Exam Papers Practice

5.2 Heating Effect of Electric Currents

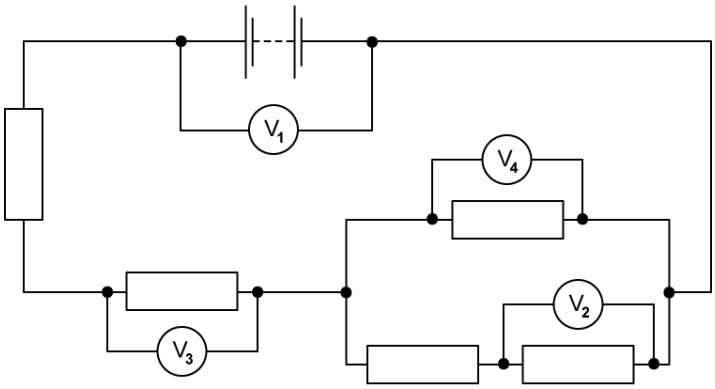
Question Paper

Course	DP IB Physics
Section	5. Electricity & Magnetism
Topic	5.2 Heating Effect of Electric Currents
Difficulty	Medium

To be used by all students preparing for DP IB Physics HL
Students of other boards may also find this useful

Question 1

A circuit contains five identical resistors and four identical voltmeters. The reading on voltmeter V_1 is 8.0 V and the reading on voltmeter V_2 is 1.0 V. What are the readings on V_3 and V_4?



	reading on voltmeter V_3 / V	reading on voltmeter V_4 / V
A.	1.5	1.0
B.	3.0	2.0
C.	4.5	3.0
D.	6.0	4.0

[1 mark]

Question 2

A power cable **X** has resistance R and carries current I. A second cable **Y** has resistance $2R$ and carries current $\frac{1}{2}$.

What is the ratio $\frac{power\ dissipated\ in\ \boldsymbol{Y}}{power\ dissipated\ in\ \boldsymbol{X}}$?

A. $\frac{1}{4}$

B. $\frac{1}{2}$

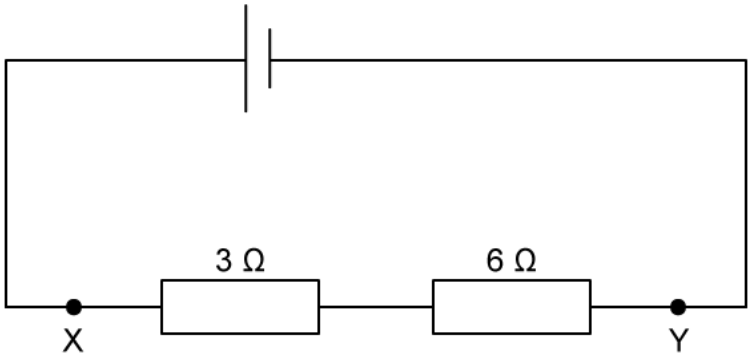
C. 2

D. 4

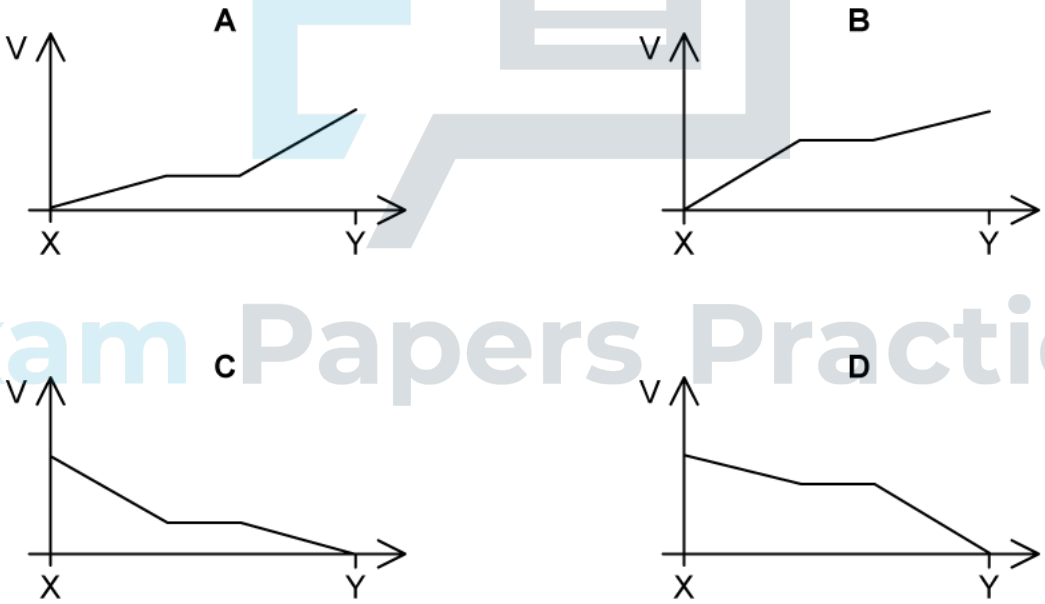
[1 mark]

Question 3

Two resistors are connected to a cell.



