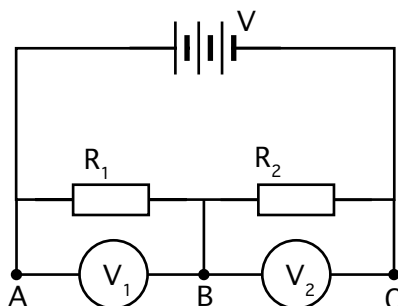AS Electricity

Potential dividers

Name & Set

1   In the circuit shown below the p.d. of the battery is 12 V. Assume that the battery has no internal resistance

If R_1 is 50Ω and R_2 is 250Ω

(i) what would voltmeter V_1 read?

_____

_____

_____ [3]

(ii) what would voltmeter V_2 read?

_____ [1]

(iii) what is the voltage at A? _____ [1]
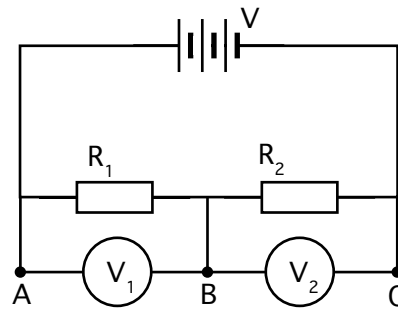
(iv) what is the voltage at B? _____ [1]

(v) What is the voltage at C? _____ [1]

(vi) Plot a graph of the p.d. across each part of the circuit from the positive terminal of the cell (+) to the negative terminal of the cell (-).BB on the graphs represents the wire between R_1 & R_2 is.   [3]

2   In the circuit shown below the p.d. of the battery is 36 V. Assume that the battery has no internal resistance

If R_1 is 10KΩ and R_2 is 80KΩ

(i) What would voltmeter V_1 read?

_____

_____

_____ [3]

(ii) What would voltmeter V_2 read? _____ [1]

(iii) what is the voltage at A? _____ [1]

(iv) what is the voltage at B? _____ [1]

(v) What is the voltage at C? _____ [1]

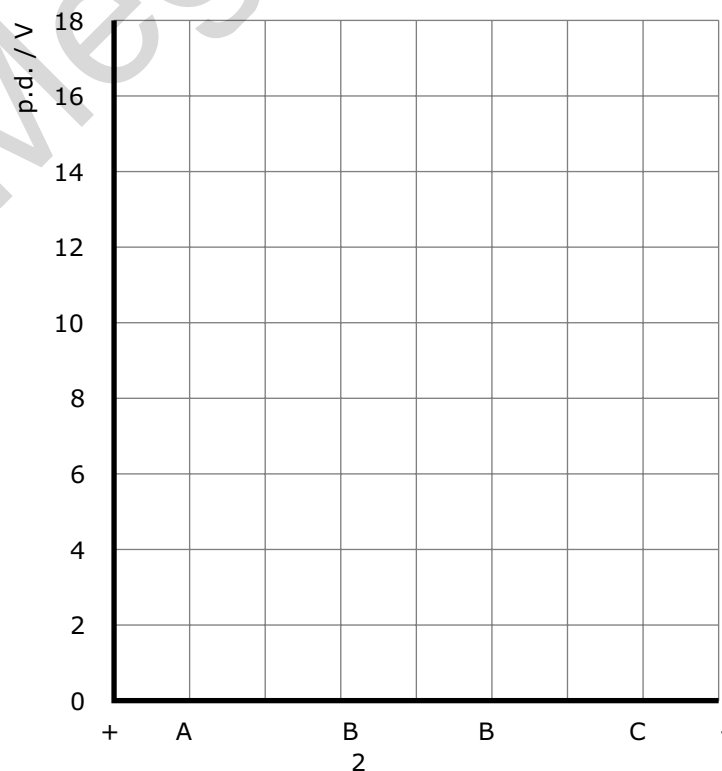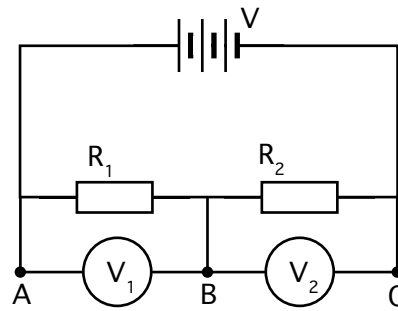(vi) What current is drawn from the battery?

