



PHYSICS

BOOKS - NAVNEET PUBLICATION

CURRENT ELECTRICITY

Examples

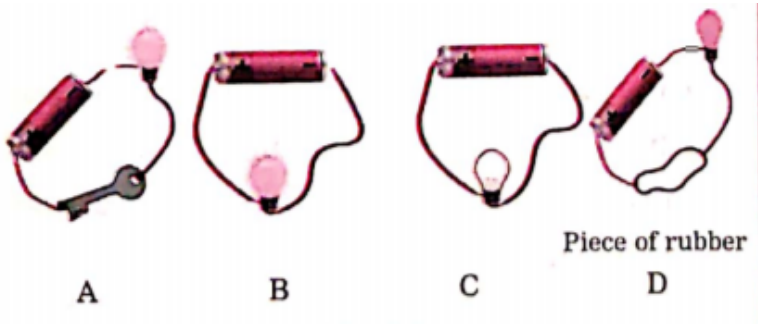
1. Does the water stop flowing ?why?



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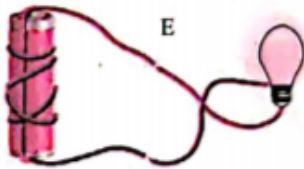
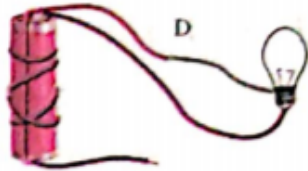
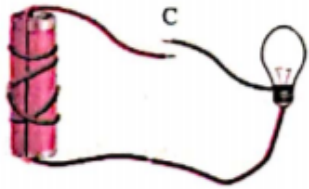
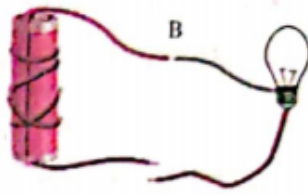
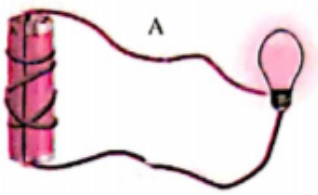
2.

Point out the mistakes in the figure.



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3. Why are the bulbs in figure B, C and D are not lighting up?



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4. Why are some substances are conductors while others are insulators?



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5. Why can our body conduct electricity? Make a list of conductors and insulators you can find around you?



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6. If 15 J of work is done when a charge of 3 C is moved from one point to another, find the electric potential difference between the two points.





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7. Calculate the work done in moving a charge of 2 C through a potential difference of 10 V.



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8. A wire carries a current of 0.2 A for 10 seconds. If the potential difference between the two ends of the wire is 20V, find the work done in this process.



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9. Calculate the potential difference across a 10Ω resistor carrying a current of 0.2 A



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10. Find the resistance of a conductor if 0.12 A current is passing through it and the potential difference of 24 V is applied across it.



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11. Find the resistance of a conductor if 0.24A current is passing through it and the potential difference of 24V is applied across it



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12. The resistance of the filament of a bulb is 1000 ohms. It is drawing a current from a source of 240 volts. How much current is flowing through it?



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13. The resistance of a device is 100Ω . Find the current through it when a potential difference of 20 V is applied across it. To pass the same current through a device having resistance 200Ω , how much potential difference should be applied across it?



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14. The resistance of a wire of length 31.4 m and diameter 1 mm is 20Ω . Find the resistivity

of the material of the wire.



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15. If the resistance of wire A is four times the resistance of wire B, find the ratio of their cross sectional areas.



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16. Calculate the length of a wire of radius 0.5 mm needed to prepare a coil of resistance 40Ω

. The resistivity of the material of the wire is $3.14 \times 10^{-7} \Omega - m$.



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17. The resistance of a conductor of length x is r . If its area of cross section is a , what is its resistivity? What is its unit?



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18. The resistance of a 1m long nichrome wire is 6Ω . If we reduce the length of the wire to 70 cm, what will its resistance be?



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19. Two wires have lengths in the ratio 1 : 4 and radii in the ratio 1 : 2. The resistivities of the materials of the wires are in the ratio 5 : 1. Compare their resistances.



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20. A wire of resistance 100Ω is uniformly stretched until its length increases by 5% . What will be its resistance after stretching? Assume that the volume of the wire remains the same when it is stretched.



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21. Find the effective resistance of the combination of two resistors of resistances 10

Omega and 15 Omega connected in series (ii)
parallel.



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22. Find the effective resistance of the combination of two resistors of resistances 10 Omega and 15 Omega connected in series (ii) parallel.



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23. If two resistors are connected in series, the total resistance is 45Ω and if the same resistors are connected in parallel, the total resistance becomes 10Ω . Find the values of individual resistors.



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24. When two resistors are connected in series, their effective resistance is 80Ω . When : they are connected in parallel, their effective

resistance is 20Ω . What are the values of the two resistances?



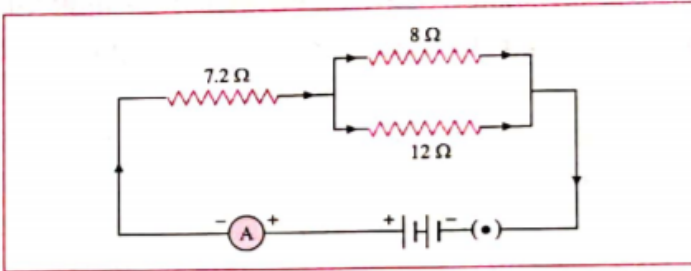
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25. How will you connect three resistances of 4 ohms each to get 12Ω , 6Ω and $\frac{4}{3}\Omega$ respectively?



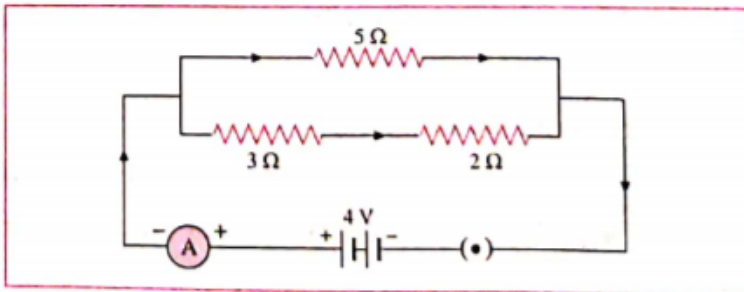
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26. Find the total resistance in the circuit.



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27. Find the total resistance and current in the circuit.





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28. Consider a series combination of two resistors of resistances 10Ω and 40Ω across which a potential difference of 5 V is applied. Find the current in the circuit and the potential difference across each resistor.



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29. Umesh has two bulbs having resistances of 15Ω and 30Ω . He wants to connect them in ,a circuit, but if he connects them one at a time the filament gets burnt. Answer the following. What are the characteristics of this way of connecting the bulbs?



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30. Umesh has two bulbs having resistances of 15Ω and 30Ω . He wants to connect them in ,a

circuit, but if he connects them one at a time the filament gets burnt. Answer the following.

What are the characteristics of this way of connecting the bulbs?



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31. Umesh has two bulbs having resistances of 15Ω and 30Ω . He wants to connect them in a circuit, but if he connects them one at a time the filament gets burnt. Answer the following.

