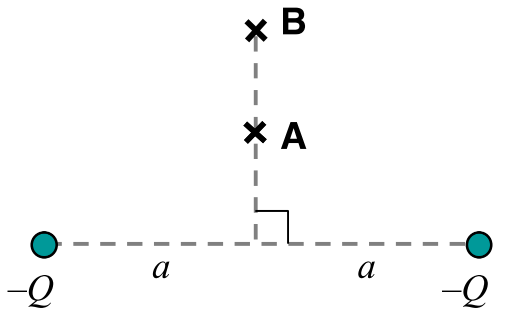
Name: ___________________ Sec. _______ **P212: Quiz 1 Week 4**

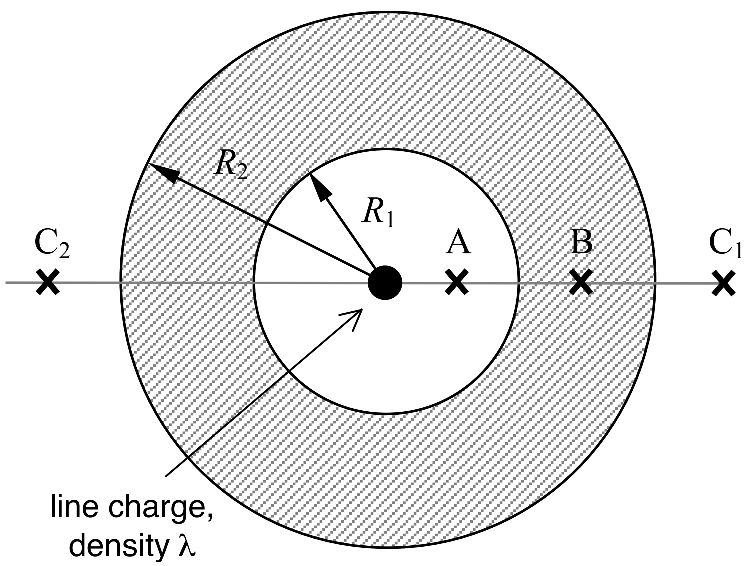
1) Two negative charges $-Q$ of the same magnitude are each located a distance a from the y-axis as shown in the diagram below. What is the sign of the potential difference between points A and B? **[4]**



(a) $V_B - V_A < 0$ (b) $V_B - V_A = 0$ **(c) $V_B - V_A > 0$**

Rubric:
Correct answer (4)

Consider an infinite line, of line charge density λ. Surrounding the line is a conducting, uncharged cylindrical shell of inner radius R_1 and outer radius R_2. Take the electric potential to be **zero** at the **inner surface** of the cylindrical shell.

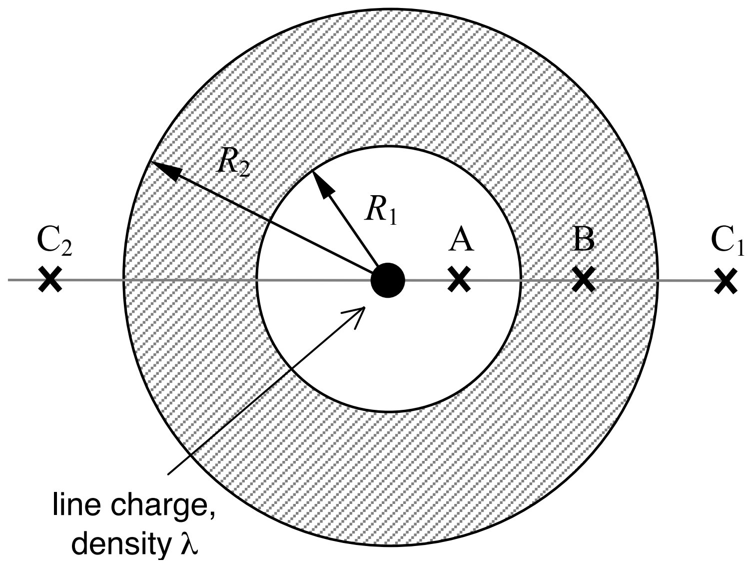


$R_1 = 8$ cm
$R_2 = 16$ cm
$\lambda = -3.5$ C/m
A = 5 cm
B = 12 cm
$C_1 = C_2 = 20$ cm

2) What is the electric potential V_B at point B? **[4]**

In a conductor the potential is constant V(inner surface) = $V_B = 0$

Rubric:
Correct answer (4)



$R_1 = 8$ cm
$R_2 = 16$ cm
$\lambda = -3.5$ C/m
A = 5 cm
B = 12 cm
$C_1 = C_2 = 20$ cm

3) What is the electric potential V_A at point A? **[8]**

$$V_A - V_{R1} = -\int_{R_1}^{A} E dr \rightarrow V_A = -\int_{R_1}^{A} \frac{|\lambda|}{2\pi\epsilon_0 r} dr = \frac{|\lambda|}{2\pi\epsilon_0} \ln\frac{R_1}{A} = -2.96 \cdot 10^{10} V$$

Rubric:
Setup problem, integral, etc (2)
E-field (2)
Sign (2)
Correct value (2)

4) What is the electric potential difference $V_{C1} - V_{C2}$ between points C1 and C2? Provide a brief but clear argument supporting your answer. **[4]**

Since C_1 and C_2 are at the same radius, and V only depends on the radius, the potential at the two points is the same and $V_{C1} - V_{C2} = 0$

Rubric:
Correct answer (2)
Explanation (2)