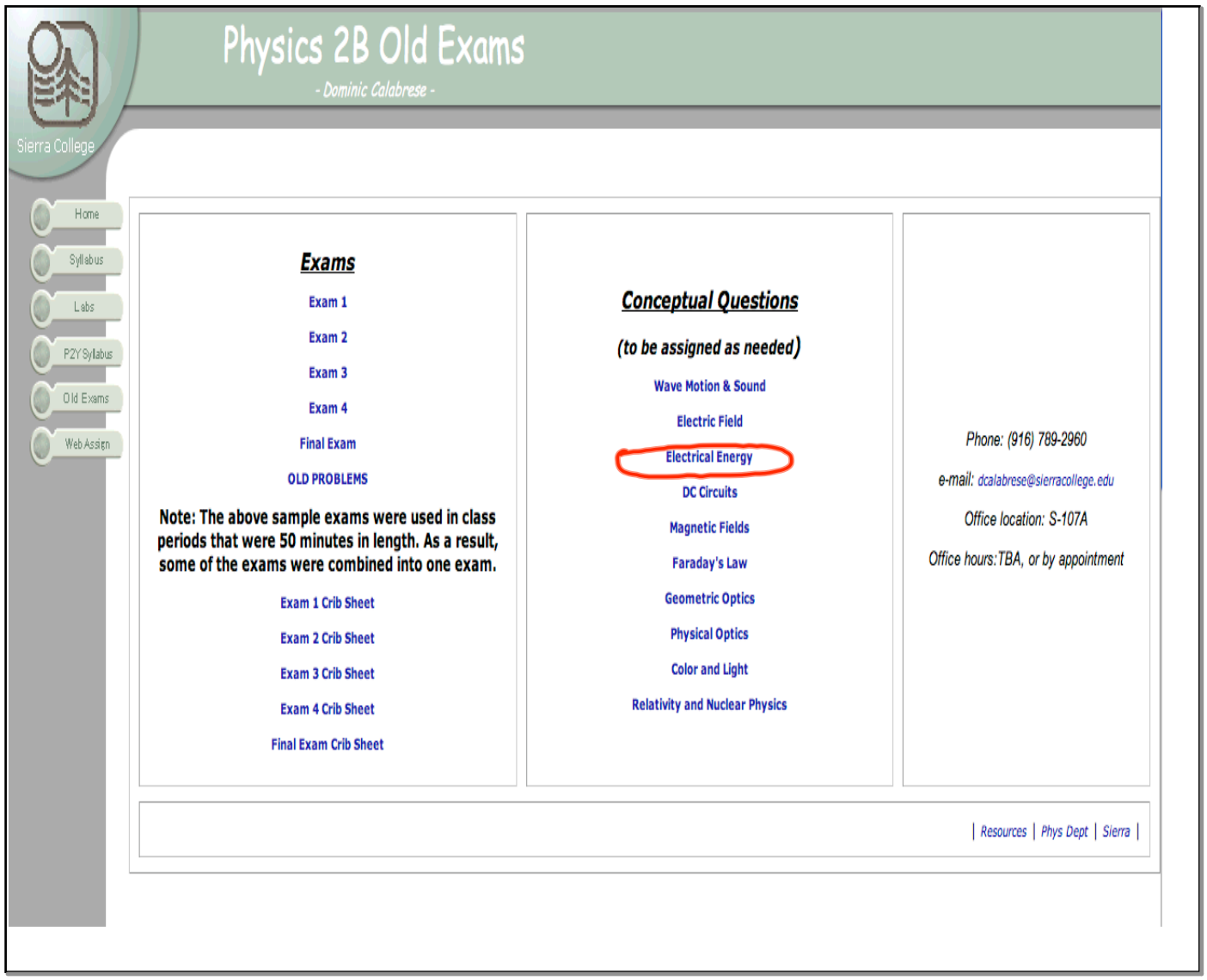
Reminders 2-19-08:
-Next Webassign Due February 20
-Electric Energy Conceptual Questions Due 2/26
-Start Reading Chapter 16
-Do not DRY LAB EXPERIMENTS!!!