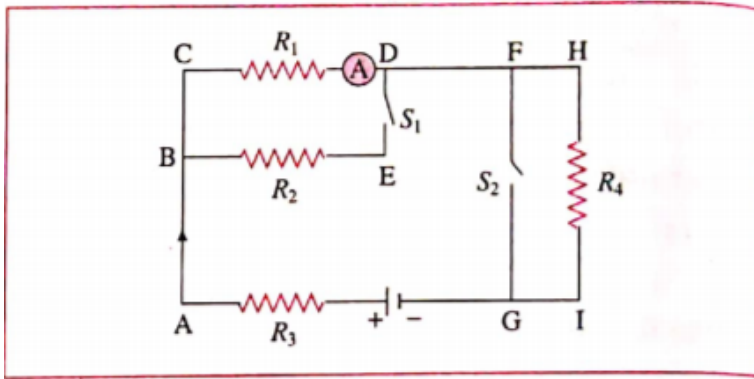
What will be the effective resistance in the above circuit?



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32. Resistances R_1, R_2, R_3 and R_4 , are connected as shown in the figure. S_1 and S_2 are two keys. Discuss the current flowing in the circuit in the following cases.

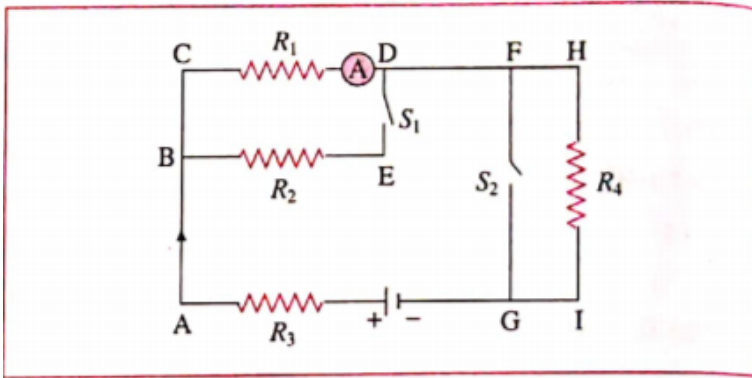
Both S_1 and S_2 are closed.



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33. Resistances R_1 , R_2 , R_3 and R_4 , are connected as shown in the figure. S_1 and S_2 are two keys. Discuss the current flowing in the circuit in the following cases.

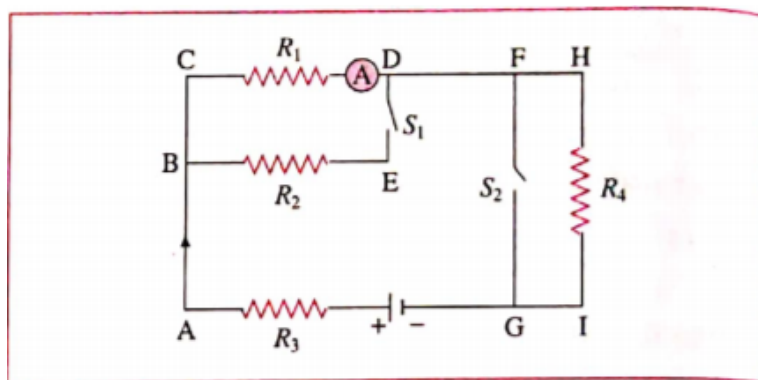
Both S_1 and S_2 are open.



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34. Resistances R_1 , R_2 , R_3 and R_4 , are connected as shown in the figure. S_1 and S_2 are two keys. Discuss the current flowing in the circuit in the following cases.

S_1 is closed but S_2 is open.



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Exercise

1. Fill in the blanks:

The coulomb is the SI unit of.....





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2. Fill in the blanks:

The ampere is the SI unit of.....



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3. Fill in the blanks:

The ohm is the SI unit of.....



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4. Fill in the blanks:

The SI unit of electric potential difference is the



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5. Fill in the blanks:

The SI unit of electric power is the



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6. Fill in the blanks:

1 volt=...../1 coulomb.



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7. Fill in the blanks:

1 ampere=...../1 second.



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8. Fill in the blanks:

.....=1 joule per second.



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9. Fill in the blanks:

1 ohm =...../1ampere.



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10. Fill in the blanks:

1mA=.....A.



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11. Fill in the blanks:

Resistance =...../electric current.



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12. Fill in the blanks:

1 microvolt=.....volt.



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13. Fill in the blanks:

The electrical work done when a current of 0.1 A is passed through a wire of resistance 200Ω for 25 seconds is.....



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14. Fill in the blanks:

To increase the effective resistance in a circuit,
the resistors are connected in



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15. Fill in the blanks:

The potential difference between the
terminals of a cell is caused by.....occurring
inside the cell.



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16. Choose the correct alternative and write it along its allotted alphabet:

What will happen to the current passing through a resistor, if the potential difference across it is doubled and the resistance is halved?

A. It will remain unchanged

B. It will become double

C. It will become half

D. It will become four times

Answer: D



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17. Choose the correct alternative and write it along its allotted alphabet:

What will be the change in the current, if the potential difference is kept constant and the resistance of the circuit is made four times?

A. It will remain unchanged

B. It will become four times.

C. It will become one-fourth

D. It will become half

Answer: C



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18. Choose the correct alternative and write it along its allotted alphabet:

When a potential difference of 24 V is applied across a conductor, the current through it is 0.24 A. The resistance of the conductor is.....

A. 100Ω

B. 10Ω

C. 5.76Ω

D. 1000Ω

Answer: A



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19. Choose the correct alternative and write it along its allotted alphabet:

If the potential difference across the ends of a

conductor is 220 V and the resistance of the conductor is 44Ω then the current flowing through it is.....

A. 0.2 A

B. 0.5 A

C. 0.0833

D. 5A

A. 0.2 A

B. 0.5 A

C. 0.08333333333333333

D. 5A

Answer: D



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20. Choose the correct alternative and write it along its allotted alphabet:

If a wire has resistance 200Ω and the current through it is 0.5 A , the p.d. across the wire must be.....

A. 400 V

B. 200 V

C. 100 V

D. 50 V

A. 400 V

B. 200 V

C. 100 V

D. 50 V

Answer: C



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21. Choose the correct alternative and write it along its allotted alphabet:

The SI unit of resistivity is.....

A. $\Omega - m^2$

B. $\Omega - m$

C. $\frac{1}{\Omega - m}$

D. $\frac{1}{\Omega - m^2}$

A. $\Omega - m^2$

B. $\Omega - m$

C. $\frac{1}{\Omega - m}$

D. $\frac{1}{\Omega - m^2}$

Answer: B



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22. Choose the correct alternative and write it along its allotted alphabet:

When a resistor of 2Ω is connected to a cell of negligible internal resistance, the current through 2Ω is 1 A. If another resistor of 8Ω is connected in series with the first one, then

the current through 2Ω will be about.....`

A. 1 A

B. 0.25 A

C. 0.2 A

D. 10 A

A. 1A

B. 0.25A

C. 0.2A

D. 10A

Answer: C



23. Choose the correct alternative and write it along its allotted alphabet:

If three resistors 2 ohms, 3 ohms and 4 ohms are connected in series, the the effective resistance in the circuit will be.....ohms.

