

Closed book. No calculators are to be used for this quiz.

Quiz duration: 10 minutes

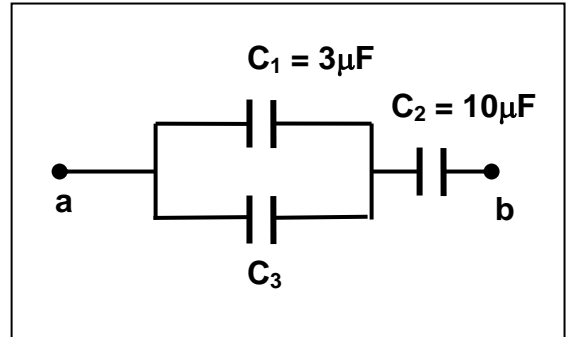
Name:

Student ID:

Signature:

For the capacitor network given in the figure, the terminals *a*, and *b* are kept at a constant potential difference. What can be the value of  $C_3$  if;

- (a)  $C_1$  and  $C_3$  have the same potential?
- (b)  $C_1$  and  $C_3$  have the same charge?
- (c)  $C_1$  and  $C_2$  have the same potential?
- (d)  $C_1$  and  $C_2$  have the same charge?



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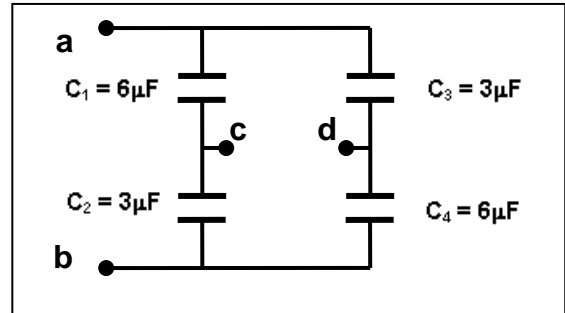
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The capacitors in the figure, are initially uncharged. The terminals **a** and **b** are connected to a battery to have a potential difference  $V_{ab} = 9$  V. Calculate the potential difference between the terminals **c** and **d** ( $V_{cd}$ ). (Hint: What is  $V_{ac} + V_{cd} + V_{da} = ?$ ).



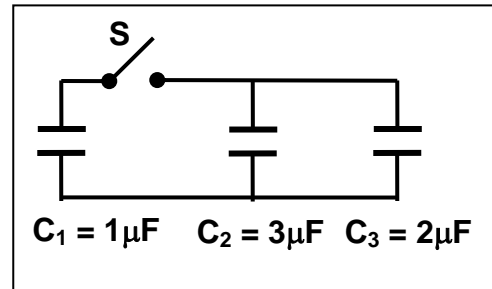
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For the capacitor network given in the figure, the switch  $S$  is initially open,  $C_1$  is charged with a potential of 12 V, and  $C_2$  and  $C_3$  are uncharged. Then  $S$  is closed (this is a parallel connection) Calculate the ratio of the electric potential energy that was stored in capacitor  $C_1$  before and after the switch was closed..



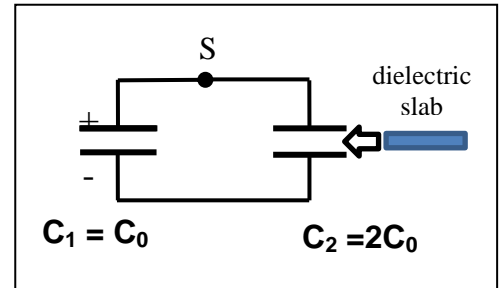
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Two parallel plate capacitors in the figure are connected in parallel. In this configuration, the capacitor  $C_1$  has charge  $Q_0$ . Now, suppose that a dielectric slab with dielectric constant  $K = 2$  is inserted between the plates of  $C_2$  and it fills the space between the plates completely. How much charge has flowed through the point S and in which direction?



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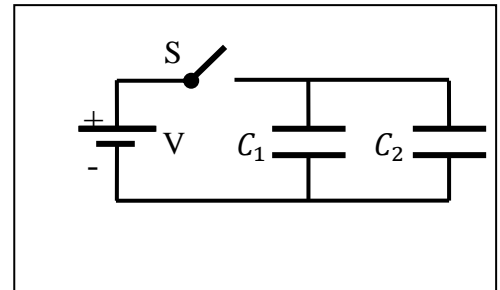
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Two identical parallel plate capacitors  $C_1 = C_2 = C$  are connected in parallel and to a battery of potential difference  $V$  as shown in the figure. Consider the following separate cases:

- (I) The switch is opened so that the battery is disconnected and then the separation between the plates of  $C_1$  is doubled.
- (II) The battery remains connected and the separation between the plates of  $C_1$  is doubled.

Determine the ratio of the charge stored in  $C_2$  in these cases.



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Two parallel plate capacitors in the figure are connected in parallel. In this configuration, the capacitor  $C_1$  has charge  $Q_0$ . The separation between the plates of  $C_2$  is  $d$ . Now, suppose that a metal slab of thickness  $d/3$  is inserted between the plates of  $C_2$  without touching to any of the plates. The metal slab has the same area and shape as the plates. Determine the ratio of the charge of  $C_2$  before and after the metal slab was inserted

**Signature:**

