

NAME \_\_\_\_\_  
PERIOD \_\_\_\_\_ DATE \_\_\_\_\_

**PHYSICS QUIZ #44D**  
**CAPACITORS**

Consider a capacitor consisting of two parallel plates, each with an area of  $A = 3.95 \text{ m}^2$ , separated by a distance of  $d = 0.00150 \text{ mm}$ . The space between these two parallel plates is initially filled with mica. This capacitor is initially connected to a 9.00 volt battery until equilibrium has been reached.

1. What is the capacitance of this parallel plate capacitor? [3 pts]

2. How much charge will be stored on each plate of this capacitor after it reaches equilibrium? [3 pts]

<u>DIELECTRIC MATERIAL</u>	<u>DIELECTRIC CONSTANT K</u>
AIR	1.0
PARAFFIN	2.2
POLYETHYLENE	2.3
POLYSTYRENE	2.5
HARD RUBBER	2.8
MICA	6.0
GLASS	8.0
$\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$	

**This capacitor is then removed from the battery and the mica in the space between the plates is then removed.**

3. What will be the potential difference between the plates of this capacitor after the insulator has been removed? [3 pts]

4. How much work will be required to remove the insulator from the space between the plates?

**A second capacitor, which has plates with 3.0x the area of the original capacitor, with plates that are 1/5 the distance apart and are separated by glass rather than mica, is connected to the original capacitor.**

5. How much charge will remain on each capacitor after equilibrium has been reached? [3 pts]