10th Electricity Trend setter Questions

Electric current indicates electric charges in motion. Dynamics deals with bodies in motion. The science of electricity in motion is known as electrodynamics

The voltmeter is a high-resistance galvanometer used to measure voltage. It measures the potential difference across any two points in an electric circuit and must always be connected in parallel that is, connected by means of a wire to either side of the device across which the voltage drop is to be measured.

The ammeter (A) is connected in series in the circuit so that all current passing through the circuit must pass through and be measured by the ammeter.

Question: In the electric circuit diagram at right, possible locations of an ammeter and a voltmeter are indicated by circles 1, 2, 3, and 4. Where should an ammeter be located to correctly measure the total current and where should a voltmeter be located to correctly measure the total voltage?
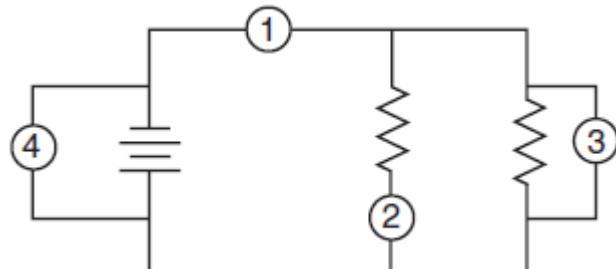

Answer: To measure the total current, the ammeter must be placed at position 1, as all the current in the circuit must pass through this wire, and ammeters are always connected in series.

To measure the total voltage in the circuit, the voltmeter could be placed at either position 3 or position 4. Voltmeters are always placed in parallel with the circuit element being analyzed, and positions 3 and 4 are equivalent because they are connected with wires (and potential is always the same anywhere in an ideal wire).

Question: Which circuit diagram below correctly shows the connection of ammeter A and voltmeter V to measure the current through and potential difference across resistor R?
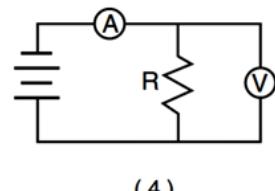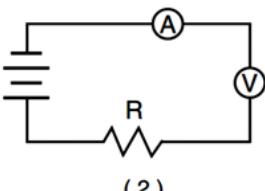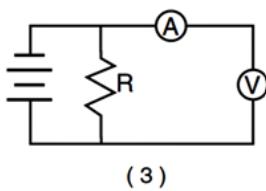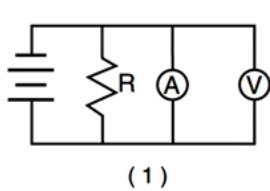
Answer: (4) shows an ammeter in series and a voltmeter in parallel with the resistor.

Question: Compared to the resistance of the circuit being measured, the internal resistance of a voltmeter is designed to be very high so that the meter will draw

1. no current from the circuit

2. little current from the circuit

3. most of the current from the circuit

4. all the current from the circuit

Answer: (2) the voltmeter should draw as little current as possible from the circuit to minimize its effect on the circuit, but it does require some small amount of current to operate.

Question: An object possessing an excess of 6.0×10^6 electrons has what net charge?

Answer: 9.6×10^{-13}C

Question: If a conductor carrying a net charge of 8 elementary charges is brought into contact with an identical conductor with no net charge, what will be the charge on each conductor after they are separated?

Answer: Each conductor will have a charge of 4 elementary charges.

Question: What is the net charge (in coulombs) on each conductor after they are separated?

Answer: $Q = n\,e = 4\,e = 4 \times 1.6 \times 10^{-19}$ C $= 6.4 \times 10^{-19}$ C

Question: Three protons are separated from a single electron by a distance of 1×10^{-6} m. Find the electrostatic force between them. Is this force attractive or repulsive?

Answer:

$$q_1 = 3 \text{ protons} = 3*(1.6*10^{-19}\,C) = 4.8*10^{-19}\,C$$

$$q_2 = 1 \text{ electron} = 1*(-1.6*10^{-19}\,C) = -1.6*10^{-19}\,C$$

$$F_e = \frac{kq_1q_2}{r^2}$$

$$F_e = \frac{(8.99*10^9\,\frac{N\cdot m^2}{C^2})(4.8*10^{-19}\,C)(-1.6*10^{-19}\,C)}{(1*10^{-6}\,m)^2}$$

$$F_e = -6.90*10^{-16}\,N$$

Question: A beam of electrons is directed into the electric field between two oppositely charged parallel plates, as shown in the diagram below.

+	+	+	+	+	+	+

Electron beam

$\longrightarrow$

–	–	–	–	–	–	–
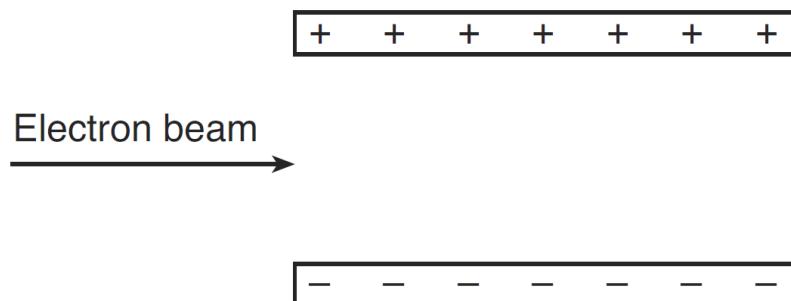
The electrostatic force exerted on the electrons by the electric field is directed

(a) into the page (b) out of the page (c) toward the bottom of the page (d) toward the top of the page

Answer: (d) toward the top of the page because the electron beam is negative, and will be attracted by the positively charged upper plate and repelled by the negatively charged lower plate.

Question: A charge of 30 Coulombs passes through a 24-ohm resistor in 6.0 seconds. What is the current through the resistor?

Answer:

$$I = \frac{\Delta q}{t} = \frac{30C}{6s} = 5A$$

Question: Why is the tungsten metal more coiled in the bulb and not installed in straight parallel wire form?

Answer: The coiled wire of tungsten increases the surface area of the wire in very less space so as to emit more light and helps in glowing with more intensity.

Question: Why are fairy decorative lights always connected in parallel?

Answer: When the fairy lights are connected in series the resistance offered will be greater and
. brightness of the bulbs will be affected. But in parallel connection all the bulbs will glow with same intensity and if any more bulbs gets fused the other bulbs will continue to glow.

Question: What will happen when -

a) Voltmeter is connected in series?

b) Ammeter is connected in parallel?

a) Answer:

b) Negligible current will pass through the circuit because the voltmeter has a very high resistance.

b) Ammeter will get damaged due to flow of large amount of current through it, because it has low resistance.