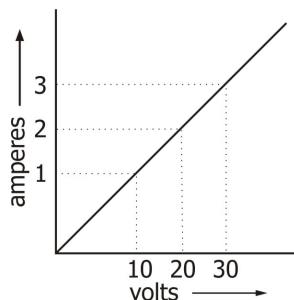


26. Draw a schematic diagram of a circuit consisting of a battery of four 2 V cells, a 5 ohm resistor, an 8 ohm resistor, and a 12 ohm resistor, and a plug key, all connected in series.
27. The graph of a conductor between the potential difference (V) and current (I) is shown in fig. Calculate the resistance of the conductor.



28. Redraw the circuit of above question, putting in an ammeter to measure the current through the resistors and a voltmeter to measure the voltage across the 12 ohm resistor. What would be the readings in the ammeter and the voltmeter?
29. An aluminium rod with a square cross section is 1.3 m long and 2.6 mm on edge.
- What is the resistance between its ends?
 - What must be the diameter of a cylindrical copper rod of length 1.3 m if its resistance is to be the same as that of the aluminium rod? [given: $\rho_{Al} = 2.75 \times 10^{-8} \Omega\text{-m}$, $\rho_{Cu} = 1.69 \times 10^{-8} \Omega\text{-m}$]
30. A solid cube of silver has a mass of 84.0 grams. What is the resistance between opposite faces? Density of silver is 10.49 g/cm³ and its resistivity is $1.47 \times 10^{-7} \Omega\text{-m}$.

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12 Electricity

(Problems Sheet – 1)

Problems on Electric Charge, Potential and Electric Current

- The filament of an electric lamp draws a current of 0.4 amperes, which lights for 3 hours. Calculate the amount of charge that flows through the circuit.
- Fill up the blanks:
 - Charge on an electron =
 - Charge on a proton and a neutron = and
- A conductor has a positive charge of 11.2×10^{-19} coulombs. How many electrons are excess or short than normal state?
- A polythene piece rubbed with wool is found to have a negative charge of 3×10^{-7} C. Calculate numbers of electrons transferred. State whether the electrons are transferred from polythene to wool or vice versa.
- Find the charge on a 1_7N nucleus.
- How much work is done in moving a charge of 2 coulombs from a point at 118 volts to a point at 128 volts?
- Calculate the work done in moving a charge of 4 coulombs from a point at 220 volts to another point at 230 volts.
- What is the potential between the terminals of a battery if 250 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery to the other?
- If the charge of an electron is 1.6×10^{-19} coulombs, how many electrons should pass through a conductor in 1 second to constitute 1 ampere current?

10. A steady current of 0.25 ampere flows through a conductor. How many electrons (charge 1.6×10^{-19} C) flow through the section of the conductor in 1 second?

Problems on Ohm's law, Resistance and Resistivity

11. A resistance of 20 ohms has a current of 2 amperes flowing through it. What potential difference is there between its ends?
12. Potential difference between two points of a wire carrying 2 ampere current is 0.1 volt. Calculate the resistance between these points.
13. Keeping the potential difference constant, the resistance of a circuit is doubled. By how much does the current change?
14. A potential difference of 20 volts is applied across the ends of a resistance of 5 ohms. What current will flow in the resistance?
15. What is the potential difference between the ends of a conductor of 16Ω resistance, when a current of 1.5 A flows through it?
16. How much current will an electric heater draw from a 220-volt line, if the resistance of the heater (when hot) is 50 ohms?
17. The resistance of an electric lamp filament is 230 ohms. The lamp is switched on when the line voltage is 115 volts. What is the current in the circuit?

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Ph: 6450282, 2424758 Mob: 92294 97622

Website: <http://manishbhadoria.blogspot.com>

18. What is the resistance (hot) of an electric arc lamp, if the lamp uses 20 A when connected to a 220-volt line?
19. A piece of wire having resistance, R, is cut into four equal parts.
(i) How will the resistance of each part compare with the original resistance?

- (ii) If the four parts are placed in parallel, how will the resistance of the combination compare with the resistance of the original wire?

20. Using the following data, draw a graph between V and I:

Potential difference, V (in volts)	2.5	5.0	10.0	15.0	20.0	25.0
Current, I (in amperes)	0.1	0.2	0.4	0.6	0.8	1.0

Infer how current varies with potential difference. Does this graph verify ohm's law? Give reasons for your answer.

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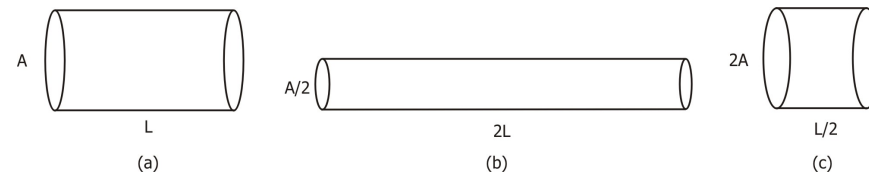
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21. Figure a, b and c show three cylindrical copper conductors along with face areas and length. Arrange them in the increasing order of their resistances.



22. A piece of wire is redrawn by pulling it until its length is doubled. Compare the new resistance with the original value.
23. A copper wire of length 2 m and area of cross-section 1.7×10^{-6} m² has a resistance of 2×10^{-2} ohms. Calculate the resistivity of copper.
24. A copper wire has a diameter of 0.5 mm and a resistivity of 1.6×10^{-6} Ω -cm. How much of this wire would be required to make a 10 ohm coil?
25. What will be the resistance of a metal wire of length 2 metres and area of cross-section 1.55×10^{-6} m², if the resistivity of the metal be 2.8×10^{-8} Ω -m?