Answer on Question #51172-Physics-Electromagnetism

Let the charges Q and −Q be placed alternatively along the x-axis at positions x = 1 m, x = 3 m, x = 6 m and x = 9 m. What is the electric field at x = 0 due to these charges?

Solution

According to the principle of superposition the electric field at x = 0 due to these charges is

$$E = k \sum \frac{q_i}{r^2} = k \left(\frac{Q}{(1-0)^2} - \frac{Q}{(3-0)^2} + \frac{Q}{(6-0)^2} - \frac{Q}{(9-0)^2} \right) = kQ \left(1 - \frac{1}{9} + \frac{1}{36} - \frac{1}{81} \right) = \frac{293}{324} kQ.$$

The electric field at x = 0 has directed negatively.