

How To Find the Electric Field for Simple Point Charges

If you have to find the electric field \vec{E} rather than the force on a specific charge q , the procedure is very similar to finding the Coulomb force, except that you evaluate the electric field vector instead of the force vector.

1. Identify the spot X where you want to find the field.
2. For each source charge q_i , draw the electric field vector \vec{E}_i at X due to q_i , remembering that direction of \vec{E} is away from positive charges and towards negative ones. When considering the field due to q_i , ignore the presence of any other charges.
3. Find the magnitude of this field at X : $E_i = kq_i/r_i^2$, where r_i is the distance from the source charge to the spot X you're at.
4. Decompose the field into components in your chosen coordinate system.
5. Repeat for every other source charge in the problem.
6. Now add the fields \vec{E}_i vectorially, i.e. add up the \hat{i} , \hat{j} and \hat{k} components. The resultant vector is the total electric field vector.