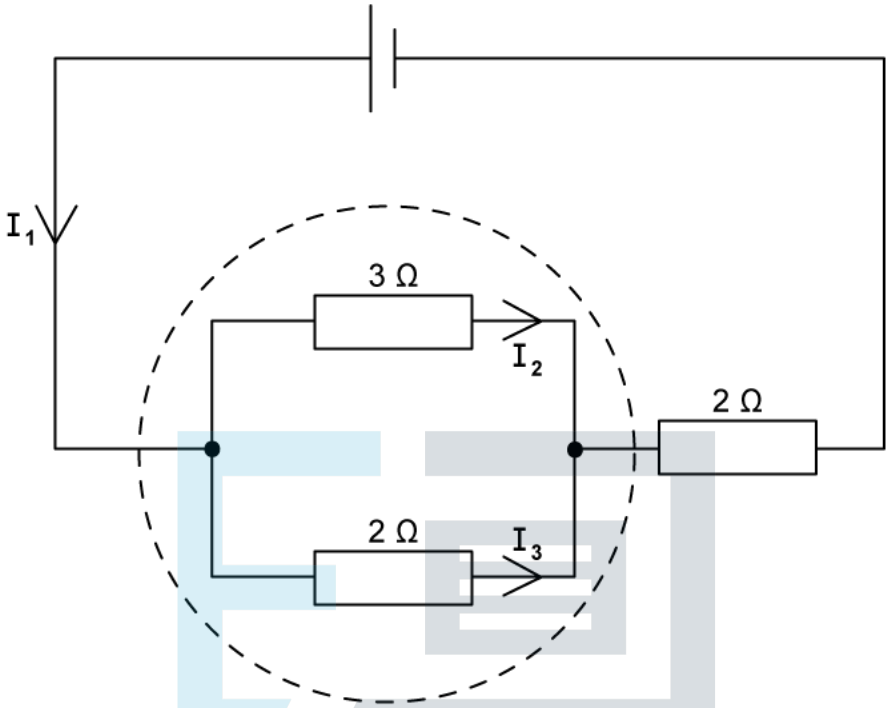
Assuming both resistors are made from wires of the same length, which graph shows how the potential *V* varies along the line XY?



[1 mark]

Question 4

Kirchhoff's laws are applied to the circuit shown.



What is the equation for the dotted loop?

A. $0 = 2I_3 - 3I_2$

B. $0 = 2I_2 - 3I_3$

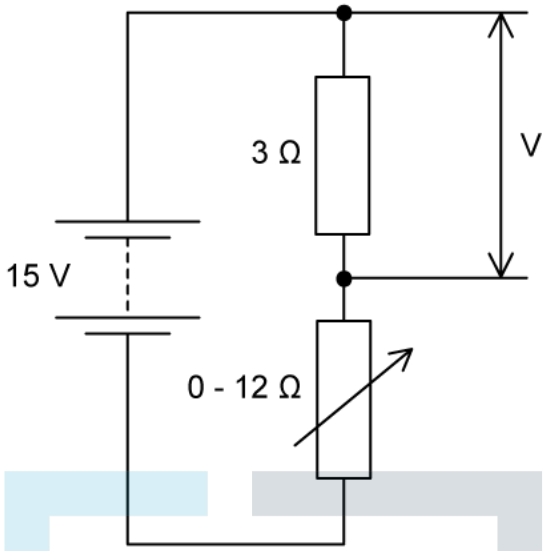
C. $6 = 3I_2 + 2I_3 + 2I_1$

D. $6 = 3I_2 + 2I_3$

[1 mark]

Question 5

In the circuit shown, the fixed resistor has a value of 3 Ω and the variable resistor varies between 0 Ω and 12 Ω.



The power supply has an emf of 15 V and negligible internal resistance.

What is the range of potential differences *V* which can be measured across the 3 Ω resistor?

A. 3 V

B. 6 V

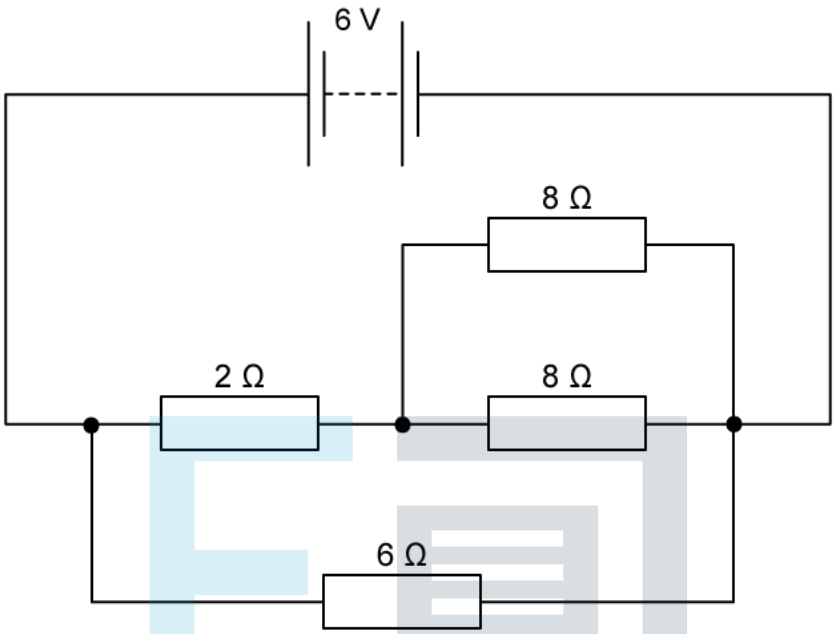
C. 9 V

D. 12 V

[1 mark]

