Applied Physics (NS-1001) **Quiz # 5** **Fall 2025**
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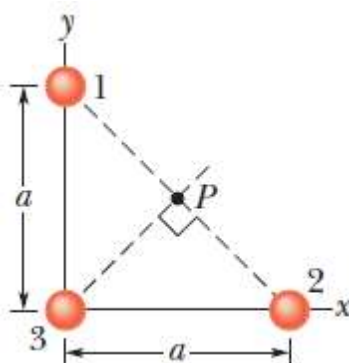
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Section: BCS-A CLO5 **Date: 19-11-2025** .

Q.1: In Figure, the three particles are fixed in place and have charges $q_1 = q_2 = +e$ and $q_3 = +2e$. Distance a = 6.00 μm. What are the (a) magnitude and (b) direction of the net electric field at point P due to the particles? **(10)**

Solution:

15. By symmetry we see that the contributions from the two charges $q_1 = q_2 = +e$ cancel each other, and we simply use Eq. 22-3 to compute magnitude of the field due to $q_3 = +2e$.

(a) The magnitude of the net electric field is

$$|\vec{E}_{net}| = \frac{1}{4\pi\varepsilon_0}\frac{2e}{r^2} = \frac{1}{4\pi\varepsilon_0}\frac{2e}{(a/\sqrt{2})^2} = \frac{1}{4\pi\varepsilon_0}\frac{4e}{a^2}$$

$$= (8.99\times10^9\,\text{N·m}^2/\text{C}^2)\frac{4(1.60\times10^{-19}\,\text{C})}{(6.00\times10^{-6}\,\text{m})^2} = 160\,\text{N/C}.$$

(b) This field points at 45.0°, counterclockwise from the x axis.