Objectives:
-More on Electrical Potential
-Capacitance
-Capacitors in Series and Parallel


Physics 2B Old Exams
- Dominic Calabrese -
Sierra College
Home
Syllabus
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Web Assign
Exams
Exam 1
Exam 2
Exam 3
Exam 4
Final Exam
OLD PROBLEMS
Note: The above sample exams were used in class periods that were 50 minutes in length. As a result, some of the exams were combined into one exam.
Exam 1 Crib Sheet
Exam 2 Crib Sheet
Exam 3 Crib Sheet
Exam 4 Crib Sheet
Final Exam Crib Sheet
Conceptual Questions
(to be assigned as needed)
Wave Motion & Sound
Electric Field
Electrical Energy
DC Circuits
Magnetic Fields
Faraday's Law
Geometric Optics
Physical Optics
Color and Light
Relativity and Nuclear Physics
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Office location: S-107A
Office hours:TBA, or by appointment
| Resources | Phys Dept | Sierra |

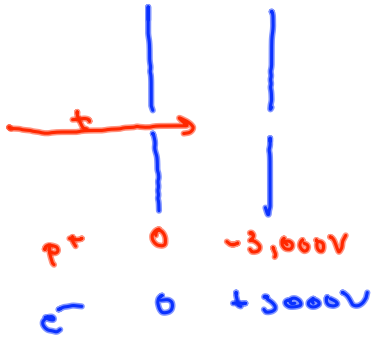
- A potential difference of 100 volts is applied between two parallel plates that are spaced 10.00 cm apart. What is the electric field (potential gradient) between the two plates?

$$|\vec{E}| = \left|\frac{\Delta V}{\Delta s}\right| = \frac{100\,\text{Volts}}{.10\,\text{m}} = 1000\left(\frac{V}{m}\right)$$

$$\frac{N}{C} = \frac{V}{m} = \frac{J}{C}\frac{1}{m} = \frac{N \cdot m}{C\,m}$$

- **A proton is accelerated to a potential of 3kV in a uniform E-field that is produced by two parallel plates that are separated by 5.0cm. What are the subsequent kinetic energy and speed of the proton. Take home problem, repeat question for the electron.**

Answer: 3keV=4.8x10^{-16}J; 7.6x10^{5}m/s: 3kV=4.8x10^{-16}J (if final V=-3kV); 3.2x10^{7}m/s



$\frac{1}{2}mv^2 = -q\Delta V = -q(-3000)$

$v = \sqrt{\frac{2q(3000)}{m}}$

$v = \sqrt{\frac{2(1.6\times10^{-19})(3000)}{1.67\times10^{-27}\,kg}}$

$= 7.6\times10^{5}\ m/s$

$KE = |q\Delta V| = (1.6\times10^{-19})(3000V) = 4.8\times10^{-16}\,J$

$= 3000\,eV$

$m_e = 9.11\times10^{-31}\,kg$

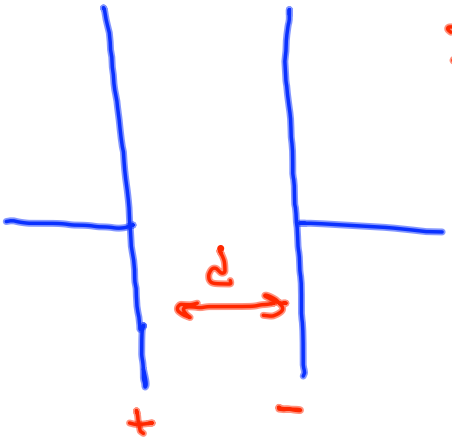
$v = \sqrt{\frac{2(1.6\times10^{-19})(3000)}{9.11\times10^{-31}}}$

$= 3.2\times10^{7}\ m/s$

What is $\vec{a}$ for proton.

$F = qE = q\frac{\Delta V}{\Delta x} = ma$

$a = \frac{q\Delta V}{m\Delta x} = \frac{(1.6\times10^{-19})(3000)}{(1.67\times10^{-27})(.05m)}$



