Answer to Question #51117 – Physics – Electric – Circuits

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

$E = k\frac{q}{r^2}; \qquad k = \frac{1}{4\pi\epsilon_0}\ \frac{N\cdot m^2}{C^2};$

$x = 1: \quad E_1 = Qk;$

$x = 3: \quad E_2 = -\frac{Qk}{9};$

$x = 6: \quad E_3 = \frac{Qk}{36};$

$x = 9: \quad E_4 = -\frac{Qk}{81};$

$E = \sum_{i=0}^{4} \overline{E_i} = Qk - \frac{Qk}{9} + \frac{Qk}{36} - \frac{Qk}{81} = \frac{293}{324}Qk = \frac{293\cdot Q}{1296\cdot\pi\epsilon_0} = Q\cdot 8127631710\ V;$

Answer: $E = Q\cdot 8127631710\ V$**;**