PHYS UN1602 Recitation Week 1 Worksheet

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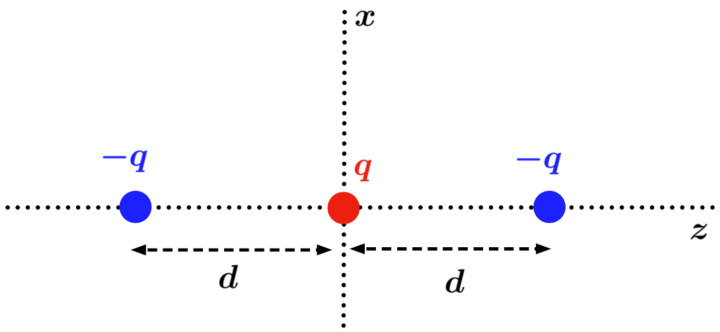
Problem 1

Three charged particles with charges $\{-q, q, -q\}$ are placed on the z axis at $z = \{-d, 0, d\}$, as shown in the diagram below.



a) List the symmetries associated with this arrangement of charges.

b) Calculate the electric field on the x axis, $\vec{E}(x, 0, 0)$.

c) Evaluate the electric potential on the x axis, $\phi(x, 0, 0)$.

d) Show that $E_x = -\frac{\partial \phi}{\partial x}$

e) What is $\vec{E}(x, 0, 0)$ in the limit $x \gg d$ to zeroth order in d/x?

f) What is $\phi(x, 0, 0)$ in the limit $x \gg d$ to zeroth order in d/x?