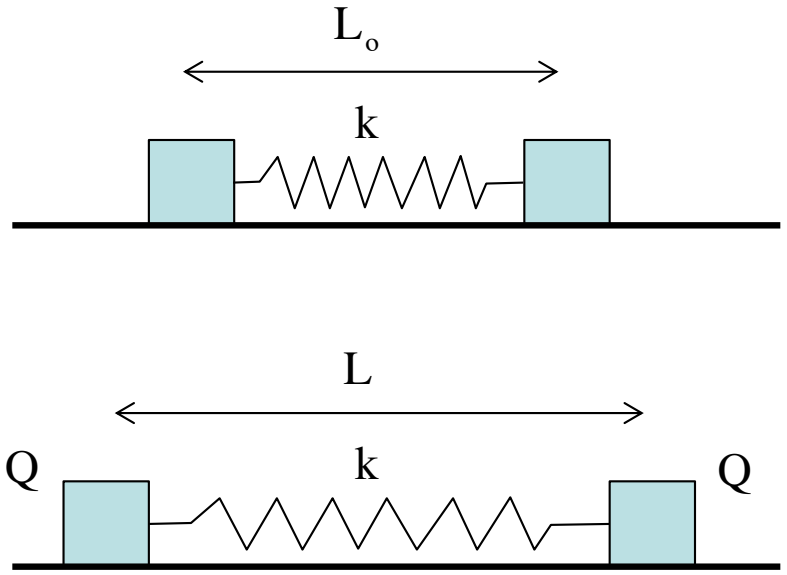
Problem 15.14

If k=100 nt/m and the initial L is .4 m, what must Q be if the final L is .5 m?



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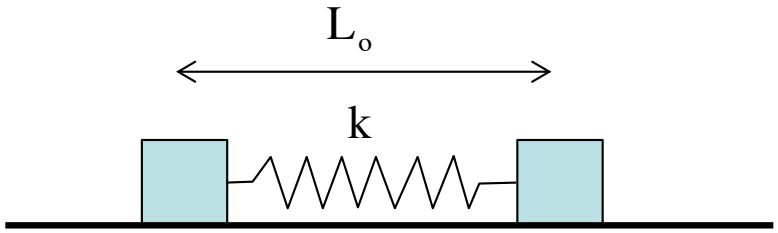

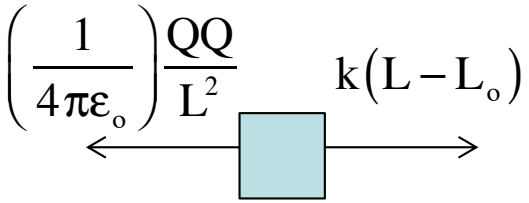

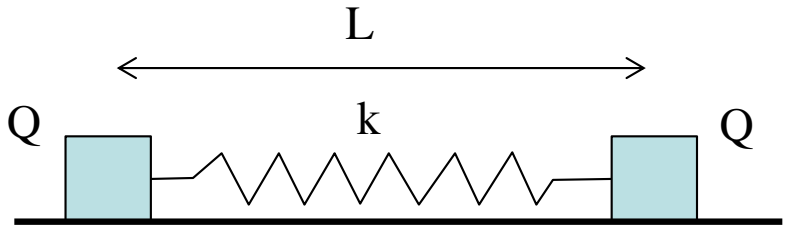

$$\underline{\textstyle\sum F_x:}$$

$$-\left(\frac{1}{4\pi\varepsilon_o}\right)\frac{Q^2}{L^2}+k(L-L_o)=m\cancel{a}^{=0}$$

$$\Rightarrow \quad \left(9x10^9\ \text{nt}\bullet\text{m}^2/\text{C}^2\right)\frac{Q^2}{(.5\ \text{m})^2}=(100\ \text{nt/m})(.5\ -\ .4)$$

$$\Rightarrow \quad Q=5.27x10^{-6}\ \text{C}$$