11. Electric Circuits

Starter Quiz ·

AP Physics C: Electricity and Magnetism Name: _____ Score: _____

1. Electric current is:

   ☐ force per charge

   ☐ energy per charge

   ☐ the rate of charge flow, dQ/dt

   ☐ charge times time

2. The EMF of a battery is:

   ☐ the energy given to each coulomb (volts)

   ☐ its internal charge

   ☐ the current it carries

   ☐ a force in newtons

3. Ohm's law relates voltage, current and resistance as:

   ☐ $V = R/I$

   ☐ $V = I/R$

   ☐ $V = IR$

   ☐ $V = I + R$

4. Electric power delivered to a component is:

   ☐ $P = V/I$

   ☐ $P = I/V$

   ☐ $P = IV$

   ☐ $P = I + V$

5. Two resistors in series have a total resistance of:

   ☐ $R_1 + R_2$

   ☐ $R_1 R_2$

   ☐ less than either one

   ☐ zero

6. A 12 V battery drives current through a 2 Ω and a 2 Ω resistor in series. Find I (in A).

   _____ A

7. 7 A enters a junction with two outgoing branches and no net charge accumulation. One outgoing branch carries 4 A. Find the other outgoing current (in A).

   _____ A

8. A 5 Ω resistor charges a 4 F capacitor. Find τ (in s).

   _____ s

9. If 10 C passes a point in 5 s, find the current (in A).

   _____ A

10. Opening a switch anywhere in a simple loop stops the current everywhere.

    ☐ True ☐ False

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Answers ·

AP Physics C: Electricity and Magnetism

1. **the rate of charge flow, dQ/dt**

   $I = dQ/dt$ – charge passing a point per second.

2. **the energy given to each coulomb (volts)**

   EMF is energy per charge, in volts – not really a force.

3. $V = IR$

   $V = IR$ for an ohmic device.

4. $P = IV$

   $P = IV$ – current times voltage, in watts.

5. $R_1 + R_2$

   Series resistances add: $R = R_1 + R_2$.

6. **3 A**

   $12 - I(2) - I(2) = 0 \Rightarrow 12 = 4I \Rightarrow I = 3$ A.

7. **3 A**

   $7 = 4 + I_2 \Rightarrow I_2 = 3$ A.

8. **20 s**

   $\tau = RC = 5 \times 4 = 20$ s.

9. **2 A**

   $I = Q/t = 10/5 = 2$ A.

10. **True**

    A break anywhere opens the loop, so no current flows at all.