Exam-style questions: electricity

Q1.   The diagram shows an electrical circuit.

(i) ....

(ii) ....
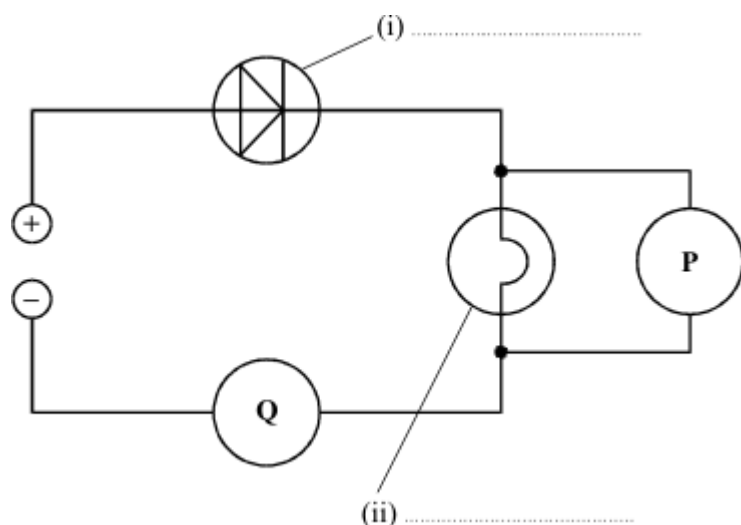
(a)   Complete the two labels on the diagram.

(2)

(b)   **P** and **Q** are meters.

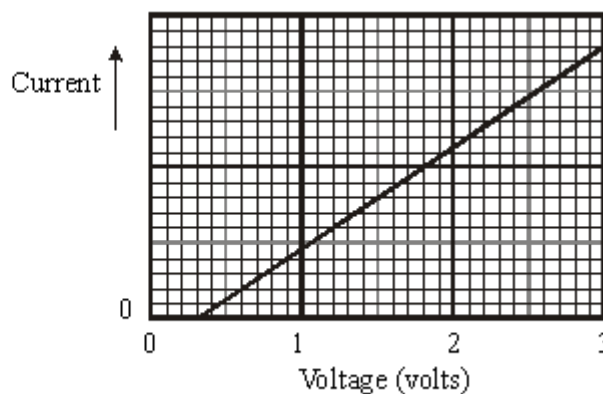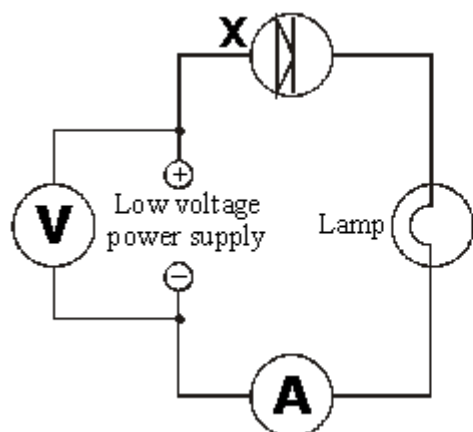What is meter **P** measuring? ....

What is meter **Q** measuring? ....

(2)
(Total 4 marks)

Q2.   Some students want to find out how the current through component X changes with the voltage they use.

The diagram shows their circuit.   The graph shows their results.

Current

Low voltage power supply

Lamp

V

A

0

0   1   2   3
Voltage (volts)

(a) Describe, as fully as you can, what happens to the current through component X as the students increase the voltage.

....

....

....

(4)

(b) The students want to find out whether component X allows the same current to flow through it in the opposite direction.
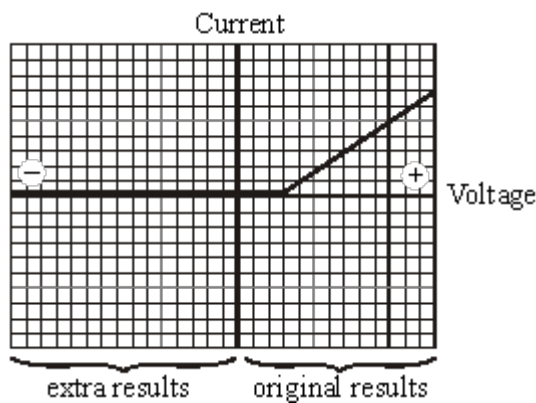
(i) How should they change the circuit to test this?

