EXAM PAPERS PRACTICE

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5.2 Heating Effect of Electric Currents

Medium

PHYSICS

IB HL

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

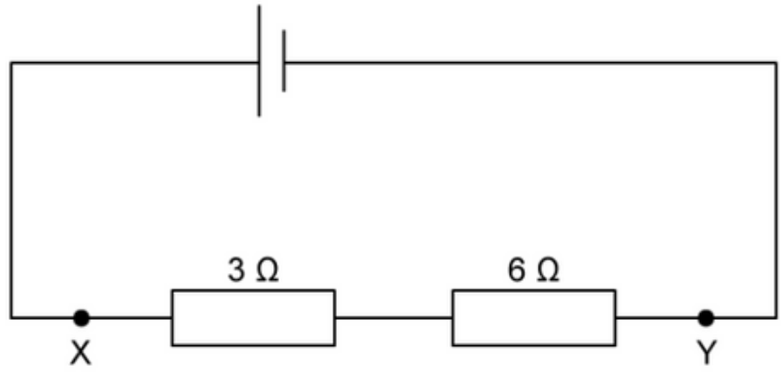
Time allowed: 20

Score: /10

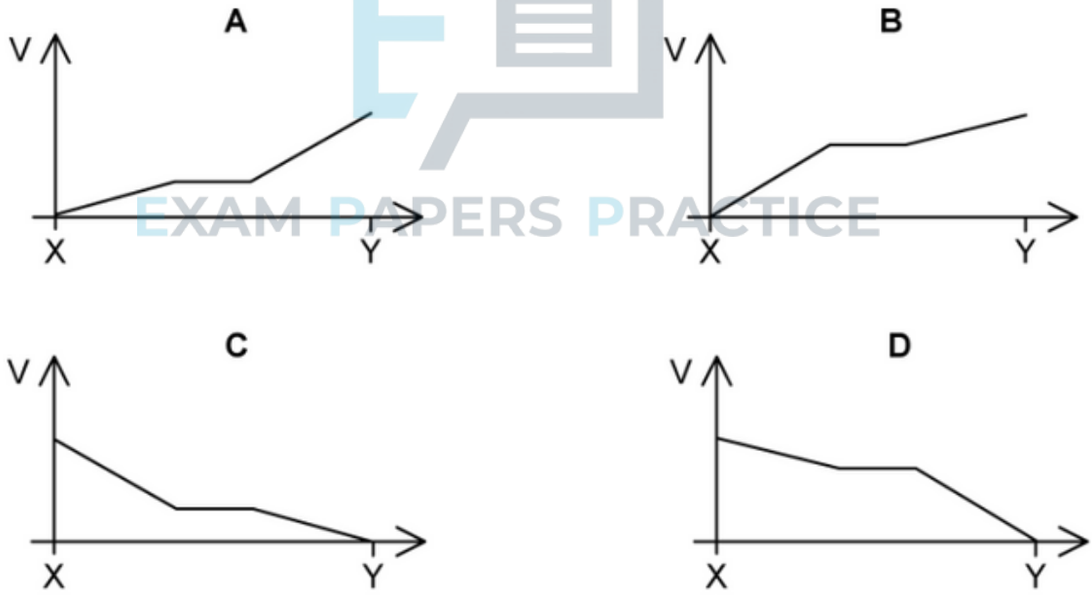
Percentage: /100

Question 1

Two resistors are connected to a cell.



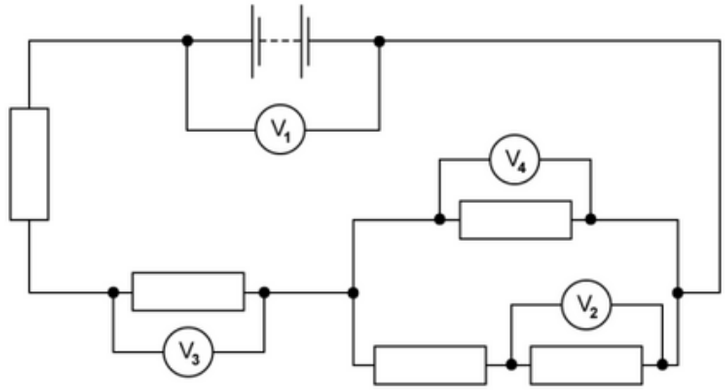
Assuming both resistors are made from wires of the same length, which graph shows how the potential *V* varies along the line XY?



