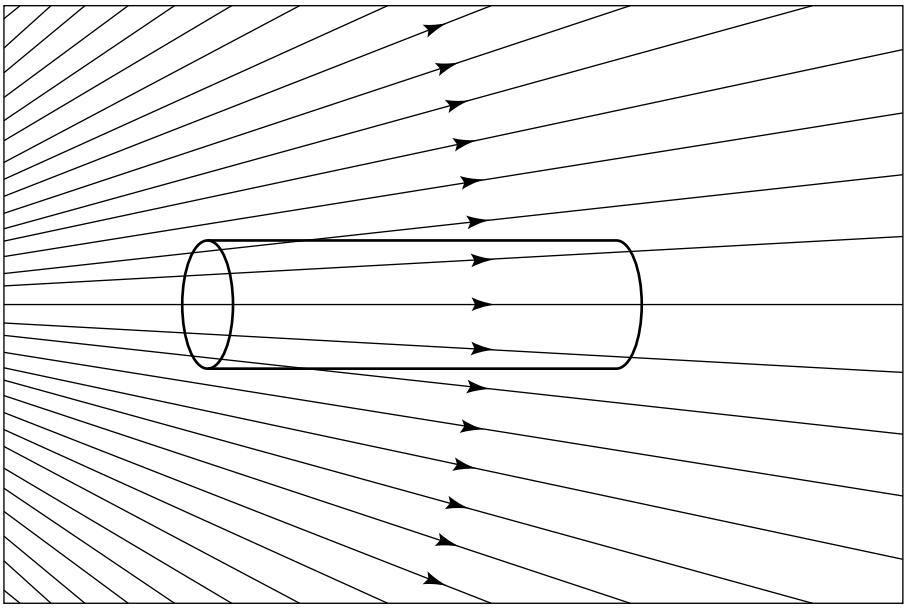
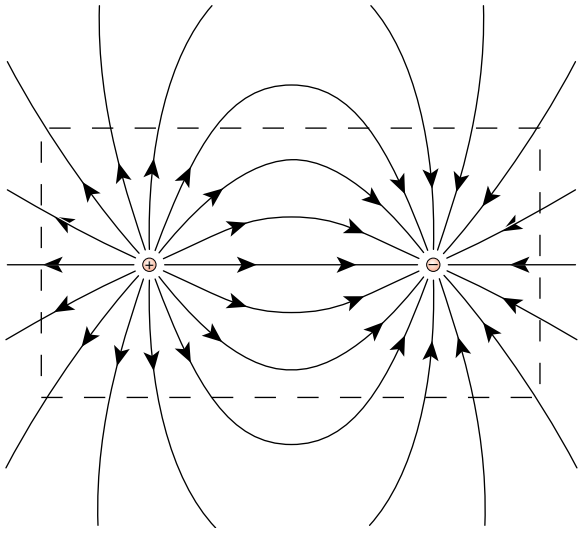
A cylindrical piece of insulating material is placed in an external electric field, as shown. The net electric flux passing through the surface of the cylinder is



1. positive.
2. negative.
3. zero.

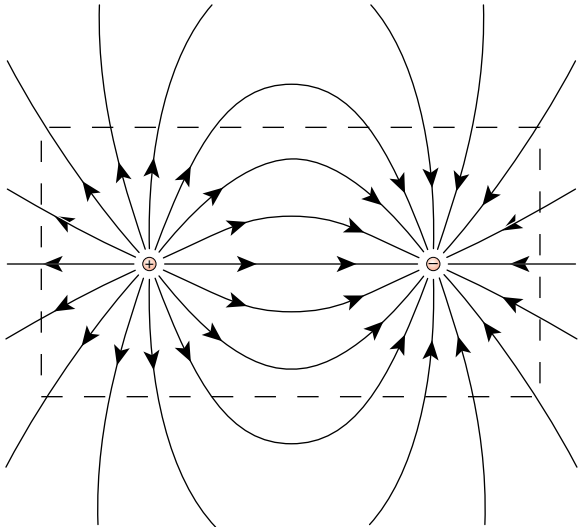
Consider a rectangular Gaussian surface surrounding a dipole that has 16 field lines emanating from its positively charged end.