....

(1)

(ii) The graph shows the students' extra results.

What do the extra results tell you?

....

....

....

(1)
(Total 6 marks)

Q3. The circuit diagram below shows a battery connected to a lamp and a switch.
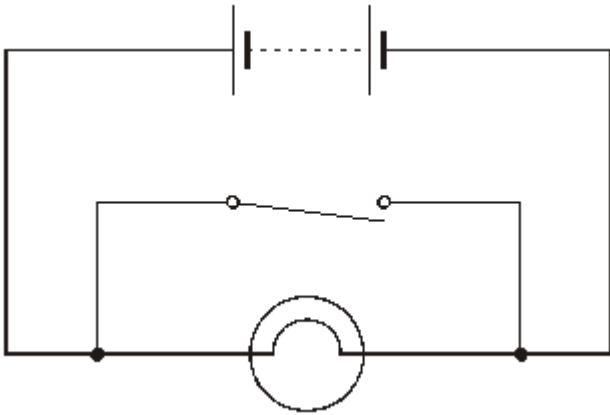
(a) State what happens to the lamp when:

(i) the switch is open (OFF);

....

(ii) the switch is closed (ON).

....

(2)

(b) When the switch is closed what problem is caused in the circuit?

....

....

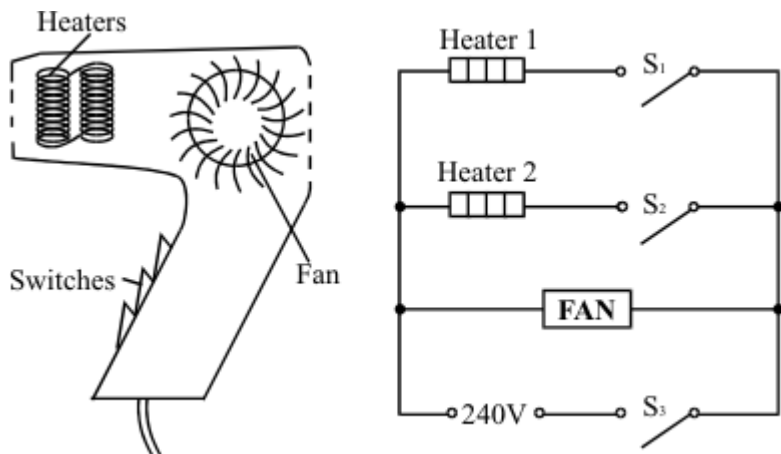...

(1)

(c) In the space below draw a circuit diagram to show how the switch should be correctly connected to the lamp and battery.

(1)
(Total 4 marks)

Q4. The diagrams show a hair-dryer and the circuit inside the hair-dryer.

(a) Switches S_1, S_2 and S_3 are all shown in the **OFF** position.

Which switch or switches have to be **ON** to make:

(i) only the fan work? ....

(ii) both heaters work? ....

(2)

(b) (i) What happens to the current in the circuit when the heaters are switched on?

....

(ii) Suggest why it is important to have the fan working when the heaters are switched on.

....

....

....

(3)

(c)   The following information is stamped on the hair-dryer.

Electrical supply   240V   50Hz

Maximum power 1300W

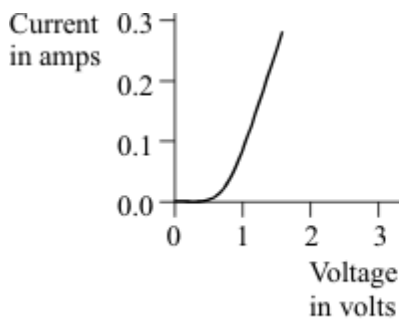(i)   Which number tells us how fast the hair-dryer uses energy?

....

(ii)   On what else does the energy used by the hair-dryer depend?

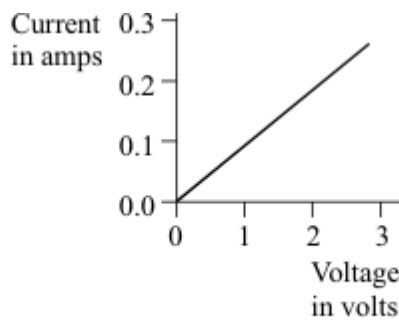...

