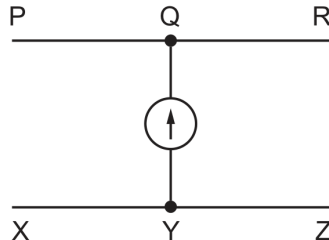


## Unit 10: D.C. circuits:

### Subunit 10.1: Practical circuits:

#### Topical Question No: 1

- 5 PQR and XYZ are wires in a circuit. A galvanometer connects Q and Y as a null indicator.

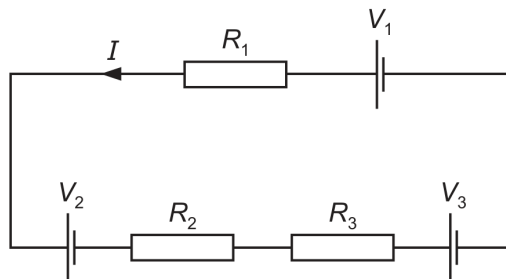


When the galvanometer reads zero, which statement is correct?

- A The potential difference between Q and Y is infinite.
- B The potential difference between Q and Y is zero.
- C The resistance between Q and Y is infinite.
- D The resistance between Q and Y is zero.

#### Topical Question No: 2

- 34 Three cells with e.m.f.s  $V_1$ ,  $V_2$  and  $V_3$ , have negligible internal resistance. These cells are connected to three resistors with resistances  $R_1$ ,  $R_2$  and  $R_3$ , as shown.



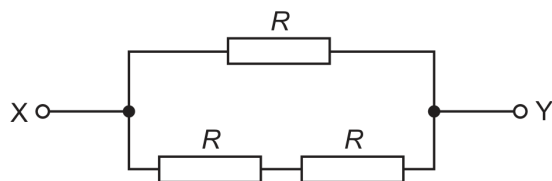
The current in the circuit is  $I$ .

Which equation is correct?

- A  $V_1 + V_2 + V_3 = I(R_1 + R_2 + R_3)$
- B  $V_1 + V_2 - V_3 = I(R_1 + R_2 + R_3)$
- C  $V_1 - V_2 + V_3 = I(R_1 + R_2 + R_3)$
- D  $V_1 - V_2 - V_3 = I(R_1 + R_2 + R_3)$

Topical Question No: 3

- 35 Three resistors, each of resistance  $R$ , are connected in a network, as shown.



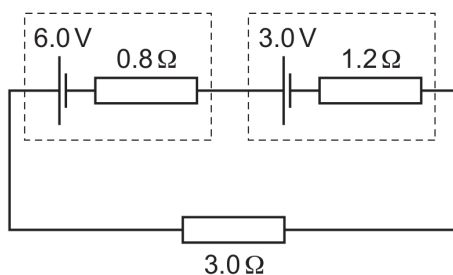
The total resistance between points X and Y is  $8.0\Omega$ .

What is the value of  $R$ ?

- A  $2.7\Omega$       B  $4.0\Omega$       C  $5.3\Omega$       D  $12\Omega$

Topical Question No: 4

- 35 Two cells are connected to a load resistor of resistance  $3.0\Omega$ . The electromotive force (e.m.f.) and the internal resistance of each of the cells is shown.

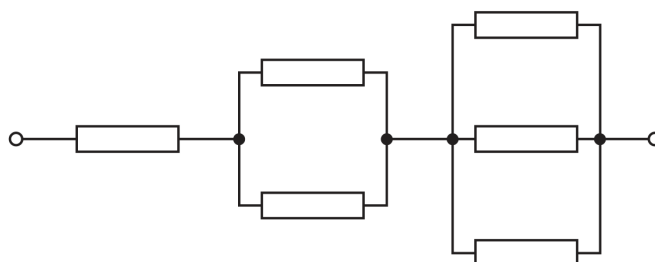


What is the current in the load resistor?

- A  $0.60\text{A}$       B  $1.2\text{A}$       C  $1.8\text{A}$       D  $3.0\text{A}$

Topical Question No: 5

- 36 Six resistors, each of resistance  $R$ , are connected as shown.



