

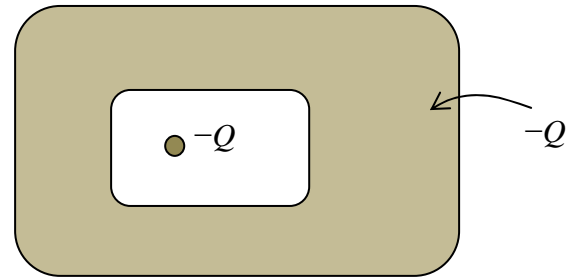
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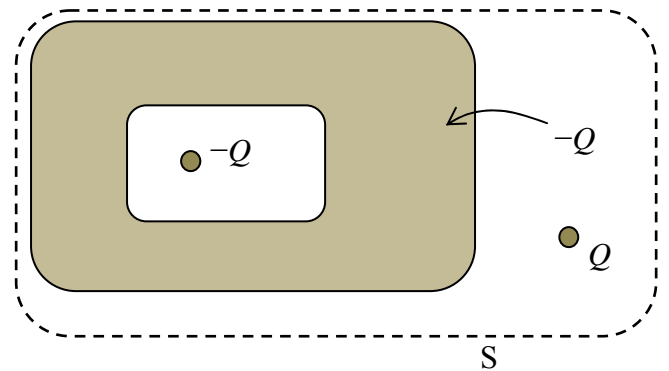
Quiz 4A

Consider a block made of a conducting material that has a cavity inside of it. A charge $-Q$ is inside the cavity, and the block (shaded area) has a net charge of $-Q$.

- a. What is the total charge on the outer surface of the block? Justify your answer.



- b. Now, another charge Q is brought near the block from outside far away. What is the total charge on the outer surface of the block? Justify your answer.



- c. Find the total electric flux through the closed surface S (which encloses the block and the point charge Q).

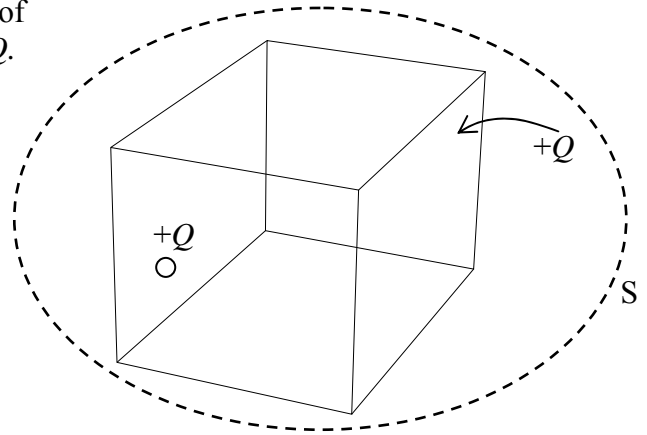
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Quiz 4B

A positive charge $+Q$ is inside a cubic box made of conducting material. The box has a net charge $+Q$.

- a. What is the total charge on the outer surface of the conducting cube?



- b. What is the total electric flux through a closed surface S enclosing the cube?

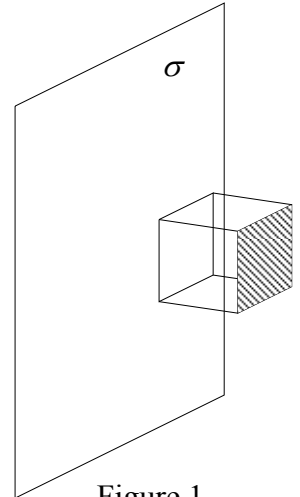
- c. Now the cube is grounded. What is the total charge on the outer surface of the conducting cube?

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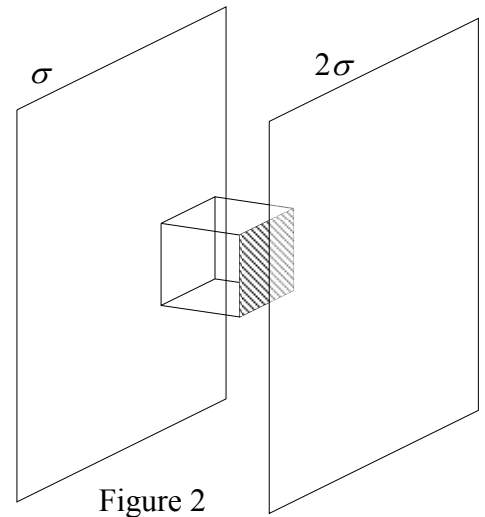
Quiz 4C

Consider a very large non-conducting sheet with uniform surface charge density σ . There is a cube to the right of the sheet with two opposing surfaces parallel to the charged sheet as shown in figure 1. The edge length of the cube is a .



- a. Find the flux through the shaded surface (side parallel to the sheet and far from the sheet).

- b. Now, another uniformly charged non-conducting sheet with surface charge density 2σ is placed to the right of the cube, parallel to the first sheet (figure 2). What is now the flux through the shaded surface?



- c. With the situation described in part b, what is the total flux through the whole cube that is between these two charged sheets?

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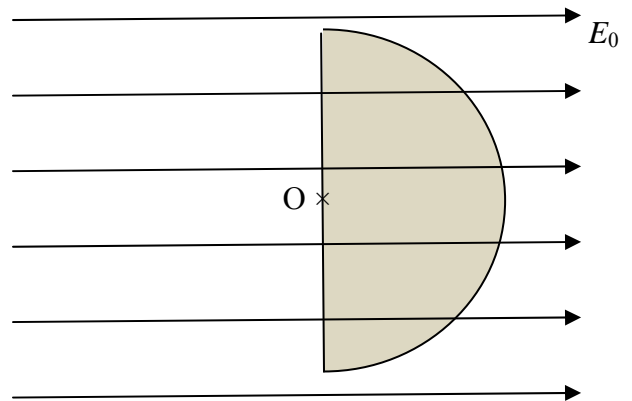
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Quiz 4D

There is a uniform electric field of magnitude E_0 in the positive x direction.

- a. What is the electric flux through a circular surface of radius R whose normal direction is parallel to the electric field?

- b. Now consider a spherical shell of radius R whose center is at the origin. The shell is then cut in two by a blade that runs along the yz plane. The left hemisphere is removed. What is the net electric flux through the right hemisphere? (see figure)



- c. A charge $+Q$ is placed at the origin. What is the net electric flux through the hemisphere described in part b?