_____

_____ [3]

(vii) Plot a graph of the pd around the circuit.   [3]

3 In the circuit shown below the p.d. of the battery is 6 V. Assume that the battery has no internal resistance

If R_1 is 250KΩ and R_2 is 500KΩ,

(i) What would voltmeter V_1 read?

_____

_____

_____ [3]

(ii) What would voltmeter V_2 read?

_____

_____

_____ [3]

(iii) What is the voltage at A? _____ [1]

(iv) What is the voltage at B? _____ [1]

(v) What is the voltage at C? _____ [1]

(vi) What current is drawn from the battery?

_____

_____

_____ [3]
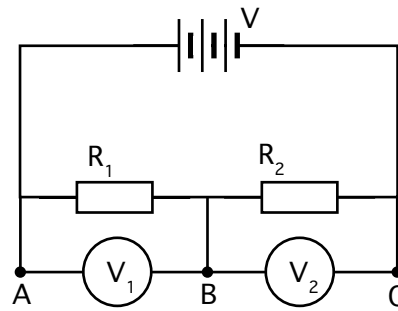
4   In the circuit shown below the p.d. of the battery is 18 V. Assume that the battery has no internal resistance

If R_1 is 600KΩ and R_2 is 300KΩ

(i) What would voltmeter V_1 read?

_____

_____

_____ [3]

(ii) What would voltmeter V_2 read?

_____

_____

_____ [3]

(iii) What is the voltage at A? _____ [1]

(iv) What is the voltage at B? _____ [1]

(v) What is the voltage at C? _____ [1]
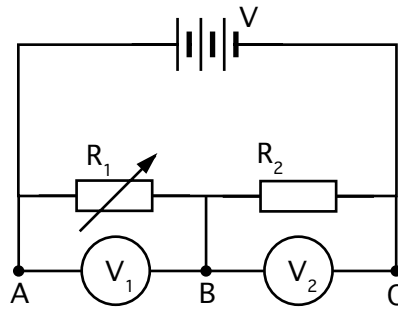
(vi) What current is drawn from the battery?

_____

_____

_____ [3]

5   In the circuit shown below the p.d. of the battery is 15 V. Assume that the battery has no internal resistance

R_1 is a variable resistor that varies from 0Ω to 500Ω and R_2 is 100Ω

(i) What would voltmeter V_1 read when R_1 is set to its lowest resistance?

_____ [1]

(ii) What would voltmeter V_2 read when R_1 is set to its lowest resistance??

_____

_____

_____ [3]

(iii) What would voltmeter V_1 read when R_1 is set to its highest resistance?

_____

_____

_____ [3]

(iv) What would voltmeter V_2 read when R_1 is set to its highest resistance?

_____

_____

_____ [3]
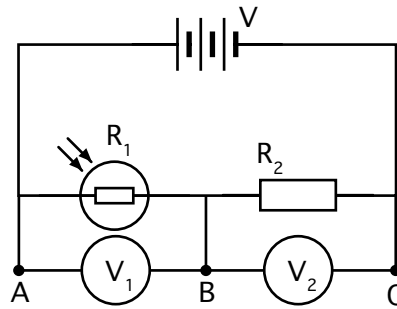
(v) What should the resistance of R_1 be if voltmeter V_1 read 6V?

_____

_____

_____ [3]

(iv) What should the resistance of R_1 be if voltmeter V_2 read 10V?

_____

_____

_____ [3]

5   In the circuit shown below the p.d. of the battery is 10 V. Assume that the battery has no internal resistance

R_1 is an LDR that varies from 0Ω in full light to 1000Ω in the dark and R_2 is a fixed resistor of 100Ω

(i) What would voltmeter V_1 read when the LDR is covered over so no light reaches it?

_____

_____

_____ [3]

(ii) What would voltmeter V_2 read when the LDR is covered over so no light reaches it?

_____ [1]

(iii) What would voltmeter V_1 read when the LDR is fully illuminated?

_____ [1]

(iv) What would voltmeter V_2 read when LDR is fully illuminated?

_____ [1]

(ii) What should the resistance of R_1 be if voltmeter V_1 read 2.5V?

_____

_____

_____ [3]

(ii) What should the resistance of R_1 be if voltmeter V_2 read 2.5V?

