Exam 1 (Problem 1, alternative solution)

$$\vec{F} = \frac{qq_1}{4\pi\varepsilon_0}\frac{\vec{r}}{\sqrt{3}} - mg\vec{e}_y + qE\vec{e}_x$$

$$\Rightarrow F_x = \frac{qq_1}{4\pi\varepsilon_0}\frac{a}{(a^2+b^2)^{3/2}} + qE$$

$$F_y = \frac{qq_1}{4\pi\varepsilon_0}\frac{b}{(a^2+b^2)^{3/2}} - mg$$

$$\vec{F} \overset{!}{=} 0 \Rightarrow$$

$$\frac{qq_1}{4\pi\varepsilon_0}\frac{b}{(a^2+b^2)^{3/2}} = mg$$

$$\Rightarrow E = -\frac{q_1 a}{4\pi\varepsilon_0(a^2+b^2)^{3/2}} \overset{①}{=} -\frac{mga}{bq} \overset{②}{}$$

You deserve also full credit, if you use the solution in this way. ① is not sufficient, since a solution is only complete, if the answer is given in terms of known quantities, and ① contains the still known charge, q_1. However, if you did not solve for q_1 explicitly and got out ② completely right, you deserve full credit!