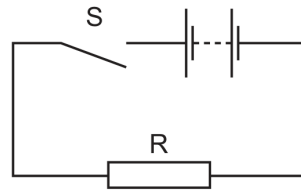
The combined resistance is  $66\text{ k}\Omega$ .

What is the value of  $R$ ?

- A  $11\text{ k}\Omega$       B  $18\text{ k}\Omega$       C  $22\text{ k}\Omega$       D  $36\text{ k}\Omega$

Topical Question No: 6

- 32 The diagram shows a simple circuit.

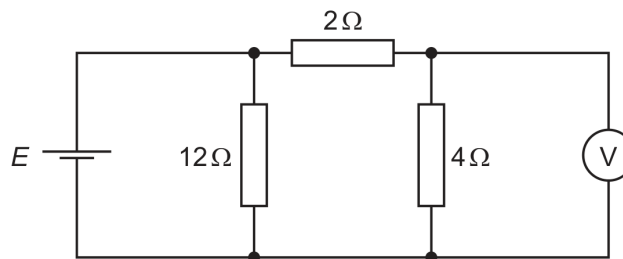


Which statement is correct?

- A When switch S is closed, the e.m.f. of the battery falls because work is done against the internal resistance of the battery.
- B When switch S is closed, the e.m.f. of the battery falls because work is done against the resistance of R.
- C When switch S is closed, the potential difference across the battery falls because work is done against the internal resistance of the battery.
- D When switch S is closed, the potential difference across the battery falls because work is done against the resistance of R.

Topical Question No: 7

- 37 A cell of electromotive force (e.m.f.)  $E$  and negligible internal resistance is connected into a circuit, as shown.



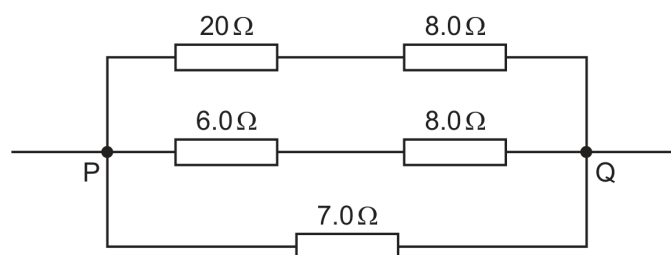
The voltmeter has a very high resistance and reads a potential difference  $V_{\text{out}}$ .

What is the ratio  $\frac{V_{\text{out}}}{E}$ ?

- A  $\frac{1}{6}$
- B  $\frac{1}{3}$
- C  $\frac{1}{2}$
- D  $\frac{2}{3}$

Topical Question No: 8

- 38 Five resistors are connected as shown.

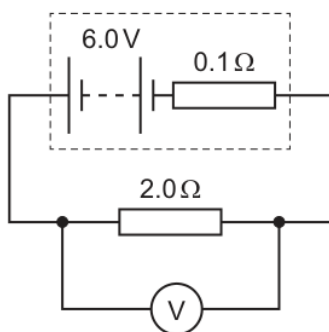


What is the total resistance between points P and Q?

- A  $0.25\Omega$
- B  $0.61\Omega$
- C  $4.0\Omega$
- D  $16\Omega$

Topical Question No: 9

- 36 The diagram shows a circuit.

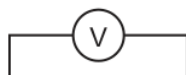


What is the reading on the voltmeter?

- A** 0.3 V      **B** 5.7 V      **C** 6.0 V      **D** 6.3 V

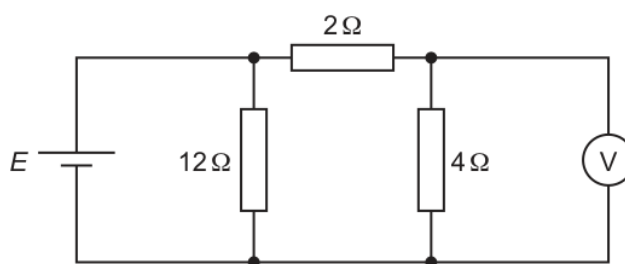
Topical Question No: 10

- 36 A cell that has internal resistance is connected to a switch S and a variable resistor. A voltmeter is connected between the terminals of the cell, as shown.