If you move the Gaussian rectangle around (anywhere in the plane), the field line flux through the rectangle:

1. always remains zero.
2. varies between -32 and +32.
3. varies between -16 and +16.
4. is -16, zero, or 16.
5. Other.

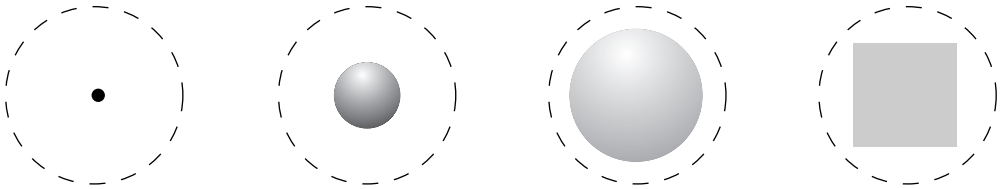
Consider a rectangular Gaussian surface surrounding a dipole as shown below.



If the negative charge is replaced by a positive charge of equal magnitude, the flux through the rectangular surface

1. doubles.
2. becomes zero.
3. becomes nonzero.
4. cannot be determined without knowing more about the charges outside the rectangle.
5. Other.

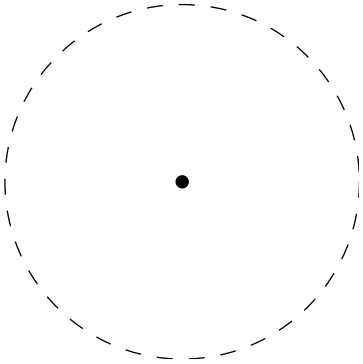
Consider a particle, a metal sphere, a large metal shell, and a plastic cube, all carrying an identical charge $+Q$. Each is surrounded by an identical spherical Gaussian surface.



The field line flux through the Gaussian surface

1. is the same for all four.
2. is largest for the shell.
3. is largest for the cube.
4. depends on how the charge is distributed on the plastic cube.
5. Other.

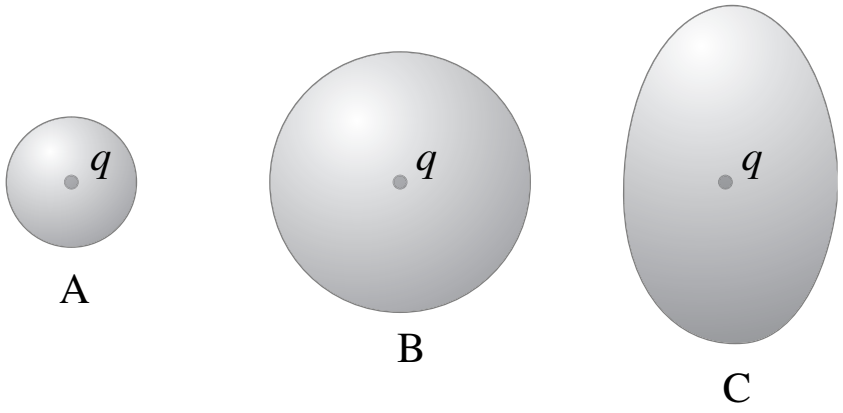
Consider a charged particle at the center of a spherical Gaussian surface.



If the charged particle is moved away from the center of the Gaussian surface, which of the following change?

1. The electric field at the surface and the flux through the surface.
2. Only the electric field at the surface.
3. Only the flux through the surface.
4. Neither one changes.

Consider three Gaussian surfaces enclosing a particle carrying a charge q. Spherical surface B has twice the radius of surface A; surface C has the same surface area as surface B.



Rank the three surface in order of increasing electric flux through them.

1. A < B = C
2. A = B = C
3. A > B = C
4. Can't tell without carrying out the integration over C