Question 6

Four resistors are connected to a battery of e.m.f. 6 V as shown.



If the battery has negligible internal resistance, what is the current in the battery?

A. 2 A

B. 3 A

C. 4 A

D. 5 A

[1 mark]

Question 7

Which of the following cannot be the units for resistivity?

A. $V\,m\,A^{-1}$

B. $J\,m\,s^{-1}\,A^{-1}$

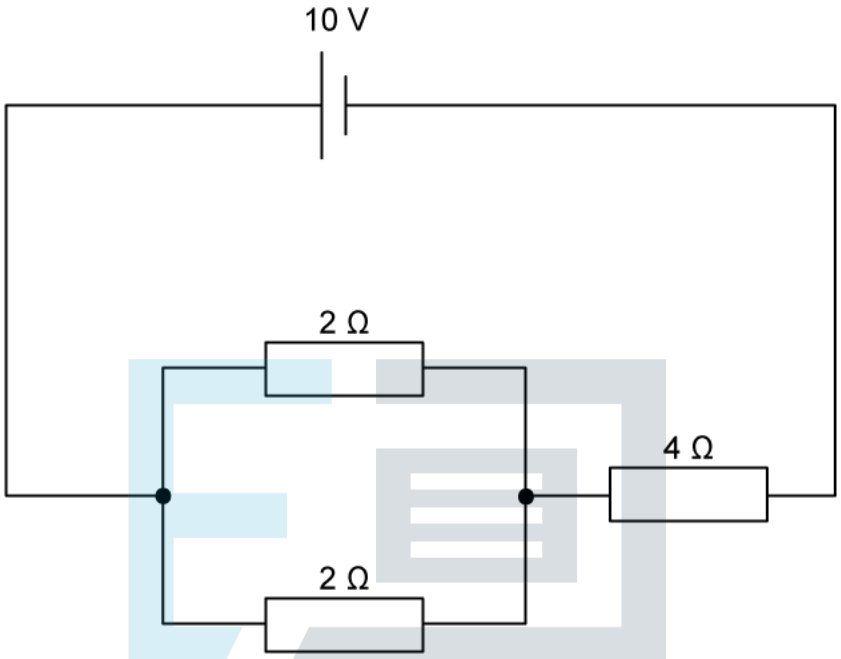
C. $J\,m\,s^{-1}\,A^{-2}$

D. $\Omega\,m$

[1 mark]

Question 8

Three resistors are connected to a cell of e.m.f. 10 V and negligible internal resistance as shown.



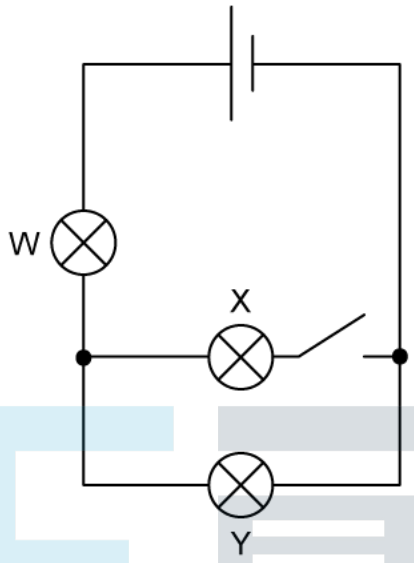
What is the power dissipated in one of the 2 Ω resistors and in the whole circuit?

	power dissipated in the 2 Ω resistor / W	power dissipated in the whole circuit / W
A	1	18
B	1	20
C	2	18
D	2	20

[1 mark]

Question 9

Three identical lamps, W, X and Y are connected to a cell of negligible internal resistance as shown.



When the switch is closed, each lamp is lit. Which of the following correctly describes the brightness of lamps W, X and Y when the switch is opened?

	lamp W	lamp X	lamp Y
A	increases	increases	decreases
B	decreases	off	decreases
C	decreases	off	increases
D	increases	decreases	decreases

[1 mark]

Question 10

A science student who lives in the UK, where the mains voltage is 240 V, buys a light bulb marked 60 W which she uses in her bedroom. The student takes the lightbulb with her on a trip to Canada where the mains voltage is 100 V and also uses it there.

Which line correctly identifies the approximate power dissipated in the bulb in the UK and Canada?

	UK / W	Canada / W
A.	30	10
B.	60	30
C.	60	10
D.	120	60

A.

[1 mark]