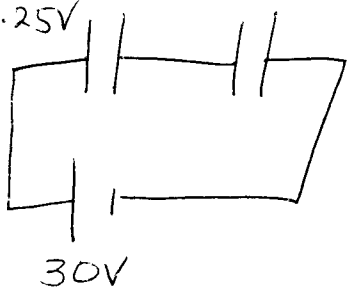
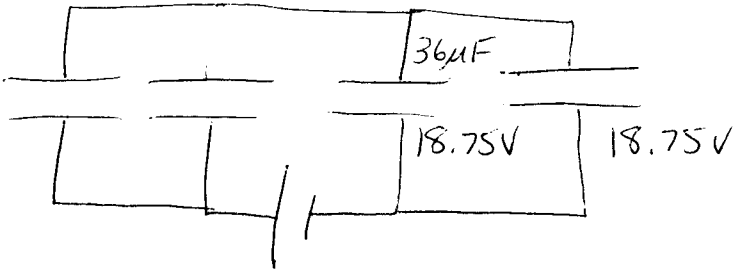
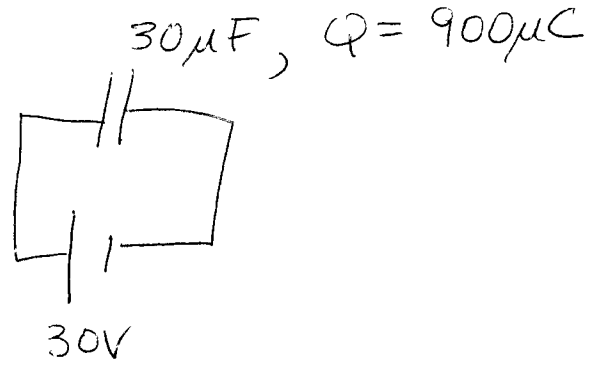


# Physics 210 - Solutions to Multiple Choice Week 6

1.  $900\mu\text{C}, 80\mu\text{F}$   $48\mu\text{F}, 900\mu\text{C}$   
 $11.25\text{V}$   $18.75\text{V}$



=

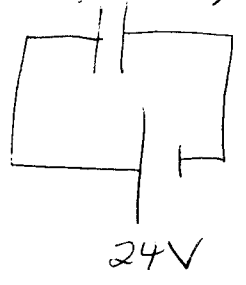


$$P.E = \frac{1}{2} CV^2$$

$$= \frac{1}{2} (36\mu\text{F})(18.75\text{V})^2$$

$$= 6.3\text{mJ}$$

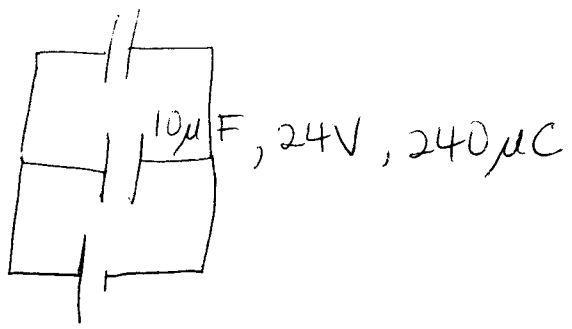
2.  $10\mu\text{F} + 5\mu\text{F} = 15\mu\text{F}$



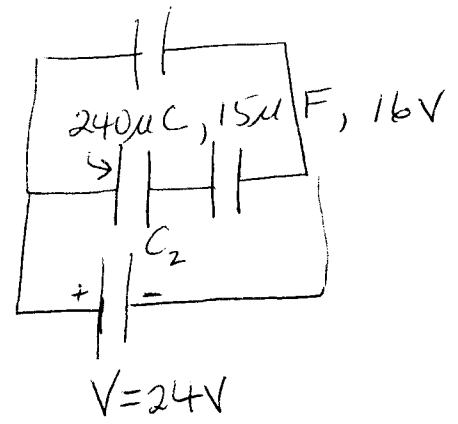
$$\frac{1}{15} + \frac{1}{30} = \frac{1}{C_T}$$

