Pratt, Scott **Section 999**

–Introductory Physics II - EXAM 1 - Feb. 5, 1996

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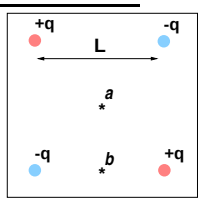
1. [1pt] Two point charges, $Q_1 = Q_2 = 2.0 \times 10^{-6} C$ are separated by 0.45 m. What is the magnitude of the force on Q_1 due to Q_2 (in N)?

A) 4.27×10^{-2} B) 5.68×10^{-2} C) 7.55×10^{-2} D) 1.00×10^{-1}
E) 1.34×10^{-1} F) 1.78×10^{-1} G) 2.36×10^{-1} H) 3.14×10^{-1}

2. [1pt] If the separation is doubled, what is the magnitude of the force on Q_2 due to Q_1 (in N)?

A) 2.02×10^{-2} B) 2.37×10^{-2} C) 2.77×10^{-2} D) 3.24×10^{-2}
E) 3.79×10^{-2} F) 4.44×10^{-2} G) 5.19×10^{-2} H) 6.08×10^{-2}



3. [1pt] Consider two positive charges q and two negative charges $-q$ arranged in a square of length L. Point a is at the center of the square, while point b is at the midpoint of the lower leg. (Give ALL correct answers, i.e., B, AC, ...)

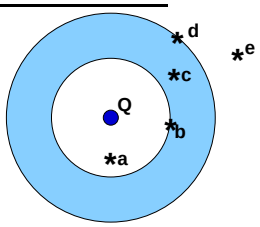
A) The electric field at a is zero.

B) The electric potential at b is zero.

C) The electric potential at a is zero.

4. [1pt] What is the work (in J) required to move one of the charges to infinity, while leaving the rest of the charges in place? DATA: $q = 8.50 \times 10^{-10}$ C, $L = 0.5$ m.

A) 8.60×10^{-9} B) 1.07×10^{-8} C) 1.34×10^{-8} D) 1.68×10^{-8}
E) 2.10×10^{-8} F) 2.62×10^{-8} G) 3.28×10^{-8} H) 4.10×10^{-8}



5. [1pt] Consider a spherical CONDUCTING shell with NO NET CHARGE, with a point charge, $+Q$, placed at its center. (Give ALL correct answers, i.e., B, AC, BCD...)

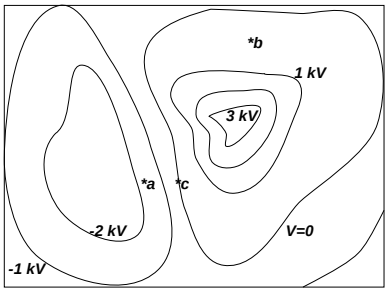
A) The electric field at e is zero.

B) The inner surface of the shell carries a charge $-Q$.

C) The electric field at c is zero.

6. [1pt] The plates of a parallel plate capacitor each have an area of 0.5 m^2, and are separated by a distance 0.035 m. The potential difference between the plates is 100 V. What is the magnitude of the electric field (in V/m) inside the capacitor?

A) 1.21×10^3 B) 1.37×10^3 C) 1.55×10^3 D) 1.75×10^3
E) 1.98×10^3 F) 2.24×10^3 G) 2.53×10^3 H) 2.86×10^3

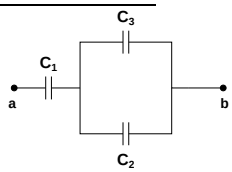


7. [1pt] Consider the plot of electric potential vs. position shown above. Equipotential lines are separated by 1000 volts. (Give ALL correct answers, i.e., B, AC, ...)

A) The electric field at a points more west than east.

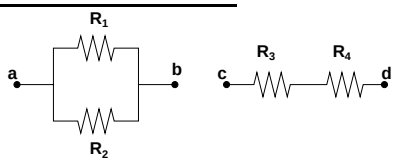
B) The electric field is stronger at c than at b.

C) An electron at c feels no force.



8. [1pt] What is the equivalent capacitance C_{ab} (in F)? DATA: C_1=0.5 F. $C_2 = C_3$=0.28 F.

A) 5.98×10^{-2} B) 8.66×10^{-2} C) 1.26×10^{-1} D) 1.82×10^{-1}
E) 2.64×10^{-1} F) 3.83×10^{-1} G) 5.55×10^{-1} H) 8.05×10^{-1}

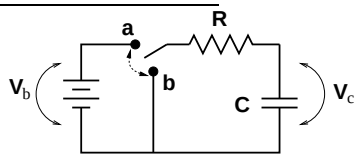


9. [1pt] Consider the sections of two circuits illustrated above. (Give ALL correct answers, i.e., B, AC, BCD...)

A) R_{ab} is always less than or equal to R_1.

B) R_{cd} is always less than or equal to R_3.

C) After connecting a and b to a battery, the voltage across R_1 always equals the voltage across R_2.



After being in position b for a long time the switch is changed to position a, making contact with a at time $t = 0$. DATA: V_b =11.0V, $C = 5 \times 10^{-3} F$, R =175 Ω.

10. [1pt] Give all correct answers, i.e. AC,BC...

A) In the instant after the switch is changed to a, the voltage across the resistor is zero.

B) In the instant after the switch is changed to a, the voltage across the capacitor is zero.

C) After waiting a long time after the switch is thrown to a, the voltage across the resistor is zero.

11. [1pt] What is the current (in amperes) through the resistor at $t = 2.0$ seconds?

A) 5.11×10^{-3} B) 6.39×10^{-3} C) 7.99×10^{-3} D) 9.99×10^{-3}
E) 1.25×10^{-2} F) 1.56×10^{-2} G) 1.95×10^{-2} H) 2.44×10^{-2}