A. 9

B.6

C. 1

D. 5

A. 9

B. 6

C. 1

D. 5

Answer: A



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24. Choose the correct alternative and write it along its allotted alphabet:

When resistors are connected in parallel, the current divides in the

- A. direct ratio of resistances
- B. inverse ratio of resistances
- C. inverse ratio of the potential differences
- D. none of these

- A. direct ratio of resistances
- B. inverse ratio of resistances
- C. inverse ratio of the potential differences
- D. none of these

Answer: B



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25. Choose the correct alternative and write it along its allotted alphabet:

There are three resistors of resistance 2 ohms, 3 ohms and 5 ohms connected in series to a battery of 10V and of negligible resistance. The potential drop across the resistor of resistance 3 ohms is

A. 2 V

B. 3 V

C. 5 V

D. 10 V

Answer: D



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26. Choose the correct alternative and write it along its allotted alphabet:

The effective resistance of a parallel connection of resistors is.....

A. smaller than the smallest resistance

B. greater than the greatest resistance

C. an average of all resistance

D. summation of all resistance

Answer: A



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27. Choose the correct alternative and write it along its allotted alphabet:

The effective resistance of a parallel

combination of two resistors is 60Ω and 40Ω
is

A. 100Ω

B. 50Ω

C. 24Ω

D. 2400Ω

Answer: C



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28. Choose the correct alternative and write it along its allotted alphabet:

When three resistors, each of resistance R , are connected in parallel the effective resistance is 10Ω . Hence, R must be.....

A. 5Ω

B. 10Ω

C. 20Ω

D. 30Ω

A. 5Ω

B. 10Ω

C. 20Ω

D. 30Ω

Answer: D



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29. Choose the correct alternative and write it along its allotted alphabet:

You are given three equal resistance. In how many combinations can they be arranged?

A. Three

B. four

C. five

D. two

A. Three

B. four

C. five

D. two

Answer: B



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30. State whether the following statements are true or false:

The SI unit of charge is the volt.



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31. State whether the following statements are true or false:

The SI unit of current is the ampere.



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32. State whether the following statements are true or false:

A voltmeter is always connected in series with the device.



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33. State whether the following statements are true or false:

An ammeter is always connected in parallel in the circuit.





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34. State whether the following statements are true or false:

The conventional direction of flow of current is from the positive terminal to the negative terminal of the cell.



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35. State whether the following statements are true or false:

Silver and copper are good conductors.



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36. State whether the following statements are true or false:

Resistivity of a metal depends on temperature.



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37. State whether the following statements are true or false:

Resistivity of pure metals is more than that of alloys.



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38. State whether the following statements are true or false:

The electric bulb consists of the filament made of the material whose melting point is low.



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39. State whether the following statements are true or false:

The material used for fuse has low melting point.



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40. State whether the following statements are true or false:

The SI unit of charge is the coulomb.



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41. Find the odd one out and give the reason:

Copper, silver, aluminium, wood



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42. Find the odd one out and give the reason:

Aluminium, silver, Gold, Nichrome



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43. Find the odd one out and give the reason:

Rubber, glass, aluminium, wood



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44. Find the odd one out and give the reason:

The joule, The erg, The calorie, The newton.



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45. Match the columns:

I	II	III
(1) Heat generated	Is used to reduce the effective resistance in a circuit	$V = IR$
(2) Resistances in parallel	Proportional to the square of current	$\rho = \frac{RA}{L}$
(3) Resistivity	Gives the relation between V and I	$\frac{VIt}{4.18} \text{ cal}$
(4) Ohm's law	Depends on the material of the conductor	$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$



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46. Match the following Or Match the pairs:

(1) Column 'A'	Column 'B'
(1) Electric current	(a) The volt
(2) Resistivity	(b) $\Omega\cdot\text{m}$
	(c) The ohm
	(d) The ampere



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47. Match the following Or Match the pairs:

* (2) Column 'A'	Column 'B'
(1) Free electrons	(a) V/R
(2) Current	(b) Increases the resistance in the circuit
(3) Resistivity	(c) Weakly attached
(4) Resistances in series	(d) VA/LI



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48. Name the following :

The negatively charged particle considered as a free particle moving in a metallic conductor.





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49. Name the following :

The quantity expressed in coulomb.



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50. Name the following :

The quantity expressed in ampere.



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51. Name the following :

The quantity expressed in ohm.



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52. Name the following :

The quantity expressed in volt.



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53. Name the following :

The quantity expressed in joule.



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54. Name the following :

The quantity expressed in watt.



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55. Name the following :

The quantity expressed in kilowatt.hour.



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56. Name the following :

A component used to control the current.



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57. Name the following :

An instrument used to measure electric current.



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58. Name the following :

An instrument used to measure potential difference.



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59. Name the following :

The scientific who invented the electric cell.



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60. Name the following :

The ratio of the work done to the quantity of charge transferred.



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61. Name the following :

A physical quantity on which resistivity depends.



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62. Name the following :

A metal used to make the filament of an electric bulb.



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63. Name the following :

An alloy used to prepare a coil of high resistance for use in electric appliances such as an electric heater.



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64. Name the following :

Constituents of the alloy used to make a fuse wire.



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65. Name the following :

The unit same as the watt. second.



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66. Name the following :

A metal used to make connecting wires in a circuit.



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67. Answer the following question:

You must have seen a waterfall. Which way does the water flow?



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68. Answer the following question:

What is electric potential?



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69. Answer the following question:

What is electric potential?



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70. Answer the following question:

What is meant by potential difference?



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71. Answer the following question:

Define potential difference.



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72. Answer the following question:

Define electric potential difference.



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73. Answer the following question:

State the formula for potential difference between two points and hence obtain the SI unit for potential difference.



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74. Answer the following question:

Define 1 volt PD.



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75. Answer the following question:

State the units used for (1) small (2) large voltages.

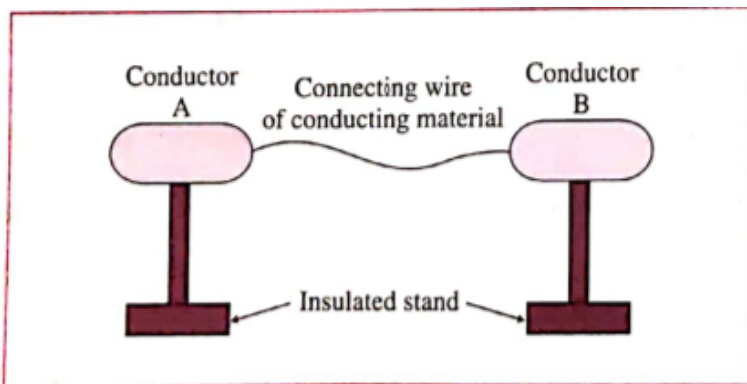


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76. Answer the following question:

Two conductors A and B are mounted on insulated stands and connected by a conducting wire as shown in figure.

What is the direction of current when the electric potential of A is (1) higher than that of B (2) lower than that of B?



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77. Answer the following question:

What is electric current?



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78. Answer the following question:

Define electric current.



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79. Answer the following question:

Explain the current flow in a metal wire (or a metallic conductor).



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80. Answer the following question:

State the formula for electric current. Hence, obtain the SI unit of current.



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81. Answer the following question:

Define 1 ampere.



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82. Answer the following question:

What happens to the net flow of charge in a conductor when the potential difference across the conductor becomes zero?



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83. Answer the following question:

What is an electric circuit?



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84. Answer the following question:

What is a electric circuit diagram?



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85. Answer the following question:

What is the advantage of a circuit diagram?



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86. Answer the following question:

Draw the symbol of electric cell.

write the uses of the component.



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87. Answer the following question:

Draw the symbol of battery.

