

12.2 DC: Potential Dividers

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	12. D.C. circuits
Topic	12.2 DC: Potential Dividers
Difficulty	Medium

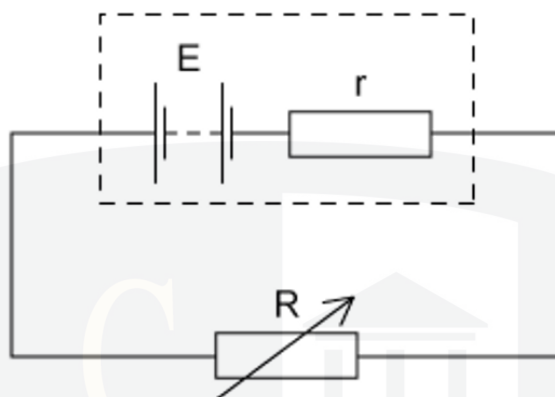
Time allowed: 10

Score: /10

Percentage: /100

Question 1

A battery with e.m.f. E and internal resistance r is connected in series with an external variable resistor.



The value of the external resistance R is slowly increased from zero.

Which statement is correct? (Ignore any temperature effects.)

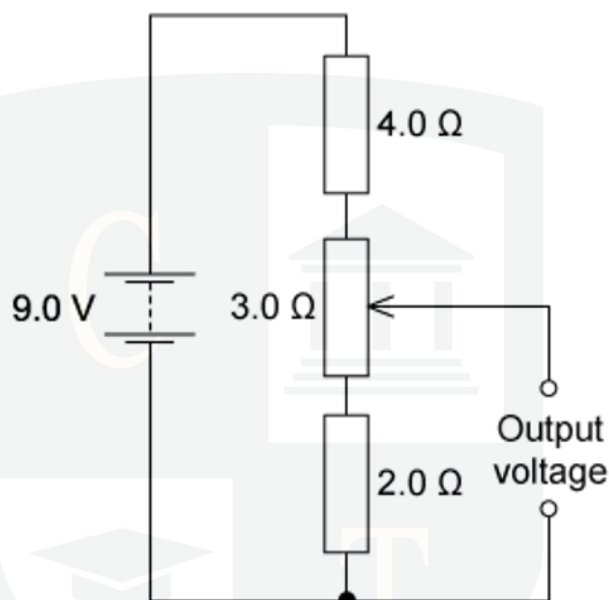
- A** the potential difference across the external resistance decreases
- B** the potential difference across the internal resistance increases
- C** the power dissipated in r increases and then decreases
- D** the power dissipated in R increases and then decreases

[1 mark]

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Question 2

A potential divider circuit consists of fixed resistors of resistance $2.0\ \Omega$ and $4.0\ \Omega$ connected in series with a $3.0\ \Omega$ resistor fitted with a sliding contact. These are connected across a battery of e.m.f. $9.0\ \text{V}$ and zero internal resistance, as shown.



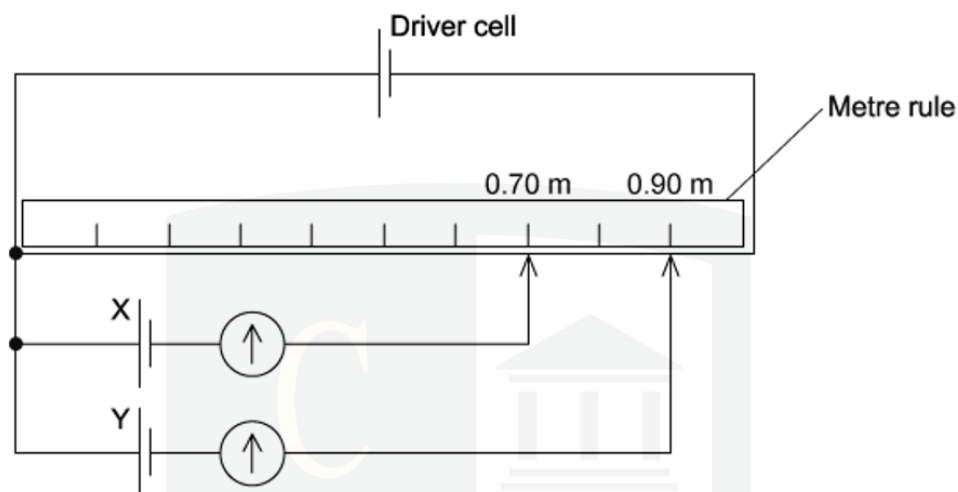
What are the maximum and the minimum output voltages of this potential divider circuit?

	maximum voltage / V	minimum voltage / V
A	4.0	2.0
B	5.0	2.0
C	9.0	0
D	9.0	2.0

[1 mark]

Question 3

A potentiometer is used as shown to compare the e.m.f.s of two cells.



