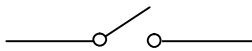
(a) Name each of the components shown.



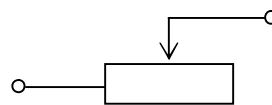
A



B



C




D

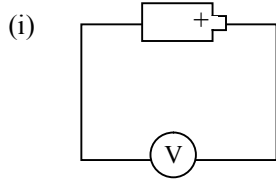
[4]

(b) What is the purpose of component D ?

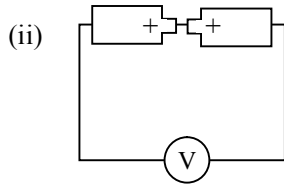
..... [1]

A torch battery represented by  produces 1.5 volts.

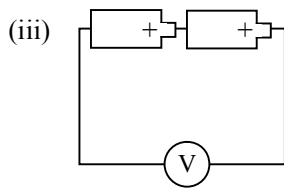
(a) Write down the voltage shown on the voltmeter in each of the following circuits.



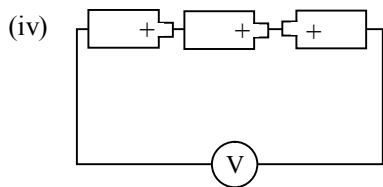
..... [1]



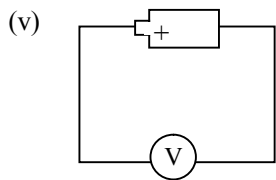
..... [1]



..... [1]



..... [1]



..... [1]

(b) Explain why you cannot light a car headlamp bulb with a 1.5 V battery.

..... [1]

(c) What happens to the size of a current in a circuit when the voltage increases?

..... [1]

Here is a list some materials in order of their ability to conduct electricity. The best conductor is at the top and poorest one at the bottom.

- silver
- copper
- aluminium
- water
- PVC
- rubber

Copper is used in household wiring, but it is not the best conductor.

(a) Why is silver not used?

..... [1]

(b) Aluminium is used in overhead power cables.
Why is copper not used?

..... [1]

(c) Which two materials from the list are used to insulate electrical wires?

..... [2]

(d) Explain why bathrooms are always fitted with pull-cord switches.

.....
..... [2]

Christmas tree lights are usually wired in series. If one bulb stops working, the others do too.

(a) Explain what is meant by *in series*.

..... [2]

(b) If there are 20 bulbs in a set of Christmas tree lights which operate from the mains (240 volts), what would be the voltage across each bulb?

.....
..... [2]

(c) Why is it wrong to replace a bulb from a 20-bulb set of lights with one from a 40-bulb set?

.....
..... [2]

(d) Why is it wrong to use

(i) a 3 amp fuse in the plug of an electric fire using 10 amps?

..... [1]

(ii) a 13 amp fuse in the plug of a radio using 1.5 amps?

.....
..... [2]