PY 202

Exam: max 95

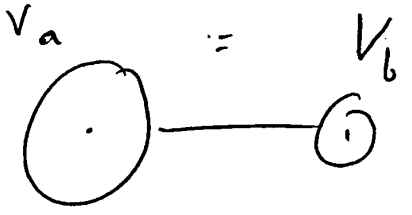
top 1/4 85

median 80

3/4 quartile · 72.5

min 54

ex

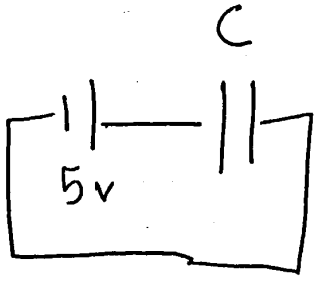


$V(\text{at center}) = V(r=a)$ ← Points!

$$V = -\int_{\infty}^{r=a} \vec{E} \cdot d\vec{\ell}$$ ← Points!

Quiz (clicker)

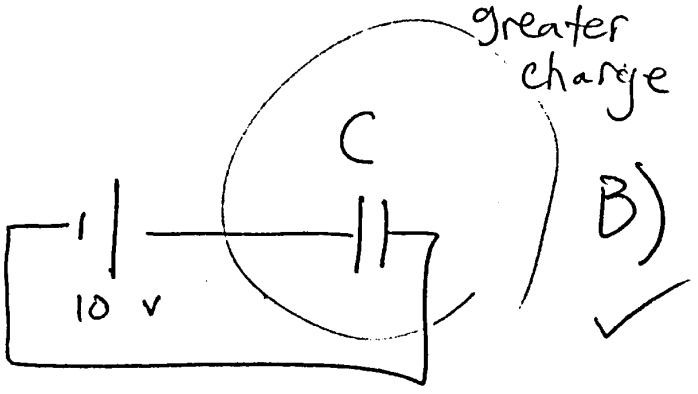
1)



Q's? $C = \frac{Q}{V}$

$Q = CV$

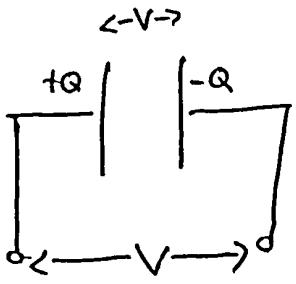
$Q_1 = CV_1$



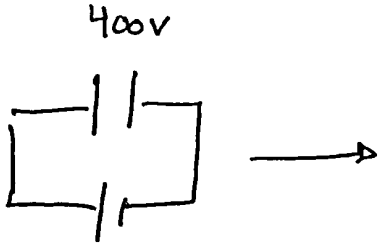
$V_1 \leq V$ Q_2

$Q_2 = CV_2$

1)



2)



Area A

distance d

I don't know capacitance as function of A and d!

but, it's something over d:

same area

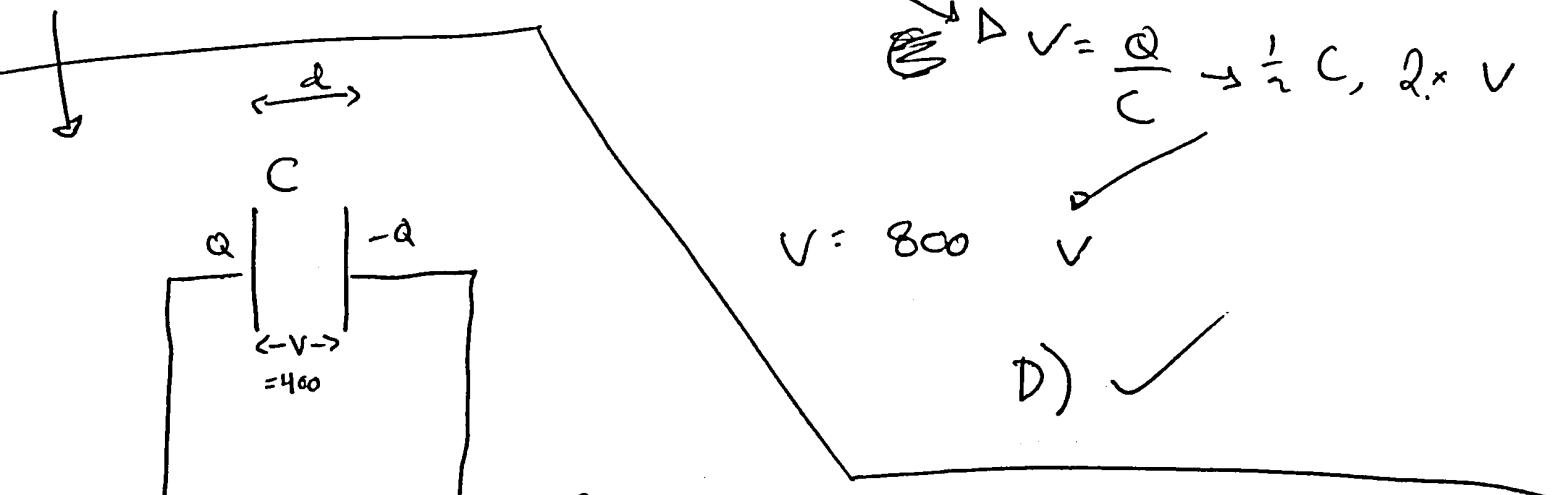
$C = \frac{k}{2d}$ ▷ $\frac{k}{d} \rightarrow \frac{k}{2d}$

