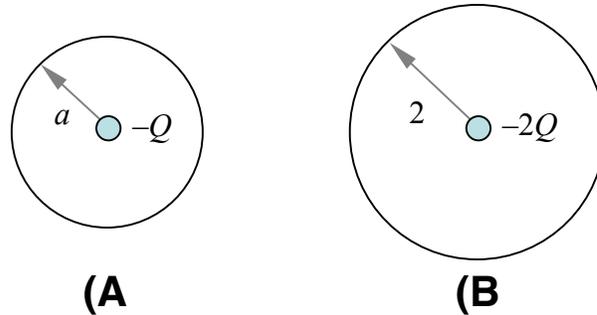
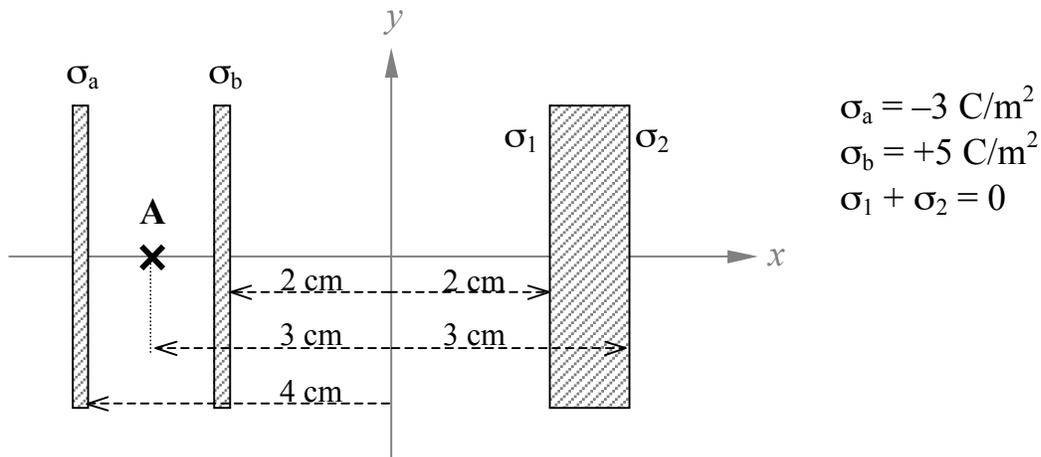


- 1) In figure **A**, a negative charge $-Q$ is located at the center of a sphere of radius a . In figure **B**, a negative charge $-2Q$ is at the center of a sphere of radius $2a$. Compare Φ_A , the flux through the sphere in Figure A, to Φ_B , the flux through the sphere in Figure B. (Remember the sign convention for flux through a closed surface: positive flux points *outwards*.) [4]



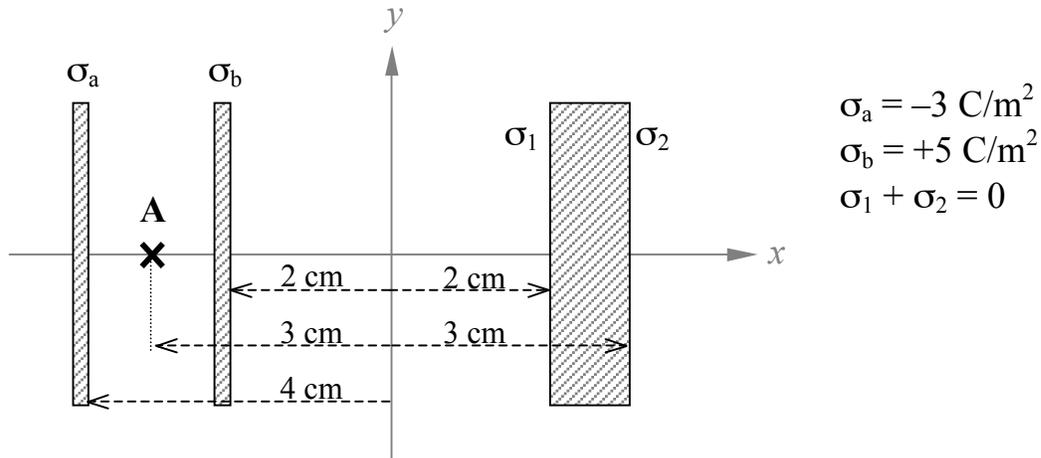
- (a) $\Phi_A < \Phi_B$ (b) $\Phi_A = \Phi_B$ (c) $\Phi_A > \Phi_B$

Consider the three infinite metal slabs shown below. The left and middle slabs are very thin and carry surface charge densities of -3 C/m^2 and $+5 \text{ C/m}^2$ respectively. The right-hand plate has a thickness of 1 cm and carries no net charge.



- 2) What is the electric field \mathbf{E} at the point A due to the thick slab alone? Be sure to indicate both magnitude and direction. [4]

- 3) What is the electric field at point A due to all three slabs? Be sure to give both magnitude and direction. [8]



- 4) What is the sign of σ_2 (the surface charge induced on the right-hand face of the thick slab)? You must supply a reason to receive credit. [4]