The balance points for cells X and Y are 0.70 m and 0.90 m respectively.

If the e.m.f. of cell X is 1.1 V, what is the e.m.f. of cell Y?

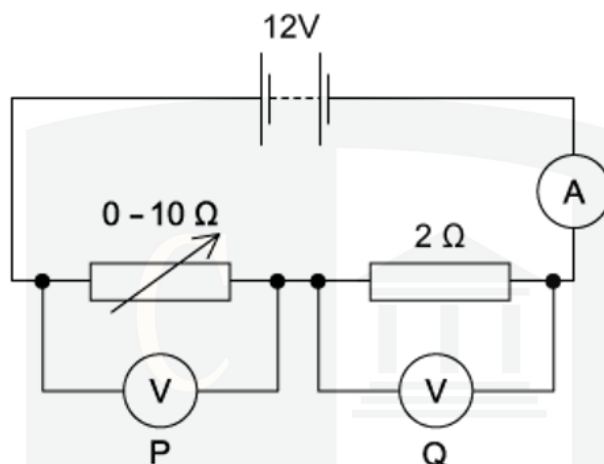
- A** 0.69 V **B** 0.86 V **C** 0.99 V **D** 1.4 V

[1 mark]

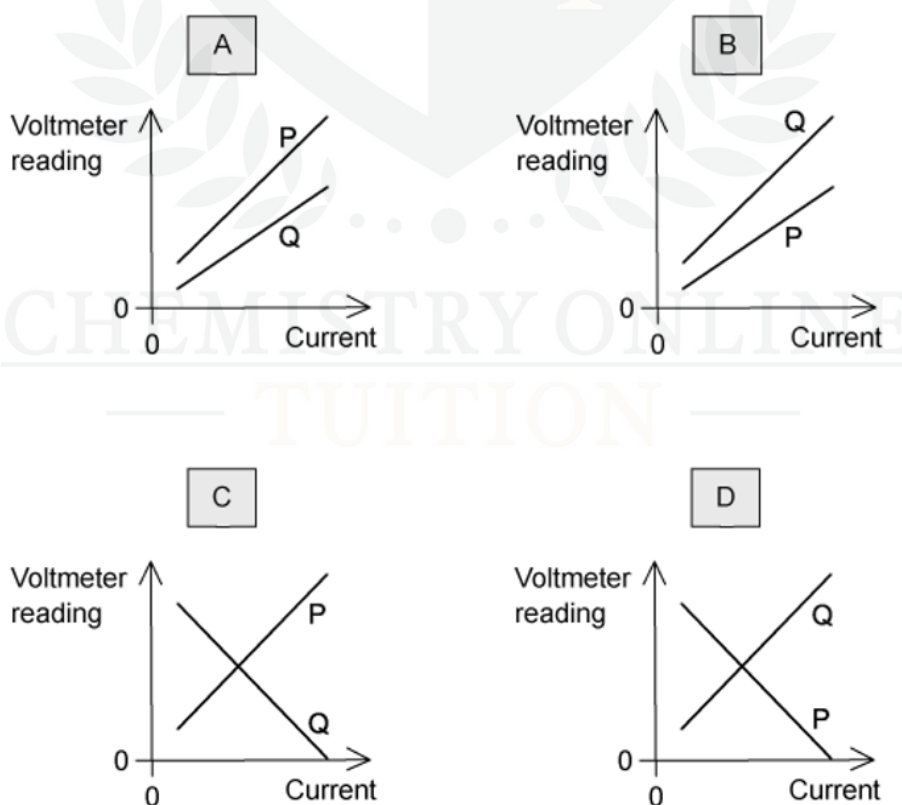
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Question 4

A 12 V battery is in series with an ammeter, a $2\ \Omega$ fixed resistor and a $0 - 10\ \Omega$ variable resistor. High-resistance voltmeters P and Q are connected across the variable resistor and the fixed resistor, respectively, as shown.