[1 mark]

Question 2

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 3

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. $\frac{1}{2}$

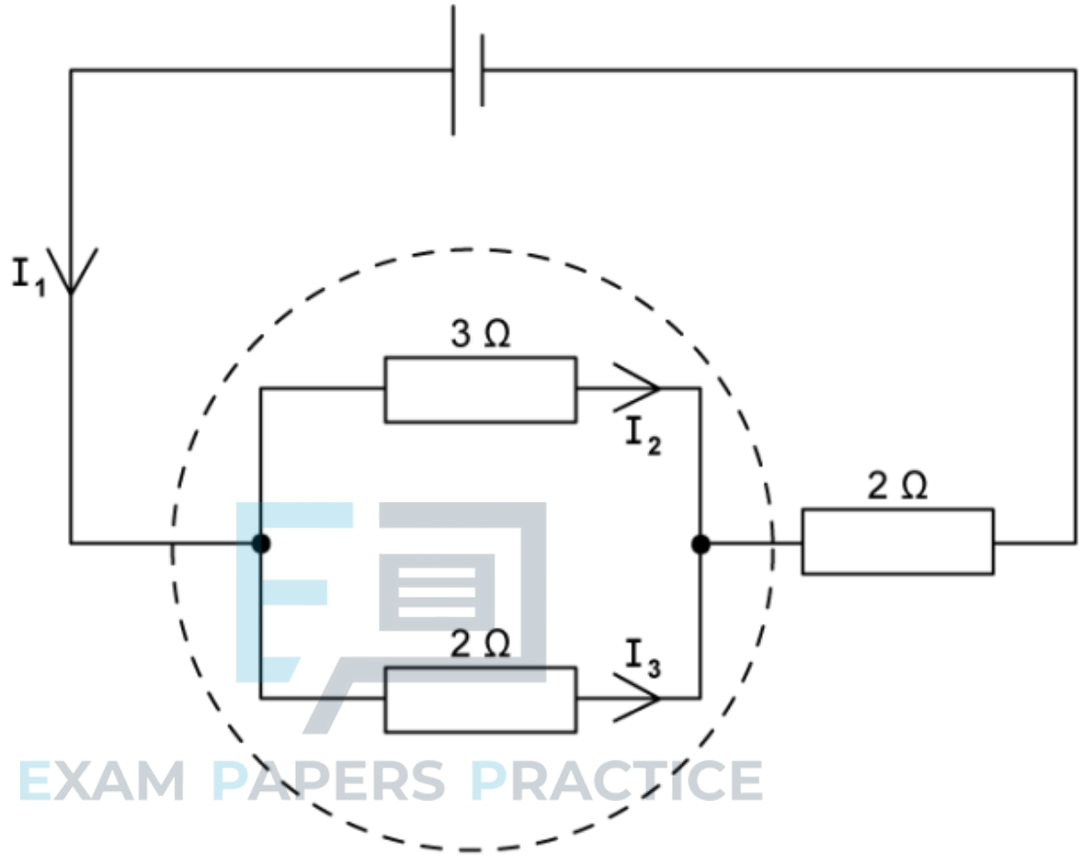
C. 2

D. 4

[1 mark]

Question 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. $0 = 2I_2 - 3I_3$