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

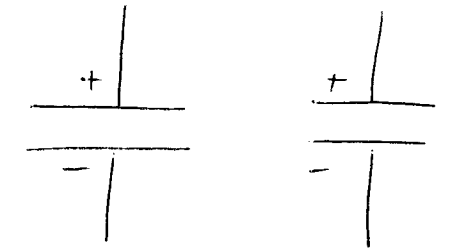
$$Q_T = 15\mu\text{F} \times 24\text{V} = 360\mu\text{C}$$



$$V_{C_2} = 16\text{V}$$



3



$$6\mu\text{F}$$

$$50\text{V}$$

$$300\mu\text{C}$$

$$4\mu\text{F}$$

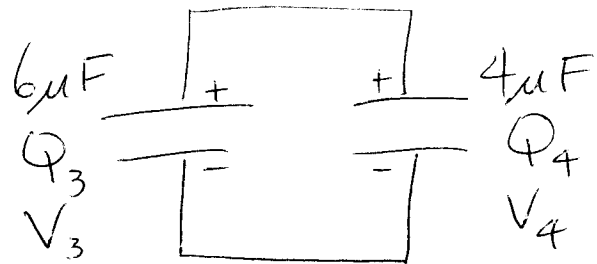
$$34\text{V}$$

$$136\mu\text{C}$$

$$Q_T = 300\mu\text{C} + 136\mu\text{C}$$

$$= 436\mu\text{C}$$

$$P.E._3 = \frac{1}{2} \frac{Q_3^2}{6\mu\text{F}} = 5.7\text{mJ}$$



$$Q_3 + Q_4 = 436\mu\text{C}$$

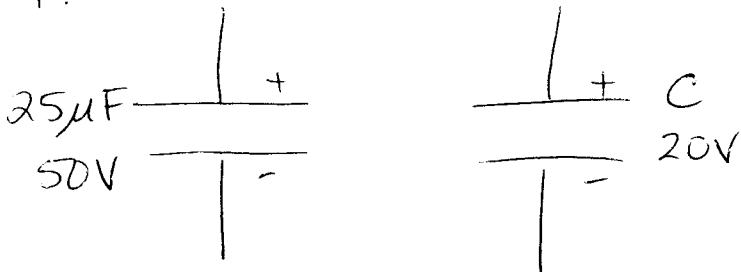
$$V_3 = V_4$$

$$\frac{Q_3}{6\mu\text{F}} = \frac{Q_4}{4\mu\text{F}}$$

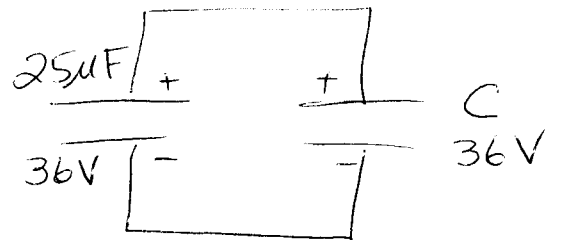
$$\frac{Q_3}{6} = \frac{436 - Q_3}{4}$$

$$Q_3 = 261.6\mu\text{C}$$

4.



$$Q_{\text{total}} = 25(50) + C(20)$$

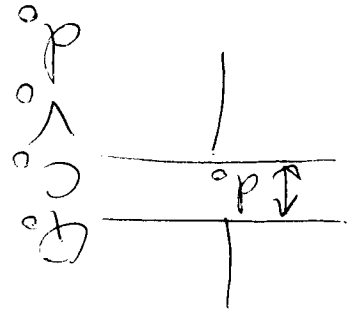


$$Q_{\text{total}} = 25(36) + C(36)$$

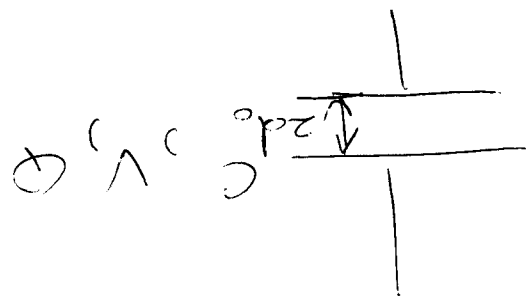
$$25(50) + C(20) = 25(36) + C(36)$$

$$C = 22\mu\text{F}$$

6



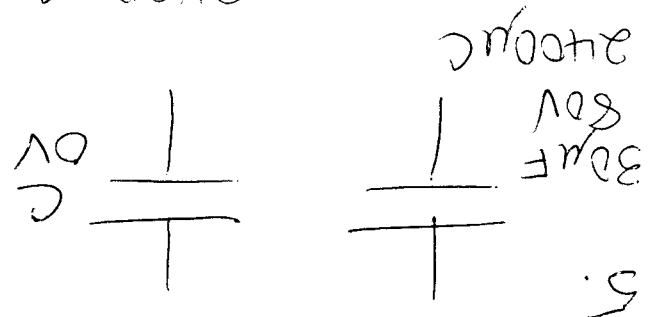
connected  $\Rightarrow V = V_0$



$$Q = CV = C \cdot \frac{V_0}{2} = \frac{CV_0}{2}$$

$$C = \frac{Q}{V} = \frac{Q}{\frac{V_0}{2}} = \frac{2Q}{V_0}$$

5.

