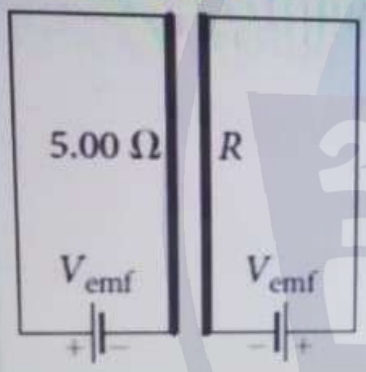
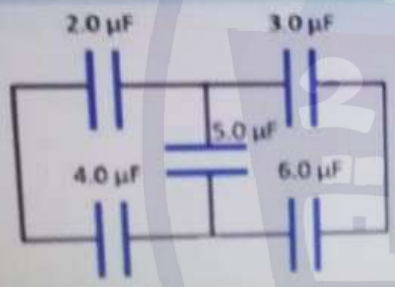
Two **black** parallel wires are connected to two separate power supplies as shown in the figure. Both wires, each 25.0 cm long, are separated by 4.00 mm. The two power supplies are 7.00 V each. The resistance of the left wire is 5.00 Ohm as shown. If the resistance R of the right wire is 8.00 Ohm, the force produced between the wires (in N) is:



Select one:

- a. 3.03 x 10^(3).
- b. 4.67 x 10^(-5).
- c. 1.53 x 10^(-5).
- d. 55.5 x 10^(3).
- e. 11.02 x 10^(-5).

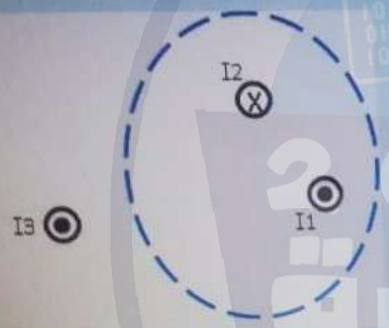
In the circuit shown, if the charge stored by the 2.0 microFarad capacitor is 32 microCoulomb, find the voltage across the 5.0 microFarad capacitor.



Select one:

- a. 24 V
- b. 0 V
- c. 30 V
- d. 18 V
- e. 15 V

The currents shown in the figure are I1 = 16.00 A, I2 = 9.00 A, and I3 = 20.00 A. The line integral of $\boldsymbol{B}.d\boldsymbol{l}$ (in T.m) over the shown closed loop in a clockwise direction is:



Select one:

- a. 0.
- b. +8.8 x 10^-6.
- c. -13.8 x 10^-6.
- d. -8.8 x 10^-6.
- e. +13.8 x 10^-6.

A parallel plate capacitor is fully charged by connecting it to a battery. While the battery is still connected to the capacitor, the distance between the plates of the capacitoris doubled. Which one of the following statements is CORRECT?

Select one:

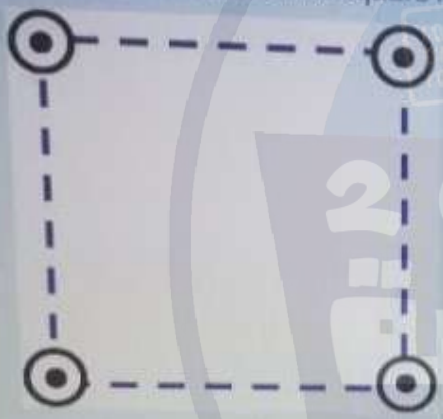
- a. The electric field between the plates is doubled.
- b. The charge on the plates changes.
- c. The potential difference between the plates is doubled.
- d. The potential difference of the battery is halved.
- e. The capacitance doubles.

A circuit has a battery with an electromotive force of 10.0 V and a negligible internal resistance connected in series with a resistance R. The power dissipated by the resistance is P. If a second identical resistance is connected in series with the first resistance, the power dissipated by the first resistance in this new circuit becomes:

Select one:

- a. P/4.
- b. 2P.
- c. 4P.
- d. P/2.
- e. P.

Four long wires are each carrying 3.0 A. The wires are located at the 4 corners of a square with side length 5.0 cm. All of these wires are carrying current out of the page. The magnetic field (in T) at one corner of the square is:



Select one:

- a. 2.5 x 10^-5.
- b. 3.6 x 10^-6.
- c. 3.6 x 10^-5.
- d. 1.7 x 10^-5.
- e. 2.5 x 10^-6.

A battery and five resistors of equal resistance R are arranged as shown in the figure. Which resistor dissipates the most power?

Select one:

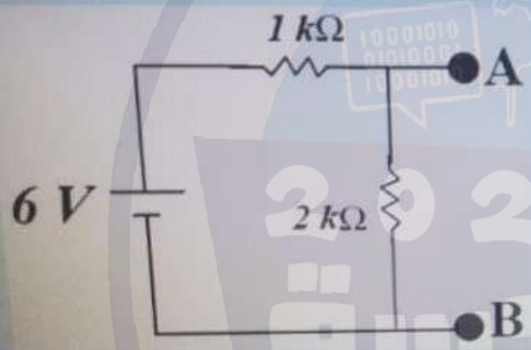
- a. R4.
- b. The power dissipated by each resistor is the same for all resistors.
- c. R1.
- d. R2.
- e. R3.

Among the following, the Hydrogen ion which has the smallest period of revolution in a uniform magnetic field is the one with:

Select one:

- a. speed v/3 in a magnetic field 3B.
- b. speed v in a magnetic field B.
- c. speed 3v in a magnetic field B/3.
- d. speed v/3 in a magnetic field B.
- e. speed 3v in a magnetic field B.

A capacitor is fully charged to 24 V and then connected between points A and B in the figure,with its positive plate located at A. What is the current (in mA) through the 1-kiloOhm resistor immediately after the capacitor is connected?



Select one:

- a. 12 to the right.
- b. 12 to the left.
- c. 18 to the right.
- d. 0.
- e. 18 to the left.

A 30-cm long solenoid is made up of 300 turns and a current $I = 10.0$ A passes through it. The surface of a 2 cm^2 circular area inside the solenoid makes an angle of 30 degrees with the magnetic field of the solenoid. The magnetic flux (in T.m^2) through this area is:

Select one:

- a. 0.94 x 10^(-6).
- b. 0.
- c. 1.26 x 10^(-6).
- d. 1.63 x 10^(-6).
- e. 1.9 x 10^(-6).

A particle of charge Q, with mass 3.00 milligram, is flying horizontally with a constant speed of 1000 m/s. A long straight wire, which is carrying a 10.0 A current, is 15.0 cm above and parallel to the particle's path. If the particle flies parallel to the current, the charge Q (in C) is: (acceleration due to gravity = 9.8 m/s^2)

Select one:

- a. +22.1 x 10^-4.
- b. Q does not experience a net force; thus, it can be any positive value.
- c. -22.1 x 10^-4.
- d. -9.8 x 10^-4.
- e. +9.8 x 10^-4.

Two circuits have two copper resistors in them. The resistor in the first circuit has a length L, a cross-sectional area A, and a current f 6.00 mA, while the resistor in the second circuit has a length 4L, a cross-sectional area 2A, and a current 2.00 mA. The ratio v1/v2 of the drift speeds in the two resistors is:

Select one:

- a. 9.
- b. 6.
- c. 2/3.
- d. 3/2.
- e. 1/6.