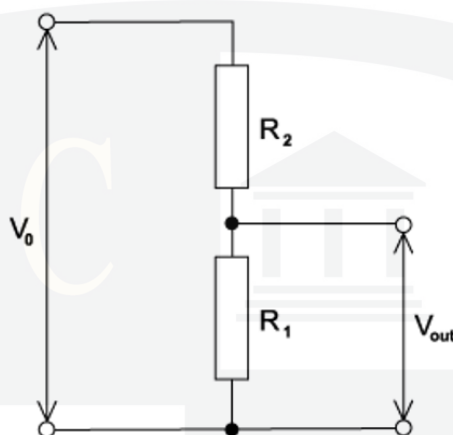
The resistance of the variable resistor is changed from its maximum value to zero. Which graph shows the variation with current of the voltmeter readings?



[1 mark]

Question 5

A potential divider consists of resistors of resistance R_1 and R_2 connected in series across a source of potential difference V_0 . The potential difference across R_1 is V_{out} .



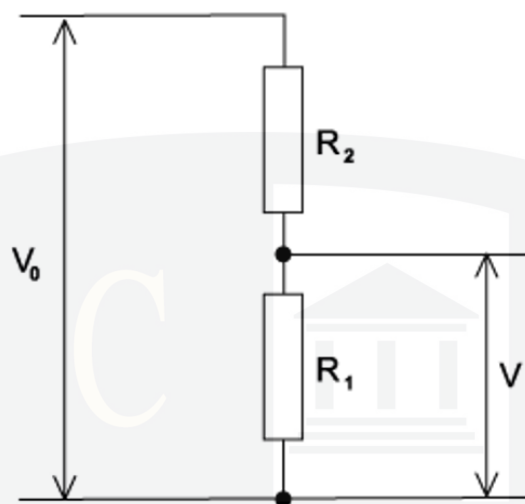
Which changes to R_1 and R_2 will increase the value of V_{out} ?

	R_1	R_2
A	doubled	doubled
B	doubled	halved
C	halved	doubled
D	halved	halved

[1 mark]

Question 6

A potential divider consisting of resistors of resistance R_1 and R_2 is connected to an input potential difference of V_0 and gives an output p.d. of V .



What is the value of V ?

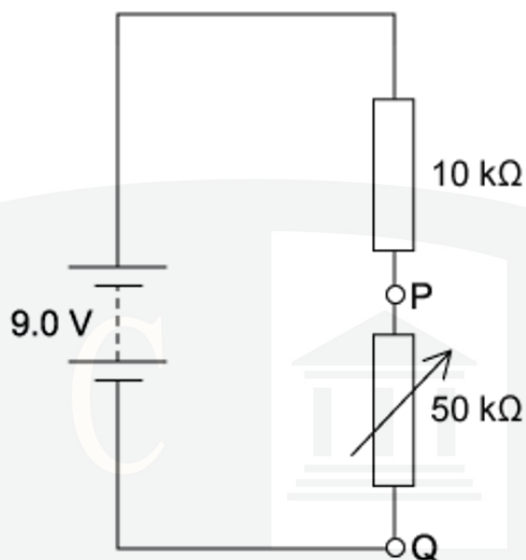
- A** $\frac{V_0 R_1}{R_2}$ **B** $\frac{V_0 R_1}{R_1 + R_2}$ **C** $\frac{V_0 R_2}{R_1 + R_2}$ **D** $\frac{V_0 (R_1 + R_2)}{R_1}$

[1 mark]

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Question 7

The diagram shows a potential divider connected to a 9.0 V supply of negligible internal resistance.



What range of voltages can be obtained between P and Q?

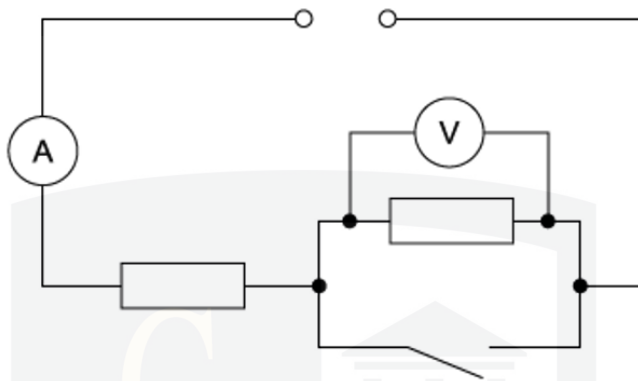
- A zero to 1.5 V
- B zero to 7.5 V
- C 1.5 V to 7.5 V
- D 1.5 V to 9.0 V

[1 mark]

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Question 8

In the circuit below, the ammeter reading is I , and the voltmeter reading is V .