Increase separation

Q doesn't Change

$\vec{E}$, doesn't change

V, Increases

C, decreases

$$\vec{E} = \frac{\sigma}{\epsilon_0} = \frac{Q}{A\epsilon_0}$$

$$E = \frac{\Delta V}{d}$$

$$Q = CV$$

$$C = \frac{\epsilon_0 A}{d}$$

Parallel

$Q_T = Q_1 + Q_2$

$= C_1 V + C_2 V = C_{eff} V$

$= V(C_1 + C_2) = C_{eff} V$

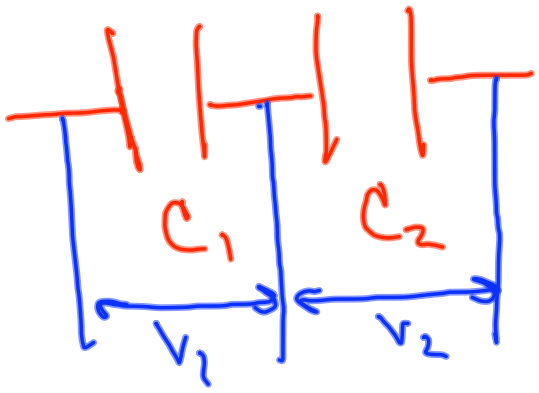
$C_{eff} = C_1 + C_2$

$C_{eff} = C_1 + C_2 + C_3 + \cdots$

Series

$Q = CV$

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



$V_{BATTERY} = V_1 + V_2$

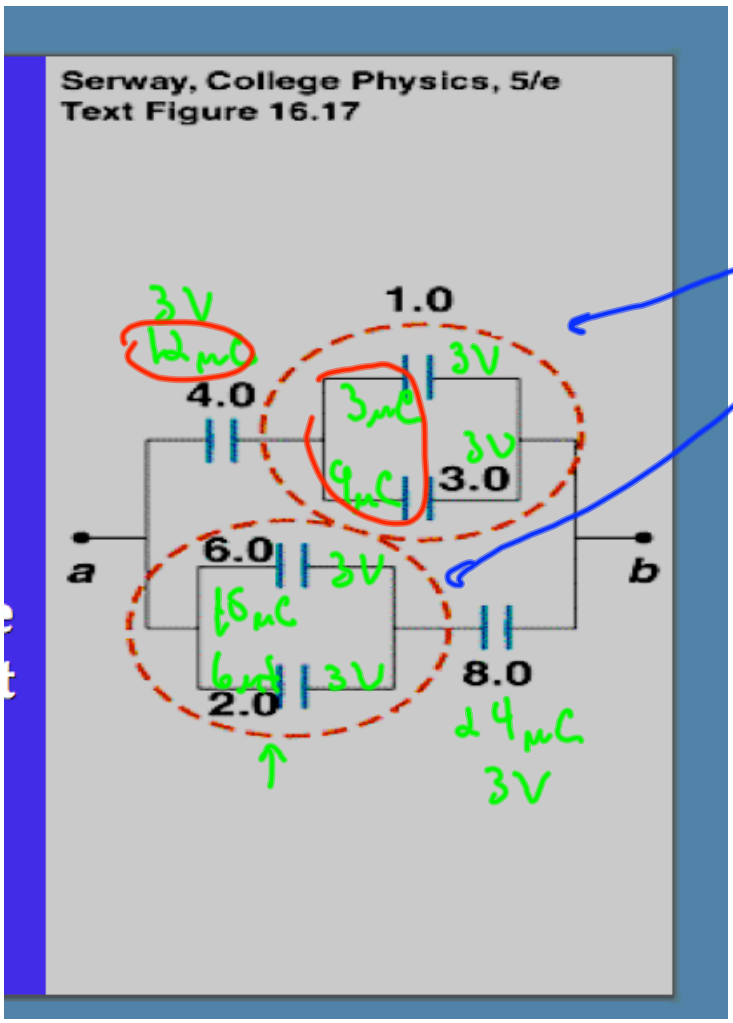
$\frac{Q}{C_{eq}} = \frac{Q}{C_1} + \frac{Q}{C_2}$