Write the uses of the component.





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88. Answer the following question:

Draw the symbol of open tap or key plug.

Write the uses of component.



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89. Answer the following question:

Draw the symbol of closed tap key or plug key.

Write the uses of the component.



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90. Answer the following question:

Draw the symbol of connecting wires.

Write the uses of the component.



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91. Answer the following question:

Draw the symbol of crossing wires.

write the uses of the component.



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92. Answer the following question:

Draw the symbol of light bulb.

Write the uses of the component.



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93. Answer the following question:

Draw the symbol of fixed resistance.

write the uses of component.



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94. Answer the following question:

Draw the symbol of variable resistance.

Write the uses of the component.



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95. Answer the following question:

Draw the symbol of ammetre.

write the uses of component.



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96. Answer the following question:

Draw the symbol of voltmeter.

write the uses of component.



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97. Answer the following question:

What can you say about the resistance of an ammeter?



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98. Answer the following question:

What can you say about the resistance of a voltmeter?



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99. Answer the following question:

What will happen if an ammeter of high resistance is connected in the circuit to measure the current?



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100. Answer the following question:

Draw the neat labelled circuit diagram which includes a cell, a resistor, a plug key (closed), an ammeter, a voltmeter and a variable resistance. Show the direction of the electron current and the conventional direction of the current.

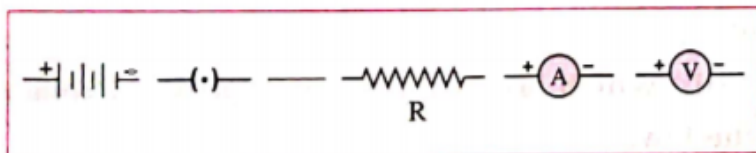


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101. Answer the following question:

The following box contains the symbols for some components used in an electrical circuit.

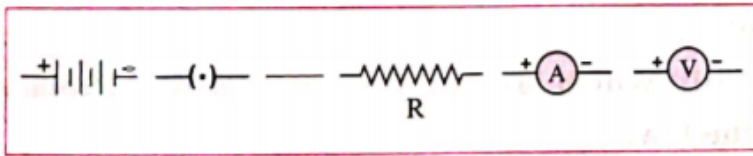
Name the law (related to electric current) that you can study by connecting properly these components in a circuit.



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102. Answer the following question:

The following box contains the symbols for some components used in an electrical circuit.



Connect the circuit. (Draw the circuit diagram).

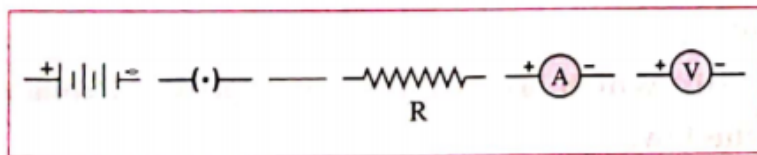


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103. Answer the following question:

The following box contains the symbols for some components used in an electrical circuit.

State the law related to electric current.



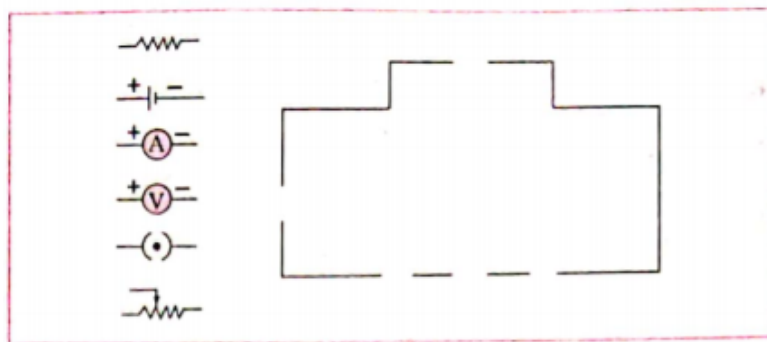
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104. Answer the following question:

The following figure shows the symbols for components used in the accompanying electrical circuit. Place them at proper places and complete the circuit.

Which law can you prove with the help of the

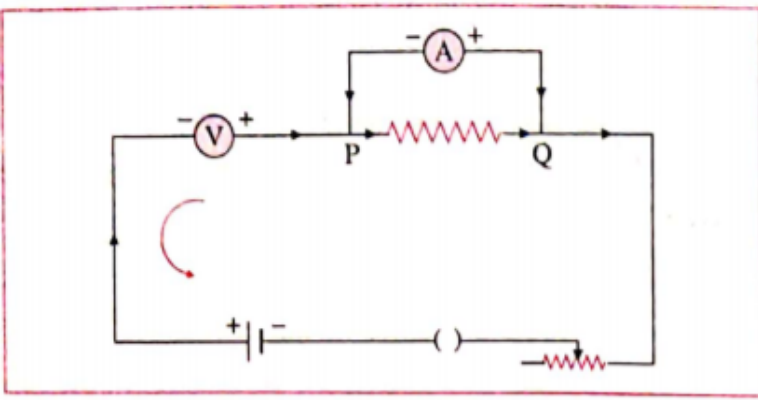
above circuit?



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105. Answer the following question:

Correct the following figure and label its parts.



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106. Answer the following question:

How many 1.5 V cells are needed to prepare a 9V battery?



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107. Answer the following question:

What is (electric) resistance?



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108. Answer the following question:

What is a conductor? Give two examples.



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109. Answer the following question:

What is an insulaator? Give two examples.



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110. Answer the following question:

What is semiconductor?



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111. State Ohm's law.



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112. Answer the following question:

The following table shows current in amperse and potential difference in Volts.

Find the average resistance.

V (Volts)	I (Amp)
4	9
5	11.25
6	13.5



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113. Answer the following question:

The following table shows current in amperes

and potential difference in Volts.

What will be the nature of the graph between the current and potential difference?(Do not draw a graph).

V (Volts)	I (Amp)
4	9
5	11.25
6	13.5



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114. Answer the following question:

The following table shows current in ampere and potential difference in Volts.

Which law will the graph prove? Explain the law.

V (Volts)	I (Amp)
4	9
5	11.25
6	13.5



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115. Answer the following question:

State the formula for resistance. Hence, obtain the SI unit of resistance.



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116. Answer the following question:

Define 1 ohm.



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117. Answer the following question:

State the large units used for resistance.



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118. Answer the following question:

Find the expression for the resistivity of a material.



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119. Answer the following question:

How will you prove that the unit of resistivity is $\Omega - m$?



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120. Answer the following question:

Define resistivity.



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121. Answer the following question:

Arrange the following substance in ascending order of resistivity: Silver, glass, copper, constantan.



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122. Answer the following question:

Arrange the following substance in descending order of resistivity: copper, hard rubber, aluminium, Nichrome.



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123. Answer the following question:

The resistivity of some materials is given below. State which one will be the best conductor for the same length, cross sectional

area and temperature.

Material	Resistivity ($\Omega \cdot \text{m}$)
Copper	1.62×10^{-8}
Aluminium	2.63×10^{-8}
Silver	1.60×10^{-8}
Nickel	6.84×10^{-8}



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124. Answer the following question:

What is meant by (1) a series arrangement (or combination) (2) a parallel arrangement (or combination) of resistors?



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125. Answer the following question:

Obtain an expression for the effective resistance when a number of resistors are connected in series.



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126. Answer the following question:

State the characteristics of a series combination of resistors?



