1.

lines of charge
⊥ to screen/page

$\vec{E}$ pts away from pos. source charges & towards negative source charges.
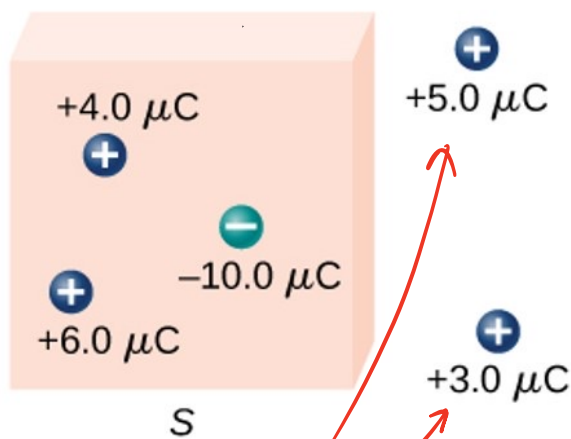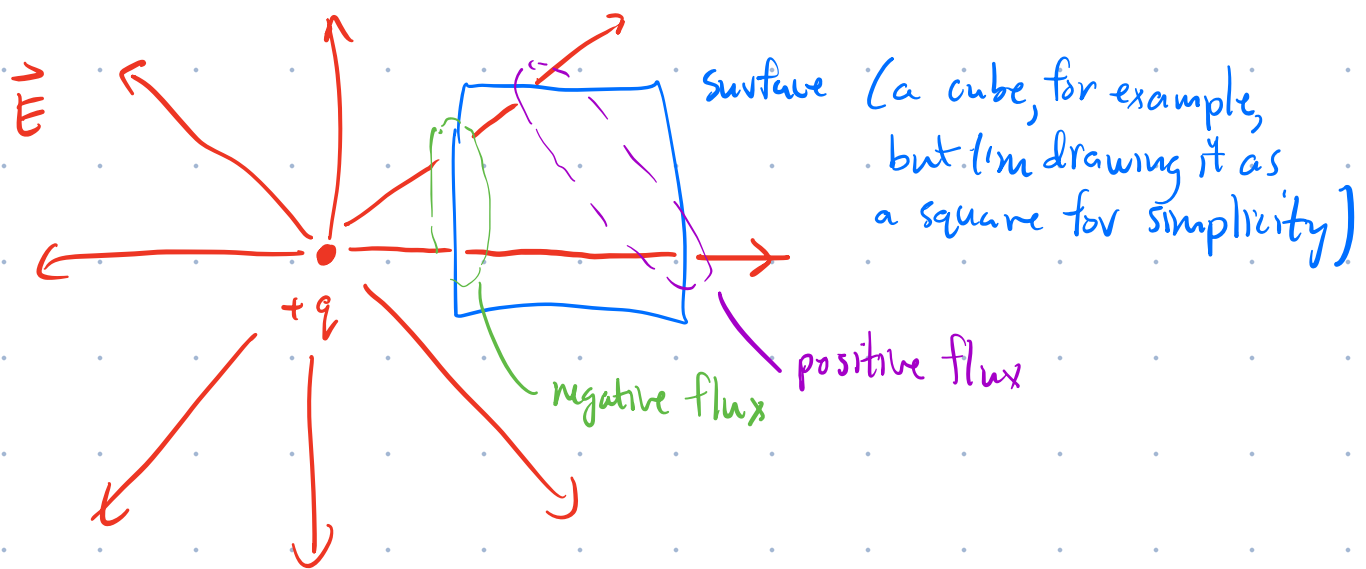
Lines of charge are same dist. from P, ∴ they have the same magnitude.

The vertical components of $\vec{E}_+$ & $\vec{E}_-$ cancel.

The horizontal components add.

∴ $\vec{E}_{net}$ pts horizontally to the right ($\hat{x}$ dir'n)

2. From Gauss's law, know $\Phi_E = \dfrac{q_{encl}}{\varepsilon_0}$

for closed surfaces. Here, q_{encl} is the total charge enclosed by the surface. It does <u>not</u> include the nearby charge that is <u>outside</u> the surface. For these charges, every $\vec{E}$ field line that enters the surface also leaves the surface & therefore contributes no net flux.

$\vec{E}$

$+q$

Surface (a cube, for example, but I'm drawing it as a square for simplicity)

negative flux

positive flux

+4.0 μC

+6.0 μC

−10.0 μC

+5.0 μC

+3.0 μC

S

outside surface S, ∴ they contribute no flux.

In this figure:

$q_{encl} = (4 + 6 - 10)\,\mu C$
$\qquad = 0\,\mu C.$

$\therefore \Phi_E = \dfrac{q_{encl}}{\varepsilon_0} = 0$