Conductors

Because of the symmetry $P_{11}=P_{22}=P_{33}\equiv A$, $P_{12}=P_{13}=P_{23}\equiv B$.
One has at every step

$$\phi_1'=P_{11}q_1'+P_{12}q_2'+P_{13}q_3'$$
$$=Aq_1'+B(q_2'+q_3')$$
$$\phi_2'=Aq_2'+B(q_1'+q_3')$$
$$\phi_3'=Aq_3'+B(q_1'+q_2')$$

First step: $\phi_1=\phi_0$, $q_1'=q_1$, $\phi_2=Bq_1$, $\phi_3=Bq_1$, where ϕ_0 is the potential of the distant conductor. Since $q_2'=q_3'=0$ one has $\phi_1=\phi_0=Aq_1$. Second step: $\phi_2=\phi_0$, $q_1'=q_1$ (the charge remains on the conductor after disconnecting it from the distant one), $q_2'=q_2$.
At this step

$$\phi_2=\phi_0=Aq_2+Bq_1$$

Third step similarly:

$$\phi_3=\phi_0=Aq_3+B(q_1+q_2)$$

One has

$$Aq_1=Aq_2+Bq_1$$
$$Aq_1=Aq_3+B(q_1+q_2)$$
$$B=A(1-q_2/q_1)$$
$$q_3=q_1+\frac{q_2^2-q_1^2}{q_1}=\frac{q_2^2}{q_1}$$