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127. Answer the following question:

Obtain an expression for the effective resistance when a number of resistors are connected in parallel.



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128. Answer the following question:

State the characteristics of a parallel combination of resistors.

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129. Answer the following question:

Three resistances x_1 , x_2 and x_3 are connected in series in a circuit. X is the effective resistance. The properties observed for these different ways of connecting x_1 , x_2 and x_3 are given below. Write the way in which they are connected in each case. (I-current, V-potential difference, X-effective resistance)

Current I flows through x_1 , x_2 and x_3 .

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130. Answer the following question:

Three resistances x_1 , x_2 and x_3 are connected in a circuit in different ways. X is the effective resistance. The properties observed for these different ways of connecting x_1 , x_2 and x_3 are given below. Write the way in which they are connected in each case. (I-current, V-potential difference, X-effective resistancen)

x is larger than x_1 , x_2 and x_3 .



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131. Answer the following question:

Three resistances x_1 , x_2 and x_3 are connected in a circuit in different ways. X is the effective resistance. The properties observed for these different ways of connecting x_1 , x_2 and x_3 are given below. Write the way in which they are connected in each case. (I-current, V-potential difference, X-effective resistancen)

x is smaller than x_1 , x_2 and x_3 .

132. Answer the following question:

Three resistances x_1 , x_2 and x_3 are connected in a circuit in different ways. X is the effective resistance. The properties observed for these different ways of connecting x_1 , x_2 and x_3 are given below. Write the way in which they are connected in each case. (I-current, V-potential difference, x-effective resistancen)

The potential difference across x_1 , x_2 and x_3 is the same .



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133. Answer the following question:

Three resistances x_1 , x_2 and x_3 are connected in a circuit in different ways. X is the effective resistance. The properties observed for these different ways of connecting x_1 , x_2 and x_3 are given below. Write the way in which they are connected in each case.(I-

current, V-potential difference, x-effective resistancen)

$$x = x_1 + x_2 + x_3.$$



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134. Answer the following question:

Three resistances x_1, x_2 and x_3 are connected in a circuit in different ways. X is the effective resistance. The properties observed for these different ways of connecting x_1, x_2 and x_3 are given below. Write the way

in which they are connected in each case.(I-current, V-potential difference, x-effective resistanc)

$$x = \frac{1}{\left(\frac{1}{x_1}\right) + \left(\frac{1}{x_2}\right) + \left(\frac{1}{x_2}\right)}$$

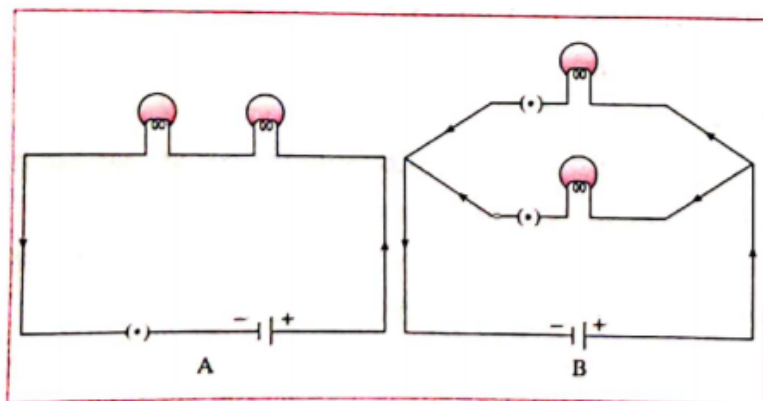


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135. Answer the following question:

A student connected two bulbs in two different combinations as shown in figure. A and B. Observe the figure and answer the following questions:

Name the type of combination of the bulbs in figure A.



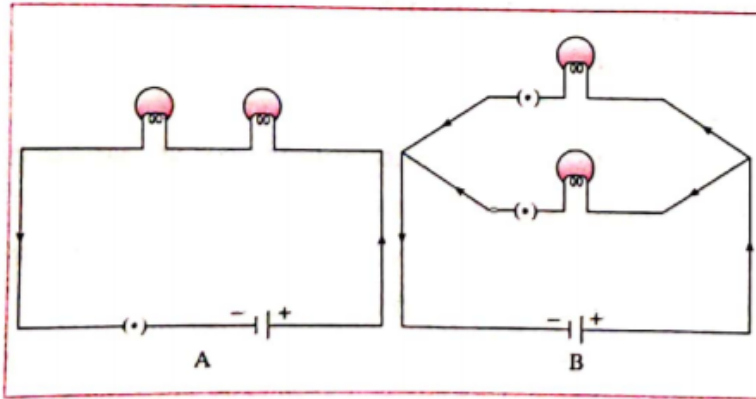
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136. Answer the following question:

A student connected two bulbs in two different combinations as shown in figure. A

and B. Observe the figure and answer the following questions:

Name the type of combination of the bulbs in figure B.

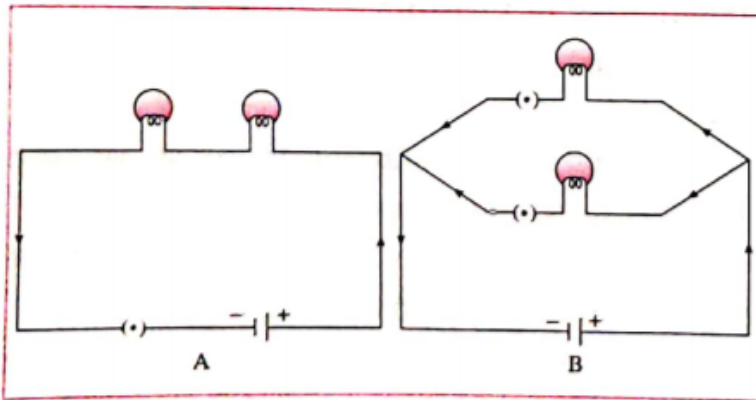


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137. Answer the following question:

A student connected two bulbs in two different combinations as shown in figure. A and B. Observe the figure and answer the following questions:

In which combination will the bulbs be brighter?

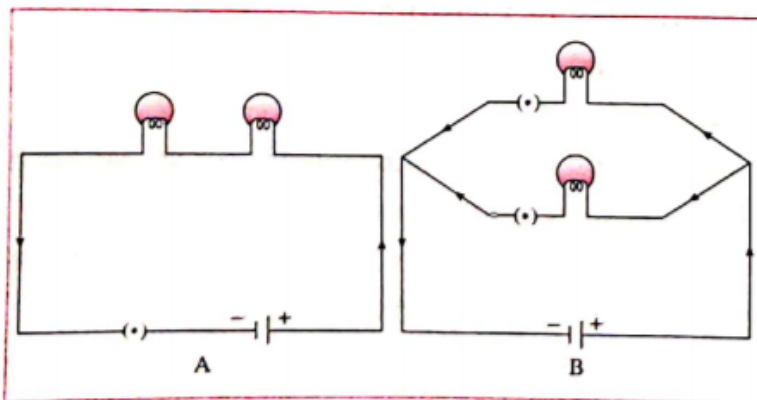


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138. Answer the following question:

A student connected two bulbs in two different combinations as shown in figure. A and B. Observe the figure and answer the following questions:

State the combination in which the resistance will be decreased.





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139. Answer the following question:

A student connected two bulbs in two different combinations as shown in figure. A and B. Observe the figure and answer the following questions:

Name the law applied for the two combinations.



