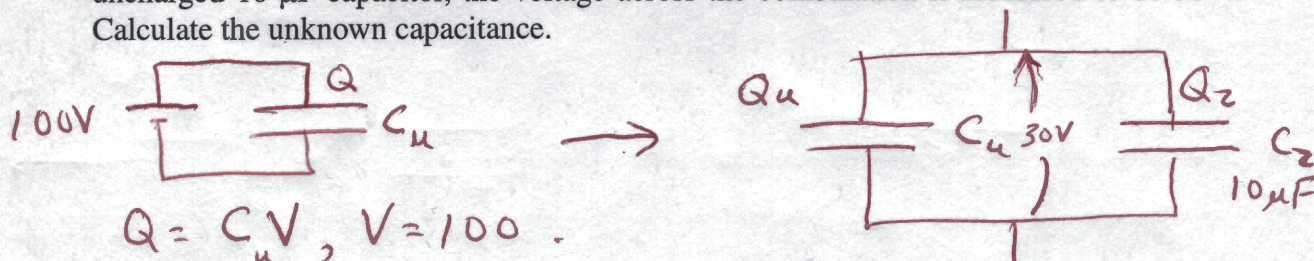


5. (10 pts.) An isolated capacitor of unknown capacitance has been charged to a potential difference of 100 V. When the charged capacitor is then connected in parallel to an uncharged $10\ \mu\text{F}$ capacitor, the voltage across the combination is measured to be 30 V. Calculate the unknown capacitance.

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$$Q = C_u V, V = 100.$$

C_u = unknown capacitance.

total charge Q splits into two: $Q = Q_u + Q_2$

$$C_2 = 10\ \mu\text{F}$$

$$V = 30\text{V}.$$

Now use conservation of charge and $Q = CV$.

$$Q = Q_u + Q_2$$

$$(C_u)(100) = (C_u)(30\text{V}) + (10\ \mu\text{F})(30\text{V})$$

$$70 C_u = 300\ \mu\text{C}$$

$$C_u = 4.29\ \mu\text{F}$$