_____

_____

_____ [3]

6   The circuit diagram below shows a type of electric thermometer. A thermistor, R_T, is used as a temperature probe. A high resistance voltmeter is used to indicate the temperature. Your task is to draw up a calibration curve for the voltmeter so that it can be read directly as a thermometer.

Data for the resistance of the thermistor, R_T , as a function of its temperature is given in the table. The value of the fixed resistor R_R is 1kΩ.

Temp (°C)	R_T (kΩ)
10	2.1
20	1.4
30	1.0
40	0.7
50	0.5
60	0.3
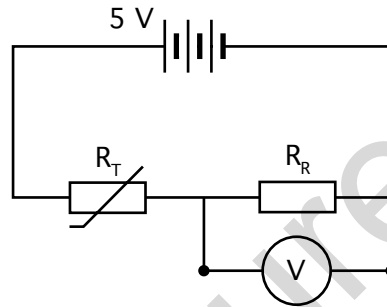
(a) Plot a graph of temperature against resistance for the thermistor over the range 0 °C to 100 °C. (Use **Graphical Analysis** or **Excel** if you wish and submit the print out.)   [3]

(b) Use the graph and a calculation to determine what the voltmeter will read when the thermistor is at 30°C.

_____

_____ [2]

(c) Draw up a table of the p.d. across the resistance R_R corresponding to different thermistor temperatures. (Use *Graphical Analysis* or *Excel* if you wish and submit the print out.)

_____

_____

_____ [4]

Temperature /°C	0	10	20	30	40	50	60	70	80	90	100
p.d. / Volts											

(d) Draw a graph of voltmeter reading (on y axis) against temperature of thermistor (on the x axis).
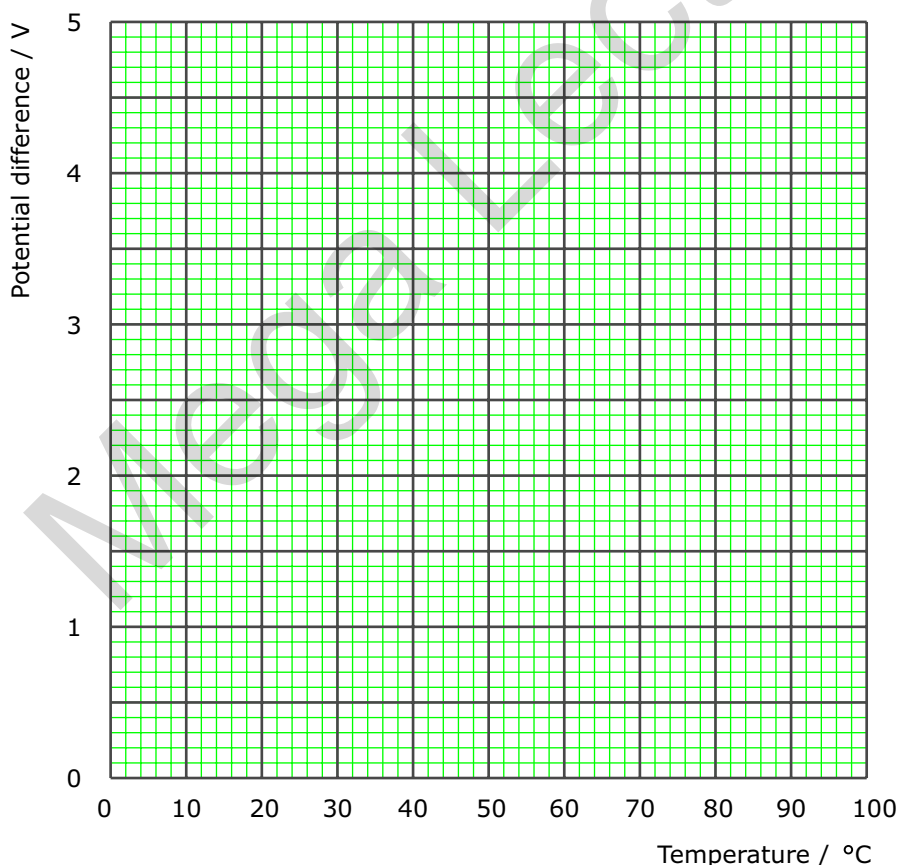
(e) What does the voltmeter read at

0 °C _____ 70 °C _____ 100 °C? _____ [3]

(f) Between what temperatures is the thermometer scale linear? _____ [1]