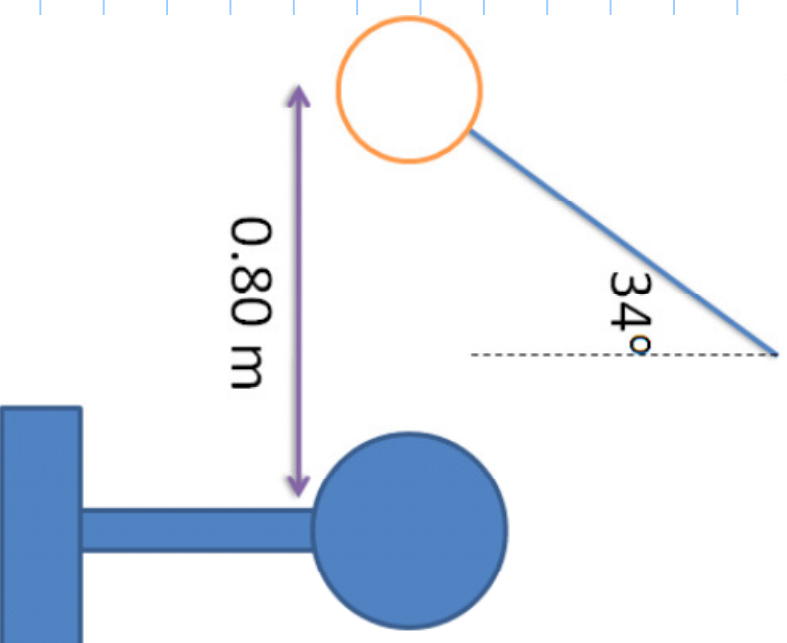
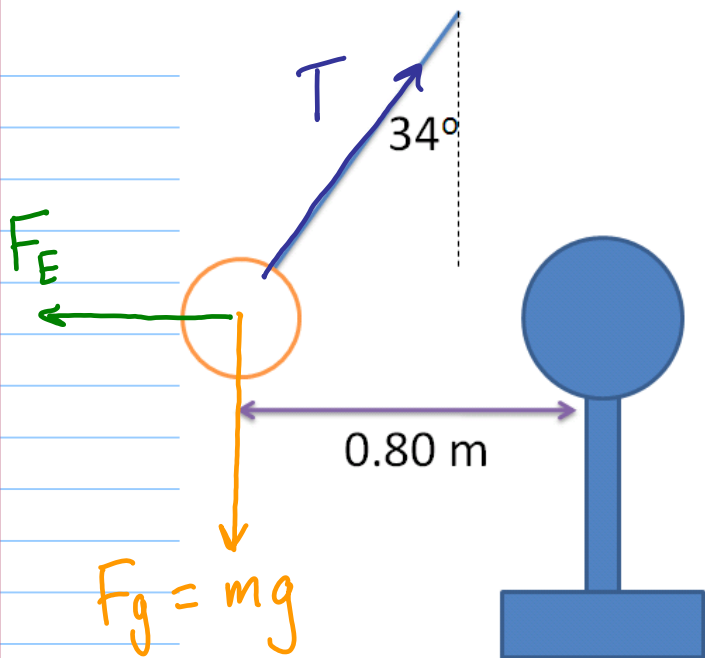
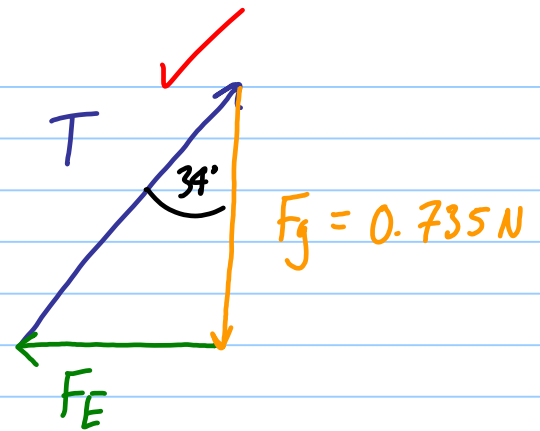


A 75 g sphere with a charge of $4.0 \mu\text{C}$ is suspended from the ceiling by a rope. When a fixed charged sphere is placed near it the suspended sphere is repelled as shown. What is the charge on the fixed sphere?





$$\begin{aligned}
 F_g &= mg \\
 &= (0.075 \text{ kg})(9.8 \text{ m/s}^2) \\
 &= 0.735 \text{ N} \quad \checkmark
 \end{aligned}$$



$$\tan 34^\circ = \frac{F_E}{F_g}$$

$$\begin{aligned}
 F_E &= F_g \tan 34^\circ = (0.735) \tan 34^\circ \\
 &= 0.4957 \text{ N} \quad \checkmark
 \end{aligned}$$

$$F_E = \frac{k q_1 q_2}{r^2} \quad \checkmark$$

$$\begin{aligned}
 q_1 &= \frac{F_E r^2}{k q_2} \\
 &= \frac{(0.4957)(0.80)^2}{(9 \times 10^9)(4 \times 10^{-6})} = \underline{8.8 \times 10^{-6} \text{ C}} \quad \checkmark
 \end{aligned}$$