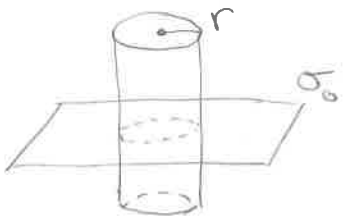
Quiz

Consider an insulating plane with surface charge density σ_0. If a cylindrical Gaussian surface passes through the plane and perpendicular to it, what is q_{enc} for Gauss's Law?



(a) $2\pi r \sigma_0$

(b) $\pi r^2 \sigma_0$

(c) $4\pi r^2 \sigma_0$

(d) $\frac{4}{3}\pi r^3 \sigma_0$

(e) None of above

Quiz

If the insulating plane is very large compared to the Gaussian cylinder, what is the flux through the top and bottom circular area segments assuming the plane bisects the cylinder?

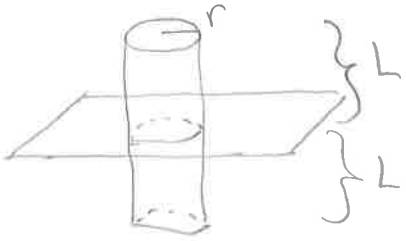
(a) $E\pi r^2$

(b) 0

(c) $\frac{1}{2}E\pi r^2$

(d) $2E\pi r^2$

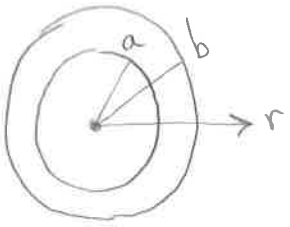
(e) None of above



Quiz

Consider a very long line with uniform charge density λ_0. Surrounding this line is a concentric conducting cylindrical shell with inner radius a and outer radius b. What is the magnitude of the electric field for $r < a$?

Side view



top view

(a) $\frac{\lambda_0}{8\pi\varepsilon_0}\frac{1}{r}$

(b) $\frac{\lambda_0}{4\pi\varepsilon_0}\frac{1}{r}$

(c) $\frac{\lambda_0}{3\pi\varepsilon_0}\frac{1}{r}$

(d) $\frac{\lambda_0}{2\pi\varepsilon_0}\frac{1}{r}$

(e) None of above

Quiz

Consider a nonuniformly charged insulating sphere with volume charge density $\rho(r) = \rho_0 \left(\frac{r}{A}\right)$, where A is the radius of the sphere. How much charge is contained in a Gaussian sphere with radius $r_0 > A$.

(a) $\rho_0 \frac{r_0}{A}$

(b) $\rho_0 \frac{\pi r_0^4}{A}$

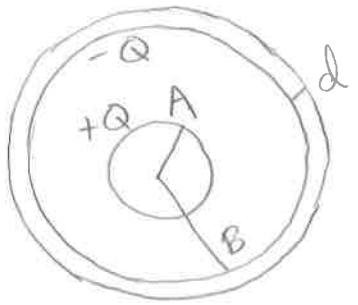
(c) $\frac{4}{3}\pi\rho_0 \frac{r_0^3}{A}$

(d) $\frac{4}{3}\pi\rho_0 \frac{r_0^4}{A}$

(e) None of above

Quiz

Consider a pair of spherical conductors with charge $\pm Q$ that are separated by air. The inner sphere has radius A, while the outer sphere has radius B and thickness d. From Gauss's Law, what is the electric field in the space between the conductors?



(a) $\frac{Q}{4\pi\varepsilon_0}\frac{1}{r}$

(b) $\frac{Q}{4\pi\varepsilon_0}\frac{1}{r^2}$

(c) $\frac{3Q}{4\pi\varepsilon_0}\frac{1}{r}$

(d) $\frac{3Q}{4\pi\varepsilon_0}\frac{1}{r^2}$

(e) None of above

Quiz

What is the potential difference $V(B) - V(0)$?

(a) $\frac{Q}{4\pi\varepsilon_0}\frac{1}{B}$

(b) $-\frac{Q}{4\pi\varepsilon_0}\frac{1}{B}$

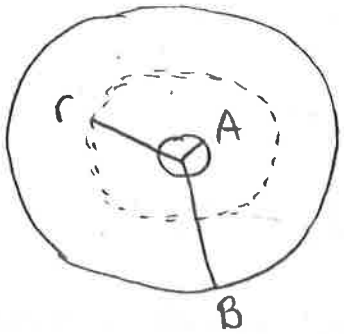
(c) $\frac{Q}{4\pi\varepsilon_0}\left[\frac{1}{A} - \frac{1}{B}\right]$

(d) $\frac{Q}{4\pi\varepsilon_0}\left[\frac{1}{B} - \frac{1}{A}\right]$

(e) None of above

Quiz 9a

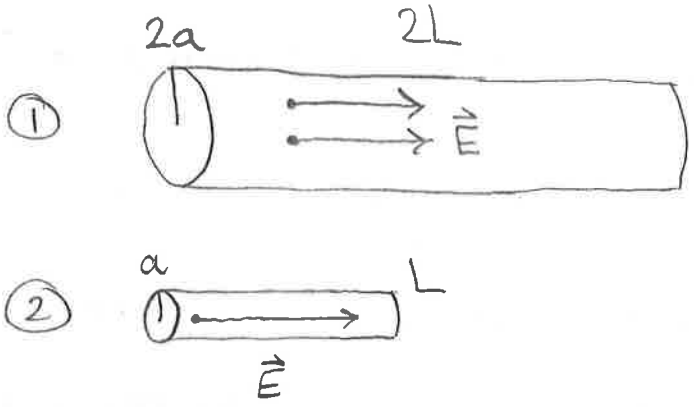
Consider a conducting spherical shell with inner radius A and outer radius B. A battery with voltage V is connected to the inner and outer surfaces of the spherical shell. How does the current i and current density j vary as a function of r?



	i(r)	j(r)
(a)	constant	constant
(b)	constant	increases with r
(c)	constant	decreases with r
(d)	increases with r	constant
(e)	None of above	

Quiz 9b

Consider the two conductors below that have different radii but identical electric fields inside. How does the current density in each compare?