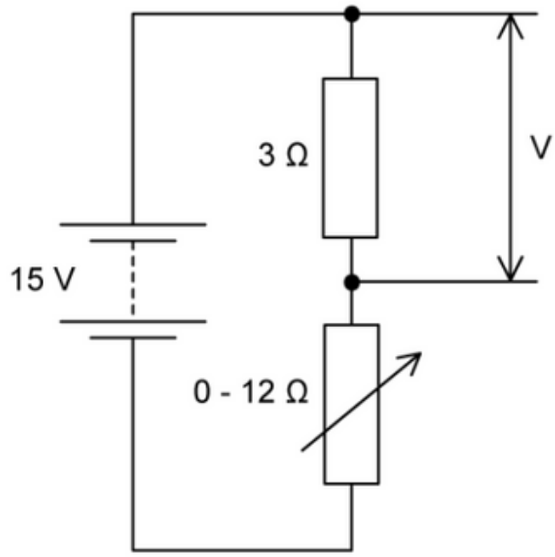
C. $6 = 3I_2 + 2I_3 + 2I_1$

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

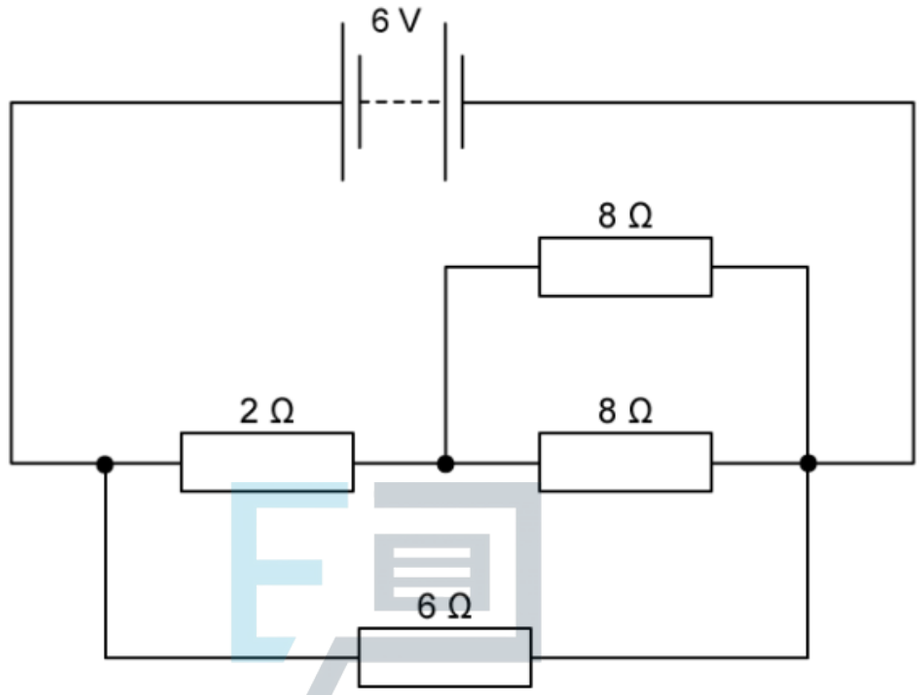
C. 9 V

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. $J m s^{-1} A^{-1}$

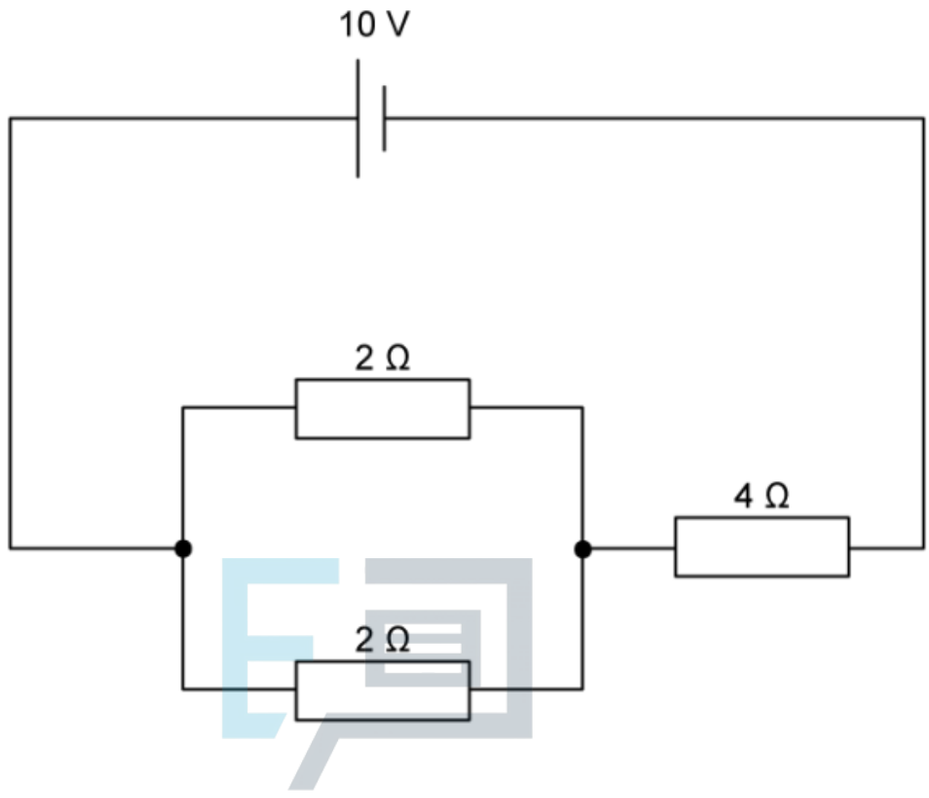
C. $J m s^{-1} A^{-2}$

D. Ωm

[1 mark]

Question 8

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



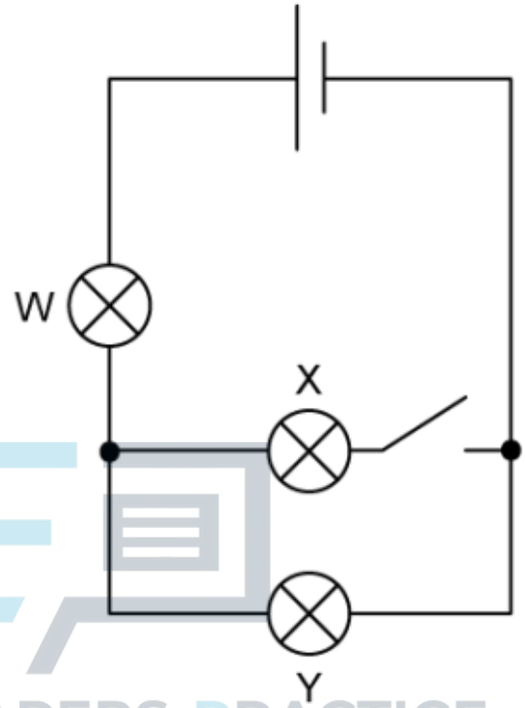
What is the power dissipated in one of the 2 Ω resistors and in the whole circuit?

	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]