Topical Question No: 11

- 37 A cell of electromotive force (e.m.f.)  $E$  and negligible internal resistance is connected into a circuit, as shown.



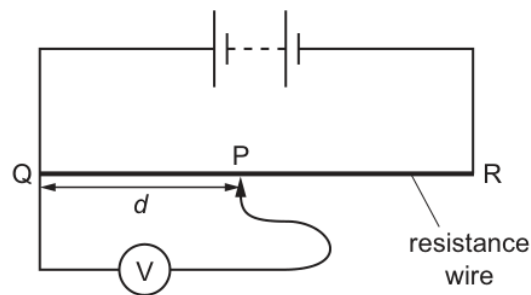
The voltmeter has a very high resistance and reads a potential difference  $V_{\text{out}}$ .

What is the ratio  $\frac{V_{\text{out}}}{E}$ ?

- A**  $\frac{1}{6}$       **B**  $\frac{1}{3}$       **C**  $\frac{1}{2}$       **D**  $\frac{2}{3}$

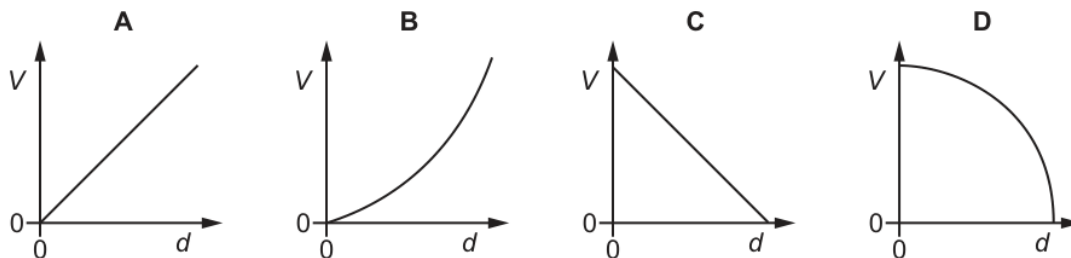
Topical Question No: 12

- 38 A battery is connected to a potentiometer. The potentiometer consists of a uniform resistance wire and a sliding contact P.



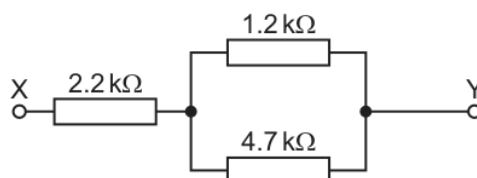
The potential difference (p.d.)  $V$  between the sliding contact P and end Q of the wire is measured using a voltmeter. The sliding contact P is moved from end Q to end R of the wire. Sliding contact P is distance  $d$  from Q.

Which graph shows the variation with distance  $d$  of the p.d.  $V$ ?



Topical Question No: 13

- 33 The diagram shows a network consisting of three resistors.

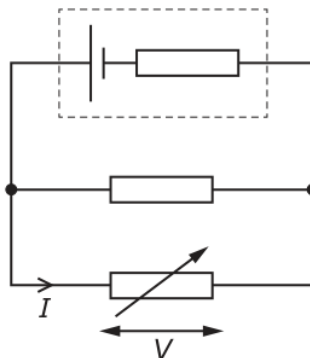


What is the combined resistance of the network between terminal X and terminal Y?

- A**  $0.67 \text{ k}\Omega$       **B**  $1.6 \text{ k}\Omega$       **C**  $3.2 \text{ k}\Omega$       **D**  $8.1 \text{ k}\Omega$

Topical Question No: 14

- 35 The diagram shows a cell with internal resistance connected in parallel with a fixed resistor and a variable resistor.



The resistance of the variable resistor is decreased.