▷ C → ½ C

▷ $V = \frac{Q}{C} \rightarrow \frac{1}{2}C,\ 2\times V$

V = 800 V

D) ✓

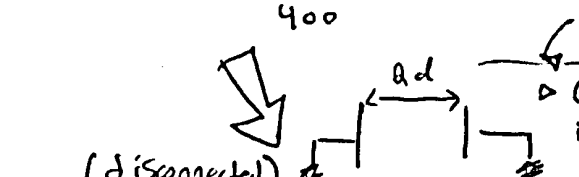


C, V known

$Q = CV = C(400\text{ v}) = Q_{old}$

▷ Q stays same. C, V will change.

▷ $C = \frac{\varepsilon_0 A}{d}$ → basically what I said.



▷ Quiz takeaway: $C = \frac{\varepsilon_0 A}{d}$

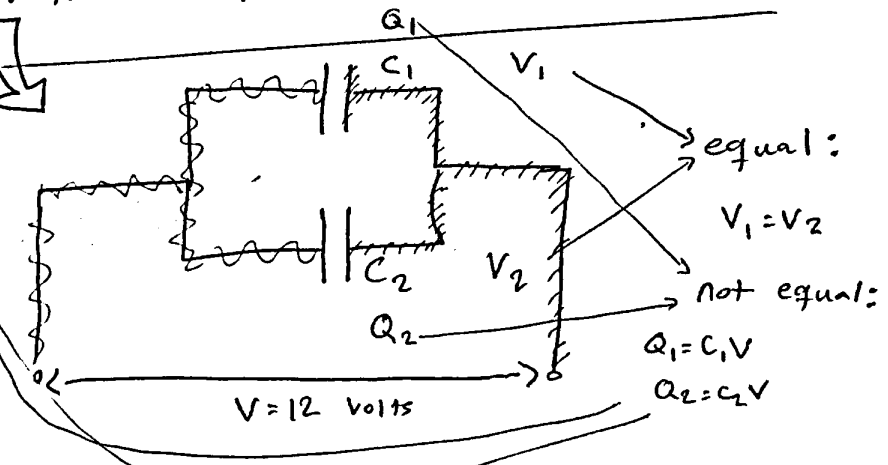
$$C = \frac{Q}{V}$$

$$\text{capacitance} = \frac{\text{charge on capacitor}}{\text{potential difference across capacitor}}$$

↑ Property of device

C_{eq} Derivation Method

Connecting Capacitors



$Q_{tot} = Q_1 + Q_2 = C_1 V + C_2 V$

$= V(C_1 + C_2)$

"$Q = C_{eq} V$"

