

Name _____

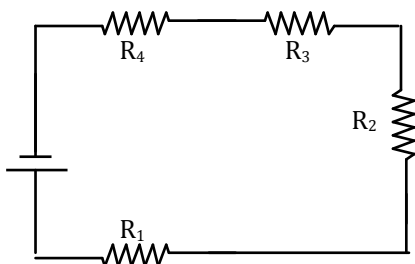
Date _____

Mr Rawson

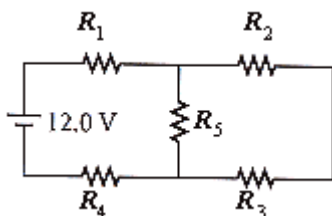


Circuitry III

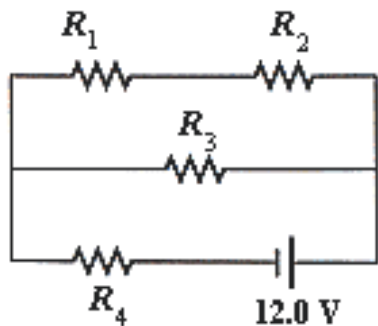
1. The circuit below has a 24 V battery connected to resistors $R_1 = 6\ \Omega$, $R_2 = 10\ \Omega$, $R_3 = 9\ \Omega$, $R_4 = 5\ \Omega$. Calculate the current and voltage through each resistor.



2. Re-draw the schematic diagram below, and then find the equivalent resistance of the circuit.
Let $R_1 = 8.0\ \Omega$, $R_2 = 6.0\ \Omega$, $R_3 = 7.0\ \Omega$, $R_4 = 6.0\ \Omega$ and $R_5 = 4.5\ \Omega$. (Your answer should be between 15 – 20 Ω)



3. Four resistors are connected to a battery with a terminal voltage of 12.0 V, as shown in the figure below. Assume that $R_1 = 30.0\ \Omega$, $R_2 = 80.0\ \Omega$, $R_3 = 100.0\ \Omega$ and $R_4 = 15.0\ \Omega$)



(a) Redraw the circuit

(b) Determine the equivalent resistance and the net current in the circuit. (Your answer should be between 50 – 70 Ω , and 0 – 1 A, respectively.)

(c) Determine the potential difference in the 30 Ω resistor. (Your answer should be between 2 – 3 V)

4. This question compares the electrical properties of two 12 V filament lamps.

A lamp is designed to operate at normal brightness with a potential difference of 12 V across its filament. The current in the filament is 0.50 A.

(a) For the lamp at normal brightness, calculate

i. the power dissipated in the filament

.....

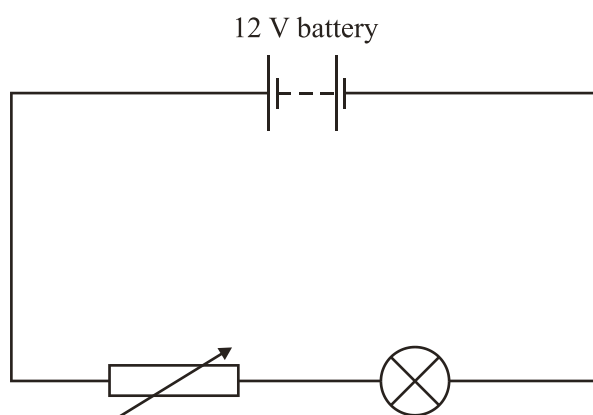
.....

ii. the resistance of the filament

.....

.....

In order to measure the voltage-current (V-I) characteristics of a lamp, a student sets up the following electrical circuit.



(b) On the circuit above, add circuit symbols showing the correct positions of an ideal ammeter and an ideal voltmeter that would allow the V-I characteristics of this lamp to be measured.

The voltmeter and the ammeter are connected correctly in the circuit opposite.

(c) Explain why the potential difference across the lamp

i. cannot be increased to 12 V

.....

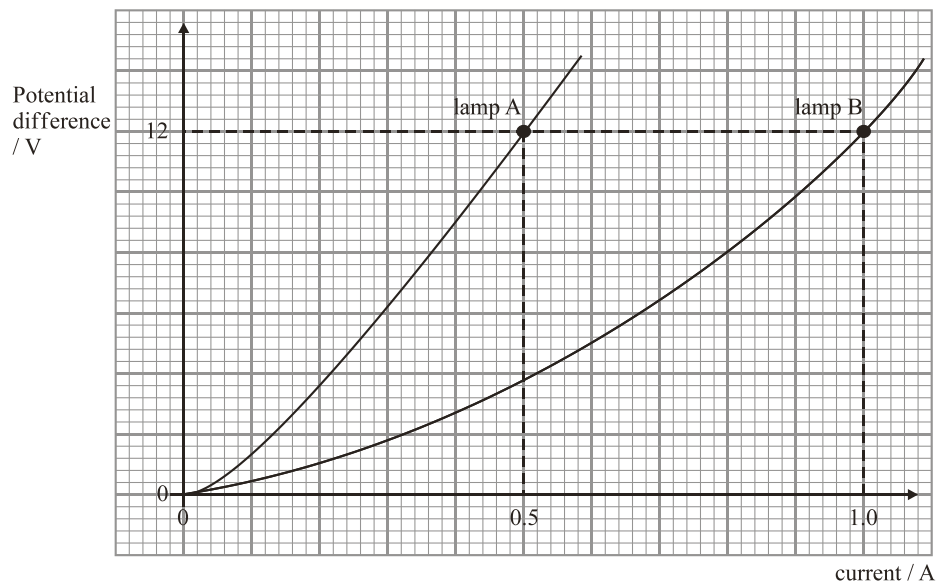
.....

ii. cannot be reduced to zero

.....

.....

The graph below shows the V-I characteristic for two 12 V filament lamps A and B.



- (d) i. Explain why these lamps do not obey Ohm's law

.....

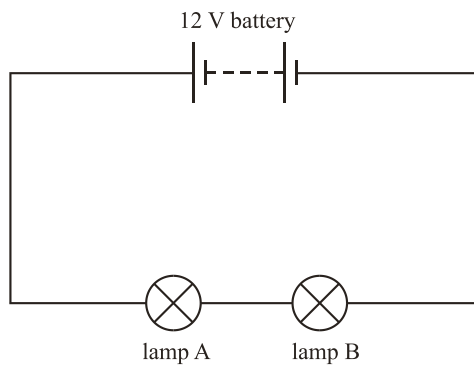
.....

- ii. State and explain which lamp has the greater power dissipation for a potential difference of 12 V.

.....

.....

The two lamps are now connected in series with a 12 V battery as shown below



- (e) i. State how the current in lamp A compares to that in B

.....

.....

- ii. Use the *V-I* characteristics of the lamps to deduce the total current from the battery.

.....

.....

- iii. Calculate the power dissipated by the two lamps.

.....

.....