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140. Answer the following question:

Two dissimilar bulbs are connected in series.

Which bulb will be brighter?

(Hint: Consider the resistance of the bulb)



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141. Answer the following question:

Name the types of wires or cables used in the electric power supply provided by the Electricity Board for houses and factories.



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142. Answer the following question:

Name the type of wire to which the main fuse is connected.



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143. Answer the following question:

What does the electricity meter measure?



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144. Answer the following question:

Is the electric potential difference across each appliance(in a domestic electric circuit) the same?



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145. Answer the following question:

Name the types of wire across which an electric appliance is connected.



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146. Answer the following question:

Electrical appliances are connected in parallel.

What are the advantages of this arrangement?



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147. Answer the following question:

In a domestic electric supply, if two bulbs are

connected in series instead of parallel, what will

happen if the filament of one of the bulbs

breaks?





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148. Answer the following question:

State two characteristics of a fuse wire.



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149. Answer the following question:

Write three safety measures in using electricity.



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150. Answer the following question:

A wireman dies while on job due to electric shock. What must have gone wrong?



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151. Answer the following question:

Explain why we should wear gloves made of insulated material and rubber soled shoes while working with electricity.



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152. Answer the following question:

Why must the insulation of the wires carrying electric current be checked periodically?



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153. Answer the following question:

Water must not be used to extinguish fire caused by short circuit. Explain why.



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154. Answer the following question:

In rainy season, we should not touch a wall of a building. Explain why.



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155. Answer the following question:

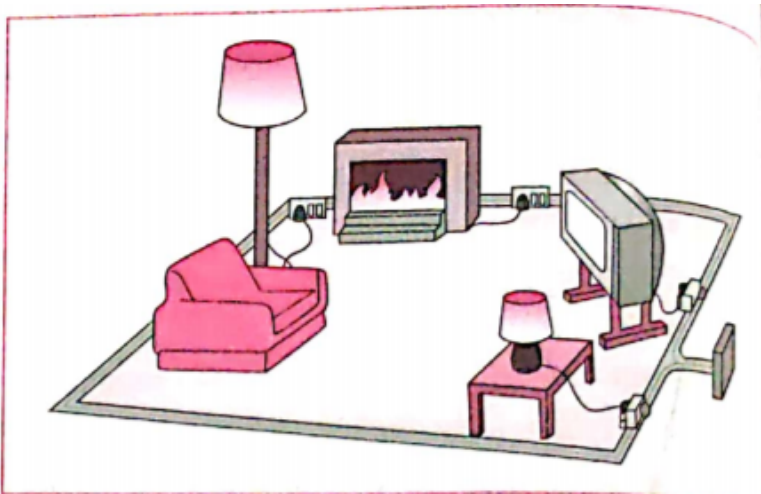
Why should a double insulated wire or cable be used in the case of appliances such as a mixer and a vacuum cleaner?



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156. Answer the following question:

The accompanying figure shows some electrical appliances connected in a circuit in a house.



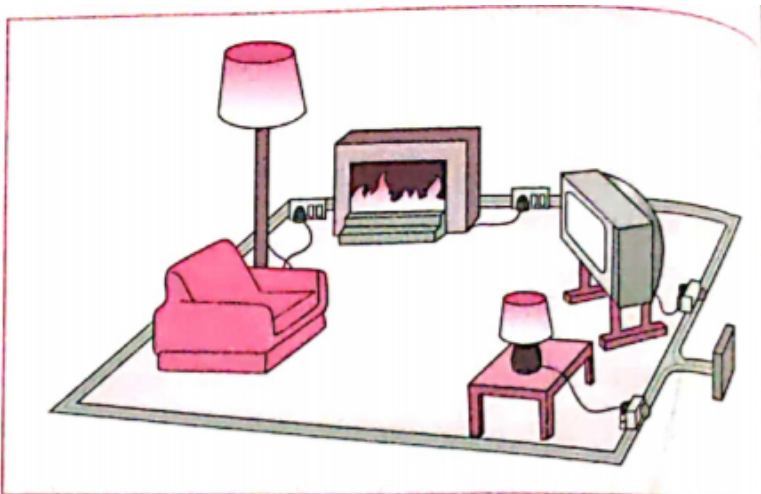
By which method are the appliances connected?



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157. Answer the following question:

The accompanying figure shows some electrical appliances connected in a circuit in a house.



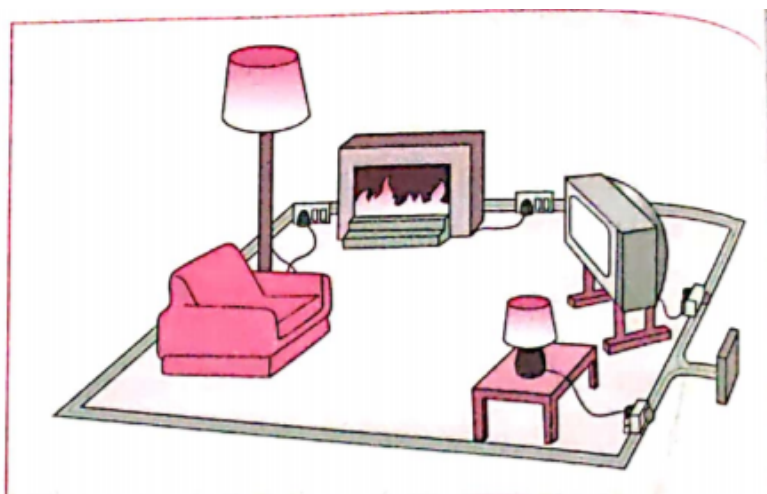
What must be the potential difference across individual appliances?



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158. Answer the following question:

The accompanying figure shows some electrical appliances connected in a circuit in a house.



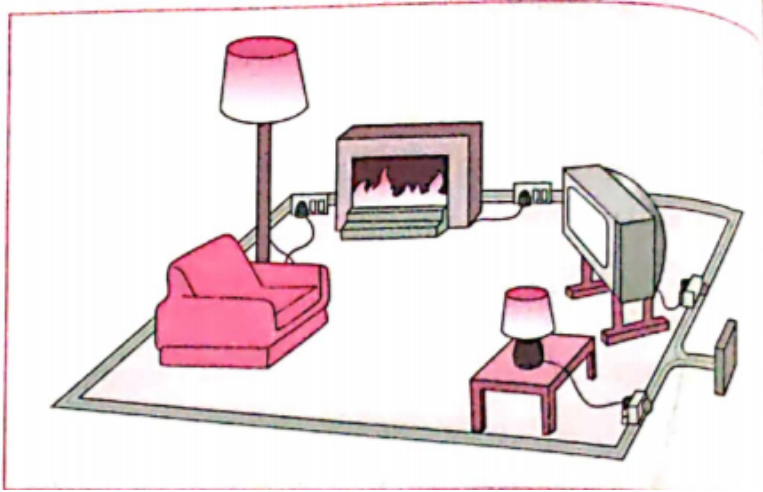
will the current passing through each appliances be the same ? Justify the answer.



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159. Answer the following question:

The accompanying figure shows some electrical appliances connected in a circuit in a house.



why are the domestic appliances connected in this way?