When the switch is closed, which row describes what happens to I and V ?

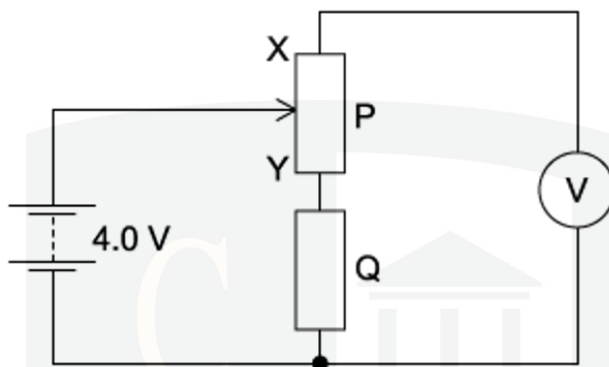
	I	V
A	decreases	decreases to zero
B	increases	stays the same
C	increases	decreases to zero
D	stays the same	increases

[1 mark]

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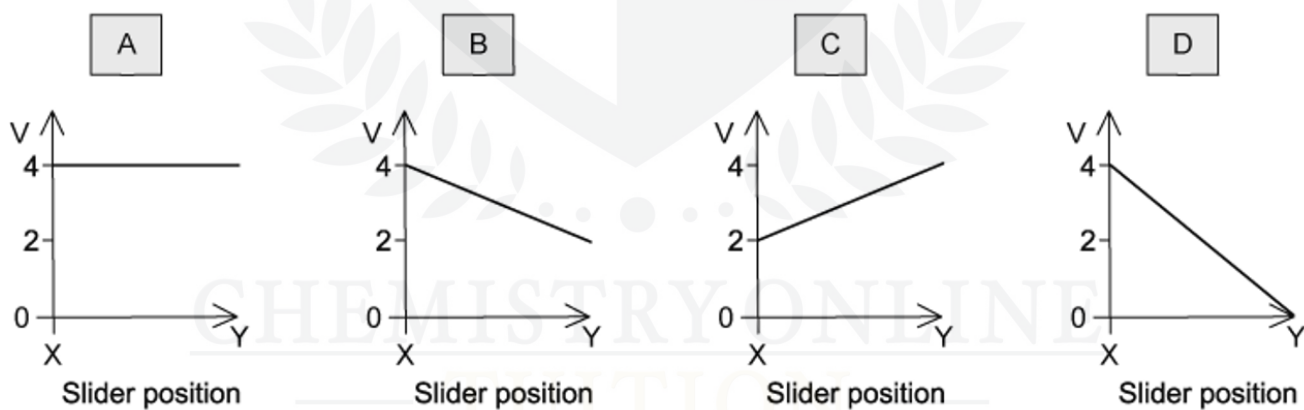
Question 9

In the circuit below, P is a potentiometer of total resistance $10\ \Omega$ and Q is a fixed resistor of resistance $10\ \Omega$. The battery has an e.m.f. of 4.0 V and negligible internal resistance. The voltmeter has a very high resistance.



The slider on the potentiometer is moved from X to Y, and a graph of voltmeter reading V is plotted against slider position.

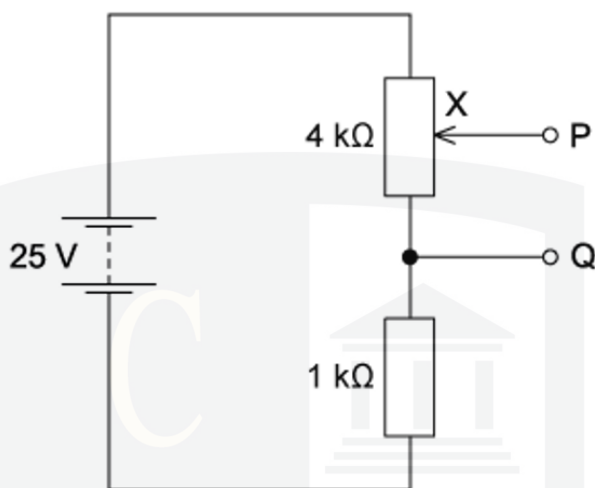
Which graph would be obtained?



[1 mark]

Question 10

The diagram shows a potential divider circuit which, by adjustment of the contact X, can be used to provide a variable potential difference between the terminals P and Q.



What are the limits of this potential difference?

- A** 0 and 5 V **B** 0 and 20 V **C** 0 and 25 V **D** 5 V and 25 V

[1 mark]

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