1. A capacitor initially has a capacitance of C. If a dielectric with a dielectric constant of 3 is added between the plates of the capacitor, what is the new capacitance?

   A) $\frac{C}{9}$

   B) $\frac{C}{3}$

   C) C

   D) $3C$

   E) $9C$

2. An electric potential of V_0 is initially applied to a capacitor. If a dielectric with a dielectric constant of κ is added between the plates of the capacitor, what is the new electric potential that must be applied in order for the charge on the capacitor to stay the same?

   A) V_0/κ^2

   B) V_0/κ

   C) V_0

   D) κV_0

   E) $\kappa^2 V_0$

3. Dielectrics are

   A) materials that do not allow free motion of charges placed on them

   B) materials that allow free motion of charges placed on them

   C) materials that do not allow motion of charges within the molecules from which they are made

   D) materials that produce an electric field to increase the applied electric field

   E) materials that decrease the capacitance of a capacitor

4. What is the net effect of a dielectric on the electric field of a capacitor?

   A) A shift of negative charge to the surface of the dielectric nearest to the positively charged plate and the shift of a positive charge to the surface nearest the negatively charged plate

   B) A shift of positive charge to the surface of the dielectric nearest to the positively charged plate and the shift of a negative charge to the surface nearest the negatively charged plate

   C) A shift of positive charge to the surface of the dielectric nearest to the positively charged plate and the shift of a positive charge to the surface nearest the negatively charged plate

   D) A shift of negative charge to the surface of the dielectric nearest to the positively charged plate and the shift of a negative charge to the surface nearest the negatively charged plate

   E) No shift of charge takes place

5. The dielectric constant of most materials is typically of which order of magnitude?

   A) 10^{-5}

   B) 10^{-1}

   C) 10^1

   D) 10^{15}

   E) 10^{10}

6. A capacitor initially has a capacitance of C_0. A dielectric, $\kappa = 2$ is placed between the plates of the capacitor and the separation between the plates is doubled. What is the new capacitance?

   A) $C_0/4$

   B) $C_0/2$

   C) C_0

   D) $2C_0$

   E) $4C_0$

7. A capacitor initally filled with a dielectric has a capacitance of C_0. The dielectric is replaced with another that has half the value and the area of the plates are tripled. What is the new capacitance?

A) $C_0/3$

B) $2C_0/3$

C) C_0

D) $3C_0/2$

E) $6C_0$

8. A voltage V_0 is initally applied to a capacitor. A dielectric of $\kappa = 3$ is added between the plates and the distance between the plates is halved. What is the new voltage that must be applied for the charge on the capacitor to remain the same?

A) $V_0/6$

B) $V_0/3$

C) V_0

D) $3V_0$

E) $6V_0$

9. A capacitor initially has a capacitance of C. A dielectric is added to the capacitor such that its new capacitance is $3C$. Which of the following best explains why this occurs?

A) The electric field is increased by the dielectric, which decreases the voltage while the charge remains the same.

B) The electric field is decreased by the dielectric, which decreases the voltage while the charge remains the same.

C) More charge is induced on the plates of the capacitor while the electric field and the voltage both remain the same.

D) Work is done in order to move the dielectric into the electric field.

E) The voltage and the charge increase in proportion due to an increase in the electric field.

Answer Key
[New Exam]

1.   D

2.   B

3.   A

4.   A

5.   C

6.   C

7.   D

8.   A

9.   B

Name _____   Class _____   Date _____

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____