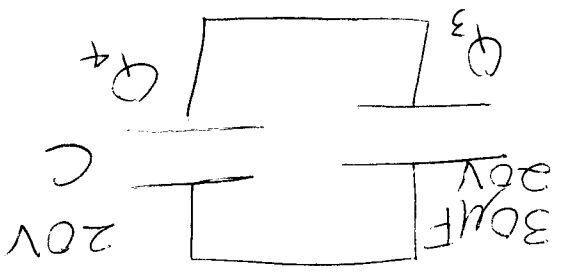


$$Q_{\text{total}} = 2400 \mu\text{C}$$

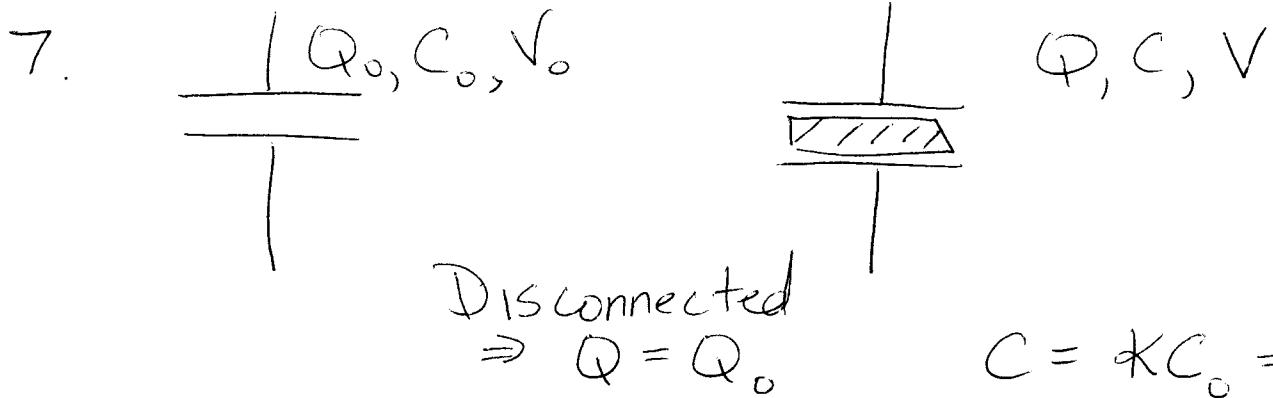
$$30(20) + C(20) = 2400$$

$$C = 90 \mu\text{F}$$

$$Q_{\text{tot}} = (30)(20) + C(20)$$



3



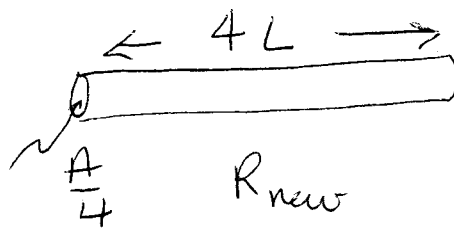
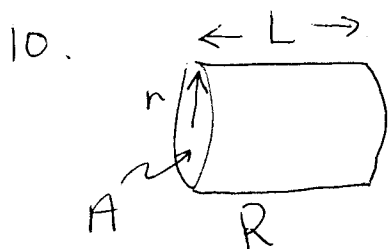
$$C = \kappa C_0 = 3C_0$$

$$V = \frac{Q}{C} = \frac{Q_0}{3C_0} = \frac{1}{3}V_0$$

8.  $P = 30 \text{ W}$   
 $V = 120 \text{ V}$   
 $I = \frac{P}{V} = \frac{30 \text{ W}}{120 \text{ V}} = 0.25 \text{ A}$

$$I = \frac{Q}{t} \quad Q = I \cdot t = (0.25 \text{ A})(60 \text{ s}) = 15 \text{ C}$$

9.  $R = \rho \frac{L}{A} \Rightarrow \rho = \frac{RA}{L} = \frac{(0.45 \Omega)(\pi(1.5 \times 10^{-3} \text{ m})^2)}{2 \text{ m}}$   
 $= 1.8 \times 10^{-7} \Omega \cdot \text{m}$



$$V_1 = V_2$$

$$AL = \left(\frac{A}{4}\right)(4L)$$

$$R = \rho \frac{L}{A}$$

$$R_{\text{new}} = \frac{\rho(4L)}{A/4} = 16R$$