What happens to the potential difference  $V$  across the variable resistor and the current  $I$  in the variable resistor?

	$V$	$I$
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

Topical Question No: 15

- 33 A source of e.m.f. of 9.0 mV has an internal resistance of  $6.0\,\Omega$ .

It is connected across a galvanometer of resistance  $30\,\Omega$ .

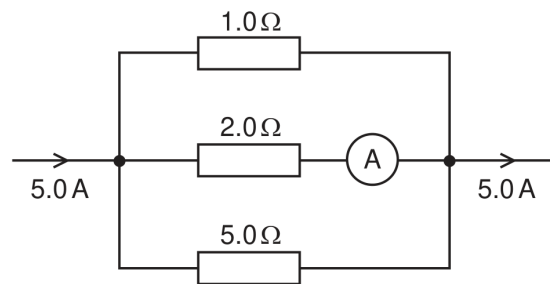
What will be the current in the galvanometer?

- A 250  $\mu\text{A}$       B 300  $\mu\text{A}$       C 1.5 mA      D 2.5 mA

Space for working

Topical Question No: 16

- 35 The diagram shows part of a current-carrying circuit. The ammeter has negligible internal resistance.



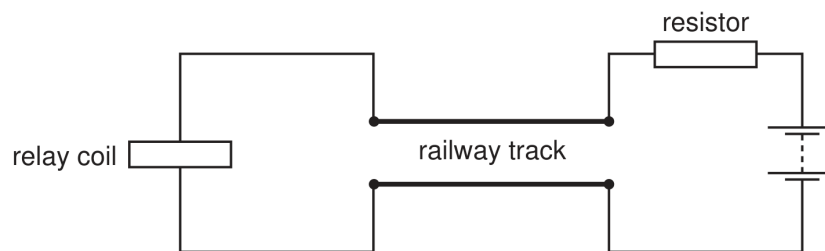
What is the reading on the ammeter?

- A**  $0.7\ \text{A}$       **B**  $1.3\ \text{A}$       **C**  $1.5\ \text{A}$       **D**  $1.7\ \text{A}$

Space for working

Topical Question No: 17

- 35 The diagram shows a length of track from a model railway connected to a battery, a resistor and a relay coil.



With no train present, there is a current in the relay coil which operates a switch to turn on a light.

When a train occupies the section of track, most of the current flows through the wheels and axles of the train in preference to the relay coil. The switch in the relay turns off the light.

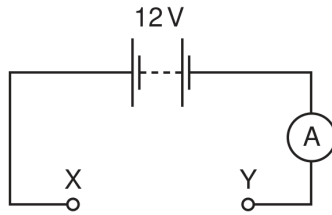
Why is a resistor placed between the battery and the track?

- A** to limit the heating of the wheels of the train  
**B** to limit the energy lost in the relay coil when a train is present  
**C** to prevent a short circuit of the battery when a train is present  
**D** to protect the relay when a train is present

Space for working

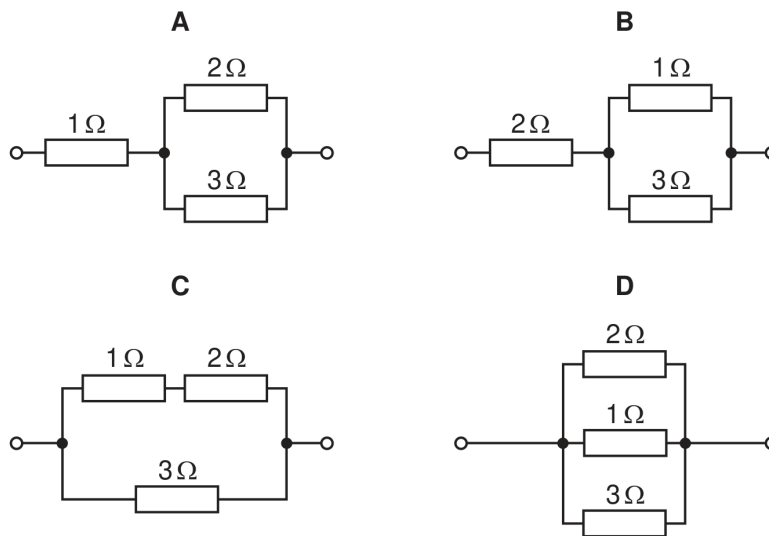
Topical Question No: 18

- 37 In the circuit shown, the battery and ammeter each have negligible resistance.



