I. [illegible]

J. Since like charges repel, and electrons move freely in a conductor, the charges move as far from each other as possible.

ANS K. If it were not evenly distributed, there would be a repulsive force and E would not be zero.

→ L. None of the above. ... see posted answers for explanation ...

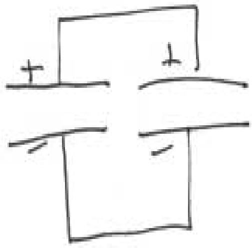
(Part 2) A 10 μF capacitor is charged by connecting it to a 12 V source. A 20 μF capacitor is separately charged to 15 V.

$C_1V_1 = Q_1 = (10\mu F)(12V) = \boxed{120\mu C}$ $\quad Q_2 = C_2V_2 = 20\mu F(15V) = \boxed{300\mu C}$

(a) Calculate the charge on each capacitor and the energy stored in each capacitor.

$U_1 = \frac{1}{2}C_1V_1^2 = \frac{1}{2}(10\mu F)(12V)^2 = 720\mu J$ $\quad U_2 = \frac{1}{2}C_2V_2^2 = \frac{1}{2}(20\mu F)(15V)^2 = \boxed{2250\mu J}$

The capacitors are now disconnected from their sources and connected to each other with positive plate to positive plate, and negative plate to negative plate.



(b) Find the effective capacitance of this combination.

in parallel ... $C_{tot} = C_1 + C_2 = 10 + 20 = 30\mu F$

(c) Determine the potential difference across this combination.

$Q_{tot} = 120\mu C + 300\mu C = 420\mu C$

$V = Q_{tot}/C_{tot} = 420\mu C / 30\mu F = 14\ V$

(d) What is the total energy stored in this combination?

$U_{tot} = \frac{1}{2}Q_{tot}V_{tot} = \frac{1}{2}(420\mu C)(14V) = 2940\mu J$

(e) Suppose the experiment is repeated but the capacitors are instead connected positive to negative and negative to positive. How do you expect the answers to parts (c) and (d) to change and why?

$Q_{tot} = 300\mu C + (-120\mu C)$ smaller Q because the + and − neutralize.

$U = \frac{1}{2}\frac{Q^2}{C}$ ... same C, smaller Q → smaller energy