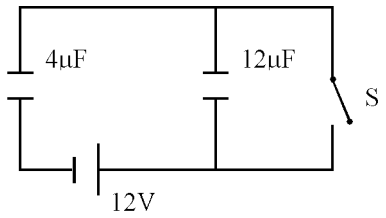
Base your answers to questions **1** through **4** on the following circuit diagram in which the battery has zero internal resistance.



1. When switch *S* is open, what is the charge on the 4 ƒF capacitor?

   A) 3 ƒC

   B) 4 ƒC

   C) 12 ƒC

   D) 36 ƒC

   E) 48 ƒC

2. When the switch *S* is open what is the total energy stored in the system?

   A) 36 J

   B) 216 J

   C) 432 J

   D) 1152 J

   E) 2304 J

3. When the switch *S* is closed, what is the energy stored in the 12 μF capacitor?

   A) 0 J

   B) 216 J

   C) 432 J

   D) 866 J

   E) 1732 J

4. When the switch *S* is open, what is the ratio of the energy stored in the 4ƒF capacitor to the energy stored in the 12 ƒF capacitor?

   A) $\frac{1}{9}$

   B) $\frac{1}{3}$

   C) 1

   D) 3

   E) 9

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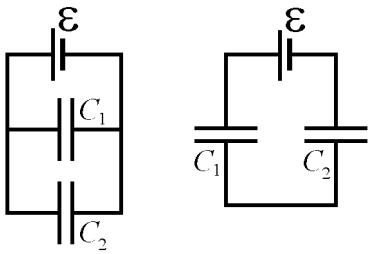
5. Base your answer to the following question on the diagram below which shows two different capacitors, C_1 and C_2, in two different connections to the same source of emf ε that has no internal resistance.

   For each question pick your answer from the following list.

   I. It is greater for the parallel connection.
   II. It is greater for the series connection.
   III. It is the same for both connections.
   IV. It is different for each connection, but one must know the values of C_1 and C_2, to know which is greater.
   V. It is different for each connection, but one must know the value of ε to know which is greater.



   How does the total energy stored in the capacitors for these two cases compare?

   A) I

   B) II

   C) III

   D) IV

   E) V

6. A current of I flows through a resistor R for a time t. If all of the energy dissipated by the resistor is converted back into electrical energy by a perfectly efficient heat engine and a perfectly efficient generator and stored on a capacitor of capacitance C, how much charge is on the capacitor?

   A) $(CI^2Rt)^{1/2}$

   B) $(2CI^2Rt)^{1/2}$

   C) $2CI^2Rt$

   D) $(2I^2Rt/C)^{1/2}$

   E) $(2CI^2Rt)^2$

7. The energy stored in an isolated capacitor is

   A) the energy provided by the voltage source

   B) the energy provided by the magnetic field

   C) the energy provided by gravitational potential

   D) the energy of the electric field between the plates

   E) capacitors do not store energy

Answer Key
Energy in Resistor Circuits MC Questions [Mar 28, 2011]

1. D
2. B
3. A
4. D
5. D
6. B
7. D

Name _____ Class _____ Date _____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____