HW 7.6 p 573 Reading 66, 67, 68, 69 (4) 6
WS #7 questions

(4) plus WS #7 actual grade

p573 – Reading

- electric eels

66) $C = 1.0\ F$ $V = .10V$ $q = ?$

$C = q/V$ $\quad q = CV$

$= (1.0\ F)(.10V)$

$= .1C$

67)  Place two 1.0 F capacitors in series

- net pot diff?

$V_{net} = V_1 + V_2$

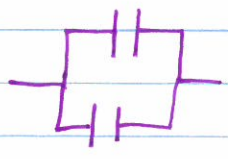
$= .1V + .1V$

$= .2V$

(4)

68) Discharge two capacitors, how much q?

series $Q_T = Q_1 = Q_2 = .1C$ (same as single)

69)  Place two 1.0F capacitors in parallel, net pot diff

$V_T = V_1 = V_2 = .10V$

Name Key

Electric Circuits HW#7

Already graded this

- Read the textbook section regarding Capacitors in Circuits from Mrs.Nadworny's webpage.
- In Mastering Physics, complete the Reading Passage questions.
- Complete the following questions. Show all work. If you need more room, attach looseleaf.

(5)

1. A 4.0 μF and an 8.0 μF capacitor are connected in parallel across a 25 V battery. Find (a) the equivalent capacitance and (b) the total charge stored in the two capacitors.

$C_1 = 4\,\mu F$
$C_2 = 8\,\mu F$
parallel
$V_T = 25V$

(1)

a) $C_{\parallel} = ?$ $\quad C_{\parallel} = C_1 + C_2 = 4\,\mu F + 8\,\mu F = 12\,\mu F$ (4)

b) $q_{tot} = ?$ $\quad q = CV = (12\times10^{-6}F)(25V) = 3.0\times10^{-4}C$ (4)

2. Three capacitors (4.0, 6.0, and 12.0 μF) are connected in series across a 50.0 V battery. Find the voltage across the 4.0 μF capacitor.

$C_1 = 4.0\,\mu F$
$C_2 = 6.0\,\mu F$
$C_3 = 12.0\,\mu F$
$V_T = 50.0V$
series
$V_1 = ?$

(2)

① $C_{tot} = \left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}\right)^{-1} = \left(\frac{1}{4\,\mu F} + \frac{1}{6\,\mu F} + \frac{1}{12\,\mu F}\right)^{-1}$ (2)

$= 2\,\mu F$

② $Q_T = Q_1 = Q_2 = Q_3$ (2)

$Q = CV = (2\times10^{-6}F)(50.0V) = 1.0\times10^{-4}C$

③ $V_1 = \frac{Q}{C} = \frac{1.0\times10^{-4}C}{4.0\times10^{-6}F} = 25V$ (2)

3. A 3.0 μF capacitor and a 4.0 μF capacitor are connected in series across a 40.0 V battery. A 10.0 μF capacitor is also connected directly across the battery terminals. Find the total charge that the battery delivers to the capacitors.

$C_1 = 3.0\,\mu F$
$C_2 = 4\,\mu F$
) series w/ $V_T = 40V$

$C_3 = 10\,\mu F$
parallel w/ battery

(2)

$Q_T = ?$

① series: $C_s = \left(\frac{1}{C_1} + \frac{1}{C_2}\right)^{-1}$

$= \left(\frac{1}{3\,\mu F} + \frac{1}{4\,\mu F}\right)^{-1}$ (2)

$C_{1,2} = 1.7\,\mu F$

② $C_{Tot} = C_{1,2} + C_3 = 1.7\,\mu F + 10\,\mu F$ (2)

$= 11.7\,\mu F$

③ $Q_T = C_T V_T = (11.7\times10^{-6}F)(40V)$ (2)

$= 4.7\times10^{-4}C$