(2)
(Total 7 marks)
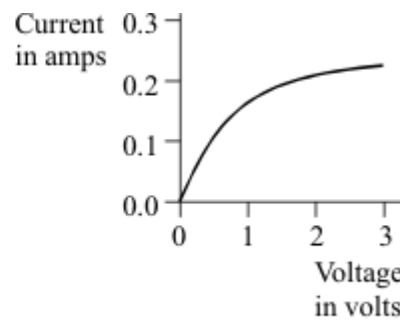
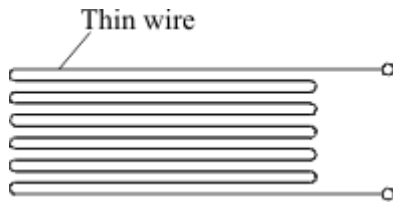**Q5.**   (a)   The diagram shows the voltage-current graphs for three different electrical components.

Which **one** of the components **A**, **B** or **C** could be a 3 volt filament lamp? Explain the reason for your choice.

....

....

....

....

(3)

(b)   Using the correct symbols draw a circuit diagram to show how a battery, ammeter and voltmeter can be used to find the resistance of the wire shown.

Thin wire

(3)

(c)   When correctly connected to a 9 volt battery the wire has a current of 0.30 amperes flowing through it.

(i)   Give the equation that links current, resistance and voltage.

....

(1)

(ii)   Calculate the resistance of the wire. Show clearly how you work out your answer and give the unit.

....

....

Resistance = ...

(3)

(iii)   When the wire is heated, the current goes down to 0.26 amperes. State how the resistance of the wire has changed.

....

....

(1)
(Total 11 marks)

M1. (a) (i) diode

[*Do not accept 'rectifier' or LED*]

(ii) lamp / bulb / light

each for 1 mark

2

(b) • P = voltage / potential difference / p.d. / volts / V

[*Allow 'Voltmeter*]

• Q = current / amperes / amps / A

[*Allow 'ammeter*]

each for 1 mark

2

[4]

M2. (a) *idea that*

it/current increases (with voltage)

gains 1 mark

but
current increases steadily (with voltage)

(allow in proportion)

gains 2 marks

4

no current at first

gains 1 mark

but
no current until voltage is more than 0.3 (volts)

gains 2 marks

(b) (i) reverse component X/power supply/change battery <u>round</u>

for 1 mark

(ii) *idea that*
X doesn't conduct in opposite/let current through/no current
(in opposite direction)
(credit X is a diode)

for 1 mark

2

[6]

M3. (a) (i) the lamp will be on/will give out light

1

(ii) the lamp will be off/will not give out any light

(b)   (very) large current flows
        or damage the battery/overheat the battery
        or short circuit
        or wire get hot

1

(c)   switch connected in series with lamp and battery

1

[4]

M4.   (a)   (i) S_3
                        for 1 mark

1

            (ii) S_1, S_2 and S_3
                    for 1 mark

1

            (b)   (i)   increases/current passes through heaters/current unaffected in fan
                            for 1 mark

1

            (ii)   (fan) blows/air moving prevents dryer overheating
                    for 1 mark each

2

            (c)   (i)   1300/power
                            for 1 mark

1

            (ii)   time/units of time
                    for 1 mark

1

[7]

M5.   (a)   C
                    award mark if A and B identified as not filament lamp

1

            resistance increases
                    negated by wrong statement e.g. current goes down

1

            as the lamp gets hot
                    *accept as current (through lamp) **or** voltage (across lamp)*

increases

*do **not** accept non-ohmic reason independent of choice of
component*

1

(b)   ammeter wire and battery only in series

*non standard symbols acceptable if correctly identified (labelled)
for ammeter, voltmeter and battery*

1

voltmeter only in parallel with wire **or** battery

*all in series **or** ammeter in parallel neither of these two marks
awarded*

1

all symbols correct

ignore lines drawn through centres of symbols

1

(c)   (i)   voltage = current **×** resistance

accept V = I × R
accept volts = amps × ohms
*do **not** accept V = C × R*

accept

if subsequent method correct

1

(ii)   30

*accept correct substitution for **1** mark (9/0.3)*

2

ohms

accept correct symbol Ω

1

(iii)   goes up

must be a comparison
accept calculation if answer is larger than c (ii)

1

[11]