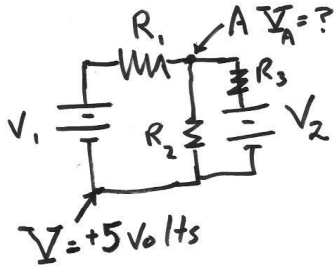


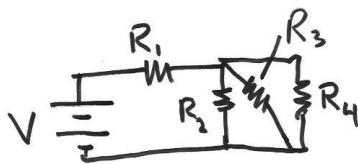
Physics 4B: Problem Set 6 Circuits

1. Find the electric potential at point A in the diagram.



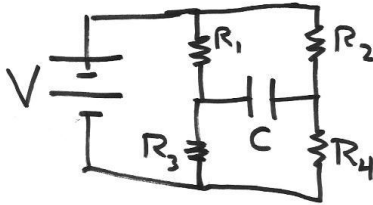
Let  $V_1 = 12$  volts and  $V_2 = 6$  volts.  $R_1 = 10 \Omega$ ,  $R_2 = 20 \Omega$  and  $R_3 = 30\Omega$ .

2. For a real battery of emf  $E$  and an internal resistance of  $r$ , find the “load resistance”  $R_L$  which maximizes the power delivered to that load.
3. For an RC series circuit, derive the voltage across the capacitor as a function of time for the charging part of the cycle.
4. Derive the power dissipated in a resistor when then there is a voltage across it,  $V$ , and a current through it,  $I$ .
5. Solve the circuit given in the diagram for all the currents.



Let  $V = 20$  volts:  $R_1 = 10 \Omega$ ,  $R_2 = 20 \Omega$  and  $R_3 = 30\Omega$   $R_4 = 40\Omega$ .

6. Find the voltage across the fully charged capacitor as shown in the diagram.



Let  $V = 20$  volts:  $R_1 = 10 \Omega$ ,  $R_2 = 20 \Omega$  and  $R_3 = 30\Omega$   $R_4 = 40\Omega$ .

7. Find the resistance of the resistor shown in the diagram given the resistivity of the material it is made from.