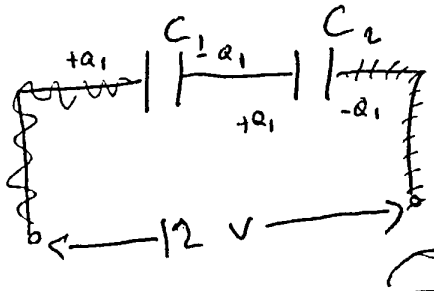
Parallel

anything connected by conducting wire (⌇ or ⌇) is at same potential

▷ in parallel : $C_{eq} = C_1 + C_2$

$V_1 + V_2 = 12 \text{ volt} = V_{tot}$

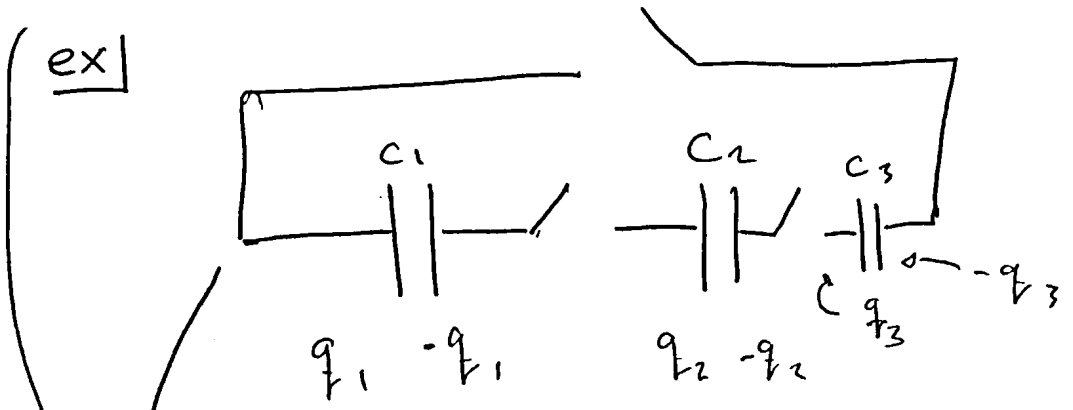
$\frac{Q_1}{C_1} + \frac{Q_2}{C_2} = V_{tot}$



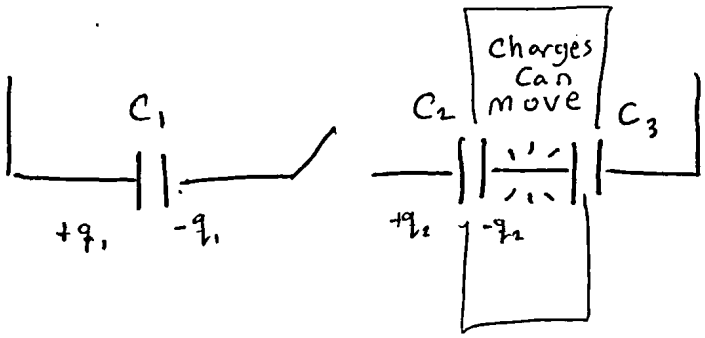
Series

$$Q\left(\frac{1}{C_1} + \frac{1}{C_2}\right) = \frac{Q}{C_{eq}} \Rightarrow \frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} \Rightarrow C_{eq} = \frac{C_1 C_2}{C_1 + C_2}$$

ex

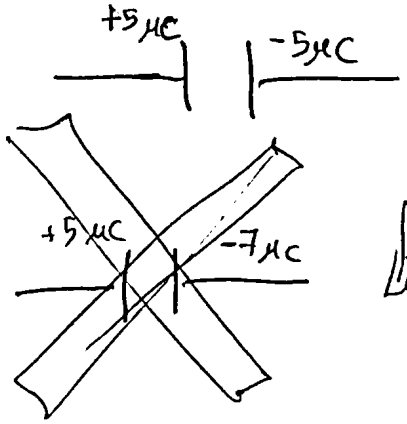


$$V_1 = V_2 = V_3$$

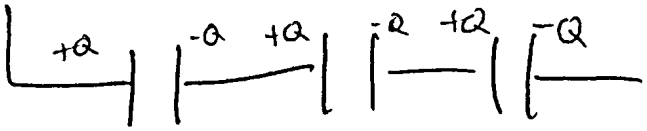


$$V_1 = V_2 = V_3$$

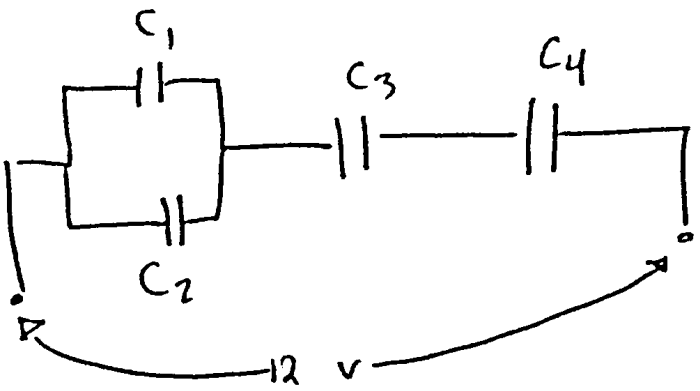
ex



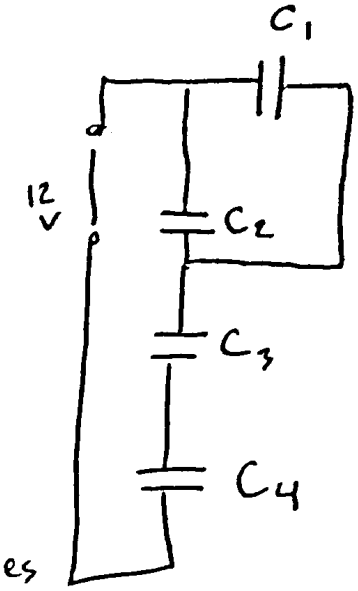
Not A Capacitor!