The following combinations of resistors are placed in turn between the terminals X and Y of the circuit.

Which combination would give an ammeter reading of 8 A?



Space for working

Topical Question No: 19

- 33 Two lamps are connected in series to a 250 V power supply. One lamp is rated 240 V, 60 W and the other is rated 10 V, 2.5 W.

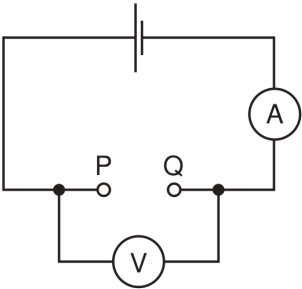
Which statement most accurately describes what happens?

- A Both lamps light at less than their normal brightness.
- B Both lamps light at their normal brightness.
- C Only the 240 V lamp lights.
- D The 10 V lamp blows.



Topical Question No: 20

- 34 A student found two unmarked resistors. To determine the resistance of the resistors, the circuit below was set up. The resistors were connected in turn between P and Q, noting the current readings. The voltage readings were noted without the resistors and with each resistor in turn.



The results were entered into a spreadsheet as shown.

1.5	1.3	28	46
1.5	1.4	14	100

The student forgot to enter the column headings.

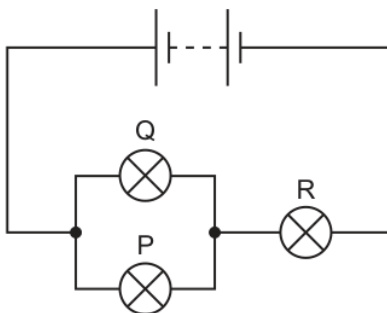
Which order of the headings would be correct?

<b>A</b>	e.m.f./V	V/V	$R/\Omega$	$I/\text{mA}$
<b>B</b>	V/V	e.m.f./V	$R/\Omega$	$I/\text{mA}$
<b>C</b>	V/V	e.m.f./V	$I/\text{mA}$	$R/\Omega$
<b>D</b>	e.m.f./V	V/V	$I/\text{mA}$	$R/\Omega$

Space for working

Topical Question No: 21

- 34 Three identical filament lamps, P, Q and R, are connected to a battery of negligible internal resistance, as shown.



The filament wire in lamp Q breaks so that it no longer conducts.

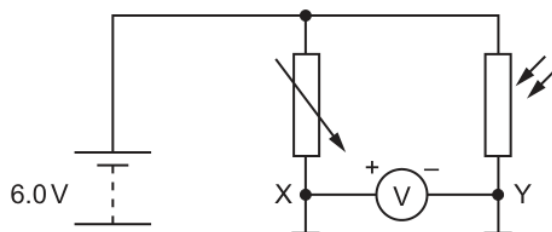
What are the changes in the brightness of lamps P and R?

	lamp P	lamp R
<b>A</b>	brighter	brighter
<b>B</b>	brighter	dimmer
<b>C</b>	dimmer	brighter
<b>D</b>	dimmer	dimmer

Topical Question No: 22

- 37 A battery of electromotive force (e.m.f.) 6.0 V and negligible internal resistance is connected to a voltmeter and four other components, as shown.

The voltmeter is connected between points X and Y. The positive terminal of the voltmeter is connected to X and the negative terminal of the voltmeter is connected to Y.



## Answer Key

1. N/A
2. N/A
3. N/A
4. N/A
5. N/A
6. N/A
7. N/A
8. N/A
9. B
10. C
11. D
12. A
13. C
14. B
15. N/A
16. N/A
17. N/A
18. N/A
19. N/A
20. N/A
21. B
22. C