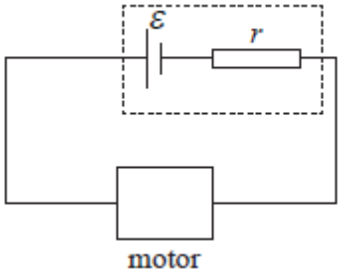
IB Physics SL Y2 – Paper 1 and Paper 2 Review – Topic 5 Assignment (xx Marks)

Name: _____ Date: _____ Period: _____

Objectives:
5.1 Electric potential difference, current, and resistance
5.2 Electric circuits

1. A cell of emf ε and internal resistance r delivers current to a small electric motor.



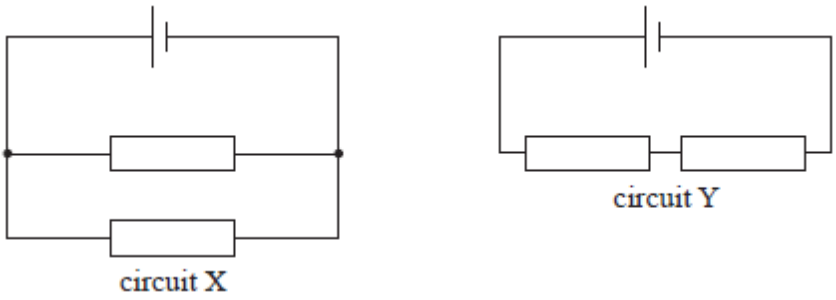
450 C of charge flows through the motor and 9000 J of energy are converted in the motor. 1800 J are dissipated in the cell. The emf of the cell is

A. 4.0 V.
B. 16 V.
C. 20 V.
D. 24 V.

2. A cylindrical conductor of length l, diameter D and resistivity ρ has resistance R. A different cylindrical conductor of resistivity 2ρ, length 2l and diameter 2D has a resistance

A. $2R$
B. R
C. $\frac{R}{2}$
D. $\frac{R}{4}$

3. In the circuits below the cells have the same emf and zero internal resistance. The resistors all have the same resistance.



Which of the following gives the ratio $\frac{\text{power dissipated in X}}{\text{power dissipated in Y}}$?

A. ¼
B. ½
C. 1
D. 4

4. Two rectangular blocks, X and Y, of the same material have different dimensions but the same overall resistance. Which of the following equations is correct?

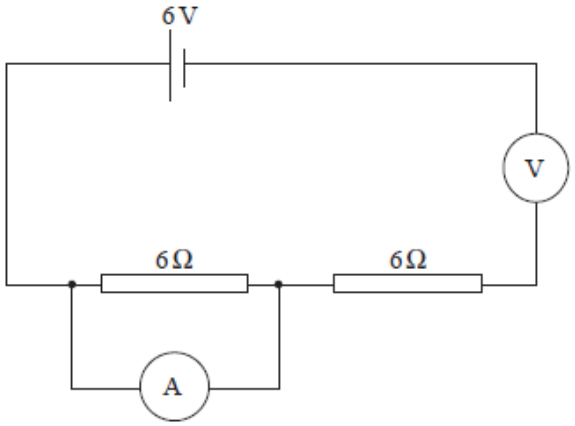
A. $resistivity\ of\ X \times length\ of\ X = resistivity\ of\ Y \times length\ of\ Y$

B. $\frac{\text{length of X}}{\text{cross sectional area of X}} = \frac{\text{length of Y}}{\text{cross sectional area of Y}}$

C. $resistivity\ of\ X \times cross\ sectional\ area\ of\ X = resistivity\ of\ Y \times cross\ sectional\ area\ of\ Y$

D. $\frac{\text{length of X}}{\text{cross sectional area of Y}} = \frac{\text{length of Y}}{\text{cross sectional area of X}}$

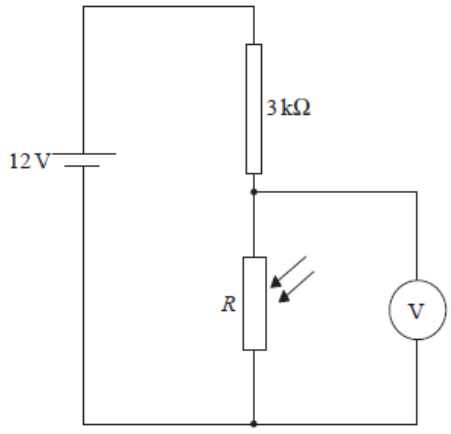
5. Two 6 Ω resistors are connected in series with a 6 V cell. A student incorrectly connects an ammeter and a voltmeter as shown below.



The readings on the ammeter and on the voltmeter are

	Ammeter reading / A	Voltmeter reading / V
A.	0.0	0.0
B.	0.0	6.0
C.	1.0	0.0
D.	1.0	6.0

6. The diagram shows a potential divider circuit.



In order to increase the reading on the voltmeter the

A. temperature of R should be increased.
B. temperature of R should be decreased.
C. light intensity on R should be increased.
D. light intensity on R should be decreased.

Part 2 Electrical resistance and electric circuits

(a) Define *resistance* and state Ohm's law. *[2]*

Resistance: .....

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Ohm's law: .....

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(b) A resistor made from a metal oxide has a resistance of 1.5 Ω. The resistor is in the form of a cylinder of length 2.2×10^{-2} m and radius 1.2×10^{-3} m. Calculate the resistivity of the metal oxide. *[2]*

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(c) The manufacturer of the resistor in (b) guarantees its resistance to be within ±10 % of 1.5 Ω provided the power dissipation in the resistor does not exceed 1.0 W. Calculate the maximum current in the resistor for the power dissipation to be equal to 1.0 W. *[2]*

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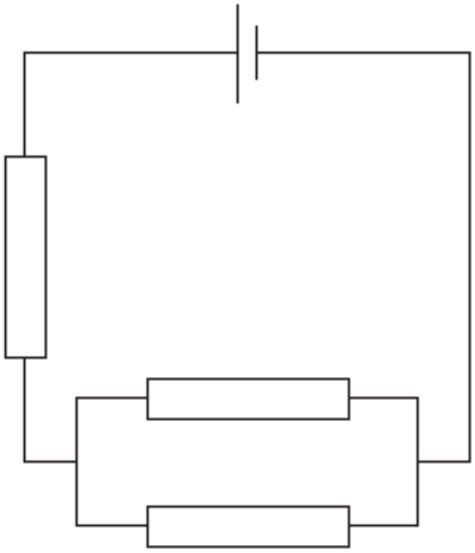
(d) The resistance of each of the resistors in the circuit below is measured to be 1.5 Ω with an accuracy of ±10 %.



The cell has an emf of 2.0 V and negligible internal resistance.

(i) Define *emf*. *[1]*

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(ii) Determine the minimum and the maximum power that could be dissipated in this circuit. *[3]*

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