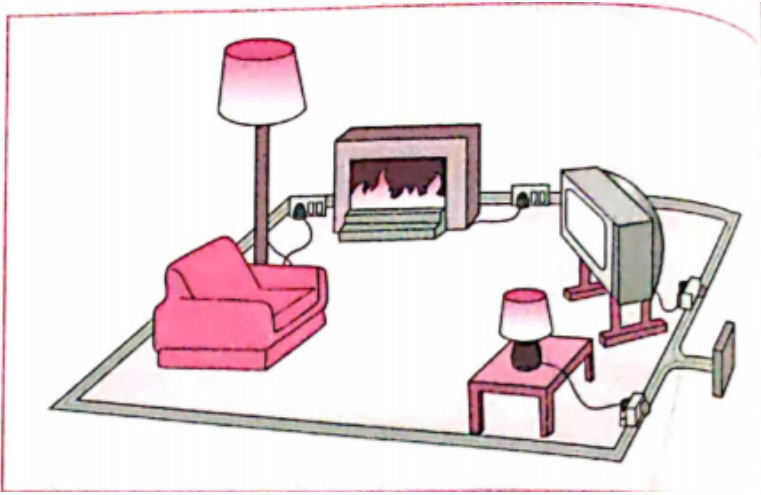


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160. Answer the following question:

The accompanying figure shows some electrical appliances connected in a circuit in a

house.



if the tv stops working , will the other appliances also stop working? Explain your answer



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161. Read the following paragraph and answer the questions given below it:

The resistance of a metal falls when cooled below room temperature. Many scientists believed that the value of the resistance would become constant at some very low temperature, allowing the current to flow with little or no resistance. H. K. Onnes successfully liquefied helium in 1908 by cooling it to about 4 K. In 1911, while investigating the electrical property of very pure mercury. Onnes discovered that at a temperature of 4.2 kelvin,

its resistance practically vanished. This new state, on account of its extraordinary property, is now called the superconducting state and the phenomenon is called superconductivity. A superconductor, below a certain critical temperature, offers almost zero resistance to a flow of current through it. Onnes also discovered that a superconductor exhibits persistent current: once set up, the current continues to flow for a very long time without an electric potential difference driving it and without significant loss. Superconductivity is used in many diverse areas, such as

magnetically levitated trains, transmission of electricity, increasing speed of computers, in MRI (magnetic resonance imaging).

Name the scientist who discovered superconductivity.



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162. Read the following paragraph and answer the questions given below it:

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At what temperature does the resistance of very pure mercury become almost zero?



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163. Read the following paragraph and answer the questions given below it:

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without significant loss. Superconductivity is used in many diverse areas, such as magnetically levitated trains, transmission of electricity, increasing speed of computers, in MRI (magnetic resonance imaging).

What is a superconductor?



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164. Read the following paragraph and answer the questions given below it:

The resistance of a metal falls when cooled

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What is special about a superconductor?



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165. Read the following paragraph and answer the questions given below it:

The resistance of a metal falls when cooled below room temperature. Many scientists believed that the value of the resistance would become constant at some very low temperature, allowing the current to flow with little or no resistance. H. K. Onnes successfully liquefied helium in 1908 by cooling it to about 4 K. In 1911, while investigating the electrical

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without significant loss. Superconductivity is used in many diverse areas, such as magnetically levitated trains, transmission of electricity, increasing speed of computers, in MRI (magnetic resonance imaging).

Name any two applications of superconductivity.



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166. Give scientific reasons:

Connecting wires in a circuit are made of

copper and aluminium.



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167. Give scientific reasons:

Wood and glass are good insulators.



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168. Give scientific reasons:

Copper and other metals are good conductors of electricity.



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169. Give scientific reasons:

The melting point of the filament of a bulb is very high.



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170. Give scientific reasons:

The melting point of the filament of a bulb is very high.



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171. Give Scientific reasons:

The material used for making fuse wire has low melting point



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172. Give Scientific reasons:

The material used for making fuse wire has low melting point



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173. Give scientific reasons:

Parallel combination of resistances decreases the effective resistance of the circuit.



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174. Give scientific reasons:

In an electric iron, the coil of high resistance is kept between mica sheets.



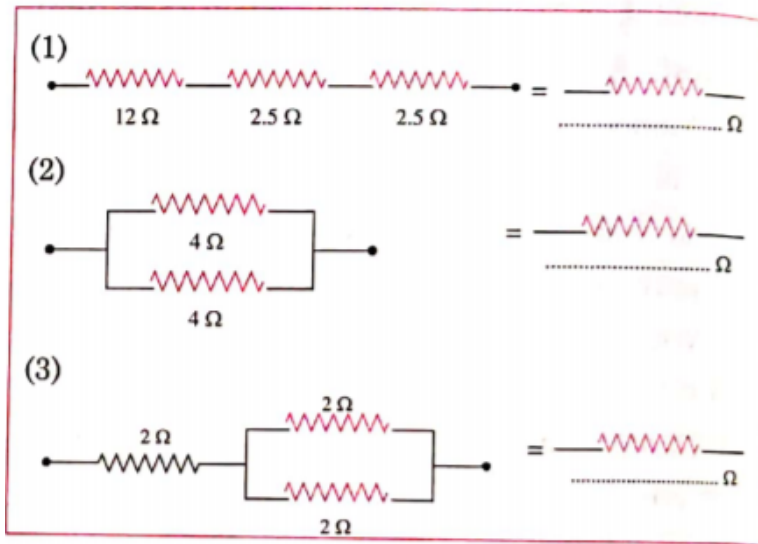
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175. Distinguish between resistance in series and resistance in parallel.



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176. Complete the following :



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177. Solve the following examples (numerical problems):

An electric charge of 15 C passes through the cross section of a wire in one minute. Find the current through the wire.



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178. Solve the following examples (numerical problems):

A Wire carries a current of 0.1 A. Calculate the charge passing through the cross section of the wire in two minutes.



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179. Solve the following examples (numerical problems):

If a charge of 420 C flows through a conducting wire in 5 minutes what is the value of the current?



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180. Solve the following examples (numerical problems):

A current of 0.1 A passes through a copper

wire for 40 seconds. Find the charge flowing through the cross section of the wire during this time and the number of electrons carrying it. (The charge on an electron, $q = -1.6 \times 10^{-19} \text{ C}$)



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181. The charge on a proton is $1.6 \times 10^{-19} \text{ C}$, How many protons will together carry a charge of 2C ?



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182. An electric charge of 12 C passes through the cross section of a wire in one minute. Find the current through the wire.



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183. A wire carries a current of 0.3 A. Calculate the charge passing through the cross section of the wire in two minutes.



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184. A current of 0.2 A passes through a metal wire for 20 seconds. Calculate the number of electrons passing through the cross section of the wire during this time. (The charge on an electron = 1.6×10^{-19} C)



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185. A wire carries a current of 0.1 A. Find the time interval during which a charge of 5 C passes through the cross section of the wire.





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186. If 20 J of work is done in moving a charge of 5C from one point to another, find the electric potential difference between the two points.



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187. Calculate the work done in moving a charge of 3C through a potential difference of 20 V.



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188. A wire carries a current of 0.1 A for 20 seconds. If the potential difference between the two ends of the wire is 10 V, find the work done in this process.



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189. A wire carries a current of 0.1 A for 10 seconds. If the work done in this process is 20

J, find the potential difference between the two ends of the wire.



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190. Calculate the potential difference across a 20Ω resistor carrying a current of 0.1 A .



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191. A conductor carries a current of 0.4 A when a potential difference of 10 V is applied

across it. Find its resistance.



