Electric Potential Energy of Two Point Charges

Consider two different perspectives:

#1a Electric potential when \( q_1 \) is placed: \( V(\vec{r}_2) \div V_2 = k \frac{q_1}{r_{12}} \)

Electric potential energy when \( q_2 \) is placed into potential \( V_2 \): \( U = q_2 V_2 = k \frac{q_1 q_2}{r_{12}} \)

#1b Electric potential when \( q_2 \) is placed: \( V(\vec{r}_1) \div V_1 = k \frac{q_2}{r_{12}} \)

Electric potential energy when \( q_1 \) is placed into potential \( V_1 \): \( U = q_1 V_1 = k \frac{q_1 q_2}{r_{12}} \).

#2 Electric potential energy of \( q_1 \) and \( q_2 \):

\[
U = \frac{1}{2} \sum_{i=1}^{2} q_i V_i,
\]

where \( V_1 = k \frac{q_2}{r_{12}} \), \( V_2 = k \frac{q_1}{r_{12}} \).