Three charges are located at the corners of a square as shown in the figure.

(a) In unit vector notation, what is $E$ at point $P$?

$$E = \frac{1}{4\pi\varepsilon_0} \left[ \left( \frac{2Q}{d^2} + \frac{3Q_z}{2d^2} \right) \hat{i} + \left( -\frac{4Q_x}{d^2} + \frac{3Q_y}{2d^2 \sqrt{2}} \right) \hat{j} \right]$$

(b) If a charge $+5Q$ is placed at $P$, what is the force on it in unit vector notation?

$$\mathbf{F} = 5Q \mathbf{E} = \frac{1}{4\pi\varepsilon_0} \frac{5Q^2}{d^2} \left[ (2 + \frac{3}{2\sqrt{2}}) \hat{i} + (4 + \frac{3}{2\sqrt{2}}) \hat{j} \right]$$