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192. A potential difference of 25 V is applied across a conductor of resistance 100Ω . Find the current through the conductor.



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193. The resistance of a conductor is 10 ohm. Find the current through it when a potential

difference of 2 V is applied across it. To pass the same current through a conductor of resistance 40Ω , how much potential difference should be applied across it?



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194. The resistance of a wire of length 15.7 m and radius 0.5 mm is 10Ω . Find the resistivity of the material of the wire.



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195. A wire has radius 0.5 mm and length 62.8 m. If the resistivity of the material of the wire is $5 \times 10^{-7} \Omega - m$, find the resistance of the wire.



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196. A wire has length 10 m and resistance 20Ω . If the resistivity of the material of the wire is $6 \times 10^{-7} \Omega. m$, find the area of cross section of the wire.



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197. If the resistance of wire A is three times the resistance of wire B and the two wires have the same length, compare their cross sectional areas. The two wires are made of the same material.



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198. Calculate the length of a wire of diameter 1 mm needed to prepare a coil of resistance 25

ohm. The resistivity of the material of the wire is $3.14 \times 10^{-7} \Omega \cdot m$.



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199. Two wires have lengths in the ratio 1:9 and diameters in the ratio 1:3. The resistivities of the materials of the wires are in the ratio 4:1. Compare their resistances.



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200. A wire of resistance 1000Ω is uniformly stretched so that its length increases by 5% . Assuming that the volume of the wire remains the same on stretching, find the resistance of the wire after stretching.



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201. Find the effective resistance of the series combination of three resistors of resistances 10Ω , 20Ω and 30Ω .





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202. Choose the correct alternative and write it along its allotted alphabet:

The effective resistance of a parallel combination of two resistors is 60Ω and 40Ω is



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203. Find the effective resistance of the parallel combination of three resistors of

resistances 20Ω , 40Ω and 50Ω .



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204. Four resistors of resistances 5Ω each are connected in parallel. Calculate the effective resistance of the combination.



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205. If two resistors are connected in series, the total resistance is 100Ω and if the same .

resistors are connected in parallel, the total resistance is 24Ω . Find the resistances of the , individual resistors.



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206. If two resistors connected in parallel, the effective resistance of the combination is 21Ω . If the same two resistors are connected in series, the effective resistance of the combination is 100Ω . Find the resistances of the individual resistors.



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207. How will you connect three resistors of resistances 3Ω each to obtain a resistance of 4.5Ω ?



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208. How will you connect three resistors ($A = 2\Omega$), ($B = 3\Omega$) and ($C = 6\Omega$) to obtain a resistance of 4Ω ?



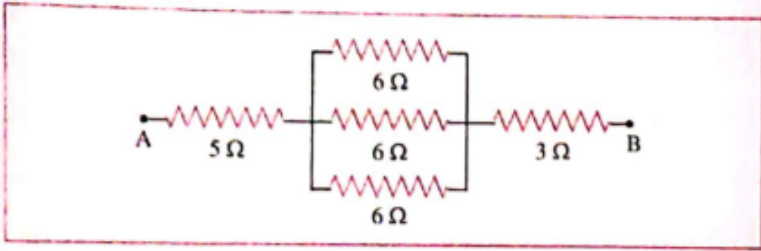
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209. How will you connect three resistors ($A = 4\Omega$), ($B = 6\Omega$) and ($C = 2\Omega$) to obtain a resistance of 5.5Ω ?



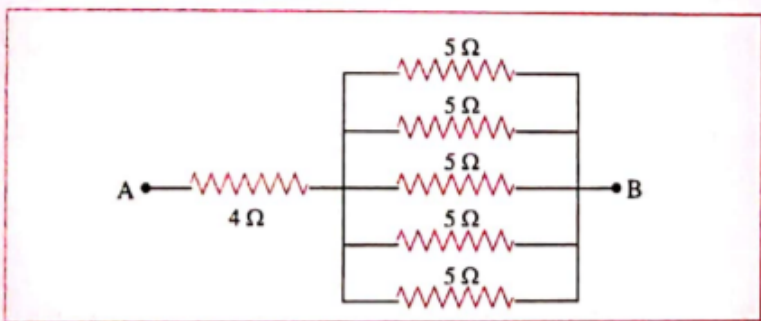
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210. Find the effective resistance between A and B.



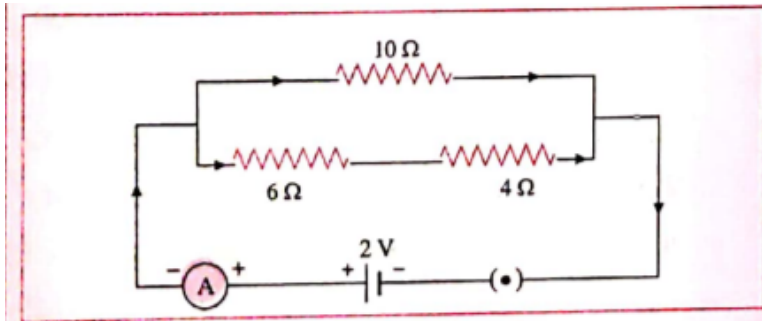
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211. Find the effective resistance between A and B.



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212. Find the total resistance and current in the circuit.



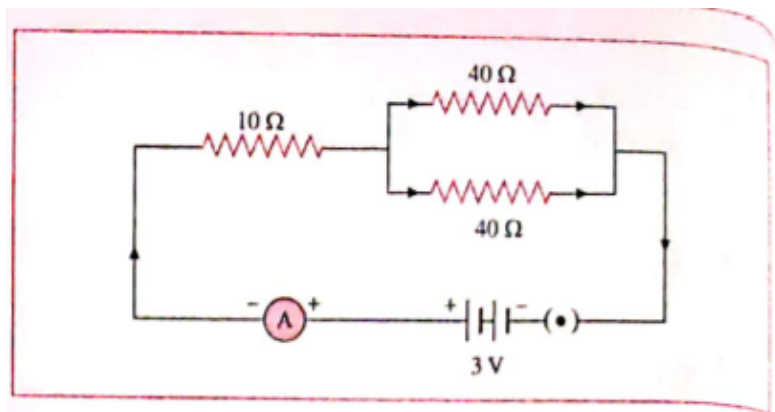
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213. Two resistors of resistance $20\ \Omega$ and $30\ \Omega$ are connected in series and potential difference of 5V is applied across the

combination. Find the potential difference across each resistor.

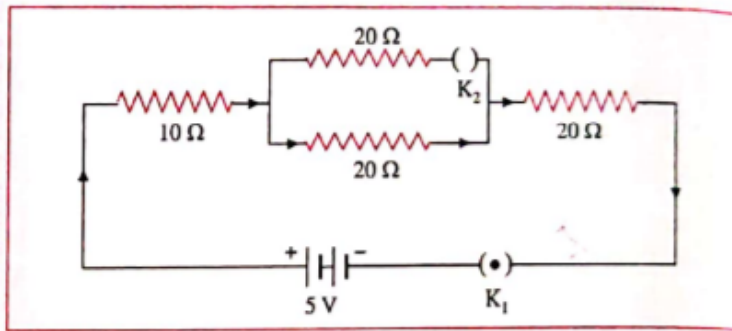
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214. Find the potential difference across each resistor in the following circuit.



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215. Find the total current in the circuit when the key K_2 is (i) open (ii) closed.



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