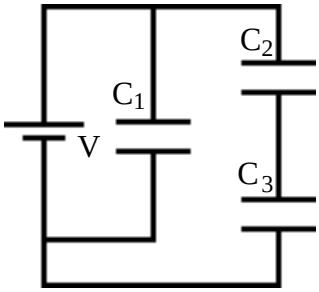
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. In the circuit at the right the battery has a potential difference of 9.00V. Find (a)the charge on each capacitor, (b)the potential difference across each capacitor, and (c)the total charge that flows through the battery (C_1=200μF, C_2=150μF, and C_3=300μF).



Q(μC)	C(μF)	V(V)
	200	
	150	
	300	
	battery	9.00

2. A solid metal sphere of radius a is surrounded by a concentric conducting spherical shell of radius b. You do NOT need to find the actual equation for the capacitance of the system. Instead, describe in words how you would go about deriving the theoretical equation for the capacitance of this system. Be sure to state the names of the basic principles you would use. What quantities will appear in the equation for the capacitance? How could you test your predicted equation?

3. A coil of wire has a total length of 31.4m. The diameter of the wire itself is 2.00mm. When a 1.00V potential difference is created across the wire, the resulting current is 6.29A. Make an educated guess about the material the wire is made from. Explain your reasoning.

4. A D-cell (1.50V emf) battery is connected to a circuit that has a total resistance of 165Ω. The resulting current is 8.33mA. Find (a)the internal resistance of the battery and (b)the terminal voltage of the battery.

5. A 20.0μF capacitor charged up to 9.00V, is shorted out with a piece of copper wire. The charge on the capacitor is 99% gone after 3.00ms. Find the resistance of the piece of wire.