(a) $J_1 = J_2$

(b) $J_1 < J_2$

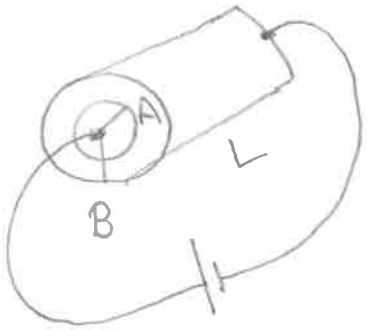
(c) $J_1 > J_2$

(d) Not enough information

(e) None of the above

Quiz

A conducting cylinder with radius A, length L, and resistivity ρ_0 is surrounded by a second conducting cylinder with inner radius A, outer radius B, length L and resistivity ρ_1. If the two ends are connected to a battery of voltage V_0, what current flows through outer conductor?



(a) $\frac{\pi B^2}{\rho L} V_0$

(b) $\frac{\pi A^2}{\rho L} V_0$

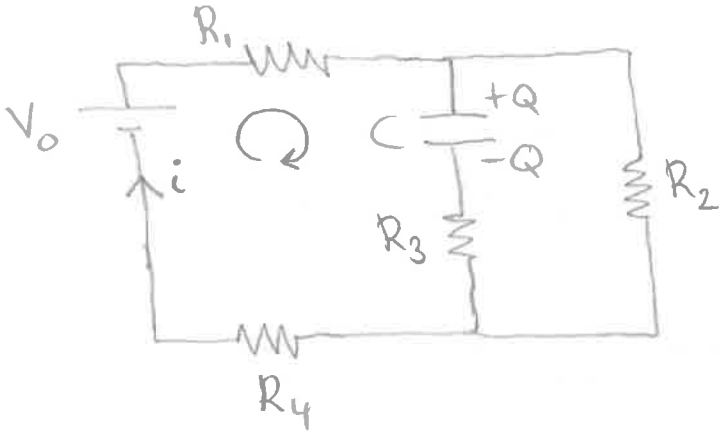
(c) $\frac{\pi (B^2 - A^2)}{\rho L} V_0$

(d) $\frac{\pi (A^2 + B^2)}{\rho L} V_0$

(e) None of above

Quiz

Consider the circuit shown below that has been connected for a long time (the assumed currents and charges are shown but not known). What loop equation could describe the potential difference around the left square of the circuit?



(a) $V_o - iR_1 - iR_3 - iR_4 = 0$

(b) $V_o - iR_1 - iR_3 - iR_4 + \frac{Q}{C} = 0$

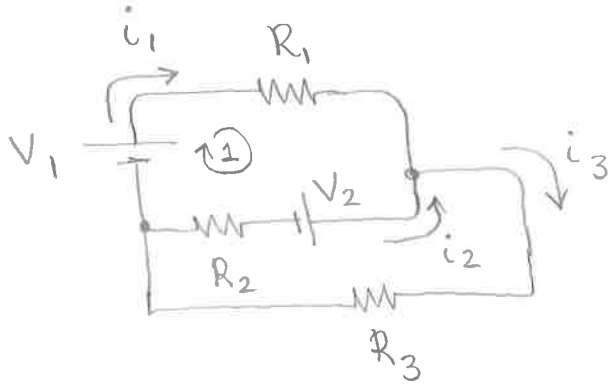
(c) $V_o - iR_1 - iR_3 - iR_4 - \frac{Q}{C} = 0$

(d) $V_o - iR_1 - iR_4 - \frac{Q}{C} = 0$

(e) None of above

Quiz

Consider the circuit diagram shown below. Which of the following is a correct expression for the voltage drops/gains around loop ① ?



(a) $V_1 - i_1R_1 + V_2 - i_2R_2 = 0$

(b) $V_1 - i_1R_1 - V_2 - i_2R_2 = 0$

(c) $V_1 - i_1R_1 + V_2 + i_2R_2 = 0$

(d) $V_1 - i_1R_1 - V_2 + i_2R_2 = 0$

(e) None of above

Quiz

Consider the circuit shown below that has been connected for a very long time. What is the magnitude of the charge on C?

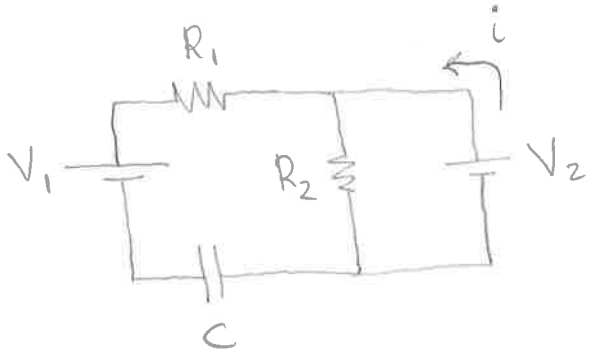
(a) $[V_1 + i(R_1+R_2)]C$

(b) $[V_1 + i(R_1-R_2)]C$

(c) $[V_1 - V_2]C$

(d) $V_2 C$

(e) None of above



$(V_1 > V_2)$