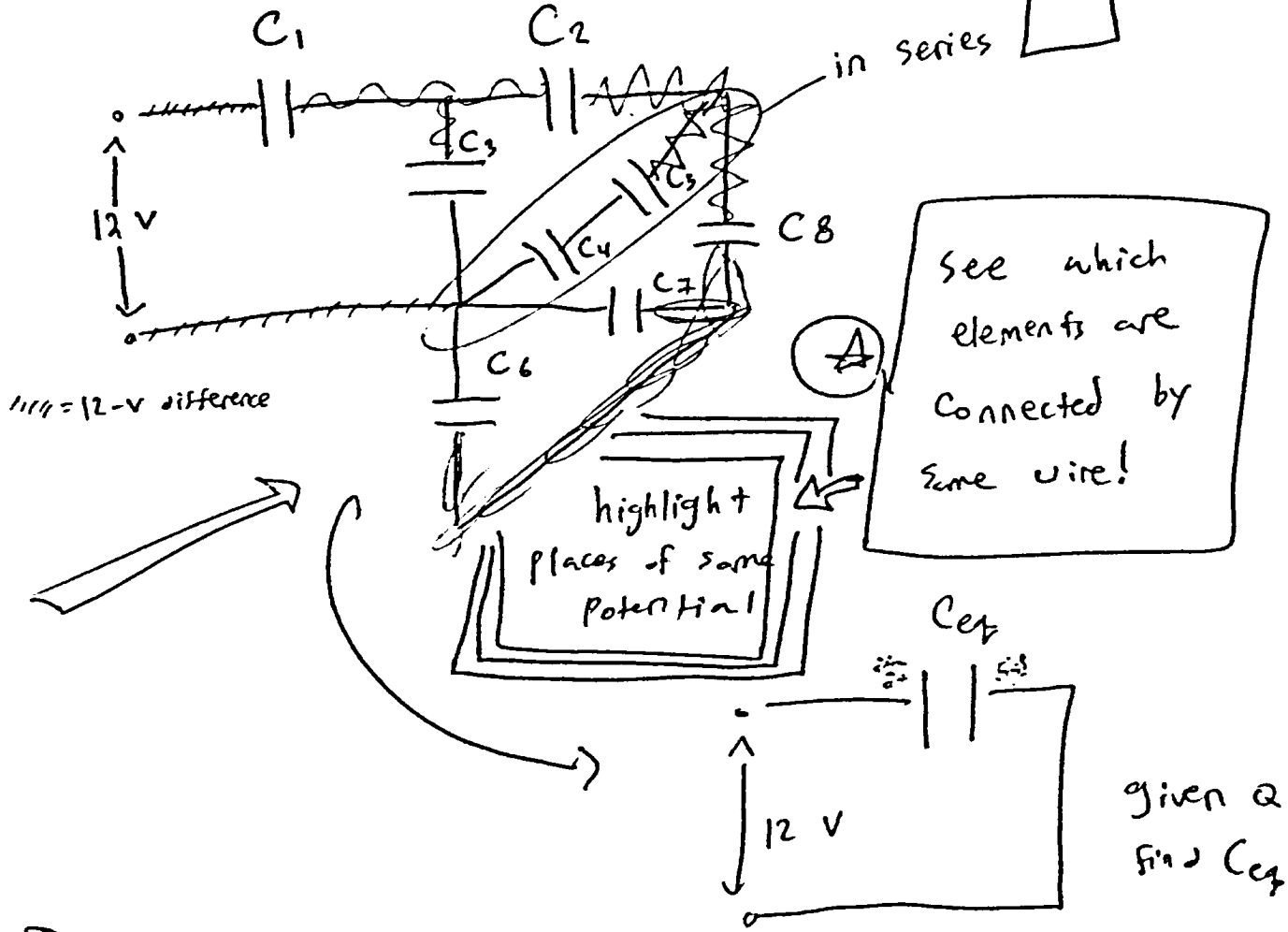


ex


C1
C3
C4
C2
12 V

=


C1
12 V
C2
C3
C4


C1
C2
in series
C3
C5
C4
C8
C7
12 V
C6
= 12-V difference
highlight
places of same
potential
See which
elements are
connected by
same wire!
Ceq
12 V
given Q,
find Ceq

- Demos