$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2}$

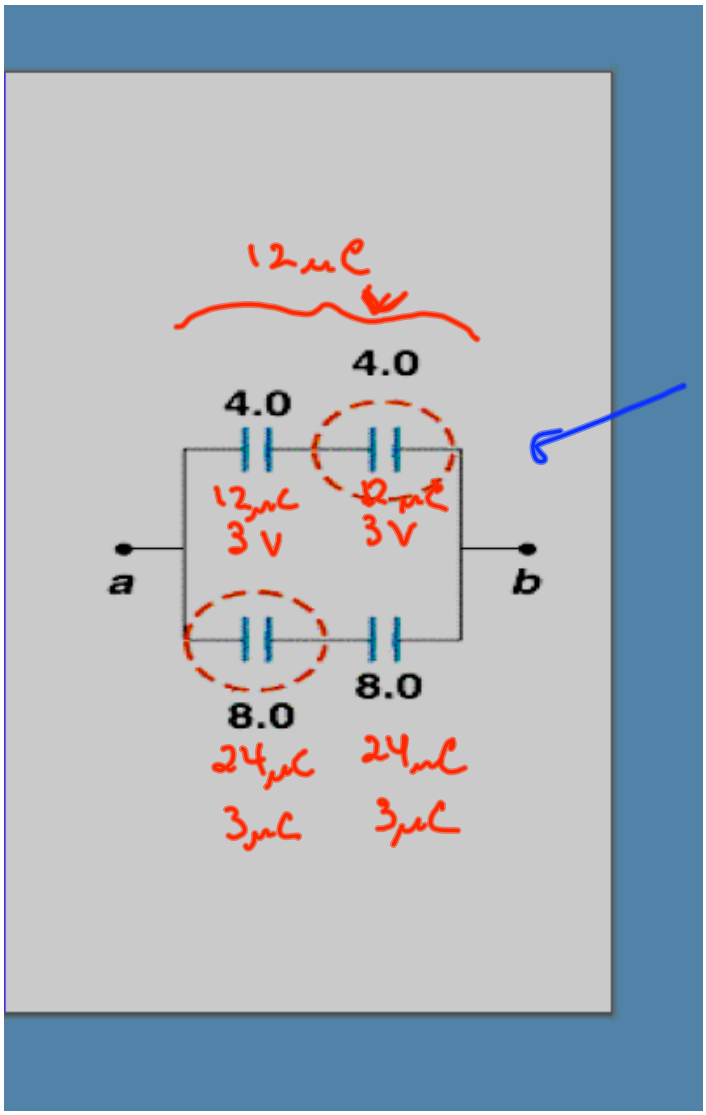
$= \frac{1}{1} + \frac{1}{1} = \frac{1}{C_{eq}}$

$= 2 = \frac{1}{C_{eq}}$

$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots$



Replace with equivalent Cap.

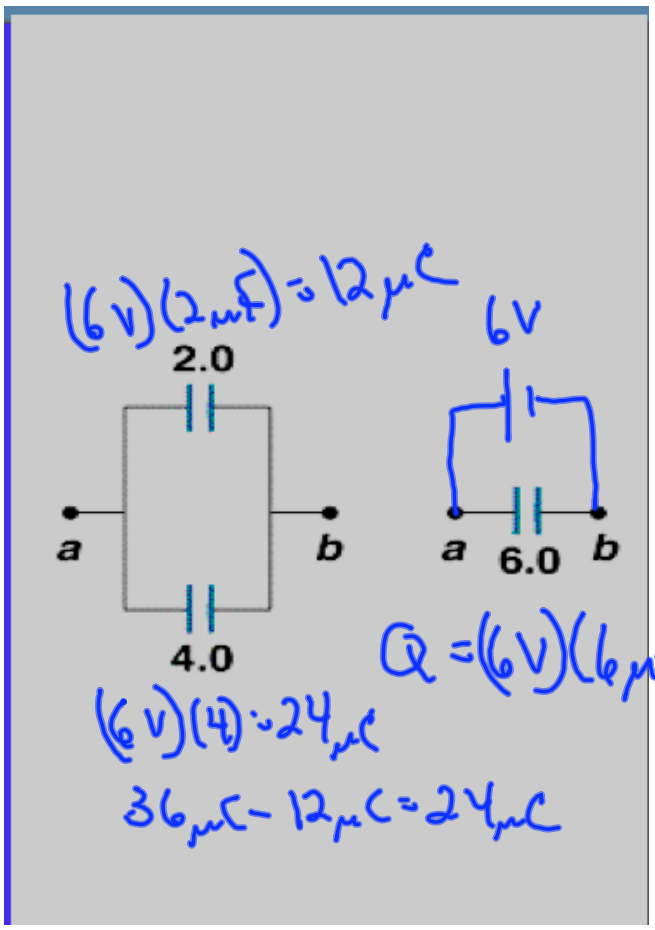


$\frac{1}{C_{eq}} = \frac{1}{4} + \frac{1}{4}$

$C_{eq} = 2$

$\frac{1}{C_{eq}} = \frac{1}{8} + \frac{1}{8}$

$C_{eq} = 4\,\mu F$



$(6V)(2\mu F) = 12\mu C$

$Q = (6V)(6\mu F) = 36\mu C$

$(6V)(4) = 24\mu C$

$36\mu C - 12\mu C = 24\mu C$

Capacitors

- A parallel plate capacitor is shown below. The area of each plate is A. Each dielectric takes up half the region between the plates. Show that

$$C=\varepsilon_o(\kappa_1+\kappa_2)A/2d$$